

# Swift M10T-MCS Series Microscope Use and Care Manual

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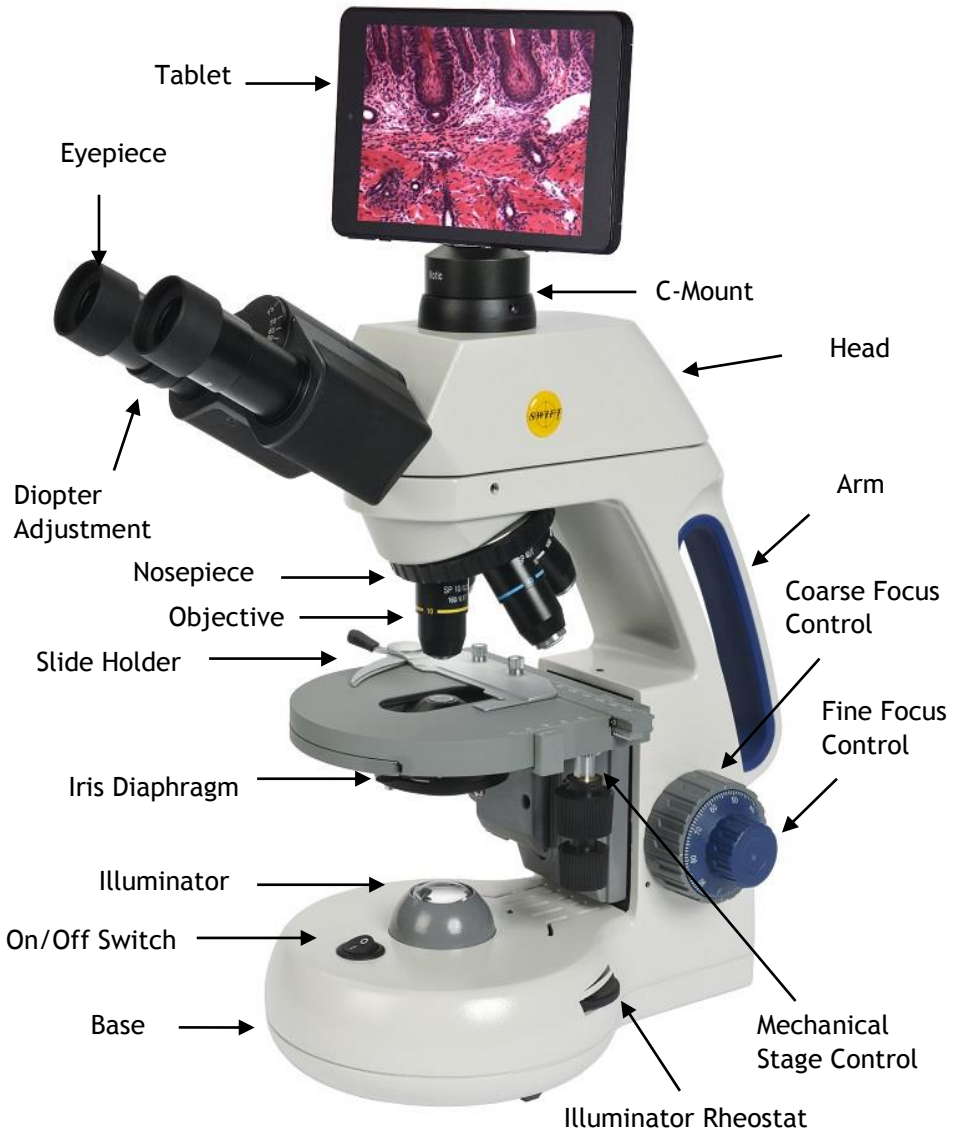
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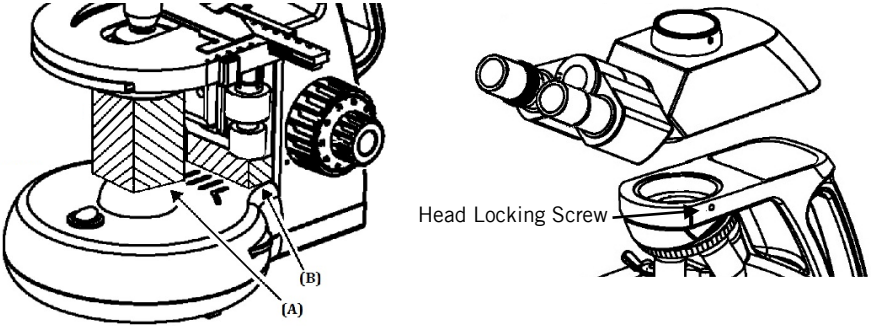
## SWIFT M10T-MCS SERIES (Digital)

Your Swift M10 microscope is an instrument of precision, both optically and mechanically and will last a lifetime with a minimum amount of maintenance. It is built to the highest and most rigid optical and mechanical standards and has many built-in features to insure durability and high performance in the hands of both student and professional users.

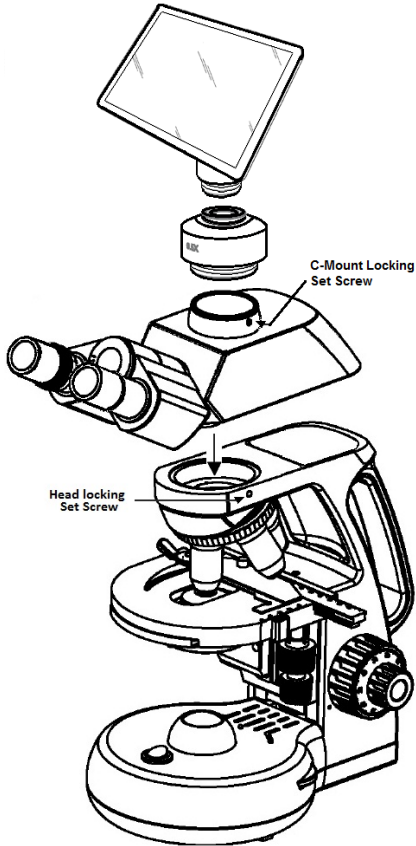


## UNPACKING THE SWIFT M10T-MCS SERIES MICROSCOPE

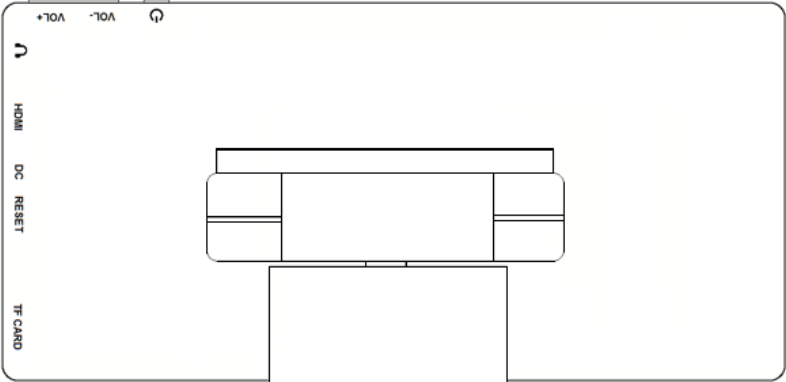
1. Remove head and body from styrofoam packaging.
2. Remove both shipping blocks from the body of the microscope - A and B blocks
3. Secure the head to the body of the microscope with the head locking screw as pictured below.



4. Secure tablet to C-Mount 0.5X adapter and lock into T-Mount port.



DETAILED TABLET SCREEN ATTACHMENT



← Tablet Attachment

← C-Ring

← C-Mount Attachment

← C-Mount Locking Set Screw

## COMPONENTS OF THE MICROSCOPE

**ARM** – the vertical column (attached to the base) which supports the stage, and contains the coarse and fine adjusting knobs and mechanism.

**BASE** – the housing and platform of the instrument to which the arm is attached. The base stands on rubber feet and contains the illuminator assembly.

**COARSE FOCUS** – the larger, outside knob of the focus control which facilitates rapid and heavy movement of the focusing mechanism. In order to prevent gear damage, the focus control is equipped with an upper limit stopper that protects the high magnification objectives and slides.

**COAXIAL CONTROLS** – the focusing mechanism moves the stage up and down to bring the specimen into focus. The coaxial focusing system combines both the coarse and fine focus into one knob located on both sides of the microscope. The control is designed for a continuous operation over the range of the stage movement. The system is also furnished with a tension control to prevent “stage drift”.

**CONDENSER** – the function of the condenser is to provide full illumination to the specimen plane and to enhance the resolution and contrast of the object being viewed. The standard condenser of the M10 Series has a numerical aperture of 1.25 with filter carrier and iris diaphragm. It is mounted in a sub-stage focusing assembly that can be raised or lowered for precise light control.

**DIOPTR ADJUSTMENT** – located on the left eyepiece of the binocular head and is designed to help compensate the difference between the user’s eyes.

**EYEPIECES** – the upper optical element that further magnifies the primary image of the specimen and brings the light rays in focus at the eye point.

**FINE FOCUS** – the smaller inner knobs of the focus control which allows for slow and subtle focusing movement to bring the specimen into sharp focus.

**HEAD** – the upper portion of the microscope which contains the refracting prisms and the eyepiece tubes which hold the eyepieces.

**ILLUMINATION** – the built-in light source which provides the optical system with light. The M10 Series uses a variable intensity 3 volt Light Emitting Diode (LED).

**IRIS DIAPHRAGM** – a multi-leaf round shaped device which is controlled by a lever. It is similar to a camera shutter, and is installed under the condenser. By moving the lever back and forth, the iris diaphragm opens and closes, increasing and decreasing the contrast of the specimen. If the image is “washed out” the iris diaphragm is opened too wide. If the image is too dark the iris is not open wide enough.

**NOSEPIECE** – the revolving turret that holds the objective lenses, permitting changes in magnification by rotating different powered objective lenses into the optical path. The nosepiece must “click” into place for the objectives to be in proper alignment.

**OBJECTIVES** – the optical systems which magnify the primary image of the instrument. Magnifications are typically 4X, 10X, 40X and 100X.

**PHASE CONTRAST** – The phase contrast microscope reveals fine detail in transparent objects which possess very little contrast. Unstained living organisms

and cells can be studied without destroying the specimen or changing its composition by using fixing and staining reagents. Before the advent of phase contrast such specimens could only be examined in transmitted light by closing down the substage condenser diaphragm to a small aperture. The narrow cone of illumination produced diffraction with destruction of detail.

**SIEDENTOPF** – a binocular head design where the interpupillary adjustment (increasing or decreasing the distance between the eyepieces) is achieved by twisting the eyepiece tubes in an up and down arc motion similar to binoculars.

**STAGE** – the table of the microscope where the slide is placed for viewing. This component moves upward and downward when the focusing knobs are turned. The stage of the M10 has a built-in mechanical stage with a below-stage ergonomic “X” and “Y” axis controls. A finger clip holds the slide securely and is designed to be a slow return holder to provide protection to the specimen.

## IMPORTANT TERMINOLOGY

**“COATED” LENS** – in attempting to transmit light through glass, much of the light is lost through reflection. Coating a lens increases the light transmission by reducing or eliminating reflection, thus allowing more light to pass through.

**COMPOUND MICROSCOPE** – a microscope having a primary magnifier (the objective) and a second (the eyepiece) to both conduct light, amplify magnification and convert the image into a field of view easily seen by the human eye.

**COVER GLASS** – thin glass cut in circles, rectangles, or squares, for covering the specimen (usually a thickness of 0.15 to 0.17mm). The majority of specimens should be protected by a cover glass, and must be covered when using 40XR or 100XR objectives.

**DEPTH OF FOCUS** – the ability of a lens to furnish a distinct image above and below the focal plane. Depth of focus decreases with the increase of numerical aperture or with the increase of magnification.

**DIN** – (Deutsche Industrial Normen *originally Deutsches Institut für Normung*). A German standard for the manufacturing of microscope lenses. DIN lenses will be interchangeable from one DIN microscope to another.

**EYE POINT or EYE RELIEF** – the distance from the eye lens of the eyepiece to your eye where a full field of view is seen.

**FIELD OF VIEW** – the area of the object that is seen when the image is observed. It may range in diameter from several millimeters to less than 0.1mm.

**FOCAL LENGTH** – parallel rays of light after refraction through a lens will be brought to a focus at the focal point. The distance from the optical center of the lens to the focal point is the focal length.

**NUMERICAL APERTURE (NA)** – a measure of an objective’s light gathering capabilities. The concept may be compared to the F-value in photographic lenses. Generally speaking, N.A. values of less than 1.00 are “Dry” objectives. Values of 1.00 or greater require oil as a medium. Please note that condensers are part of the optical system and are also assigned an N.A. value. That value must be at least as high as that of the highest objective used.

**PARFOCAL** – a term applied to objectives and eyepieces when practically no change in focus is needed when changing objectives. The objectives on your microscope are parfocalized at the factory so that only a slight adjustment of the fine focus knob is needed to maintain focus when switching magnification.

**RESOLUTION or RESOLVING POWER** – the ability of a lens to define the details of the specimen at a maximum magnification. This is governed by the NA (Numerical Aperture) of the lens. For example, a 40X objective with NA 0.65 has a maximum resolving power of 650X, equal to 1000 times the NA. This rule of  $NA \times 1000$  is true of all achromatic objectives.

**WORKING DISTANCE** – the distance from the lens of the objective to the cover slip on the slide, when the specimen is in focus.

### TABLET ACCESSORIES



HDMICable	This cable will enable you to connect to an HDMI ready device, for view your table on a larger format. The displayed image will replicate the displayed image of the tablet.
Power Adapter	This 5V DC power adapter is for charging your tablet's battery. This charger maybe left plugged in.
Calibration Slide	This slide will enable you to calibrate your tablet to your microscope, for accurate measurements.
C-Ring	This ring is can be used between the camera and c-mount to achieve par-focus. Only used if using another manufactures microscope and C-mount.
4GB Micro-SD	This storage card can be used with your tablet to store images and then transfer them to your computer. This card is provided as a courtesy and cannot be replaced.

## USING YOUR MICROSCOPE

Once you have learned the terminology and purpose of each component of the microscope, use of the microscope is simple. By following these steps, you will be able to begin studying the specimen quickly and easily.

1. Open the slide holder of the mechanical stage and carefully place the slide against the fixed side and back edge of the mechanical stage. Now slowly release the slide holder lever to hold the slide in place.
2. Align the specimen under the objective lens by using the adjustment knobs under the mechanical stage. The bottom knob moves the slide from right/left while the top knob adjusts the slide from front/back. These knobs allow for precise movement and scanning of the slide.
3. Rotate the nosepiece to place the lowest power objective (4XD) over the specimen. Be sure the objective "clicks" into position.
4. Adjust the interpupillary distance of the Siedentopf binocular head for a comfortable view. Align the eyepiece tubes of the binocular head to create one perfect circle, by moving the eyepiece tubes in an arc motion.
5. While viewing through the eyepiece, rotate the coarse focus knob to bring the specimen into focus. This should be done slowly and carefully.
6. To adjust the contrast of the specimen, open the iris diaphragm to its largest aperture. If additional contrast is required to permit accurate viewing of the specimen, the diaphragm should be slowly closed until the details of the specimen are sharply defined. Be careful not to close the aperture too much. Although you may be achieving a higher contrast, the fine structure of the image may be destroyed. Reducing the aperture increases the contrast and depth of focus, but it also reduces resolution and introduces diffraction. The aperture must be adjusted for each objective.

NA 0.25 for 10XD

NA 0.65 for 40XRD

NA 1.25 for 100XRD

The iris diaphragm is not intended to control the brightness of the illumination, but induce contrast of the specimen by diffracting light rays.

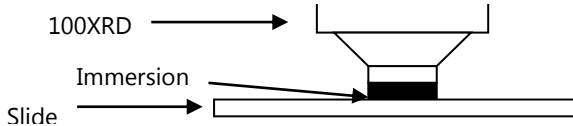
7. Use the fine focus control to complete the focus and produce the sharpest image.
8. For additional clarity, use the left eye diopter adjustment to correct the differences between the user's eyes. Set the adjustable left eye diopter at zero. Then focus with the coaxial focusing knob, using your right eye only (close your left eye). Now using your left eye only, adjust the diopter ring until a clear image is seen (close your right eye). The diopter adjustment is now set to the user's eyes and will not need to be adjusted again until a different user uses the microscope.
9. Now you can rotate the nosepiece to higher magnification objectives. The objectives are parfocalized so that once the lowest objective (4XD) is focused, only a slight turn of the fine focusing knob is required when changing to 10XD, 40XRD and 100XRD objectives.



## Oil Immersion

It is desirable to use immersion oil with the 100XR objective. Oil generates a fine resolution and brightness of the image viewed through the microscope. Drop a tiny amount of oil (1 drop) onto the slide prior to focusing with the 100XR objective (between the slide and the objective tip). It is essential to thoroughly clean the objective tip after use. Please contact Swift Optical or your authorized Swift dealer for the appropriate immersion oil to use.

**IMPORTANT:** The focal distance of the 100XR and 40XR objective to the slide surface is very close and although the 40XR objective is sealed to prevent immersion oil contamination, it is a good practice to avoid dragging the 40XR objective through an oiled slide.



## PHASE CONTRAST – MP MODELS ONLY

The phase contrast microscope reveals fine detail in transparent objects which possess very little contrast. Unstained living organisms and cells can be studied without danger of artifacts produced by killing, fixing or staining reagents. Before the advent of phase contrast such specimens could only be examined in transmitted light by closing down the sub-stage condenser diaphragm to a small aperture. The narrow cone of illumination produced diffraction with destruction of detail. The M10 can be outfitted with a multi-phase system (MA10050) that includes a set of Plan Phase objectives and a special phase condenser carousel. Please refer to the detailed instruction sheet enclosed with each phase kit for proper use.

**Bright Field** is defined as: *“a type of light microscopy that produces a dark image against a brighter background; commonly used for the visualization of stained cells.”* To start, you will need to make sure the condenser is in the highest position. Use of the iris diaphragm is highly recommended to aid in adding contrast. Rotate the condenser disk to the **BF** designation.



**4x, 10x, 20x (optional), 40x Objectives:** Adjust focus and iris as normal.

**100x Objective:** Adjust and focus as normal. It is highly recommended that immersion oil be used on the surface of the slide

**Dark Field** is defined as *“an illumination technique that makes the specimen appear luminous against a background of little or no light.”* This discipline requires a strong and wide arc of transmitted light. Swift microscopes fitted for phase condensers have high-output halogen or LED illumination, but their characteristic arcs of light may require some experimentation to achieve the desired effect. The iris must be wide open to achieve this effect and the condenser

must be in the highest position. Only the 4x, 10x, 20x (optional) and 40x produce Dark Field. Rotate the disc to the **DF** designation.



**4x, 10x, 20x (optional), 40x Objectives:** Adjust and focus as normal. Iris must be fully opened.

**Phase Contrast** is defined as *“an optical technique used to better view the structure of transparent objects whose differences in thickness result in a difference in the phase of the transmitted light.”* This is also referred to as “optical staining”. The condenser should be at the highest position and the iris fully open. In addition, it will be necessary for the phase contrast to add a clear green filter. The filter optically stains the specimen allowing structures that are now seen in phase contrast to be further enhanced. Place the green filter in the swing-out filter carrier.



**Please note:** For models that have LED illumination, an additional swing-out filter carrier is provided. LED illumination provides a very white light that needs to be softened with a neutral diffusing filter when using the 10X objective. Place the neutral diffusing filter in the secondary filter carrier.

Rotate the disc to the desired phase magnification (10, 20/40, or 100) to match the objective you are using. (Please note: the 4x objective included with the system is **not** phase)

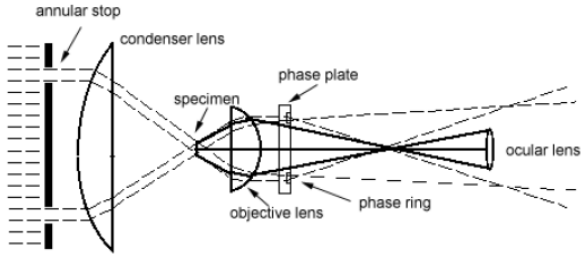


**10x, 20x (optional), 40x Objectives:** Adjust and focus as normal. Iris must be fully opened

**100x Objective:** Make sure the iris is fully open and the condenser is at the highest position. The green filter may or may not be used, depending on the desired result upon evaluation of highly magnified specimens. It is highly recommended that proper immersion oil be used on the surface of the slide. Use of a dry P100X phase objective may not produce the desired results. Please be sure to clean the

oil from the lens surfaces when you are finished. Please consult your Swift Use and Care manual for proper objective cleaning and care instructions

**Aligning the Multi Phase System:** As mentioned at the beginning of these instructions, this system has been calibrated by Swift technicians at the factory before shipment. This calibration consists of centering the condenser holder and aligning the annuli. These annuli, also called annular stops, are inside the condenser and are specific for each of the phase magnifications. These annuli must be aligned with the corresponding phase rings inside each phase objective (10X, 20X/40X, 100X) in order for the effect to occur.



**Prior to aligning the annuli, it is important to establish a focus baseline.** Begin by rotating the condenser control knob to move the phase condenser to its highest point. Rotate the phase turret control disc to the Bright Field (BF) setting. (Ensure that the disc “clicks” into position). Rotate the 10x phase objective into the optical path. Place a standard prepared specimen slide (cover slip facing upwards) on the stage. Use the microscope focus controls to bring the specimen into sharp focus. Remove the specimen slide from the stage. ***Once you have this slide in focus, do not move or adjust the focus controls.*** You have established the range in which you will be working and this range needs to be maintained.

**Alignment of the Phase Annulus:** To align each annulus, begin by removing the eyepiece from the eyepiece tube that does **not** have the diopter adjustment (the right eyepiece). (Please note: Should the eyepiece be locked onto the microscope, use a jeweler’s screwdriver to loosen the eyepiece set screw to enable you to remove the eyepiece). Place the centering telescope (CT, included with the phase system) into the eyepiece tube:



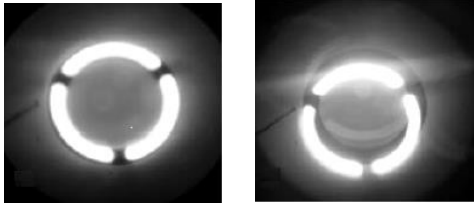
**The condenser and stage should remain in the highest position and the iris should be fully opened. Do not adjust the focus controls**

Loosen the thumb screw on the centering telescope (CT). While holding the knurled locking screw with one hand, grasp the very top portion of the centering

telescope with the other hand, look through the eyepiece of the centering telescope while slowly sliding the telescope tube out until the phase ring in the **objective** is in focus. Tighten the knurled locking screw.

**10X Phase:** Begin by placing the condenser disk of the phase condenser on the **10** position. Ensure that it is “clicked” into position and 10X phase objective is in the optical path.

Using only the condenser focusing control knob, focus the bright annuli ring located in the **phase condenser**. Now observe the two rings in the field of view. The dark larger annulus ring is located at the objective lens. The bright smaller annulus ring is located in the phase condenser. When properly aligned, these will appear as superimposed rings. Incorrect alignment will require that the annuli be re-centered.



Place the 2 alignment tools (1.5mm allen wrenches) into the condenser on both sides as shown:



Turn the adjustment tools **carefully** and **gently** (both directions) to manipulate the rings into correct alignment. **Important: do not force the adjustment wrenches. Avoid turning the adjustment all the way to one side**

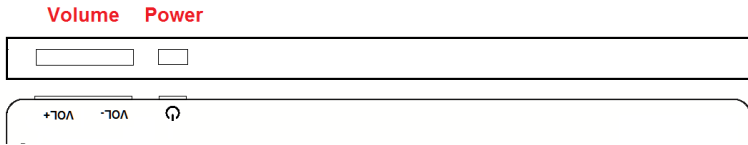
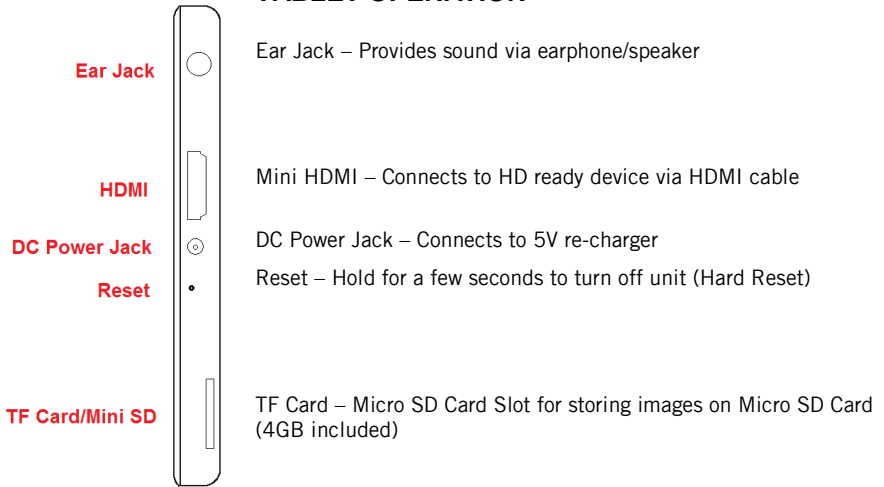
Please note: when the condenser disc is in the **BF** or **DF** position, **no** adjustments can be made

**20X / 40X Phase:** Remove the adjusting tools and rotate the condenser disk to the **20/40** position. Place either a 20X or a 40X objective into the optical path. Re-focus the CT and ensure that the rings are superimposed. If not, perform adjustments as described above.

Please note: *As the magnification of the objective increases, the number of concentric rings will also increase. To determine which ring you are moving, turn the adjusters to elicit movement. Once you have determined which ring represents your condenser annulus, align this to the rings in your field of view to achieve the proper alignment pattern (see figure G, above)*

**100X Phase:** Remove the adjusting tools and rotate the condenser disk to the **100** position. Place the 100X objective into the optical path. Re-focus the CT and ensure that the rings are superimposed. If not, perform adjustments once more as described above. The 100X phase is the most difficult to align due to its small diameter rings and multiple plan achromat lens system.

## TABLET OPERATION



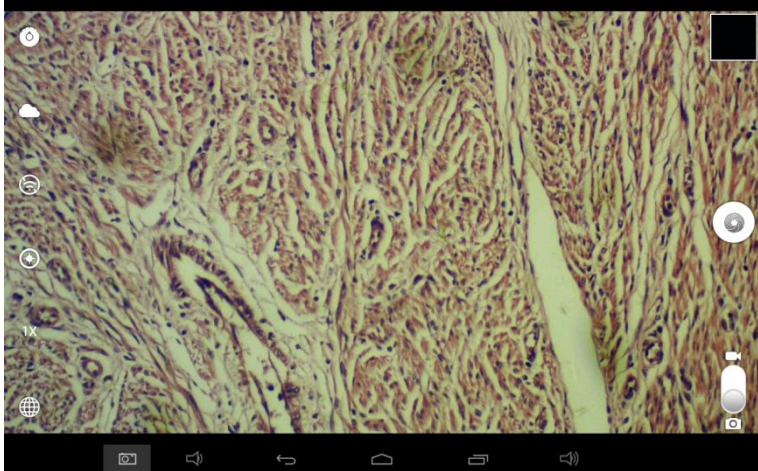
Power – Hold for a few seconds to turn unit on  
Volume – Adjusts all sound volumes

## TABLET SOFTWARE









This android tablet comes equipped with all the necessary software needed to start using your equipment out of the box. Since it is an android tablet, you will be able to connect to your office/school Wi-Fi network to access the internet and download additional applications. The primary application for accessing your camera is MotiConnect T.

### MOTICONNECT-T OVERVIEW

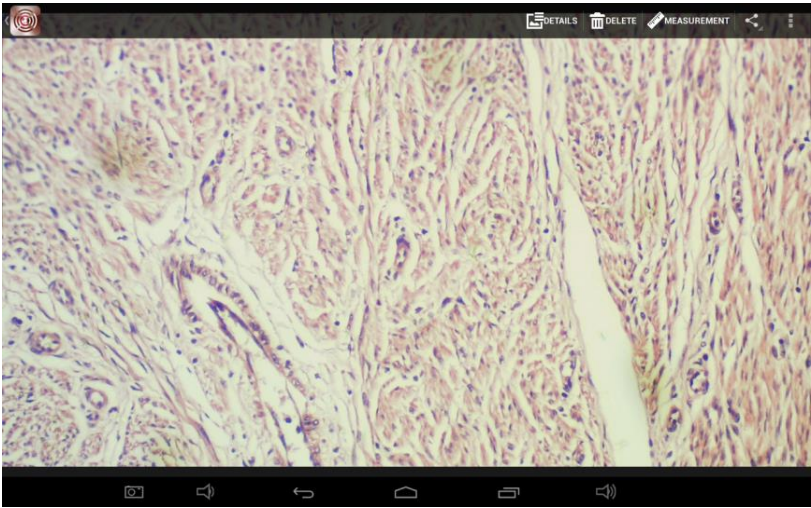
MotiConnect T is a dedicated image processing Android app for Motic cameras, which includes image preview, capture, recording, editing and measuring functions.








### Home Screen Button Description

	Image Quality Settings: Change preview image aspect ratio, picture resolution and picture quality
	White Balance Settings: Change the white balance scenario to fit the light conditions of the image. There are 5 preset white balance scenarios.
	MotiHub Settings: Turn on and off MoticHub.
	Calibration Options: Calibrate the tablet to make accurate measurements.
	Network Settings: Tapping "IP Address" shows the IP address used for MoticHub. Wi-Fi settings is a shortcut to the settings on the android tablet.
	Image Capture Button: Capture and save the image.
	Image Album: View and edit the captured images in the album.
	Image / Video Toggle Switch: Toggle between camera and video modes.

## Image Album



The Image Album is used for managing the still images and videos captured by Moticonnect T. Users can edit, measure, view, share and export images.

	Detail: Providing detail image file information.
	Delete: Removing the image file from the system
	Measurement: Entering image measurement mode
	Sharing: Sharing images with the other devices via Bluetooth
	Edit: Allows user to edit the color scheme, polish edges, crop/rotate/mirror, and change image settings such as contrast/sharpness/etc.

## Measurement



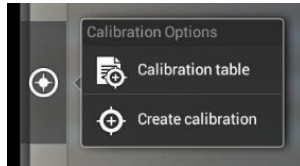
Software is able to measure after being calibrated. After calibration, measurements are accurate to the nearest pixel.

	Zoom in
	While this button selected, it will provide the general description from the button which user selected
	Settings: Change the line width/ colors, font sizes and colors, and scientific unit.
	Delete: Delete the measurement data on the image.
	Cancel: Exit measurement interface without saving the changes.
	Save: Save the measurement data on the image and exit measurement interface
	Undo previous editing job done on the image
	Redo previous editing job done on the image
	Free Hand: Allows for free handed drawing
	Line: Measures a straight line
	Circle: Measures a circle (Height, Width, Area, and Perimeter)
	Box: Measures a rectangle (Height, Width, Area, and Perimeter)
	Arrow: Draws an arrow for labeling purposes (no measurement)
	Angle: Measures the size of an angle in degrees
	Text: Adds text to the image

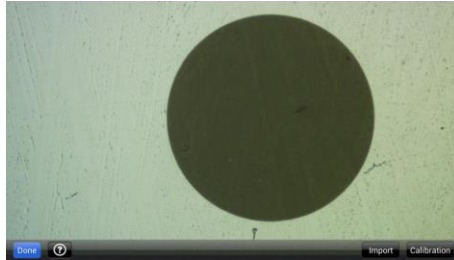


## Calibration

To begin click on Create Calibration. Get out your Calibration Slide.



The software will capture the image from the preview mode and input the image into calibration mode.



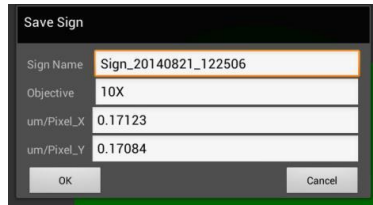
Now put the Calibration slide on the stage of the microscope and focus the dot in the center of the screen. For 4x Objective, use the 1.5mm dot. For 10x Objective, use the 0.6mm dot. For the 40x Objective, use the 0.15mm dot. For the 100x Objective, use the 0.07mm dot.

After your dot is in focus, select "Create Calibration" then "Calibration" to add a new set of calibration parameters into the calibration table. You should have a bright green circle (shown below). If you don't have a bright green circle, the calibration failed. Make sure the slide is clean and the image has sufficient lighting.

If the calibration is successful, choose what objective you're using on the microscope under "Objective Magnification" then select the length of the diameter of the dot, then tap OK. A calibration is needed for each objective that will be used in measuring, so repeat the process if necessary.



Software will provide the um/Pixel X and um/Pixel Y based on the previous users provided information.



Field	Value
Sign Name	Sign_20140821_122506
Objective	10X
um/Pixel_X	0.17123
um/Pixel_Y	0.17084

Users can save those parameters with user assigned own Sign Name. This new Sign Name will be saved in the calibration table for the future use.

Objective Magnification: If users change the objective magnification number, please ensure same magnification number is selected on the software. There is no need to re-calibrate the system.



#### **How to create a Portable Hotspot on the tablet screen:**

1. Open the Settings menu on your Android tablet (select the black box with a blue outline from the home menu on the right side of the screen).
2. Under “Wireless & Networks” tap “More...” then tap “Portable hotspot” on the right.
3. Tap “Set up Wi-Fi hotspot”
  - a. Choose a name for the hotspot and enter it under “Network SSID”
  - b. Leave the security as WPA2 PSK
  - c. Choose a password and enter it under “Password.” This password will be used when you connect to the Access Point from your other devices.
  - d. Tap “Save”
4. Tap “Portable Wi-Fi hotspot” on the right. The hotspot should activate and show a checkmark on the right.
5. Open the “MotiConnect T” app. The live image from your microscope should appear. Tap the third icon down on the left side of the screen (circle with a wireless icon). Tap “On” to turn MotiHub on. Write down the IP Address from the window that appears, followed by a colon then the port number (192.168.##:8080).
6. MotiHub is now enabled and may be connected to by other devices that are connected to the Android’s portable Hotspot. Connect other devices by searching for Wi-Fi networks and selecting the hotspot you created, and then enter the password for the hotspot.

## **MOTICHUB CONNECTION GUIDE**

### **Connecting to the hub with Motic Images Plus 2.0 on PC:**

After you have connected to your network/hotspot, open Motic Images 2.0 software and click the capture button. After you've opened the Motic Live Imaging Module, the drop down box under "Video Device" should say Moticam X. Then you will need to click "Open" which is located beneath the drop down box that says Moticam X. A dialog box will appear, instructing you to input an IP address. Input the IP address you wrote down without the: 8080. Your image should appear.

### **Connecting to the hub with Android/iOS/Chromebook:**

Download the MotiConnect app from the App Store, Google Play, or Chrome Store.

After connecting to your network/hotspot via Wi-Fi, open the MotiConnect app. Select Live Camera on the left side. At the top right, click Options. Click Add (on iOS: Click Cameras→New Camera).

Input the following for Android/Chromebook:

Input the following for iOS:

Name: MoticHub

Name: MoticHub

IP Address: (IP address you wrote down without the: 8080)

URL: (IP you wrote down)

Port Number: 8080

Click OK (on iOS: Click Save). Click options and make sure there is a check mark by the camera you just added. You should have a picture.

### **Connecting to the hub with a web browser:**

Open your web browser and type the IP address you wrote down exactly as it appears (with: 8080) into the address bar, then hit enter.

### **Connecting to the hub on a Mac:**

Open Motic Images Plus 2.0. At the top of the screen, click Tools, and then click MotiConnect setting from the drop down menu. The IP Address is the same as you wrote down without: 8080, and the Port should be 8080. Click "OK" after making sure settings are correct. Then, click File at the top, and then click Capture or New. Click OK, and a live video from your camera should appear.

## MOTIC IMAGES SOFTWARE

### Full Help Menu

The full software manual for Motic Images is accessible within the software's main page.

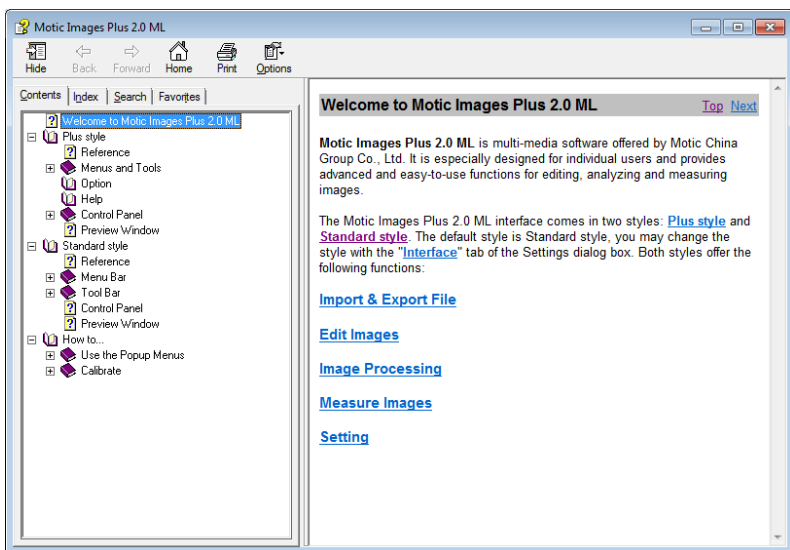
- To begin, open the Motic Images Software.
- At the top of main screen find the menu tab labeled Help:



- Click on Help and then select the help option:



- This will open the Motic Images help file contents, containing the full help menu:



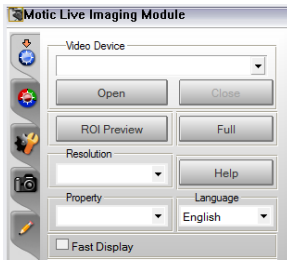
## Motic Live Imaging Module

### Full Help Menu

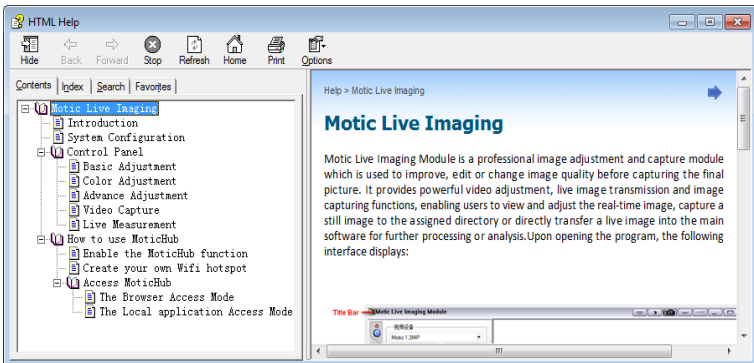
- The full Live Imaging Module manual is accessible within the live Imaging main page.
- To begin, open the Motic Images Software.
- At the top of main screen find the menu tab labeled File and click on Capture:



- Once the Motic Live Imaging Module has opened, click on Help:



- This will open the Motic Live Imaging Module help file, containing the full help menu:



## COMMON PROBLEMS IN MICROSCOPY

If you have a problem, you may be able to correct it yourself. Here are a few common problems and easy solutions you may want to try before calling for service.

**CAUTION** – Never disassemble, electrical, mechanical or optical components. This servicing should only be done by an authorized Swift technician. The Limited Lifetime Warranty will be null and void if disassembled by a non-Swift dealer.

- A. **PROBLEM** - Image appears “washed out” or weak  
**CORRECTION** -
  1. Slowly close the iris diaphragm.
  2. Objective lens is dirty. See “Care and Cleaning” Section
  3. Eyepiece is dirty. See “Care and Cleaning” Section
  
- B. **PROBLEM** - Hairs or dust seem to be moving in the image  
**CORRECTION** - The iris diaphragm is not open wide enough. Slowly open the iris diaphragm to increase the size of the opening allowing for additional illumination.
  
- C. **PROBLEM** - Unable to bring specimen into focus with any objective  
**CORRECTION** - Eye lens of the eyepiece is partially unscrewed. Remove the eyepiece and screw the two sections together.
  
- D. **PROBLEM** - Image of the specimen goes out of the focus all by itself.  
**CORRECTION** – Increase the focus tension by turning the tension knob found next to the left coarse focus knob.
  
- E. **PROBLEM** – Focusing knobs turn with difficulty even with tension knob loosened.  
**CORRECTION** - Microscope should be disassembled by qualified, authorized repairman, cleaned and re-lubricated.

## LED REPLACEMENT

The Swift M10 series is equipped with a 3 watt LED illumination system. The life of the LED may vary depending on use and intensity. To prolong the life of the LED, you should always turn off the unit when not in use. It is important that you only use a Swift replacement LED because it is integrated on to a circuit board. This LED has been tested and approved for life span, color temperature and brightness. Please call the Swift Optical parts department at (877) 967-9438 for replacement part information.

**Make sure the microscope is unplugged before replacing the LED.**

1. Remove the eyepiece(s) from the head if they are not secured in place so they do not accidentally fall out of the microscope. Remove the slide that may be on the stage.
2. Turn the microscope on its side. Remove the 4 screws on the bottom of the microscope. Remove the base cover to access the LED.
3. The LED is integrated on to a circuit board. This LED circuit board is held into the illuminator housing by a black ring. Unscrew this black ring from the illuminator housing to remove the LED circuit board.
4. Unplug the LED's power wire from the circuit board attached to the base cover.
5. Reverse the steps listed above to install the new LED.

## CLEANING YOUR MICROSCOPE

Swift microscopes are designed to function with minimal maintenance, but certain components should be cleaned frequently to ensure ease of viewing. The power switch should be turned off or the microscope should be unplugged when not in use.

### Do not disassemble your microscope

Disassembly may significantly affect the performance of the instrument, and may result in electric shock or injury and will void the terms of the warranty.

Never attempt to dismantle any parts other than the ones described below. If you notice any malfunction, contact your nearest Motic supplier.

### Optics

Keeping the optics of your microscope clean is essential for obtaining clear images. Choosing the best cleaning method depends on the nature of the optical surface and type of dirt.

Dirtiness on the image may be caused by the following variables:

- Dirt on the outer or inner eyepiece lens.
- Dirt on the front lens of the objective.
- Dirt on the upper lens of the condenser.
- Dirt on the surface of the sample slide glass.
- Dirt on the upper lens of illuminator.
- Dirt on other optical components of the microscope such as mirrors, lamps, filters, intermediate lenses ...

In the case of microscopes with a camera attached to it:

- Dirt on the camera adapter.
  - Dirt on the protection filter of the camera sensor.
- For Eyepieces with reticules:
- Dirt on the outer or inner reticle glass.

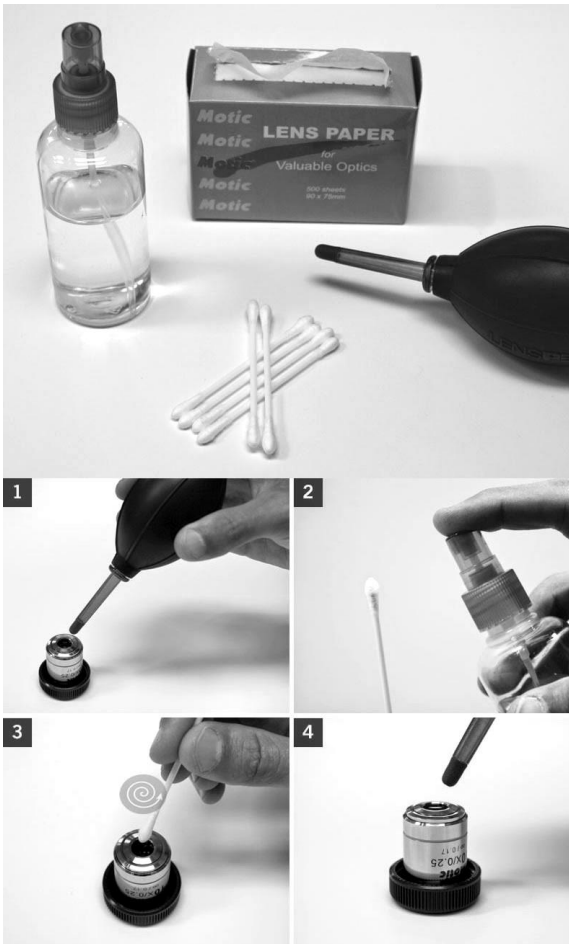


**Objectives** are the optical component of the microscope that require the most maintenance. Because for their actual use, they can get dirty easily.

For objectives that work without oil (dry): The first step is to carefully unscrew the objective from the nosepiece.

In order to make things easier and safer, we can screw the objective on one of the objective cases supplied with microscope. By doing it this way, the objective will be in a stable position avoiding possible falls.

**(1)** We will proceed by cleaning it using pressurized dry air - or an air gun if available – and, if after this is done we still observe spots of dust or dirt, **(2)** we will clean them with a cotton swab dampened with a low graduation of alcohol 70% or with a mixture of alcohol and ether (ratio alcohol: 3 and ether: 7). **(3)** With a spiral movement (starting from the center of the lens) we will then clean the surface of the lens. **(4)** We will then dry its surface by using pressurized dry air and we will check that the lens is clean either with the help of a magnifying glass or by screwing the lens back on the revolving nosepiece of the microscope.





**For objectives that work with immersion oil** it is essential to clean them after each observation session. To clean it we will use a cleaning cloth for lenses slightly dampened with a low graduation of alcohol. We will proceed by cleaning the frontal objective lens (normally 100X-Oil or 50X-Oil). It is important to make a preventive maintenance also for those objectives that work at a very close distance to the sample. With this we mean the 40X and 60X objectives, which may accidentally get in contact with the immersion oil.

Users of inverted biological microscopes have to take special care with the objectives because they can get dirty with dust or liquid that spills from the sample/s. In this case we recommend you check the status of the objectives accurately at least once a week.

**For optical components such as eyepieces, condensers, filters,** etc. we recommend using the same cleaning method. First cleaning it with pressurized dry air, then cleaning it with a cotton swab or a cleaning cloth for lenses (slightly moistened with a low graduation of alcohol) and finally drying it with pressurized dry air. Once the cleaning process is finalized if the image is still not clear, you can either contact us or you can contact your Motic supplier.

**For users that have a digital camera mounted on the microscope** and whom observe dirt on the digital image, it is important that the first step is to proceed with objectives maintenance, as explained above. If the dirt persist, we have to find out if it has to do with the microscope or the camera. To check this we simply have to loosen the adapter and rotate the camera. If the dirt rotates whilst turning it, then it means that it is in the microscope. If it does not rotate, then it is either in the adapter or in the protection filter of the sensor. If the dirt is on the surface lens of the adapter then you can use the same cleaning method that we have explained above, but if the dirt is in the protection filter of the sensor then use pressurized dry air only. If the dirt persist you can either contact us or you can contact your Motic supplier.

### **Mechanics**

The mechanical components of the microscope require less maintenance than the optical components. Our first maintenance advice is to **use the dust cover** provided with the microscope, this way we will avoid the accumulation of dust on the microscope.

**If we wish to clean the stand or the specimen holder,** we will simply use a cleaning cloth moistened with soap diluted in distilled water. After this we will proceed in perfectly drying the entire surface of the microscope. You have to take special care with the electrical components of the microscope such as the ON / OFF switch, the dimmer, the lamp holder...

If there are grease stains we can use the same cloth moistened with a low graduation of alcohol.

If you face any problems related to the maintenance of your microscope, please contact us. Our technicians will gladly help you solve your maintenance issue/s.

**CLEANING** – The front lens of the objectives (particularly the 40XRD and 100XRD) should be cleaned after use. The lens surface may be gently cleaned with a soft camel hair brush, or blown off with clean, oil-free air to remove dust particles. Then wipe gently with a soft lens tissue, moistened with optical cleaner (eyeglass or camera lens) or clean water. Immediately dry with a clean lens paper.

**CAUTION** - Objectives should never be disassembled by the user. If repairs or internal cleaning should be necessary, this should only be done by qualified, authorized microscope technician. The eyepiece(s) may be cleaned in the same manner as the objectives, except in most cases optical cleaner will not be required.

In most instances breathing on the eyepiece to moisten the lens and wiping dry with a clean lens tissue is sufficient to clean the surface. Lenses should never be wiped while dry as this will scratch or otherwise mar the surface of the glass.

The finish of the microscope is hard epoxy and is resistant to acids and reagents. Clean this surface with a damp cloth and mild detergent.

Periodically, the microscope should be disassembled, cleaned and lubricated. This should only be done by a qualified, authorized microscope technician.

**DUST COVER AND STORAGE** – All microscopes should be protected from dust by a dust cover when in storage or not in use. A dust cover is the most cost-effective microscope insurance you can buy. Ensure that the storage space is tall enough to allow the microscope to be placed into the cabinet or onto a shelf without making undue contact with the eyepieces. Never store microscopes in cabinets containing chemicals which may corrode your microscope. Also, be sure that the objectives are placed in the lowest possible position and the rotating head is turned inward and not protruding from the base. Microscopes with mechanical stages should be adjusted toward the center of the stage to prevent the moveable arms of the mechanical stage from being damaged during storage in the cabinet.

# SWIFT OPTICAL INSTRUMENTS, INC. LIMITED LIFETIME WARRANTY

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

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