User Manual

Darkfield Trinocular Compound Microscope

Model XM837A191BOIL

MicroscopeNet.com

Table of Contents

i. Caution

1. Find the “UP” sign and place the Styrofoam container on your table so that the arrow is pointing upward. Open the shipping carton carefully to prevent any small items (i.e. objectives or 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 light, light 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.

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. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.

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 dampened with 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. Oil immersion objectives should be cleaned immediately after use by removing the oil with lens tissue or a clean, soft cloth.

4. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.

1. Components Illustration

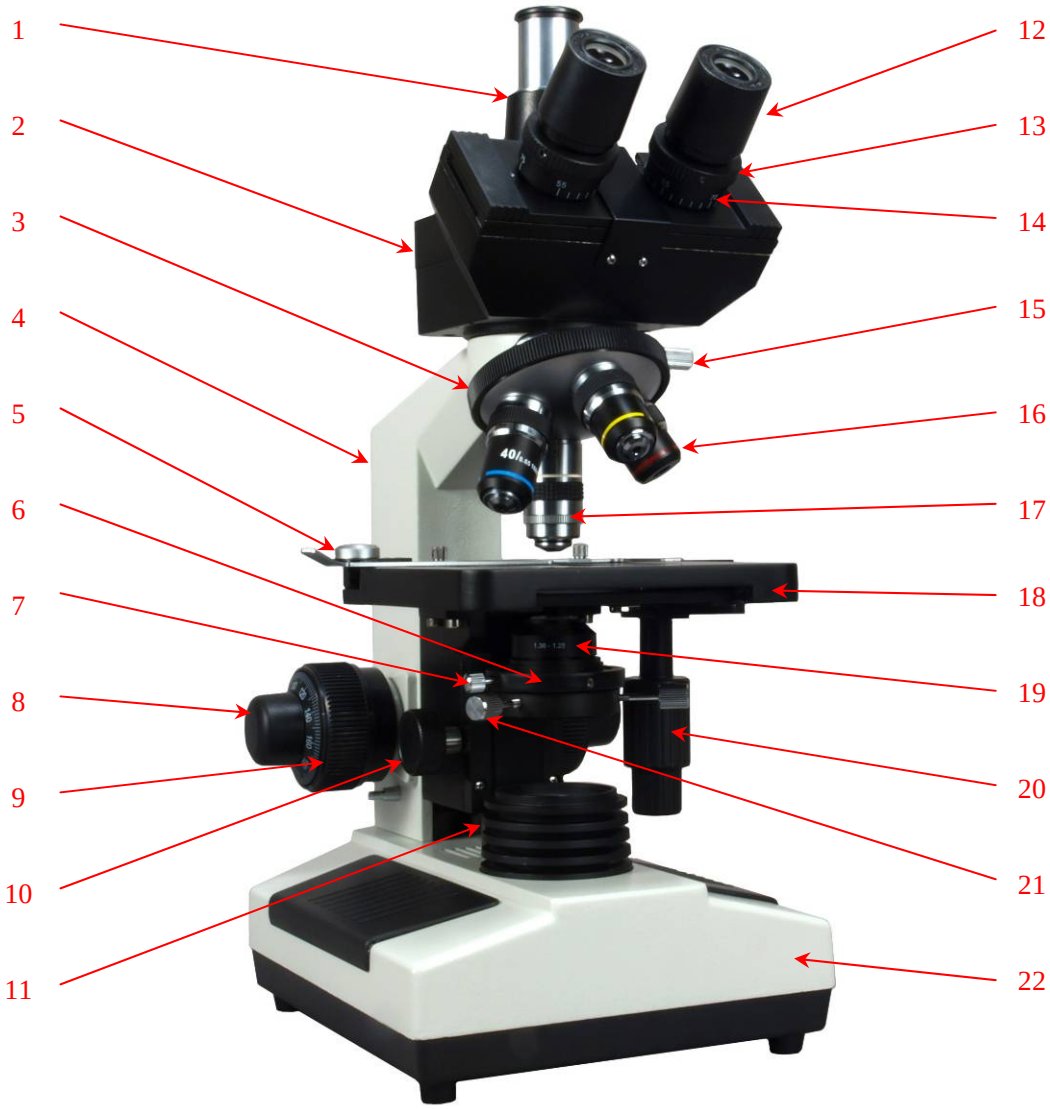


Fig.1

1. Photo Tube
2. Viewing Head
3. Nosepiece
4. Microscope Body
5. Slide Holder
6. Condenser Holder
7. Holder Thumb Screw
8. Fine Focus Knob
9. Coarse Focus Knob
10. Condenser Focus Knob
11. Light Collector
12. Eyepiece
13. Diopter Ring
14. Eyepiece Tube
15. Head Thumb Screw
16. Objective
17. Darkfield Objective
18. Mechanical Stage
19. Condenser
20. Stage Translational Knobs
21. Condenser Centering Screw
22. Microscope Base

2. Installation

2.1 Installation of the trinocular viewing head

1) Loosen the thumb screw (15) on the top of the microscope body (4) and remove the plastic cover on the top.
2) Remove the cap on the circular dovetail of the trinocular viewing head (2).
3) Insert the dovetail into the socket on the top of the body; ensure that the dovetail is completely seated into the socket; tighten the thumb screw (15).

Caution: Do not release the head from your hand grip until you are sure the head is installed securely.

2.2 Installation of the eyepieces

1) Remove the protective caps from the eyepiece tubes (14).
2) Insert the eyepieces (12) into the eyepiece tubes (14).

2.3 Installation of the objectives

1) Adjust the coarse focus knob (9) until the mechanical stage (18) is at its lowest position.
2) Install the 4X objective into the nosepiece (3). Then in a clock-wise direction, rotate the nosepiece and install each succeeding higher magnification objective.

2.4 Installation of the glass filter (Fig.2)

1) Swing out the filter holder under the condenser.
2) Insert the filter into the holder, swing the holder back in.

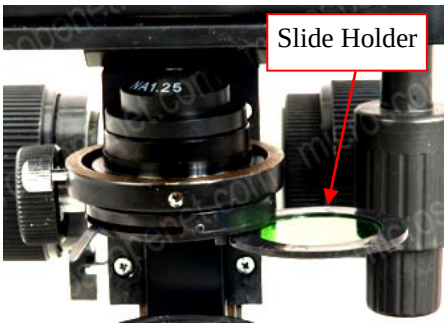


Fig.2

2.5 Installing (or changing) the halogen bulb (Fig.3)

1) Turn the power off and disconnect the power cord.
2) Allow some time to cool down the lamp.
3) Turn over the microscope on its side; find the bulb compartment at the bottom.
4) Open the cover of the bulb compartment by loosening the thumb screw. Take out the dead bulb and insert the new bulb. Be sure the pins on the bulb are completely inserted into the lamp socket. You may also loosen the two screws on the cover to adjust the position of the bulb to get centered and even brightness. Screw the cover on.

Caution: Before you turn over the microscope, be sure to take the eyepieces off and the head is securely locked by the thumb screw.

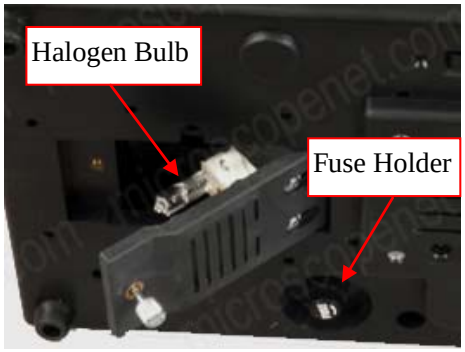


Fig.3

2.6 Replacing the fuse (Fig.3)

1) Turn off the power and disconnect the power cord.
2) Turn over the microscope on its side; find the fuse holder at the bottom of the base.
3) Turn the fuse holder counter-clockwise to take it off, insert new fuse, and then turn it on clockwise.

Caution: Before you turn over the microscope, be sure to take the eyepieces (12) off and the head is securely locked by the thumb screw (15).

2.7 Installing the mirror (optional, your model may not have one)

1) Unplug the power cord.
2) Thread off the light collector (11) on the base.
3) Thread the black disc onto the base and then insert the mirror into the hole at the center of the black disc. You may try to get reflected ambient light on either side of the mirror with different angles for best result.

Note: The mirror is only used when there is a power failure or you are on the field and no power available.

Fig.4

3. Operation

3.1 Adjusting illumination (Fig.5)

1) Connect the power cord to the power outlet and the microscope.
2) Turn on the power switch.
3) Turn the variable intensity dial to increase or reduce the brightness.

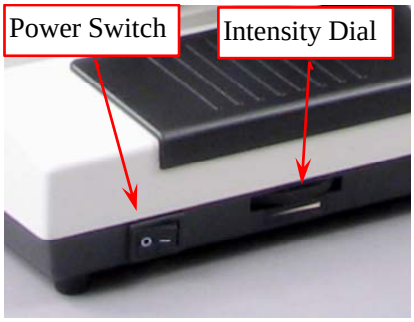


Fig.5

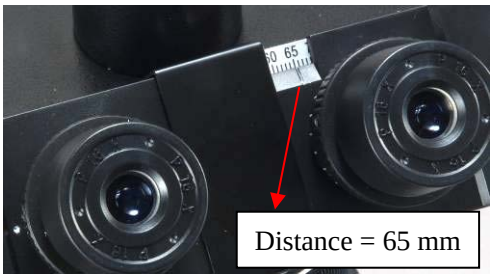
3.2 Placing specimen

1) Place the slide on the mechanical stage (18). Use the slide holder (5) to gently secure the slide.
2) Turn the X and Y translational control knobs (20) to position the specimen for viewing.

Caution: Be sure not to allow an objective to touch a specimen slide when changing objectives.

3.3 Adjusting interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes (14) then slowly slide them in and out. The interpupillary distance is correct when the left and right fields of view converge completely with one image.



3.4 Adjusting eyepiece diopter

1) Rotate the 10x objective into position.
2) Rotate the diopter ring (13) on the right eyepiece tube until its numerical value is the same as your interpupillary distance, for example, 65 in the Figure 6.
3) Close your left eye and bring the specimen into focus following the focusing procedures in 3.5.
4) Close your right eye and bring the same specimen into clear sharp focus by adjusting only the diopter ring (13) on left eyepiece tube. Don't use focus knobs at this step.
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.

Figure 6

3.5 Focusing

1) With the 10x objective in position, raise the mechanical stage (18) using the coarse focus knob (9) until the specimen is close to the objective lens.
2) Turn the coarse focus knob (9) until the specimen is in focus. Then use the fine focus knob (8) 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 100x objective, then tighten the focus stop lever.

3.6 Adjusting condenser

1) Turn the condenser focus knob (10) to raise or lower the condenser (19)
2) The condenser is raised when using high magnification objectives and lowered when using low magnification objectives.

Note:

- *The centering of the condenser and the light axis of the objective are factory adjusted. Do not attempt re-adjustment.*
- *The highest position of the condenser has been factory adjusted. Do not attempt re-adjustment.*

3.7 Adjusting iris aperture diaphragm (Fig.7)

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

Note: The iris diaphragm is designed to adjust the aperture size, not to adjust brightness. Generally, opening the diaphragm to 70-80% of the N.A. value of the respective objective will provide an image of acceptable quality. If you want to observe the image of the iris diaphragm, remove one eyepiece and look through the tube. You will see a dark circle encroaching on the bottom of the tube.

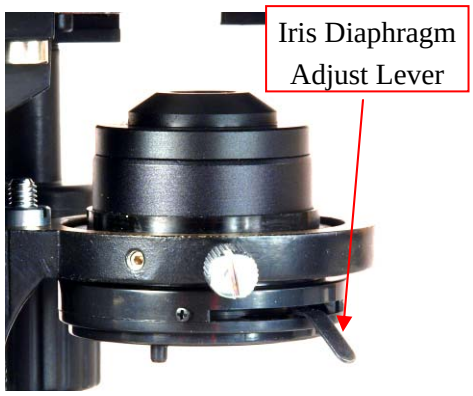


Fig.7

3.8 Adjusting focus tension (Fig.8)

The focus tension has been pre-set at the factory. If the mechanical stage drops by itself, rotate the tension adjustment ring located between the focus knob and microscope body on the power switch side until the tension is in maintained.

3.9 Adjusting focus stop level (Fig.8)

1) Turn the focus lock lever count clockwise to its end.
2) Turn the coarse focus knob to raise the stage to the demanded highest position.
3) Turn the focus lock lever clockwise to its end. The stage cannot be raised over this position anymore.

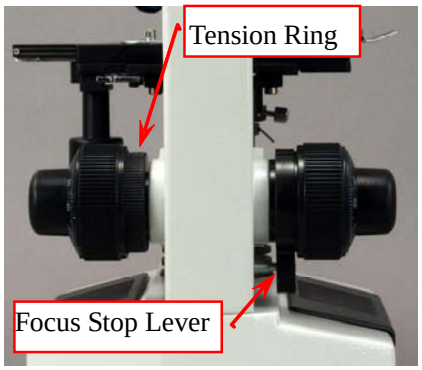


Fig.8

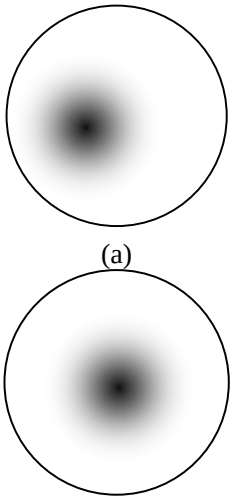
3.10 Photo/video observing, capturing and recording (Fig.9)

1) Remove the plastic photo tube port cover on the top of the viewing head (2).
2) Thread the photo tube (1) on to the trinocular viewing head (2).
3) Turn on the computer and launch the observing software to examine.
4) If necessary, adjust the height by loosening the 2 set screws on the photo tube (1) and turn the upper part in order to make the camera parfocal with the eyepieces.
5) You also can capture images or record live videos through the software.

Fig. 9

Note: Camera and digital camera sold separately.

3.11 **Darkfield observation** (Fig.10)


(a)

(b)

Fig. 10

1) Install darkfield condenser
   - Loosen the thumb screw (7) on the condenser holder (6) and remove the brightfield Abbe condenser.
   - Install the darkfield condenser and tighten the thumb screw (7) on the condenser holder (6).
2) Centering the darkfield condenser
   - Turn the 40X objective to the light path.
   - Turn the condenser focus knob to slowly lower and raise the condenser till a dark spot showed in the viewing field as shown in the figure 10 (a).
   - Turn the condenser translational centering screws (21) to move the dark spot to the center as shown in the figure 10 (b).
3) Raise the condenser till the top lens is close to the opening of stage. Apply a drop of immersion oil on the front lens of condenser.
4) Place the slide on the stage. Raise the condenser and let the oil drop contact the underside of the slide. If air bubbles exist in the oil, clean the oil from the condenser lens and bottom of slide and repeat the procedures.
5) Following the procedures mentioned above to get clear image.
6) When using the 100x darkfield objective, adjust the iris ring to get a darkfield image, and proper brightness and contrast of view field.

Note：The condenser won't work if no oil drop applied on the condenser top lens.

Fig.11

4. Specifications

General

Model	XM837A191BOIL
Total Magnification	40X, 64X, 100X, 160X, 400X, 640X, 1000X, 1600X
Viewing Head	Trinocular, inclined 45º, swiveling 360º Interpupillary distance 55-75mm Adjustable diopter on both eyepiece tubes
Eyepieces	1 pair of WF10X/18 1 pair of P16X/11
Objective Tube Length	160mm
Nosepiece	Revolving quadruple
Objectives	Achromatic 4X, 10X, 40X(spring), 100X(spring, oil), 100X(spring, oil, built in iris diaphragm, for darkfield)
Condensers	Abbe condenser: NA=1.25, w/ iris diaphragm and filter holder Darkfield condenser: NA=1.25 – 1.36 Rack and pinion adjustment
Focus Mechanism	Coaxial coarse and fine focusing knobs on both sides w/ focus stop Minimum fine focusing adjustment at 0.002mm, range 28mm
Stage	Double layer mechanical stage Dimension: 5-1/2” x 5-1/2” (140mmx140mm) Movement range: 3” x 2” (75mm X 50mm)
Photo Tube	Height adjustable, range 3/4” (18mm)
Illumination	Transmitted: 6V/20W, Halogen, Variable intensity
Power Supply	AC 100V-240V, 50/60HZ (US and Canada plug)
Dimension	11” x 7-1/2” x 17” (28cm x 19cm x 43 cm)
Net weight	11 lb (5 kg)
Package weight	13.8 lb (6.3 kg)

Objectives

Magnification	NA	slide cover Thickness	Focus	Working Distance	Working Mode
4X	0.10	0.17mm	31.04mm	37.5mm	Dry
10X	0.25	0.17mm	17.13mm	7.316mm	Dry
40X(Spring)	0.65	0.17mm	4.65mm	0.632mm	Dry
100X (Spring, Oil)	1.25	0.17mm	2.906mm	0.198mm	Oil
100X(Spring, Oil, Darkfield)	1.25	0.17mm	2.906mm	0.198mm	Oil

Eyepieces

Designation	Magnification	Field of View	Focal Length
Wide Field	10X	18mm	24.94mm
Plan Field	16X	11mm	15.58mm

Magnifications

Eyepiece	10X	16X	10X	16X	10X	16X	10X	16X
Objective	4X		10X		40X		100X	
Magnification	40X	64X	100X	160X	400X	640X	1000X	1600X

5. Troubleshooting Guide

OPTICAL PROBLEMS

Problem	Cause	Solution
Darkness at the periphery or uneven brightness in the field of view	Revolving nosepiece not in click stop position	Revolve the nosepiece to click-stop position by swinging the objective correctly into the optical path
	The light source of the bulb is not at the center	Adjust the position of the bulb
Dirt or dust on the view	Dirt or dust on the lens eyepiece, condenser, objective, collector lens or specimen	Clean the lens with a camera cleaning kit
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 of the appropriate thickness (0.17mm)
	Slide may be upside down	Turn slide over so the cover-glass faces up
	Immersion oil is on a dry objective (especially the 40x)	Check the objectives, clean if necessary
	No immersion oil used with 100x objective	Use immersion oil
	Air bubbles in immersion oil	Remove bubbles
	Condenser aperture is closed or open too much	Open or close properly
	Condenser is positioned too low	Position the condenser upward

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

IMAGE PROBLEMS

Problem	Cause	Solution
Image moves while focusing	Specimen rises from stage surface	Secure the specimen in the slide holder
	Revolving nosepiece is not in the click-stop position	Revolve the nosepiece to the click-stop position
Image tinged yellow	Lamp intensity is too low	Adjust the light intensity by rotating the intensity control dial
Image is too bright	Lamp intensity is too high	Adjust the light intensity by rotating the intensity control dial
Insufficient brightness	Lamp intensity is too low	Adjust the light intensity by rotating the intensity control dial
	Aperture diaphragm closed too far	Open to the proper setting
	Condenser position too low	Position the condenser upward

MECHANICAL PROBLEMS

Problem	Cause	Solution
Image will not focus with high power objectives	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a 0.17mm cover glass
High power objective contacts slide when changed from low power objective	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a 0.17mm cover glass
	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

DARKFIELD PROBLEMS

Problem	Cause	Solution
It's totally dark in the viewing field	The light is not on	Turn on the light
	There is no oil in between the condenser top lens and slide	Place a drop of oil on the top lens of condenser and let it contact the underside of slide
	The built-in iris diaphragm of 100X objective is not in proper position	Adjust the iris diaphragm ring on the objective
	The low power objective is put in the light path	Use 40X or higher power objective
	The condenser is not in the right position	Lower or raise the condenser slightly to the position that the specimen is the brightest. Make sure the oil contact the slide during the adjustment.
The illumination is insufficient or too bright	The intensity of lamp is too low	Adjust the intensity dial to higher position
	The condenser is not in the right position	Lower or raise the condenser slightly to the position that the specimen is the brightest. Make sure the oil contact the slide during the adjustment.
	The condenser is not centered properly	Adjust the translational centering screws to center the condenser
	The built-in iris diaphragm of 100X objective is not in proper position	Adjust the iris diaphragm ring on the objective
Image of the specimen is not clear and lacking in sufficient contrast	The specimen is not suitable for darkfield observation	Change to brightfield or phase contrast
	The built-in iris diaphragm of 100X objective is not in proper position	Adjust the iris diaphragm ring on the objective
	The condenser is not in the right position	Lower or raise the condenser slightly to the position that the specimen is the brightest. Make sure the oil contact the slide during the adjustment.