

# Flinn Economy 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 the following models: MS1118, MS1119, MS1121, MS1122 and MS1123.

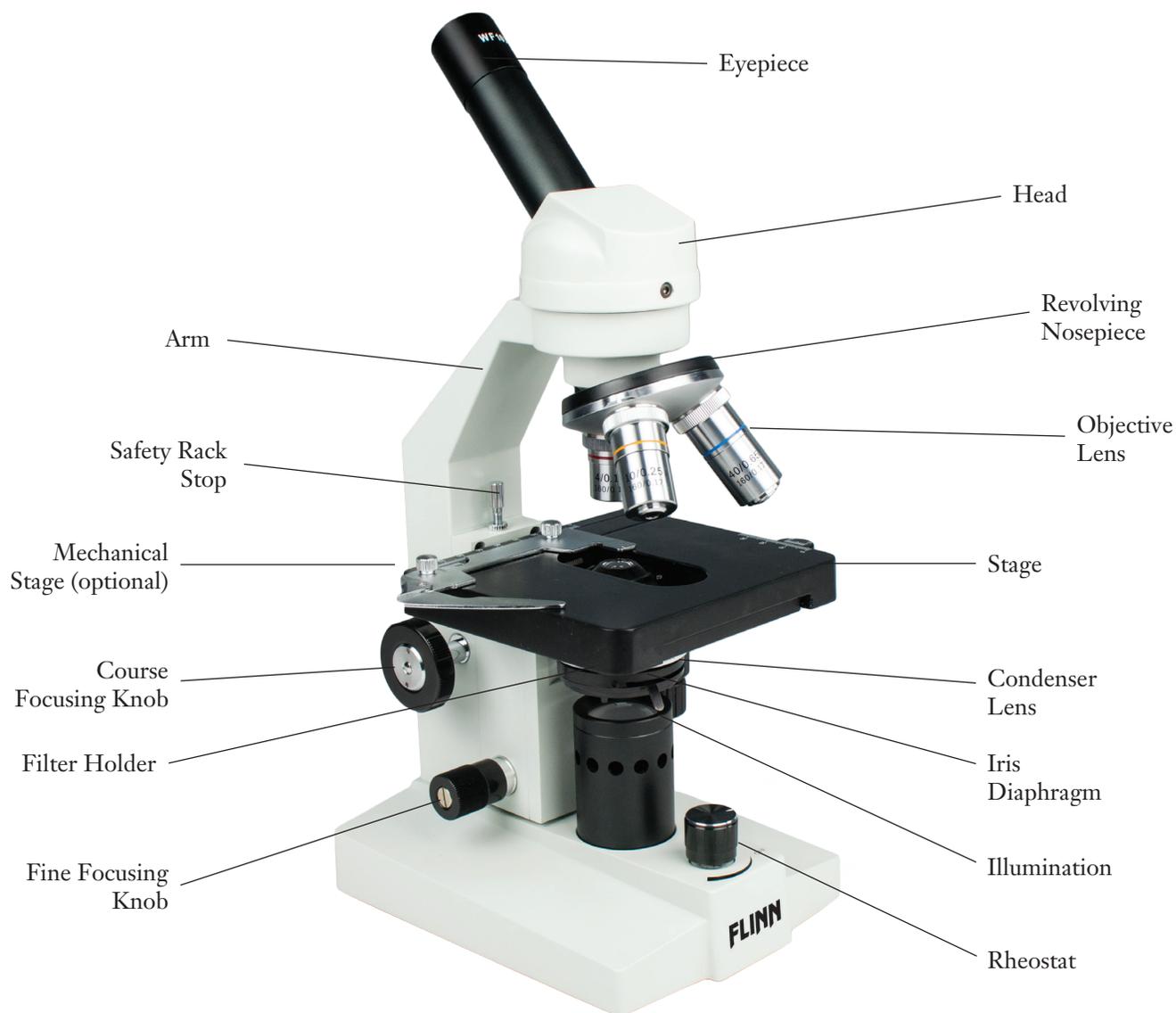
## Unpacking, Assembly and Storage

1. The microscope and accessories have been carefully packed to assure they reach you in the best possible condition. Retain the styrofoam 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 styrofoam container and in another box, secured 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 comes pre-assembled except for the objective lenses.
  - b. 3 or 4 objective lenses housed in bottles to ensure they remain dust-free.
  - c. A frosted filter which can be installed below the iris diaphragm to protect it from damage and to diffuse light.
  - d. A dust cover.
3. Install the objective lenses. 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 the magnification increases from lowest to highest as the nosepiece is rotated in a clockwise direction. Avoid touching any of the lens surfaces with bare hands as dust, dirt, or fingerprints can damage the lens or adversely affect image quality.
4. Connect the included power supply and charge the microscope. Many similar looking power supplies have different voltages. Before each use, examine the power supply to ensure the voltage is consistent with the rating voltage printed on the microscope. Flinn Economy Compound Microscopes all have an output voltage rating of 4.6 V.
5. Always handle and move microscope carefully by securely holding the arm and base of the microscope. Avoid impact or abrupt movements during transport.
6. 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 Mobile Microscope Storage Cabinet (Catalog No. FB1031) or Microscope Storage Cabinets (Catalog No. AP7133 and AP7142) will protect microscopes from dust and damage from UV rays.

## Description of Components *(Refer to diagram on the following page.)*

1. **Eyepiece (ocular lens):** Lens closest to the eye, magnifies the primary image formed by the objective lens. This model comes equipped with an achromatic widefield (WF) 10X eyepiece.
2. **Revolving nosepiece:** Round, rotating piece that holds objective lenses. Rotating the nosepiece changes the magnification by moving different powered objective lenses into optical path.
3. **Objective lens:** Lenses that magnify the object from low to high degrees of magnification. Models with three objective lenses have 4X, 10X, and 40X magnification, respectively. Models with four objective lenses have an addition 100X oil immersion lens.
4. **Mechanical stage:** (MS1122 and MS1123 models only) Permits precise, mechanical manipulation of the specimen slide using two dials located under the stage. One dial moves the slide along the  $x$ -axis while the other moves it along the  $y$ -axis.
5. **Stage clips:** (MS1118, MS1119 and MS1121 models only) Metal spring-mounted clips that hold the specimen slide in place.
6. **Stage:** Platform of the microscope where the specimen slide is placed.

7. **Condenser lens:** The Abbe condenser lens is positioned under the center of the stage and condenses light rays, improving image resolution under higher magnification.
8. **Iris diaphragm:** Iris opening controls the amount of light. It is controlled by a lever. The size of the opening is called the aperture. Larger apertures are required for higher magnifications, and smaller apertures are required for lower magnifications.
9. **Filter holder:** This piece is attached to bottom of iris diaphragm. The frosted filter should be removed when using 40x and 100x objective lenses.
10. **Safety rack stop:** When properly adjusted, controls maximum upward travel of stage. Prevents higher power objectives from breaking specimen slides and damaging objective lenses. This stop has been pre-adjusted at the factory.
11. **Focusing knobs:** Dual focusing knobs for course and fine adjustment. Raises or lower stage to bring specimen into focus.
12. **Illumination:** Built-in sub-stage electric LED illuminator provides constant and reliable illumination with adjustable brightness.



## Operation

1. Place microscope in front of you with the eyepiece in a comfortable position. The eyepiece rotates 360°, allowing for viewing from any direction.
2. Using either the stage clips or the graduated mechanical stage, secure the specimen slide. When using the graduated mechanical stage, 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, as doing so may chip or break the slide. Position the slide so that the specimen is over the opening in the stage.
3. Turn on the light using the dial and adjust to the appropriate brightness. The microscope may be used with or without the power supply. Charge the microscope before the initial use. The indicator light on the power supply will turn red when the microscope is fully charged.
4. Rotate coarse focus knobs to move stage down (away) from objective lens as far as possible.
5. 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” indicating that the lens is properly indexed in the optical path.
6. Locate the lever beneath stage that controls the iris diaphragm. Move lever until iris diaphragm is about half open. Normally, aperture of iris should become smaller for lower magnifications and larger for higher magnifications. Experiment with this setting until optimum resolution and contrast of specimen is obtained.
7. Look through the eyepiece and turn the coarse focusing knobs until specimen comes into focus. Scan the slide to located desired specimen for magnification.
8. Adjust fine focus controls until specimen is in sharp focus.
9. 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.

## Objective Specifications

Objective	Numerical Aperture (N.A.)	Color-Coded Ring	Total Magnification with WF10X eyepiece
DIN achromatic 4X	0.10	Red	40X
DIN achromatic 10X	0.25	Yellow	100X
DIN achromatic 40X retractable	0.65	Light Blue	400X
DIN achromatic 100X retractable (MS1118 and MS1122)	1.25	White	1000X

10. 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.
11. 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.
12. When rotating the 40X and 100X objective lenses into place, take care to avoid hitting the cover slip. These lenses have a spring retractable mechanism which retracts slightly into its housing if the front of the lens strikes the specimen slide. With fine focus adjustment at mid-range, the rack stop has been adjusted at the factory to assure 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 using a thicker than normal slide or cover slip, moving the 40X and 100X lenses too quickly or carelessly could cause damage to the front lens element or to the slide.
13. In order to obtain maximum resolution of the 100X oil immersion lens, it is necessary to apply immersion oil between the cover glass of slide and front lens of the objective. Use a very small amount of immersion oil. All air bubbles must be removed from between the lens and slide to create a continuous layer of oil by gently rotating the nosepiece back and forth.

14. When you are finished viewing, all parts that come in contact with oil must be cleaned using lens paper. Failure to do so could permanently damage the 100X immersion objective lens.
15. Do not let the front lens element of the 40X objective lens come into contact with a wet slide surface, as prolonged contact with any moisture could damage the lens. If lens is exposed to moisture, promptly wipe with soft tissue to remove moisture.

## Maintenance

**WARNING: For your own safety, make certain that battery recharger is unplugged and removed from microscope jack 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 instructions are needed.

- a. Fingerprints or other matter on the front lens element of the objective lens is the single most common reason that you will have difficulty in focusing the microscope. Before having costly servicing done, make certain to examine the front lens element with a magnifying glass.
- b. Prior to cleaning any lens surface, brush dust or dirt off lens surfaces using a camel hair brush or compressed air.
- c. Clean only the outer lens surface. Breathe on lens to dampen surface, then wipe with lens paper or lint free tissue. You may also use a cotton swab moistened with distilled water. Wipe lenses with 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 on 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 pre-adjusted at the factory and should not require re-adjustment. However, if you do attempt re-adjustment, note the following procedure.

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

Rotate rack stop screw in clockwise direction until tight

- 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 the course of time it may loosen and cause the stage of the microscope to slip downward on the focusing block.

With stage facing you, the tension adjustment collar is located between arm and coarse focus knob on left side of microscope. Turn collar counter-clockwise to tighten tension, clockwise to loosen tension.

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

### 3. Electrical maintenance

- a. The battery compartment is accessed by removing the four screws on the bottom panel of the microscope. There are three, AA rechargeable batteries that are expected to recharge approximately 500 times before needing replacing. To open the housing for the batteries remove the two screws holding the housing in place. Remove one small screw to open the housing. *Important Note:* replace only with rechargeable batteries. Replacing with alkaline batteries may result in batteries exploding.
- b. If the light on the power supply fails to illuminate or the microscope will not charge, the power supply may need to be replaced. Replacement 4.6 V power supplies are available (Catalog No. MS1167).

## 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.
Unclear image.	No cover slip on the specimen slide.	Add the cover slip.
	The cover slip is not standard thickness	Use a cover slip with 0.17mm thickness.
	The specimen is facedown.	Turn it over.
	The immersion oil has accumulated on the dry objective. (100X lens)	Clean thoroughly.
	Immersion oil is not used for the 100X objective.	Use immersion oil.
	Air bubble in the immersion oil.	Slightly rotate the nosepiece back and forth.
	The aperture is not opened to the correct size.	Adjust the iris diaphragm.
	The condenser is not in the right position.	Adjust the condenser.
The image moves while focusing.	The specimen slide is not fixed.	Fix with clips.
	The aperture is not large enough.	Open the iris diaphragm.
	The condenser is not in the right position.	Adjust the condenser.
The field of view is not bright enough.	The specimen is outside the cover slip	Reset the cover slip
	Stain or dust has accumulated on the condenser, objective, eyepieces, base lens.	Clean lens.
	No filter is used.	Use correct filter.
The objective touches the cover slip while turn the nosepiece.	The bulb is too dim	Turn the intensity up on the light.
	The cover slip is facedown.	Turn the cover slip over.
Cannot move the slide smoothly.	The cover slip is not standard.	Use a cover slip with thickness of 0.17mm.
	The slide is positioned incorrectly.	Ensure the slide is being help by the slide holder and is not over or under it.
The light does not work.	The graduated mechanical stage is loose.	Tighten associated screws.
	No power to the light.	Check the connection of the power cable or the charge of the batteries. Check the rating on the power supply.
The microscope will not charge.	The voltage is too high.	Use a 4.6 V power supply
	Power supply malfunction	Replace power supply
	Batteries will not charge.	Replace rechargeable batteries with new rechargeable batteries. Not alkaline batteries.

## Limited 5-year Warranty

Flinn Scientific, Inc. warrants the microscope against manufacturers defect for five years from the date of purchase. Please contact Flinn Scientific at [flinn@flinnsci.com](mailto:flinn@flinnsci.com) or 1-800-452-1261.