



## MA10050 Multi Phase Instructions

**Congratulations**, your Swift microscope has been factory-equipped with a Multi Phase condenser system. This fully-adjustable, multi-discipline condenser allows you to use your microscope in Bright Field, Dark Field and Phase Contrast. The Multi Phase system has been preset to factory specifications with each annulus pre-centered for optimum performance. However, it is recommended that this system be calibrated periodically using the enclosed tools and instructions found in this manual. For obtaining the optimum performance out of your phase system, we have listed each discipline below with our recommendations. Good microscopy is subject to personal preference and your own methods may produce even better results. We invite you to experiment.

**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 (figure A)



**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 (figure B)



**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 (figure C)



**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.

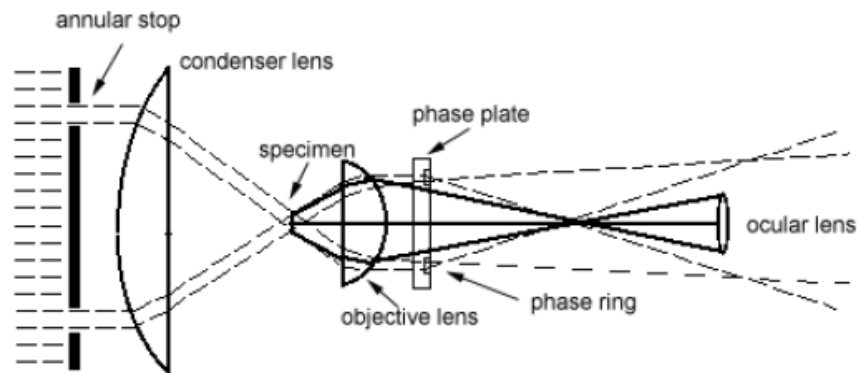
Rotate the disc to the desired phase magnification (10, 20/40, or 100) to match the objective you are using. (Please note: the 4x objective included with the system is **not** phase)



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

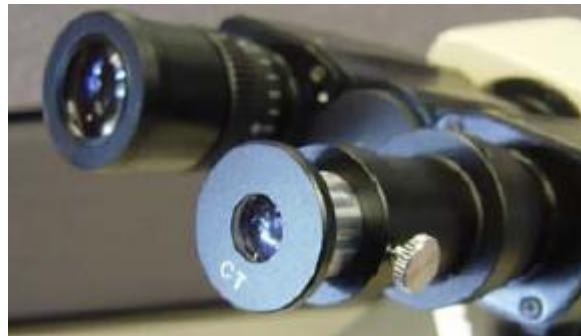
**100x Objective:** Make sure the iris is fully open and the condenser is at the highest position. The green filter may or may not be used, depending on the desired result upon evaluation of highly magnified specimens. It is highly recommended that proper immersion oil be used on the surface of the slide.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



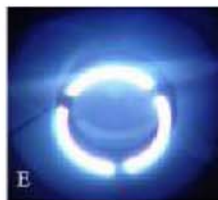
**The condenser and stage should remain in the highest position and the iris should be fully opened. Do not adjust the focus controls**

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 and 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 in the objective lens. The bright smaller annulus ring is located in the phase condenser. When properly aligned, these will appear as superimposed rings (figure G). Incorrect alignment will require that the annuli be re-centered (figure E).



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 acromat lens system.



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