

Inverted Metallurgical Microscope  
*XJL-17AT*

OPERATION MANUAL



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# 1 Getting Started

This guide is written on the assumption that it will be used by advanced students and experienced microscopists. It covers the essential adjustments and controls of microscopes. No attempt has been made to include fundamentals of microscopy. Read this guide prior to unpacking the microscope. This guide is designed to illustrate a sequential method for assembly and operation. We recommend the instructions be followed in a sequential process. After assembling the instrument, re-read the guide and become familiar with all adjustments and functions before using your new microscope.

## 2 Components

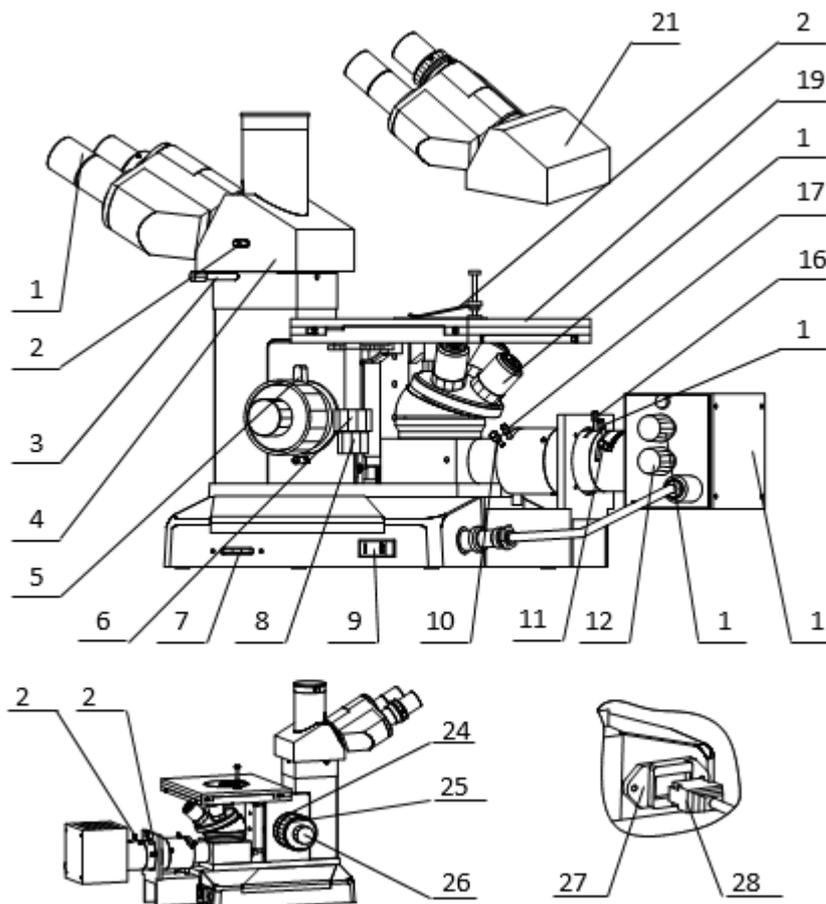


Figure 1

1. Eyepiece 2. Switch Handspike For Observe/Photograph 3. Thumbscrew 4. Trinocular 5. Up Stop 6. Table-board Longitudinal Adjustment Knob 7. Brightness Control Knob 8. Table-board Transverse Adjustment Knob 9. Power Switch 10. Field Diaphragm Centering Screw 11. Focusing Lens Adjustment Lever 12. Light Bulb Vertical Adjustment knob 13. Light Bulb Transverse Adjustment knob 14. Lamp House 15. Filter Wheel 16. Aperture Diaphragm Adjustment Lever 17. Field Diaphragm Adjustment Lever 18. Objective 19. Stage 20. Stretchy Clip 21. Binocular 22. Polarizer (Optional) 23. Lamp House Set Screw. 24. Focus Tensional Adjustment Knob 25. Coarse Focus Control Knob 26. Fine Focus Control Knob 27. Power Outlet with Fuse Seat 28. Power Inlet

## 3 Technical Specifications

**Trinocular:** Inclined 30°

**Objectives:**

Type (no cover glass)	Magnification	N.A.	W.D.(mm)	Model
Plan achromatic	10×	0.25	8.8	XJL-17AT
	20×	0.40	8.6	
	40×	0.60	3.73	
	100×(Spring, Oil)	1.25	0.33	
Achromatic	10×	0.25	6.6	XJL-17BT
	20×	0.40	1.85	
	100×(Spring, Oil)	1.25	0.194	
Span plan achromatic	40×	0.65	0.55	

**Nosepiece:** Quadruple nosepiece ball-bearing reversed nosepiece with positive click stops and smooth operation.

**Eyepieces:** 10X wide field eyepiece, focal length 25mm, field  $\Phi$ 18mm.

**Stage:** Double layer mechanical,

Size: 180mmX150mm,

Moving range: 15mmX15mm.

**Filters:** Ground glass, blue filter, green filter and yellow filter.

**Illumination:** 6V/20W halogen lamp, adjustable brightness.

**Power supply:** 220V (50/60HZ) or 110V (50/60HZ).

**Anti-fungus:** Yes.

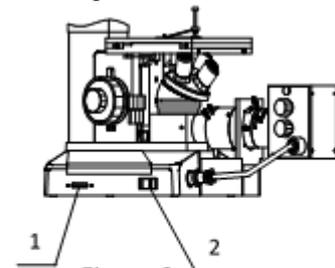


Figure 2

1. Brightness Control Knob
2. Power Switch

## 4 Setup Instructions

1. Remove all parts from their packing materials and retain the packaging in the event you need to transport the product.

2. Connect the power cord to a suitable power supply.

### 4.1 Basic Operation

#### 4.1.1 Illumination controls

The power switch to the illuminator and the brightness control is located on the base. The electrical system is fuse protected and the fuse holder located on the socket.

Turn on the light with the power switch, see figure 2. If the light does not appear to be ON, check the brightness control to see if it's on a sufficiently low setting. Then adjust the brightness control until image can be observed comfortably.

**Note:** *Using the light at brightest setting reduces life span of lamp.*

Focusing Controls

**Focusing adjustment** is accomplished by using the large coarse adjustment knobs located comfortably on each side of the frame. Fine adjustment is accomplished using the smaller knobs located on the same focus shaft. This coaxial arrangement allows for easy, precise adjustment without drift or discomfort.

**Focus Control** Turning either of the coarse focus control knobs will raise or lower the stage.

The smallest graduation on the fine adjust knob index scale is  $2\mu\text{m}$  of vertical.

**Focus Tension Adjustment** The tension of the coarse focus is adjustable and preset at the factory for ease of use. If you wish to adjust the coarse focus tension, first locate the tension adjustment ring, it is located between the frame and coarse adjustment knob.

Turning the ring toward the rear of the microscope increases the tension, and toward the front of the microscope loosens it. Tension is too high if you experience physical discomfort.

**Pre-focusing or Focus Stop Control** Use of this feature will insure that the shorter working distance objectives don't contact the stage or specimen when using the microscope. Its use also simplifies focusing. After focusing on the specimen with the coarse adjustment by low magnification eyepiece, rotation of the lever toward the handler will set an upper limit on the coarse adjustment movement. After changing specimens or objectives, focusing is easily accomplished by rotating the coarse adjustment knob to reach the pre-focused position, then making fine adjustments with the fine adjustment knob. Focusing movement with the fine adjustment isn't affected by using the pre-focusing lever.

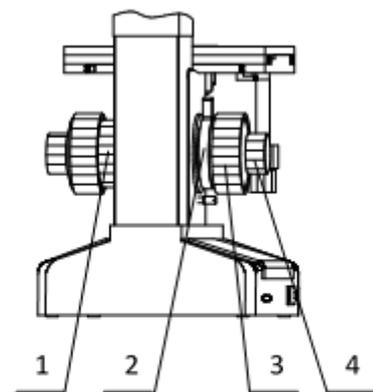


Figure 3

1. Focus Tension Adjustment Knob
2. Up Stop
3. Coarse Focus Control Knob
4. Fine Focus Control Knob

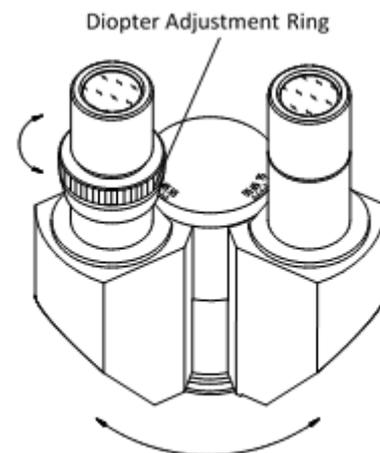


Figure 4

## 5 Diopter and Interpupillary Adjustments

**Diopter Adjustment** Proper correction for individual vision is accomplished via the diopter adjustment located at the left eyepiece, see figure 4. Using the 40X magnification objective, bring an image into focus with your right eye only. Once the

image is well focused, observe with left eye, make fine adjustments with the diopter adjustment ring to correct for your vision.

Proper Interpupillary distance, or the distance between eyepieces, is crucial to the comfort of the user. Adjusting the Interpupillary distance is accomplished through a “folding” action of the optical head, at figure 4, allowing for quick and easy adjustment.

Mechanical Stage Controls, see figure 5, the coaxial transverse/ longitudinal knob allow for easy adjustment.

Illumination Alignment, See Figure 6.

The aperture diaphragm near the illuminator house in the vertical illuminator tube may be adjusted slightly to change contrast.

To center the incident or vertical lamp.

Put a piece of paper and place it on the stage. Take out one objective form nosepiece and rotate the nosepiece until this objective opening hole is in position over the paper.

Turn the power on and adjust the brightness control to establish sufficient light.

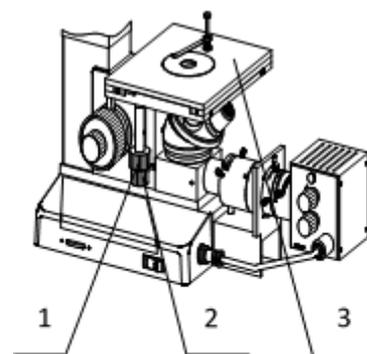
This paper will allow for focusing of the lamp filament on it. If the filament image is not centered in the overpass hole, reduce the aperture diaphragm, adjust the light bulb transverse and vertical adjustment to obtain a uniform image. Adjust the focusing lens lever until a sharp image of the lamp filament is attained, refer to figure 7 for this step.

Reinstall the objective again.

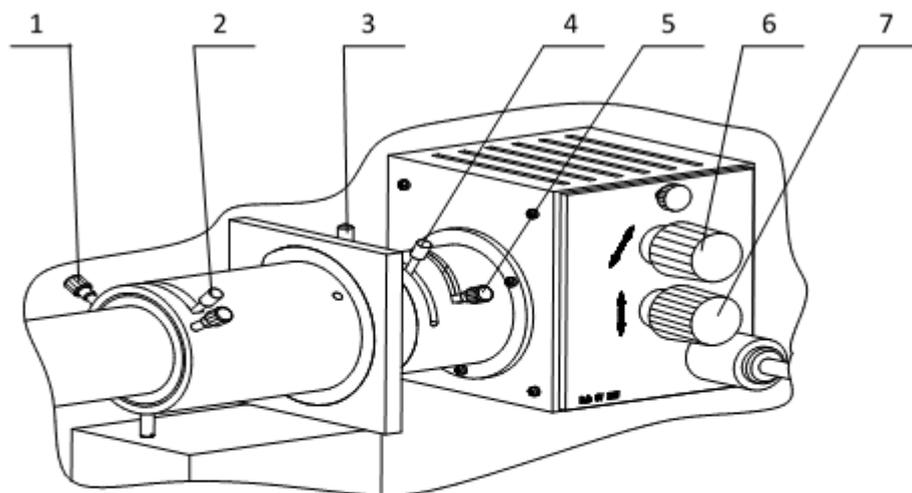
Adjust the focusing control until the image clear. If brightness of field not equality, you may move the lamp adjustment and focusing lens adjustment lever slightly to make the brightness of field equality.

Reduce the field diaphragm, If it is not centered, move it to the center using the centering screw. Adjustment can be done by opening the field diaphragm.

The green, yellow, blue filter and ground glass can be inserted in the socket to obtain an image of good quality; also the polarizer (optional) can be inserted in the socket to make the polarizing analyzer on work.

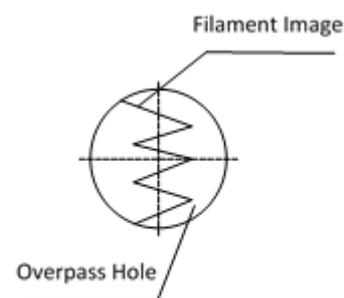


**Figure 5**  
 1. Longitudinal Adjustment Knob  
 2. Transverse Adjustment Knob  
 3. Stage



**Figure 6**

1. Field Diaphragm Centering Screw
2. Field Diaphragm Adjustment Lever
3. Aperture Diaphragm Adjustment Lever
4. Filter wheel (Polarizer (optional))
5. Focusing Lens Adjustment Lever
6. Light Bulb Transverse Adjustment Knob
7. Light Bulb Vertical Adjustment Knob



**Figure 7**

## To Observe the Facility Polarizer (Optional)

Turn the Analyzer and Polarizer to the light way (Figure 8), so that the analyzer used for transmitted light work., rotate the polarizer (Figure 6) while watching the brightness in the field and let the polarizer and analyzer orthogonally. The white push rod to the upper left of the trinocular head will send 100% of the image light to the binocular eyepieces or to the top port. It satisfies high-grape photography.

### 5.1 Changing the Lamp

Turn off and unplug the microscope.

Loosen the set screw, see figure 9, and remove the entire cover board from the lamp house. The halogen lamp can be removed by grasping the lamp and pulling it firmly from its fixture.

**Take care not to touch the lamp with bare fingers, as the lamp will be hot.**

Insert the new halogen lamp into the same fixture. When installing the new lamp, be careful not to touch the glass with your fingers. The new lamp should be supplied in a plastic protective envelope. If not, use a tissue or other medium to grasp the lamp. This will prevent contamination from your hand from reducing the lamp's intensity and life. Reinstall the cover board to the lamp house and retighten the screw.

If necessary, you may need to readjust the lamp as previously described.

#### 5.1.1 Changing the Fuse

Draw the Power inlet and remove the fuse, reinstall the new one and insert the fuse seat and power line (Figure 10).

### 5.2 Preventative Maintenance

#### 5.2.1 Cleaning frame and stage

Disconnect the plug from mains socket before cleaning. Clean the frame and stage with a soft cloth moistened with a mild detergent solution. Be sure the instrument is dry before using.

#### 5.2.2 Cleaning optical parts

Microscope eyepieces and objectives are coated.

They should not be wiped while dry as dirt or dust may scratch the coating. It is best to remove parts from the frame prior to cleaning. Always blow loose dust away first. Use cotton swabs or lens tissue moistened with a lens cleaner or a small amount of alcohol, then wipe the surface clean with a good quality lens tissue. Solvents such as Xylene should NOT be used as cleaner.

#### 5.2.3 Cleaning 100X oil immersion lens

The immersion oil should be removed from the lens at the end of each workday using cotton swabs or lens tissue moistened with a lens cleaner or a small amount of alcohol.

**DO NOT DISASSEMBLE OBJECTIVE LENSES.**

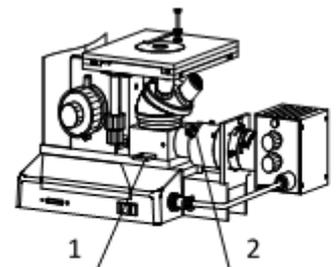


Figure 8  
1. Analyzer (Optional)  
2. Polarizer (Optional)

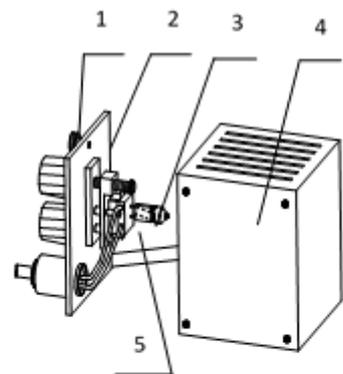


Figure 9

1. Set Screw
2. Cover Board
3. Lamp
4. Lamp House
5. Lamp Socket

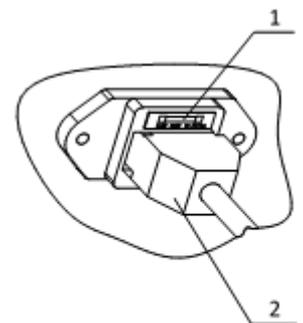


Figure 10

1. Fuse seat
2. Power inlet