User Manual

Trinocular Polarizing Microscope

Model M837PL

MicroscopeNet.com

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i. Caution

1. Find the “UP” sign and place the Styrofoam container on your table or bench so that the arrow is pointing upward. Open the shipping carton carefully to prevent any accessory items (i.e. objectives and eyepieces) from dropping and being damaged.

2. Do not discard the molded Styrofoam container. The container should be retained should the microscope ever requires reshipment.

3. Keep the instrument out of direct sunlight, high temperature or humidity, and dusty environments. Ensure that the microscope is located on a smooth, level and firm surface.

4. If any specimen solutions or other liquids splash onto the stage, objective or any other component, disconnect the power cord immediately and wipe up the spillage. Otherwise, the instrument may be damaged.

5. **Important**: the lamp, lamp housing and adjacent parts will become very hot. Do not touch these parts until they have completely cooled. Never attempt to handle a hot halogen bulb.

6. All electrical connectors (power cord) should be inserted into an electrical surge suppressor to prevent damage due to voltage fluctuations.

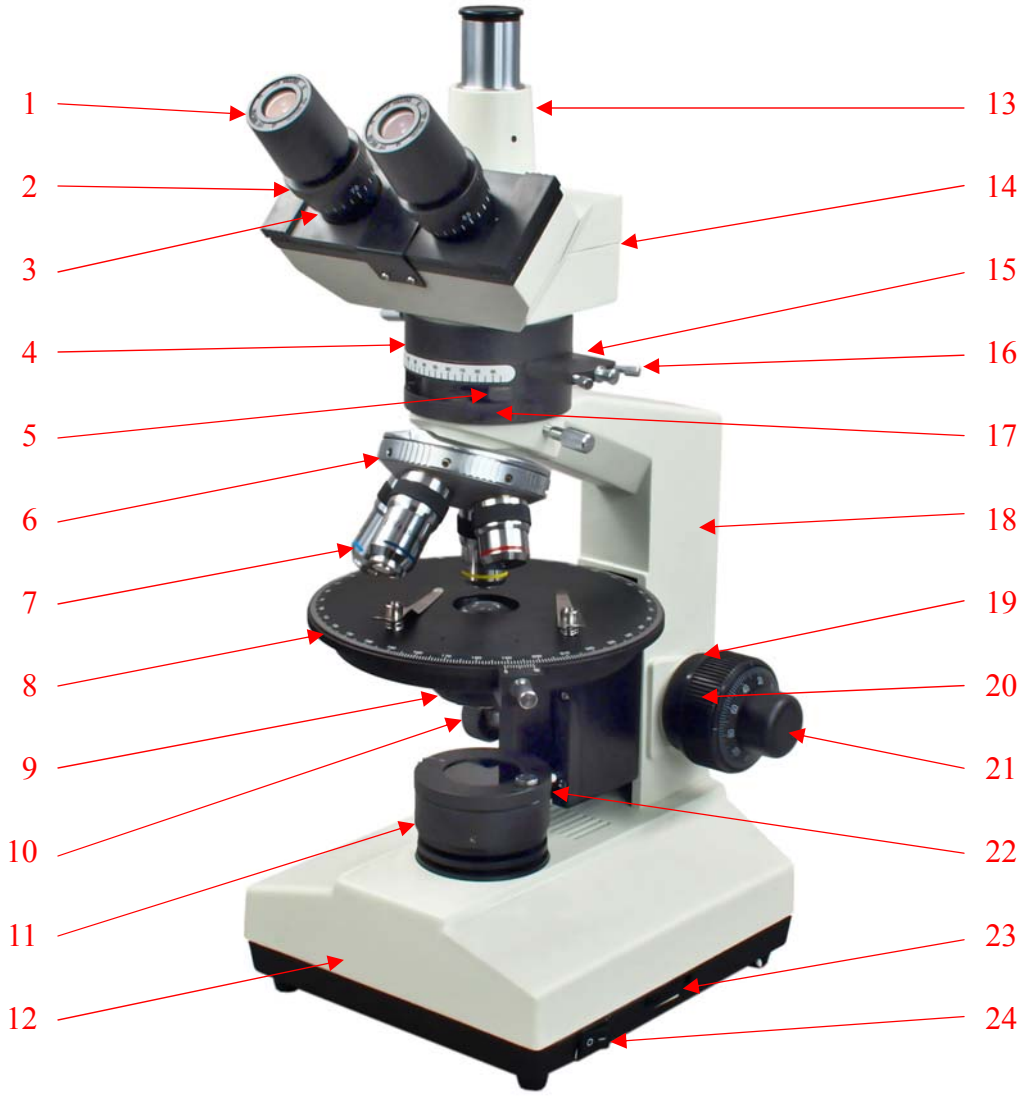
7. For safety, when replacing the halogen lamp or fuse, be sure the main switch is off; unplug the power cord, and only replace the halogen bulb after the bulb and the lamp house has completely cooled down.

8. Confirm that the input voltage indicated on your microscope corresponds to your line voltage. The use of a different input voltage other than that as indicated will cause severe damage to the microscope.

ii. Care and maintenance

1. All the lenses have been calibrated and adjusted. It is forbidden to disassembly them yourself.
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. **Do not use organic solvents for cleansing**
3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft cloth or cotton swab moistened by a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using a circular motion. A small amount of absorbent cotton wound on the end of a tapered stick makes a useful tool for cleaning recessed optical surfaces. Avoid using an excessive amount of solvents as this may cause problems with optical coatings or cemented optics or the flowing solvent may pick up grease making cleaning more difficult.
4. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.

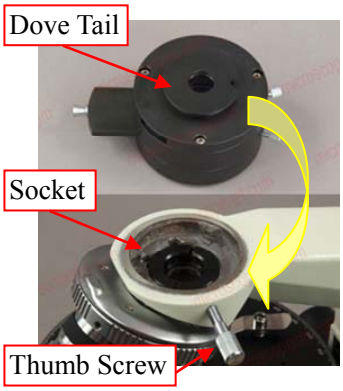
1. Components illustration



1. Eyepiece
2. Diopter Ring
3. Eyepiece Tube
4. Intermediate Tube
5. Analyzer Bar
6. Nosepiece
7. Objective
8. Rotating Stage
9. Condenser
10. Condenser Focus Knob
11. Light Collector
12. Microscope Base
13. Photo Tube
14. Viewing Head
15. Bertrand Lens
16. BL Centering Screw
17. Test Plate Slot
18. Microscope Frame
19. Tension Ring
20. Coarse Focus Knob
21. Fine Focus Knob
22. Polarizer
23. Intensity Dial
24. Power Switch

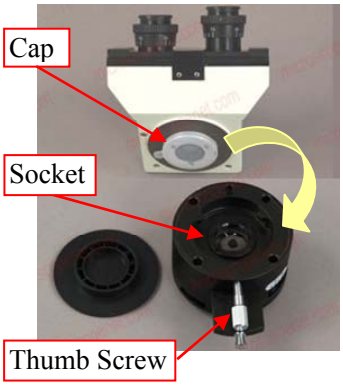
2. Installation

2.1 Install the intermediate tube



2.1.1 Loosen the thumb screw on the top of the microscope frame (18) and remove the plastic cover.
2.1.2 Remove the cover on the dove tail at the bottom end of the intermediate tube (3).
2.1.3 Insert the dove tail into the socket on the top of the frame (18); ensure that it completely seats in, tighten the set screw.

2.2 Install the trinocular viewing head



2.2.1 Loosen the thumb screw on the intermediate tube (4) and remove the plastic cover;
2.2.2 Remove the cap of the dove tail on the bottom end of the viewing head (14);
2.2.3 Insert the dove tail of viewing head into the socket of intermediate tube, ensure that the dove tail is completely seated into the socket; and then tighten the thumb screw.
2.2.4 Do not release the view head from your hand grip until you are sure the head is installed securely.

2.3 Install the photo tube

2.3.1 Screw off the cap on the top of the view head (14).
2.3.2 Screw the photo tube (13) onto the head (14).

2.4 Install the eyepieces

2.4.1 Remove the protective caps from the eyepiece tubes (3).
2.4.2 Insert the eyepieces (1) into the eyepiece tubes (3).

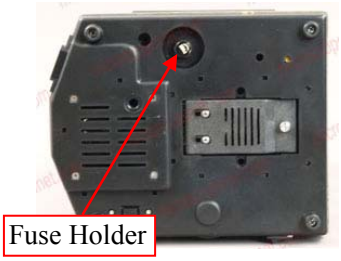
2.5 Install the objectives

2.5.1 Adjust the coarse focus knob (20) until the stage (8) is at its lowest position.
2.5.2 Install the 4x objective onto the nosepiece (6). Then in a clock-wise direction, rotate the nosepiece and install each succeeding higher power objective.

2.6 Install the filter

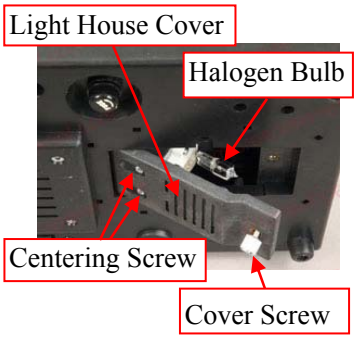
2.6.1 Swing out the filter holder under the condenser (9).
2.6.2 Insert the filter into the holder, swing the holder back in.

2.7 Replace the fuse



2.7.1 Turn off the power switch (24) and unplug the power cord.
2.7.2 Take the eyepieces (1) off and ensure the head (14) and intermediate tube (4) are securely locked by the thumb screw.
2.7.3 Lay the microscope down on its side gently.
2.7.4 Find the fuse holder at the bottom of the base.
2.7.5 Turn the fuse holder counter-clockwise, take out the old fuse.
2.7.6 Insert new fuse, and then turn fuse holder back on clockwise.

2.8 Replace the halogen bulb

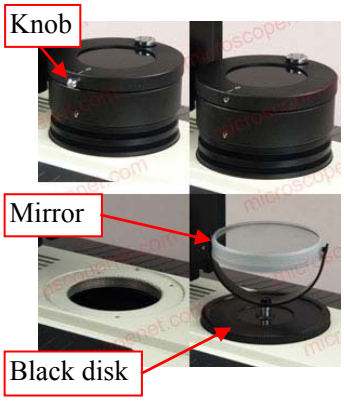


2.8.1 Turn the power switch (24) off and unplug the power cord. Wait for a while till the lamp and light housing cools down.
2.8.2 Take the eyepieces (1) off and ensure the head (14) and intermediate tube (4) are securely locked by the thumb screw.
2.8.3 Lay the microscope down on its side gently.
2.8.4 Loose the screw on the light house cover, and then open the cover.
2.8.5 Take out the dead bulb and insert the new bulb. Be sure the pins on the bulb are completely inserted into the pin holes.
2.8.6 The center of the bulb can be adjusted by move the two screws to get even brightness.
2.8.7 Push the cover back and tighten the cover screw.

Caution:

- Don't touch the halogen bulb with your bare fingers. The fingerprints left on the bulb will shorten the bulb's life.

2.9 Mount the mirror



2.9.1 Turn the power switch (24) off and unplug the power cord.
2.9.2 Screw off the knob on the polarizer
2.9.3 Screw off the light collector (11) on the base.
2.9.4 Turn the black disc onto the base and then insert the mirror into the hole at the center of the black disc.
2.9.5 You may try to get reflected ambient light on either side of the mirror with different angles for best result.

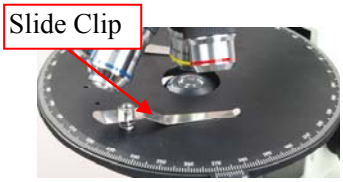
3. Operation

3.1 Adjust illumination

3.1.1 Connect the power cord and press the power switch (24) on.

3.1.2 Turn the intensity dial (23) to increase or decrease the brightness.

3.2 Place specimen



3.2.1 Place the slide on the rotating stage; ensure the interesting spot in the center of the stage opening.

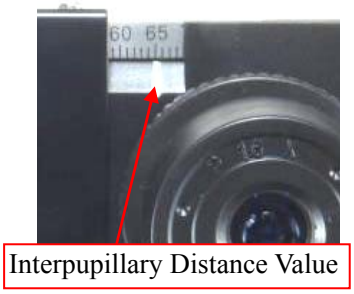
3.2.2 Use the slide clips to gently secure the slide.

Caution:

- Ensure the objective does not touch the slide when switch the objectives.

3.3 Adjust interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes then slowly slide the tubes in and out. The interpupillary distance is correct when the left and right fields of view converge completely into one image.



3.4 Adjust eyepiece diopter

3.4.1 Rotate the 10X objective into position.

3.4.2 Rotate the diopter ring on the right eyepiece tube until its numerical value is the same as your interpupillary distance, for example, 65 in the right figure.

3.4.3 Close your left eye and bring the specimen into focus following the focusing procedures in 3.5.

3.4.4 Close your right eye and bring the same specimen into clear sharp focus by adjusting the diopter ring on left eyepiece tube only. Do not use focus knobs at this step.

3.4.5 Since both sides are adjustable, you may also do the above in the opposite way, in other words, left eye first and right eye second.

3.5 Focus

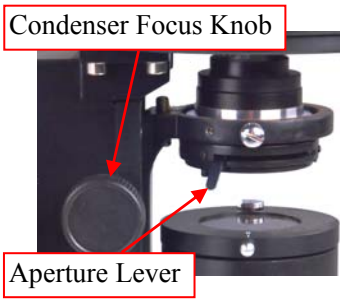
3.5.1 With the 10X objective in the light path, raise the stage using the coarse focus knob until the specimen is close to the objective.

3.5.2 Turn the coarse focus knob until the specimen is in focus. Then use the fine focus knob to obtain a sharp image. You may now switch to another magnification objective.

Tips:

- To prevent your specimen slide from making contact with an objective, raise the stage to its highest position without contacting the 60X objective, then tighten the focus stop lever.

3.6 Adjust condenser



3.6.1 Turn the condenser focus knob (10) to raise or lower the condenser (9).

3.6.2 The condenser (9) is raised when using high magnification objectives and lowered when using low magnification objectives.

Note:

- The highest position and center of the condenser are factory adjusted. Do not attempt re-adjustment.

3.7 Adjust aperture iris diaphragm

Move the aperture lever left or right to adjust the aperture size.

3.8 Adjust Tension

The tightness of the tension ring (19) has been pre-set at the factory. If the stage drops by itself, rotate the tension ring (19) until the tension is in maintained.

3.9 Center the objective

Turn the 2 centering screws with Allen key to center the objective as required.

3.10 Bright field observe

3.10.1 Pull the analyzer bar (5) out to switch the analyzer lens out of the light path.

3.10.2 Push the Bertrand lens (15) from left to right to switch it out of the light path.

3.10.3 Swing the polarizer (22) out of the light path.

3.10.4 Perform focusing and all necessary adjusting following the procedures **3.1 - 3.8**.

3.11 Orthogonal polarized light observe

3.11.1 Push the analyzer bar (5) back to bring the analyzer into light path and turn it to the 90°.
3.11.2 Keep the Bertrand lens (15) out of the light path.
3.11.3 Keep the polarizer (22) in the light path.
3.11.4 Perform focusing and all necessary adjusting following the procedures **3.1 - 3.9**.

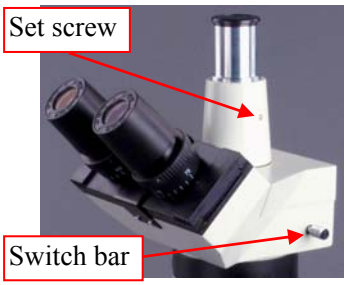
3.12 Convergent light observe

3.12.1 Set up the microscope at orthogonal polarized light observing state.
3.12.2 Perform adjusting and focusing following the above procedures.
3.12.3 Push the Bertrand lens (15) to switch it in the light path.
3.12.4 Rise up the condenser.
3.12.5 Turn the screws (16) to center the Bertrand lens.

3.13 Use the test plates

The test plates, i.e. the 1/4λ plate, λ plate, and quartz wedge plate, are equipped. During the orthogonal polarized light observation, insert the required test plate into the slot (17) to observe the demanded images.

3.14 Photo/video observing, capturing and recording



3.14.1 Insert the camera into the photo tube.
3.14.2 There might be a switch bar on the viewing head and it should be pulled out to switch the light path to photo tube.
3.14.3 Turn on the computer and launch the observing software to examine.
3.14.4 If necessary, adjust the height by loosening the 2 set screws on the photo tube and turn the upper part in order to make the camera parfocal with the eyepieces.
3.14.5 You also can capture images or record live videos through the software.

Note:

- Camera and digital camera sold separately.

4. Specifications

4.1 General

Total Magnification	40X, 100X, 400X, 600X
Viewing Head	Trinocular, inclined 45º, swiveling 360º, interpupillary distance 55-75mm, adjustable diopter
Eyepieces	one WF10X/18 and one WF10X/18 with crosshair reticle
Nosepiece	Quadruple, objective center adjustable
Objectives	Strain free achromatic DIN 4X, 10X, 40X(spring), 60X(spring)
Focus system	Coaxial coarse and fine focusing, minimum fine focusing adjustment at 0.002mm, range 28mm
Condenser	Abbe, NA=1.25, with iris diaphragm and filter holder
Stage	Circular rotating stage, with 360° angle graduations and a vernier scale, accurate to 0.1°, diameter Φ160mm
Illumination	Halogen lamp, 6V/20W, brightness adjustable

4.2 Eyepieces

	WF10X/18	WF10X/18 with crosshair reticle
Magnification	10X	10X
Field of View	18mm	18mm

4.3 Objectives

	4X	10X	40X	60X
Magnification	4	10	40	60
Numerical Aperture	0.1	0.25	0.65	0.85
Thickness of Slide cover	0.17mm	0.17mm	0.17mm	0.17mm
Working Mode	Dry	Dry	Dry	Dry
Spring	No	No	Yes	Yes

4.4 Polarized light components:

Polarizer	0°, swing in/out the light path
Analyzer	0° - 90° rotatable, pull out/push in the light path
Bertrand Lens	Push in and pull out of the light path, center adjustable by two screws
Test Plate	1/4λ plate, λ plate and quartz wedge plate

5. Troubleshooting guide

5.1 Optical problems

Problem	Cause	Solution
Darkness at the periphery or uneven brightness in the field of view	The nosepiece not in click stop position	Revolve the nosepiece to click-stop position
	The light source is not at the center	Adjust the position of the bulb
Dirt or dust in the view	Dirt or dust on the lenses of eyepiece, objective, light collector, condenser or specimen	Clean the lens with a camera cleaning kit (not included in the package)
Poor image quality	No slide cover attached to the slide	Attach a 0.17mm slide cover
	Slide cover is too thick or thin	Use a slide cover with the thickness designated by the objective
	Slide may be upside down	Turn slide over so the cover-glass faces up
	Immersion oil is put on a dry objective	Check the objective, clean if necessary
	Condenser aperture is closed or open too much	Open or close properly
	Condenser is too low	Adjust the condenser to the right position

5.2 Image problems

Problem	Cause	Solution
Image moves while focusing	Specimen rises from stage surface	Secure the specimen in the slide clip on the stage
	Nosepiece is not in the click-stop position	Turn the nosepiece to the click-stop position
Image tinged yellow	Blue filter not used	Use daylight blue filter
	Lamp intensity is too low	Adjust the light intensity by turning the intensity control knob
Image is too bright	Lamp intensity is too high	Adjust the light intensity by turning the intensity control knob
Insufficient brightness	Lamp intensity is too low	Adjust the light intensity by turning the intensity control knob
	Aperture diaphragm over closed	Open to the proper setting
	Condenser position too low	Adjust the condenser at the right position

5.3 Electrical problems

Problem	Cause	Solution
Lamp does not light when switched on	No electrical power	Check power cord connection
	Lamp bulb burnt out	Replace bulb
	Fuse blown out	Replace fuse

5.4 Mechanical problems

Problem	Cause	Solution
Image does not focus with high power objective	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a right slide cover according to the objective
High power objective contacts slide when switch from low power objective	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a right slide cover according to the objective
	Diopter adjustment is not set properly	Readjust the diopter settings
Slippage of focus when using the coarse focusing knob. Fine focus is ineffective	Tension adjustment is set too low	Increase the tension on the focusing knobs
	Tension adjustment is set too high	Loosen the tension on the focusing knobs

5.5 Polarized light problems

Problem	Cause	Solution
Dark or no sufficient light in the field of view when perform normal observation	One or both of the analyzer and polarizer in the light path	Remove the analyzer and polarizer out of the light path
	Test plate or Bertrand lens is in the light path	Remove the test plate and/or Bertrand lens
Failed for polarized light observation	One or both of the analyzer and polarizer not in the light path	Put the analyzer and polarizer into the light path
	The specimen is not good under polarized light observation	Try other observation