

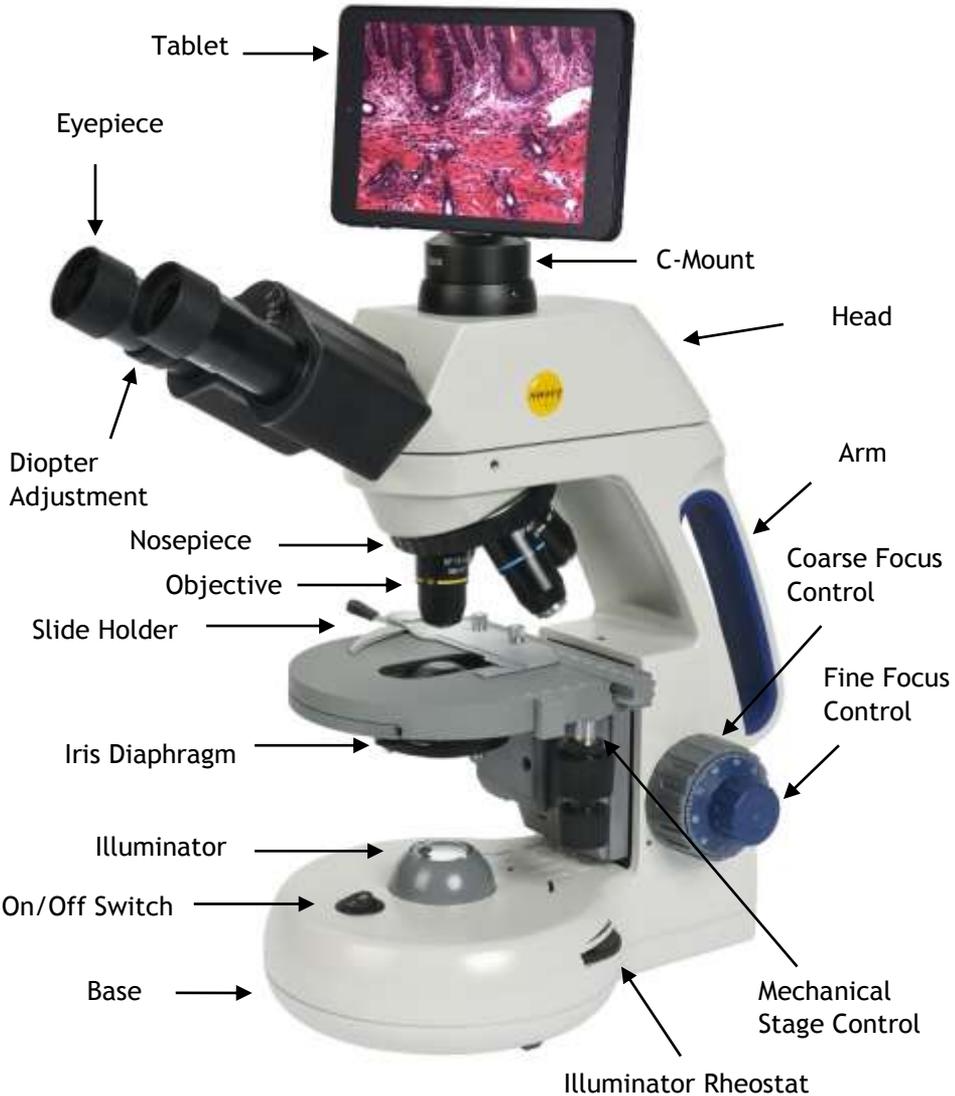
Swift M10T-MCS Series Microscope

Use and Care Manual



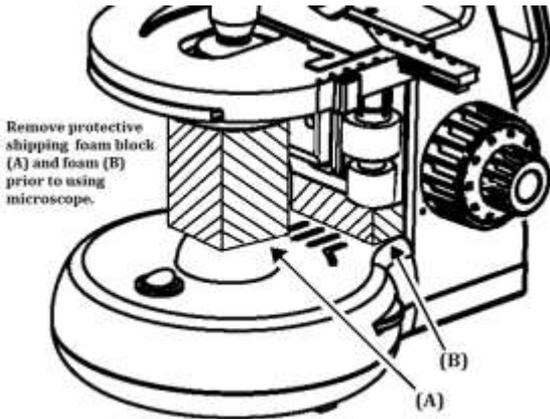
SWIFT M10T-MCS SERIES (Digital)

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.

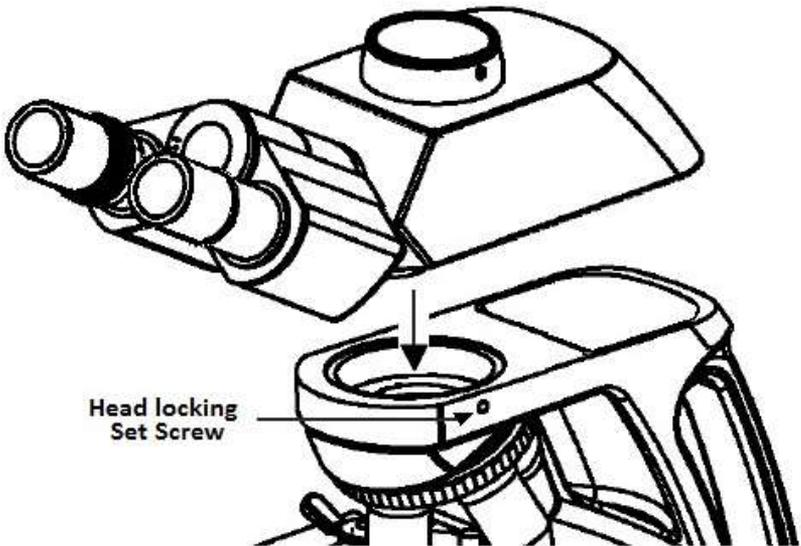


UNPACKING THE SWIFT M10T-MCS SERIES MICROSCOPE

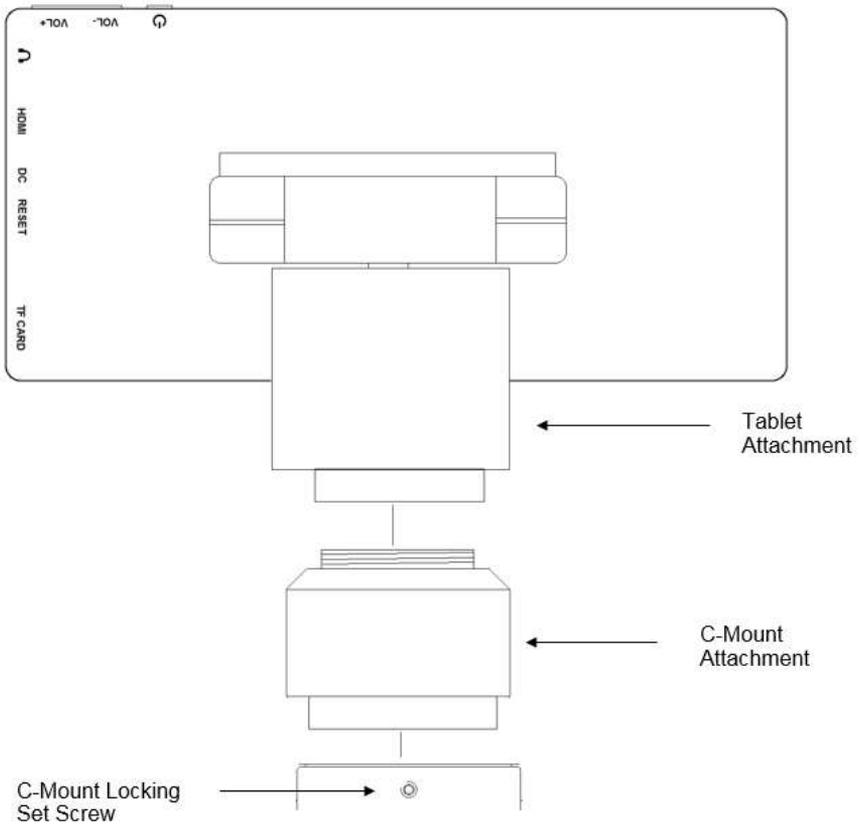
1. Remove head and body from styrofoam packaging.
2. Remove both shipping blocks from the body of the microscope as pictured below.



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.



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.

DIOPTRER 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 eyepoint.

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 40XRD or 100XRD 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.

USING THE SWIFT M10T-MCS SERIES 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 maybe 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.

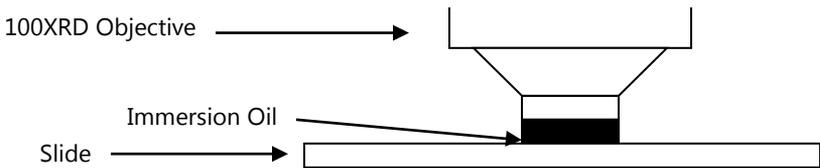
7. Use the fine focus control to complete the focus and produce the sharpest image.

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 users 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.

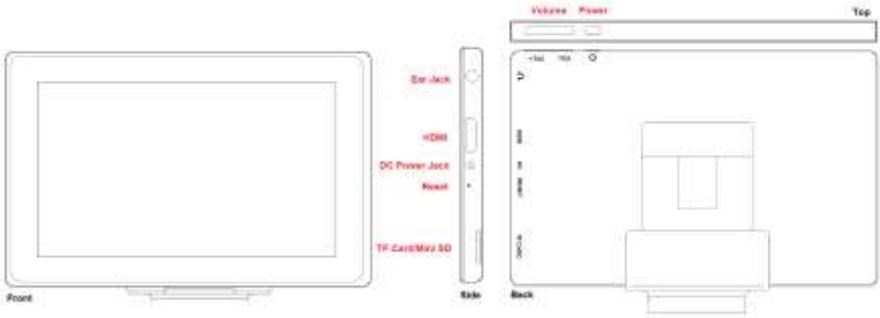
OIL IMMERSION

It is desirable to use immersion oil with the 100XRD 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 100XRD 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 100XRD and 40XRD objective to the slide surface is very close and although the 40XRD objective is sealed to prevent immersion oil contamination, it is a good practice to avoid dragging the 40XRD objective through an oiled slide.



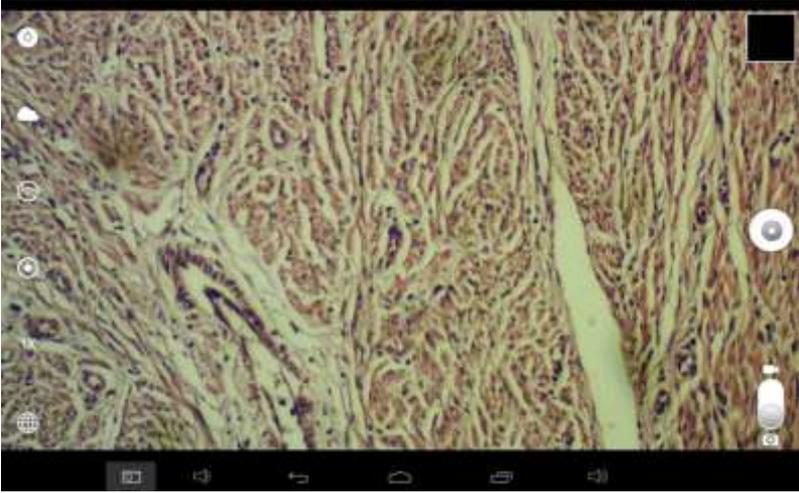
TABLET OPERATION



1. Power – Hold for a few seconds to turn unit on
2. Volume – Adjusts all sound volumes
3. Ear Jack – Provides sound via earphone/speaker
4. Mini HDMI – Connects to HD ready device via HDMI cable
5. DC Power Jack – Connects to 5V re-charger via min DIN cable.
6. Reset – Hold for a few seconds to turn off unit (Hard Reset)
7. TF Card – Micro SD Card Slot for storing images on Micro SD Card (4GB included)

MOTICONNECT-T OVERVIEW

MotiConnect T is a dedicated image processing Android app for Motic cameras. Software 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 MotiHub.



Calibration Options: Calibrate the tablet to make accurate measurements.



Network Settings: Tapping “IP Address” shows the IP address used for MotiHub. Wi-Fi settings is a shortcut to the settings on the android tablet.



Image Capture Button: Capture and save the image.

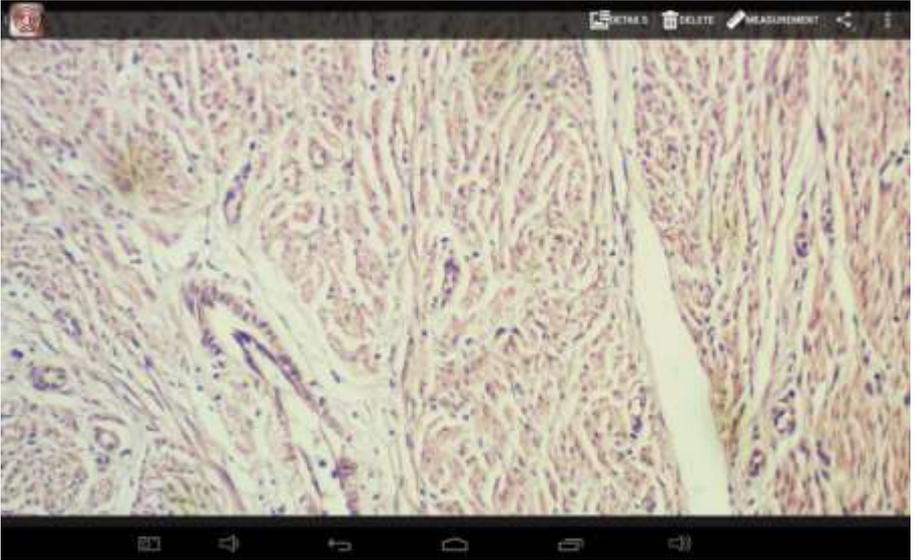


Image Album: View and edit the captured images in the album.



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, 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.

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.

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.

CARE AND CLEANING

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.

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.

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.

SWIFT OPTICAL INSTRUMENTS, INC. LIMITED LIFETIME WARRANTY

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

