Flinn Advanced Research Compound Microscope Owner's Manual

Please read and adhere to all recommendations in this manual to ensure the best experience and to maintain your microscope in good working order. This owner's manual is for MS1182.

Unpacking, Assembly and Storage

1. The microscope and accessories have been carefully packed to ensure they reach you in the best possible condition. Retain the foam container in case you need to transport, store, or return the microscope for service. If it becomes necessary to ship the microscope for any reason, pack it in the foam container and in another box to secure it for transport. Inadequate shipping may result in damage to your microscope.
2. Lay the molded microscope container with the UP sign facing you. Remove the top piece and inspect the contents and container. Each microscope comes with the following:
   a. The main body of the microscope, preassembled
   b. 2 WF 10X20 Infinity Plan eyepieces
   c. 4 Infinity Plan objective lenses
   d. Koehler illumination condenser
   e. Dust cover
   f. Two hex wrenches
   g. Power cord
3. Install the eyepieces. Use the small hex wrench to carefully remove the set screw on the eyepiece tube. Remove caps covering the oculars on the binocular head. Insert eyepieces. Replace the set screws and tighten to secure.
4. Install the objective lenses (see Figure 1). To avoid touching the surface of the lens, wear clean gloves. Ensure that the stage is in its lowest position. Install the objective lenses so that as the nosepiece rotates in a clockwise direction it moves from low to high magnification. Avoid touching any of the lens surfaces with bare hands as dust, dirt or fingerprints can damage the lens or adversely affect image quality.
5. Install the Koehler illumination substage condenser. See Figure 2.
   a. Rotate the coarse focusing knob ① to raise the stage to the highest position.
   b. Rotate the condenser knob ② to lower the condenser bracket to a position that allows easy access.
   c. Fully loosen the condenser lock screw ③.
   d. Insert the condenser into the bracket, ensuring that the condenser handle is accessible.
   e. Tighten the lock screw ③, then raise the condenser to the highest position.
6. Connect the included power cord. Only use this power cord with this microscope.
7. Always handle and move microscope carefully by securely holding the arm and base of the microscope. Avoid impact or abrupt movements during transport. *Note:* Carrying the microscope by the stage, head or focus knobs will damage the microscope.
8. Store microscopes in a dry, clean place away from direct sunlight with the dust cover in place. A microscope storage cabinet such as Flinn's Microscope Storage Cabinets (Catalog No. AP7133 and AP7142), will protect microscopes from dust and damage from UV rays.

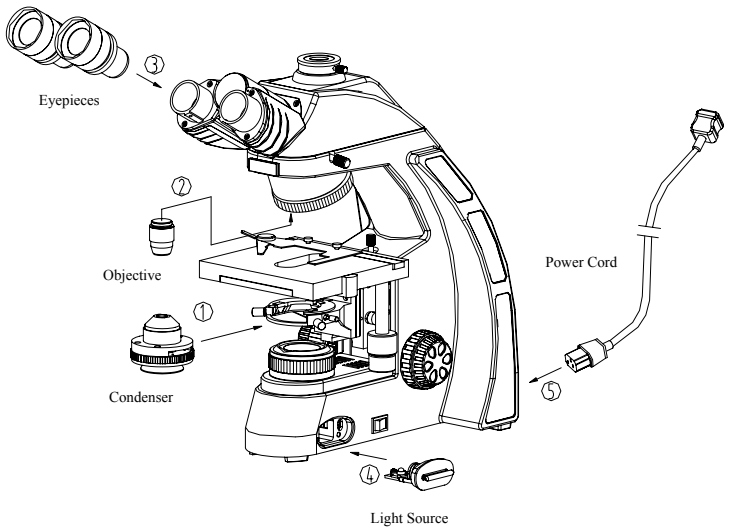

Figure 1.

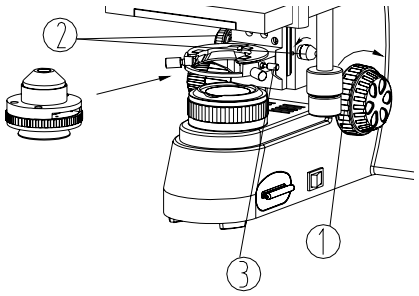

Figure 2.

Description of Components *(Refer to Figure 3.)*

1. Eyepieces (ocular lens): The lens closest to the eye that magnifies the primary image formed by the objective lens. This model comes equipped with two Infinity Planachromat widefield (WF) 10X eyepieces.
2. Revolving nosepiece: Round, rotating piece that holds four objective lenses. Rotating the nosepiece changes the magnification by moving different powered objective lenses into the optical path.
3. Objective lens: 4X, 10X, 40X and 100X magnification. Each lens is high-quality infinity Planachromat. The 100X lens is oil immersion.
4. Mechanical stage: Permits precise, mechanical manipulation of the specimen slide using the coaxial dials located under the stage. The top dial moves the stage along the *y*-axis while the bottom dial moves the slide along the *x*-axis.
5. Stage: Platform of the microscope where the specimen slide is placed.
6. Koehler illuminator: The Koehler illumination system has two main parts. The field diaphragm collects light from the lamp and focuses it at the front focal plane of the substage condenser's aperture diaphragm. This projects an image of the light source onto the lens, providing very true and crisp illumination.
7. Safety rack stop: Controls maximum upward travel of the stage. When properly adjusted, the safety rack stop prevents higher power objectives from breaking specimen slides and damaging the objective lenses. This stop has been preadjusted at the factory. Sometimes the safety rack stop needs slight adjustment to focus when using very thin cover slips. Turn the knurled screw clockwise to allow the stage to move closer to the objective lens and counterclockwise to move the stage to its maximum height away from the objective lens.
8. Focusing knobs: Coaxial focusing knobs for coarse and fine adjustment. Raises or lowers the stage to bring a specimen into focus.
9. Illumination: Built-in substage electric 3W LED illuminator. This provides constant and reliable illumination with adjustable brightness.

Figure 3.

Operation

1. Place microscope in front of you with the eyepiece in a comfortable position.
2. Plug in the microscope.
3. Using the graduated mechanical stage, secure the specimen slide. Swing back the movable caliper on the slide holder, place the slide against the stationary side of the slide holder and gently place the caliper against the slide. Do not release the caliper suddenly; doing so may chip or break the slide. Position the slide so that the specimen is centered over the light. A second slide may be held simultaneously if so desired.
4. Turn on the light using the switch on the lower right, and adjust it to the appropriate brightness using the dial on the lower left.
5. Rotate coarse focus knobs to move the stage down and away from the objective lens as far as possible.
6. Position the 4X objective lens in the optical path by rotating the nosepiece until it "clicks" in place. *Note:* Each time you change from one objective lens to another, turn the nosepiece until you hear the "click," which indicates that the lens is properly indexed in the optical path.
7. Adjust the interpupillary distance by moving both eyepieces either up or down until a single image is seen. The Gemel-style eyepiece tube can be rotated 360º. Rotating the eyepieces up or down makes viewing more comfortable. Note this setting for future use.
8. Adjust the diopter. The diopter adjustment compensates for differences in vision between the left and right eye. Glasses should be removed, as the diopter adjustment will compensate. Align the zero on the adjustment ring of the right eyepiece with the neutral position on the tube of the eyepiece and focus to get a clear image using only the right eye. Then look through the other eyepiece, using only the left eye. Rotate the diopter adjustment ring on the left eye until the image is clear. Do not adjust the focus while looking with only the left eye.
9. Center the condenser. Rotate the condenser knob ① to raise it to the highest position (see Figure 4). Rotate the 10X objective into the light path, and focus the specimen. Rotate the field diaphragm adjustment ring ② to close the field diaphragm as much as possible. You will see a circle of light surrounded by a dark field of view. Rotate the condenser knob ① until the circle of light is crisp and in focus around the edges. Turn the center adjustment screw ③ to place the circle of light in the center of the field of view (see Figure 5). Gradually open the field diaphragm to expand the circle of light until it just fills the entire field of view. By limiting the diameter of the beam entering the condenser, the field diaphragm prevents other light from interfering, thereby improving the image contrast.

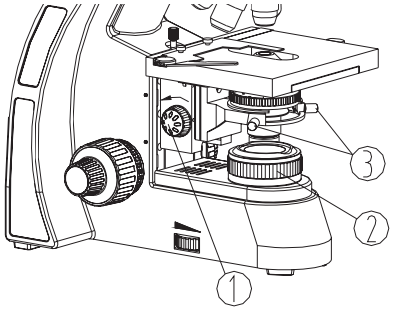

Figure 4.

10. Set the aperture diaphragm. The aperture diaphragm controls the amount of light that passes through the condenser. Set the aperture by rotating the diaphragm adjustment ring ② (see Figure 4) so that the arrow points to the related magnification of the objective lens in use.

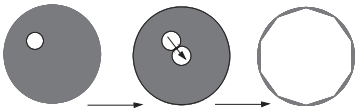
Figure 5.

11. View the specimen. Ensure that the specimen is in the center of the viewing area before increasing the magnification. The microscope is par centered and par focused, meaning that once the specimen is centered and focused under low magnification, it will also be nearly centered and focused under higher magnification. Increase the magnification to view the specimen with more detail, and adjust the diaphragm and condenser as necessary.

Objective Specifications

Objective	Numerical Aperature (N.A.)	Color-Coded Ring	Total Magnification with WF 10X Eyepiece
DIN Infinity Planachromat 4X	0.10	Red	40X
DIN Infinity Planachromat 10X	0.25	Yellow	100X
DIN Infinity Planachromat 40X retractable	0.65	Light Blue	400X
DIN Infinity Planachromat 100X retractable, oil immersion	1.25	White	1000X

12. Each objective has a colored ring indicating the magnification. The color of the objective can be used to indicate which objective should be used to view the specimen.
13. The N.A. value is the resolving power of the objective lens. Magnification and resolving power result in an image that is both large and clear. The N.A. value multiplied by the total magnification gives the maximum resolving power. The N.A. value on these lenses results in a resolving power that exceeds the total magnification of the microscope.
14. When rotating the 40X and 100X objective lenses into place, take care to avoid hitting the cover slip. These lenses have a retractable spring mechanism that retracts slightly into its housing if the front of the lens strikes the specimen slide. With fine focus adjustment at midrange, the rack stop has been adjusted at the factory to ensure the 40X and 100X lens will clear the thickness of a normal specimen slide and cover slip. However, if the rack stop has been improperly adjusted, or if a thicker than normal slide or cover slip is used, moving the 40X and 100X lenses too quickly or carelessly could cause damage to the front lens element or the slide.
15. To obtain maximum resolution of the 100X oil immersion lens, it is necessary to apply immersion oil between the specimen and the front lens of the objective. Use a very small amount of immersion oil. Remove all air bubbles from between the lens and slide by gently rotating the nosepiece back and forth to create a continuous layer of oil.
16. When you are finished viewing the slide, all parts that come into contact with oil must be cleaned using lens paper. Failure to do so can permanently damage the 100X immersion objective lens.
17. Do not let the front lens element of the 40X objective lens come into contact with a wet slide surface; prolonged contact with any moisture can damage the lens. If the lens is exposed to moisture, promptly wipe it with a soft tissue to remove moisture.

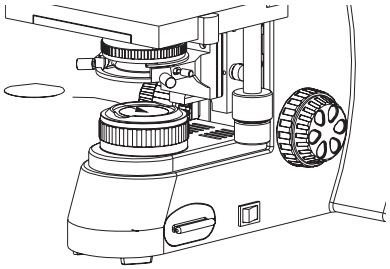

Figure 6.

Operation of Optional Accessories

1. Filters: blue (MS1195), green (MS1197), yellow (MS1196) and neutral (MS1198). Place the filter, rough side down, on the field diaphragm surface (see figure 6).
2. Phase Contrast Set (MS1201): Includes condenser and objectives.
   a. Replace the objectives on the nosepiece with phase contrast objectives.
   b. Remove the standard substage condenser from the microscope.
   c. Install the phase contrast condenser. Rotate the coarse focusing knob to raise the stage to the highest position. Rotate the condenser knob to lower the condenser bracket to a position that allows easy access. Fully loosen the condenser lock screw. Insert the condenser into the bracket ensuring that the condenser handle is accessible. Tighten the lock screw, then raise the condenser to the highest position.
   d. Rotate the phase contrast ring to "BF," indicating brightfield microscopy. As the ring is rotated, it will stop in designated spots indicating that one diaphragm is rotated into the center of the optical path (see Figure 8).
   e. Centering the halo. Slide the aperture diaphragm lever ① all the way to the left to completely open the aperture diaphragm (see Figure 7). Place the specimen on the stage and focus. Remove one eyepiece and insert the centering eyepiece into the tube. Confirm the corresponding phase ring (in phase contrast objective) and halo (in phase contrast disc ②) are moved into the optical path. Adjust the centering eyepiece to bring the phase ring and halo in the field of view (see Figure 8). Using the adjusting levers ③ (see Figure 7) on the phase contrast condenser, bring the halo ④ center and the phase ring center ⑤ together to make a bullseye (see Figure 8). The halo and phase ring center must be adjusted for each objective used. Centering is critical to achieving phase contrast observation.
3. Polarizer (MS1199) and Analyzer (MS1200). Use these two accessories together for simple polarizing (see Figure 9). Remove analyzer cover ① from the arm of the microscope, and insert the analyzer face up. Place the polarizer on the field diaphragm groove ④. Rotate the polarizer ③ to change the orthogonal status of polarization through anisotropic materials.

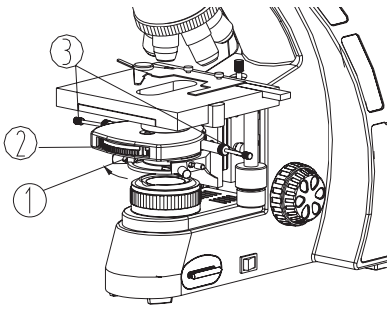

Figure 7.

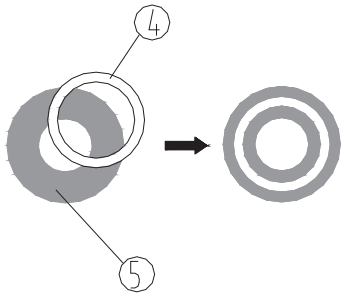

Figure 8.

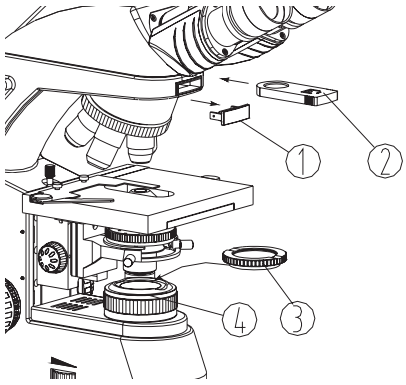

Figure 9.

4. Darkfield Flashboard (MS1203). Enables darkfield viewing of specimens without using a special condenser. With the flashboard in the up position (words on top), insert it from left to right into the condenser flashboard socket as shown in Figure 10. Open the aperture diaphragm to the maximum position.

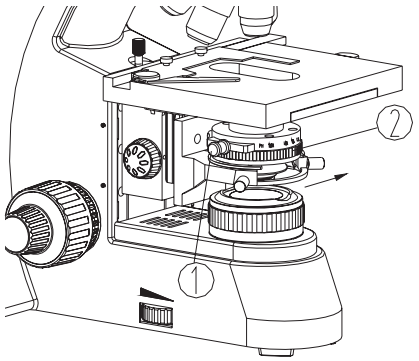

Figure 10.

Maintenance

WARNING: For your own safety, make certain that the power supply is unplugged before maintaining your microscope.

1. Optical maintenance

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

   a. Fingerprints or other matter on the front lens element of the objective lens is the single most common reason you will have difficulty focusing the microscope. Before having costly servicing done, examine the front lens element with a magnifying glass.

   b. Prior to cleaning any lens surface, brush dust or dirt off lens surfaces with a camel hair brush or compressed air.

   c. Clean only the outer lens surface. Breathe on the lens to dampen the surface, then wipe with lens paper or lint-free tissue. You may also use a cotton swab moistened with distilled water. Wipe lenses in a circular motion, applying as little pressure as possible. Avoid wiping a dry lens surface as lenses are scratched easily. If excessive dirt or grease gets onto lens surfaces, a small amount of lens cleaner can be used on a cotton swab or lens tissue.

2. Mechanical maintenance.

   a. The rack stop screw has been preadjusted at the factory and should not require readjustment. However, if you do attempt readjustment, note the following procedure.

   Loosen the rack stop screw by rotating it in a counterclockwise direction. With fine focus adjustment at midrange, focus on a standard slide until a sharp image is obtained.

   Rotate the rack stop screw in a clockwise direction until tight.

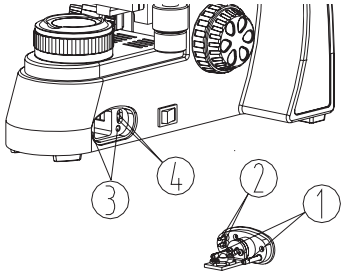

Figure 11.

   b. Coarse focus tension adjustment prevents the stage from drifting down from its own weight and causing the image to move out of focus. This has been adjusted at the factory, but over time it may loosen and cause the stage of the microscope to slip downward on the focusing block.

   With the stage facing you, the tension adjustment collar is located between the arm and the focus knob on the right side of the microscope and is indicated by the an arrow and the word "tension". Turn the collar in the direction of the arrow to increase the tension. Keep the tension as low as possible without the stage drifting.

   c. Metal parts: Use a clean, damp cloth to remove dust or dirt from metal parts, then use a dry cloth.

3. Replacing the LED.

   The LED light set should not need replacing often. This microscope comes with an easy-to-access light source module (see Figure 11). Pull the old module straight out and replace it with a new module, ensuring that the two pins line up with the sockets.

Troubleshooting

Symptom	Cause	Solution
The side of the field of view is dark or not even.	The nosepiece is not in the right position.	Turn the nosepiece into the right position.
	Lenses are dirty.	Clean the lens.
Stain or dust is observed in the field of view.	Stains have accumulated on the specimen slide.	Clean the specimen.
	Stains have accumulated on the lens.	Clean the lens.
The image is unclear.	No cover slip is on the specimen slide.	Add the cover slip.
	The cover slip is not a standard thickness.	Use a cover slip with 0.17 mm thickness.
	The specimen is facedown.	Turn it over.
	The immersion oil has accumulated on the dry objective (100X lens).	Clean it thoroughly.
	Immersion oil is not used for the 100X objective.	Use immersion oil.
	An air bubble is in the immersion oil.	Slightly rotate the nosepiece back and forth.
	The aperture is not opened to the correct size.	Adjust the aperture diaphragm.
	The condenser is not in the right position.	Adjust the condenser.
	The specimen slide is not fixed.	Fix slide with clips.
The image moves while focusing.	The aperture is not large enough.	Open the aperture diaphragm.
	The condenser is not in the right position.	Adjust the condenser.
	The specimen is outside the cover slip.	Reset the cover slip.
The field of view is not bright enough.	Stain or dust has accumulated on the condenser, objective, eyepieces, base lens.	Clean lens.
	No filter is used.	Use the correct filter.
	The bulb is too dim.	Turn the intensity up on the light.
The objective touches the cover slip while turning the nosepiece.	The cover slip is facedown.	Turn the cover slip over.
	The cover slip is not standard.	Use a cover slip with thickness of 0.17 mm.
Cannot move the slide smoothly.	The slide is positioned incorrectly.	Ensure the slide is being held by the slide holder and is not over or under it.
	The graduated mechanical stage is loose.	Tighten associated screws.
The light does not work.	There is no power to the light.	Check the connection of the power cord.
	The bulb is not inserted correctly.	Reinsert the bulb.
	The bulb has burned out.	Replace the bulb.

Limited 5-Year Warranty

Flinn Scientific warrants the stereoscope against manufacturer defect for five years from the date of purchase. Please contact Flinn Scientific at flinn@flinnsci.com or 800-452-1261.