CFM SERIES

COMPARISON FORENSIC MICROSCOPE

MANUAL

Distributed By:

NEW YORK MICROSCOPE COMPANY INC.
AKA MEL SOBEL MICROSCOPES

100A Lauman Ln., Hicksville, N.Y. 11801 Toll Free: (877) 877-7274 • Fax: (516) 801-2046
Web Site: www.microscopeinternational.com • www.nscopes.com • E-mail: Info@nscopes.com
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SAFETY NOTES

1. Open the shipping carton carefully -- your microscope arrived packed in a molded shipping carton. **Do not discard the carton:** the shipping carton should be retained for reshipment of your microscope if needed.

2. Carefully remove the microscope from the shipping carton and place the microscope on a flat, vibration-free surface.

3. Avoid placing the microscope in dusty surroundings, in high temperature or humid areas as mold and mildew can form. Carefully remove the microscope from the shipping carton and place the microscope on a flat, vibration-free surface.

4. Please check the complete microscope, spare parts and consumable parts according to the packing list.

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

   **NOTE:** Always plug the microscope power cord into a suitable grounded electrical outlet. A grounded 3-wire cord is provided.

CARE AND MAINTENANCE

1. Do not attempt to disassemble any component including eyepieces, objectives or the 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 bulb. If dirt remains on the optical surface, use a soft, lint free 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.

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

5. UNITRON® microscopes are precision instruments which require periodic servicing to maintain proper performance and to compensate for normal wear. A regular schedule of preventative maintenance by qualified service personnel is highly recommended. Your authorized UNITRON® distributor can arrange for this service.
INTRODUCTION

Congratulations on the purchase of your new UNITRON® microscope. UNITRON® microscopes are engineered and manufactured to the highest quality standards. Your microscope will last a lifetime if used and maintained properly. UNITRON® microscopes are carefully assembled, inspected and tested by our staff of trained technicians in our New York facility. Careful quality control procedures ensure each microscope is of the highest quality prior to shipment.

TECHNICAL PARAMETERS

Objective Magnification: 16200: 0.8X, 1.25X, 2X, 3.2X, 4.8X
Optional auxiliary lens: 0.4X, 2X

Eyepieces: CWF 10x/22mm (standard)
CWF 20x/13mm (optional)
CWF 16x/16mm (optional)

Working Distance: 95mm

Adjustment of Interpupillary Distance: 55-75mm

Stage: • Two circular 65mm stages
• 360° revolving
• 25° gradient adjustment in different directions
• Combined operation for two stages: horizontal movement range -- 55mm; elevation and subsidence 80mm
• Independent operation for two stages: horizontal movement range of X and Y: 55mm x 55mm; elevation and subsidence -- 55mm
• Diameter of transmitted light stage: 95mm

Camera Adapter: Optional: 2x, 4x, and 10x adapters

CCD Adapter: Optional: 0.4x

Illumination: • Input voltage: 100V – 240V; Output voltage: 12V 5A
• 2.5W circular LED light (42 LED ring)
• Gooseneck LED spotlight (White LED light)
  Optional: UV, Green, Red LED Light
• Gooseneck fluorescent light
• 3w transmitted light (48 LED ring)
• Coaxial illuminator: high power, 1w LED
INSTRUMENT STRUCTURE - (Figure 1)

1. Base
2. Light Control Panel
3. Height Adjustment Focus Knob
4. Lateral Adjustment Focus Knob
5. Socket for Transmitted Light
6. Socket for Circular Light
7. Socket for Gooseneck LED Light or Gooseneck Fluorescent Light
8. Transformer (12v)
9. Focus Knob
10. Gooseneck Fluorescent Light
11. Circular LED Light
12. Bridge Body
13. Separation Line Adjusting Knob
14. Camera Beam Splitter
15. Camera Adapter
16. CCD Camera
17. Camera
18. Eyepiece
19. Photo Tube
20. Binocular Head
21. Tightening Set Screw
22. Separation Line Adjustment Screw
23. Magnification Adjustment Knob
24. Set Screw
25. Magnification Changer Knob
26. Lock Screw
27. Transmitted Light
28. Tightening Knob
29. Front and Back Adjustment Knob
30. Stage
31. Left and Right Adjustment Knob
32. C-Mount Adapter
INSTRUMENT STRUCTURE - (Figure 1)

1. Base
2. Light control panel
3. Height Adjustment Focus Knob
4. Lateral Adjustment Focus Knob
5. Socket for Transmitted light
6. Socket for Circular LED light
7. Socket for Gooseneck LED Light or Gooseneck Fluorescent Light
8. Transformer (12v)
9. Focus Knob
10a. Gooseneck LED Light
11. Circular LED Light
12. Bridge Body
13. Separation Line Adjustment Knob
14. Camera Beam Splitter
15. Camera Adapter
16. CCD Camera
17. Camera
18. Eyepiece
19. Photo Tube
20. Binocular Head
21. Tightening Set Screw
22. Separation Line Adjustment Screw
23. Magnification Adjustment Knob
24. Set Screw
25. Magnification Changer Knob
26. Lock Screw
27. Transmitted Light
28. Tightening Knob
29. Front and Back Adjustment Knob
30. Stage
31. Left and Right Adjustment Knob
32. C-Mount Adapter
SET UP
Please review INSTRUMENT STRUCTURE on pages (5-6) before attempting to set up the microscope.

MAIN BODY
1. Place the microscope on a suitable work table, install the Bridge Body (12) into arm of stand and lock it with the Lock Screw (26).
2. Remove the dust cap in the middle of bridge and install the Binocular Head (20). Lock it in with the Set Screw (21).
3. Remove the dust caps on the Binocular Head (20) and insert the Eyepieces (18) into the tubes.
4. Insert the power cable of the transformer into the Base (1), and plug the other end into a grounded AC110v outlet.

ILLUMINATION
Circular Light
Set up the Circular Light (11) by plugging it into the Socket (6) and securing it by tightening the Set Screw (24).

Gooseneck LED Light
Or Gooseneck Fluorescent Light
See Figure 1, the Gooseneck LED Light (10a) or the Gooseneck Fluorescent Light (10) is secured to Socket 7).

Transmitted Light (Optional)
Some objects, such as negative film, transparent and semitransparent objects, should be observed under transmitted light.

See Figure 1. The base of the transmitted light can be secured by tightening the Set Screw (24). After placing the sample on the glass stage of the transmitted light, press the illuminator control button (Figure 2, p. 10)
FUNCTION AND OPERATION

ILLUMINATION

**Using a Polarizer** (Optional)
Using a Polarizer will eliminate scattered stray light for better image quality.

Connect the Polarizer with a Spot Lamp or a Transmitted Lamp, then screw the Analyzer on.

Adjust the brightness and change the polarizing angle by rotating the Analyzer to get a polarizing effect.
FUNCTION AND OPERATION (Continued)

ILLUMINATION (continued)

Coaxial Light (Optional) -- (Figure 5 & 6)
Coaxial illumination is suitable to observe deep hole trace, eyelet or a slippery object surface. The coaxial illumination cable is a four-pin socket which connects with number 7 on Figure 1 and is controlled by the button “RING” on the Light Control Panel.

Setting: connect the coaxial illumination parts according to figure 5. The user can loosen the tightening set screw and adjust the coaxial illumination parts at the required position, then tighten the Set Screw and plug it in. The stage can be adjusted to get the best coaxial illumination effects.

Figure 5
The Setting of Coaxial Light

Figure 6
Magnification Correction

Separation line shall be coincide with all scales in view field
FUNCTION AND OPERATION  (Continued)

ILLUMINATION (continued)

Light Control Panel -- (Figure 2)
The REFL and TRAN can control the light from all three-pin plugs such as Gooseneck LED Spot Light, Transmitted Light, LED Ring Light, and Fluorescent Light.

![Light Control Panel Image]

Figure 2

USING THE SEPARATION LINE
The separation line is thin, black and straight, as is shown in Figure 7-(c). Turning the Separation Line Adjusting Knob (13) can move the comparison line continuously to have a single, cutting or overlapping view field.

If the separation line appears as is shown in Figure 7-(a) or Figure 7-(b), this means the line has changed out of shape and needs to be adjusted by the following steps: remove the dust cover, insert the screw driver that comes with the microscope into the groove within the Bridge Body (22) and carefully adjust the line by viewing through the eyepiece and turning the screw driver slightly until the shape is shown as in Figure 7-(c). If it is like the line in Figure 7-(a), adjust the right screw. If it is like the line in Figure 7-(b), adjust the left screw.

![Separation Line Figures]

Figure 7

- (a) 'Black line' 'White line' over wide
- (b) 'Black line' 'White line'
a wider and a narrower at two ends
- (c) Black & thin straight line
FUNCTION AND OPERATION (Continued)

ADJUSTING INTERPUPILLARY DISTANCE

To adjust the interpupillary distance, hold the left and right eyetubes while observing a specimen. Rotate the eyetubes around the central axis until the fields of view of both eyetubes coincide completely. A complete circle should be seen in the viewing field when viewing the specimen slide. An improper adjustment will cause operator fatigue and will disrupt the objective parfocality.

Where “•” \( 1 \) on the eyepiece tube lines up, then that is the number for the interpupillary distance. Range: 55~75mm. (Fig. 8).

Remember your interpupillary for future operation.

ADJUSTING THE STAGE

Use Knobs (29) and (31) to adjust the stage movement from front to back and left to right. The Stage (30) can be rotated 360°. Move the Stage (30) to adjust it in different directions. The Lateral Adjustment Focus Knob (4) can link the two stages to make the same movements.

ADJUSTING THE FOCUS

To ensure that you obtain sharp images with both eyes (since eyes vary especially for those wearing glasses) any eyesight variation can be corrected in the following manner:

1. Set both diopter collars on the eyepieces to “0.”
2. Set the magnification on the microscope to 4.8x.
3. Set the indicator line to be viewed on the right side only.
4. Place the enclosed stage micrometer on the right side stage.
5. Adjust the focus of the microscope to bring the micrometer to its sharpest focus using your left eye only to observe.
6. Rotate the diopter collar to obtain the sharpest focus.
7. Now using your right eye only obtain the same sharp focus by rotating the right diopter collar until the sharpest image appears.
8. Repeat the above procedures by changing the Indicator Line to view the specimen from the left side only.
9. Repeat these procedures several times going from the maximum to minimum magnification to ensure you get a sharp image at all magnifications.
FUNCTION AND OPERATION  *(Continued)*

ADJUSTING THE MAGNIFICATION

To get the highest quality image, set both the left and right objectives at the same magnification; rotate the Magnification Adjustment Knob (25) to change the objective magnification; under the nominal magnification ratio, the right side magnification still needs to make fine adjustment. The steps of fine adjustment on the magnification are below:

Separately place the stage micrometer on the left and right stage surface, observe the scales image by the eyepiece, move the stage micrometer to keep the reticle scales matched; if the two objective magnifications are not identical, all scales in the view field will not match. Rotate the Magnification Adjustment Knob [Figure 1-(23)] in a clockwise or counter-clockwise direction. Using the fine focus adjustment knob, refocus it until the image is clear and move the stage micrometer to overlap the scales. Repeat the above procedures until the magnifications of both left and right objectives are identical.

Shown as Figure 6 the same adjustment should be done when the objective magnification changes.

CAMERA CENTRATION

Centering when the microscope is connected with a CCD camera and observed with a monitor:

If the target surface center of the CCD camera does not coincide with the center of the C-Mount Adapter, the image center will move during the zoom process. Adjustment method: use the lowest magnification rate and set a point on the sample as an image target, then move the sample until the selected image target coincides with the monitor center. (See Fig. a) After that change the magnification from low to high and remember the moving direction of target point. (See Fig. b); Set the magnification back to low and move the sample towards the opposite direction (see Fig. c), then repeat the above operation until the target point does not move away. Then loosen the three set screws, regulate the center of CCD adapter until the image of target point matches with the monitor center and the objective position (See Fig d). Tighten the set screws until the image center doesn’t move during the zoom process.

The schematic diagram is below:

![Schematic Diagram](image-url)

- **Monitor**: Use low magnification to move target to center of monitor
- **Target moves away from center**: Magnification from low to high
- **Magnification from high to low**: Move target in opposite direction at low magnification. Repeat movements until the target remains at the same point when changing magnifications/zooming
- **Adjust the CCD adapter until the target is at the center and image remains centered when changing magnifications/zooming**
FUNCTION AND OPERATION (Continued)

USING THE BULLET HOLDER

1. Insert the bullet shell into the wire brush bullet holder (Figure 1)

2. Install the Universal Holder base (6) onto the Mechanical Stage and secure it using the two screws (3) as shown in Figure 2.
3. **Viewing Samples** (Figures 3 & 4)

   To view trace on the bottom of the bullet shell, thread the wire brush holder with bullet shell into the base in an upright position (Figure 3).

   To view trace on the side of the bullet shell, put (25) on the end of the bullet shell and secure its position by locking it in place with (29) (Figure 3).

   To inspect a sample with a large diameter, unscrew (11) and remove (30) (Figure 4).
4. **Positioning Samples** (Figures 5, 6, 7)

Rotate the base of the Universal Holder by loosening the locking screw (4a) (Figure 6).

To move the bullet into a horizontal or inclined setting, loosen the locking screw (4a) and slide the bullet holder along the groove. Secure into place by tightening the locking screw.

To adjust the big diameter sample, unscrew (9) and move (8) (Figure 7) forwards or backwards until you obtain a suitable position.
FUNCTION AND OPERATION (Continued)

SELECTING PROPER MAGNIFICATION OF CCD CAMERA

Formulas for Magnification Calculation

Total Magnification = magnification of body x Magnification of CCD x digital Magnification (x magnification of optional auxiliary lens)

Diameter of Object view field = length of CCD target surface diagonal line/magnification of objective/magnification of CCD/ (x magnification of optional auxiliary lens)

Element Size of CCD Camera (Unit: mm)

Digital magnification = length of monitor diagonal line/ CCD target surface diagonal line

For example:

Digital magnification of 8" monitor with 1/3" CCD camera = \( \frac{8 \times 25.4}{6} = 33.87 \)

Digital magnification of 17" monitor with 1/3" CCD camera = \( \frac{17 \times 25.4}{6} = 71.97 \)
## TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE AND SOLUTION</th>
</tr>
</thead>
</table>
| Lamp does not work          | • Confirm the power is on  
• Confirm the power connection is secure  
• Check transformer, if it was damaged, replace it by contacting your authorized UNITRON® distributor  
• Check lamp, if it is damaged, replace it by contacting your authorized UNITRON® distributor  
• Check whether service voltage matches with instrument voltage. If the problem is not caused by the reasons above, please consult your authorized UNITRON® distributor |
| Specimen is not focused     | • Check whether the specimen is too high to get enough distance to focus  
• Check focusing range. If focus distance is not enough, adjust the height of microscope, (the specific approach please read item 6 in this operating instruction) -- Focusing Section  
• Check whether lens is dirty -- If it is dirty please clean the lens, the specific approach please read notes before use in this operating instruction |
| Image is not clear          | • Specimen is unfocused; please adjust according to the above procedures  
• Objective is dirty; please clean the objective according to operating instruction  
• Eyepiece is dirty; please clean the eyepiece according to operating instruction |
MAINTENANCE

Please remember to never leave the microscope with eyepieces removed and always protect the microscope with the dust cover when not in use.

SERVICE

UNITRON® microscopes are precision instruments which require periodic servicing to keep them performing properly and to compensate for normal wear. A regular schedule of preventative maintenance by qualified personnel is highly recommended. Your authorized UNITRON® distributor can arrange for this service. Should unexpected problems be experienced with your instrument, proceed as follows:

Contact the UNITRON® distributor from whom you purchased the microscope. Some problems can be resolved simply over the telephone.

If it is determined that the microscope should be returned to your UNITRON® distributor or to UNITRON for warranty repair, contact UNITRON or your authorized UNITRON® distributor for guidance on packaging and shipping of the instrument.

LIMITED MICROSCOPE WARRANTY

This microscope is warranted to be free from defects in material and workmanship for a period of five (5) years for mechanical and optical components and one (1) year for electrical components from the date of invoice to the original (end user) purchaser. This warranty does not cover damage caused in-transit, misuse, neglect, abuse or damage resulting from improper servicing or modification by other than UNITRON® approved service personnel. This warranty does not cover any routine maintenance work or any other work, which is reasonably expected to be performed by the purchaser. Normal wear is excluded from this warranty. No responsibility is assumed for unsatisfactory operating performance due to environmental conditions such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage or other conditions beyond the control of UNITRON Ltd. This warranty expressly excludes any liability by UNITRON Ltd. for consequential loss or damage on any grounds, such as (but not limited to) the non-availability to the End User of the product(s) under warranty or the need to repair work processes. Should any defect in material, workmanship or electronic component occur under this warranty contact your UNITRON® distributor. This warranty is limited to the continental United States of America. All items returned for warranty repair must be sent freight prepaid and insured to UNITRON Ltd., 73 Mall Drive, Commack, NY 11725 – USA. All warranty repairs will be returned freight prepaid to any destination within the continental United States of America. For all foreign warranty repairs, return freight charges are the responsibility of the individual/company who returned the merchandise for repair.