

# Olympus Metallurgical Microscope SOP

## 4D Labs Confidential

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### Olympus Metallurgical Microscope Standard Operation Procedure

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### Overview

This document will provide a detailed operation procedure of the Olympus Metallurgical Microscope. Formal training is required for all users prior to using the system.

### Revision History

#	Revised by:	Date	Modification
1	Grace Li	11/12/08	Initial document release, formatting updated and Doc. No. added
2	Philip Kubik	11/20/08	Adding more picture and descriptions
3	Nathanael Sieb	02/18/09	Formatting changes
4			
5			

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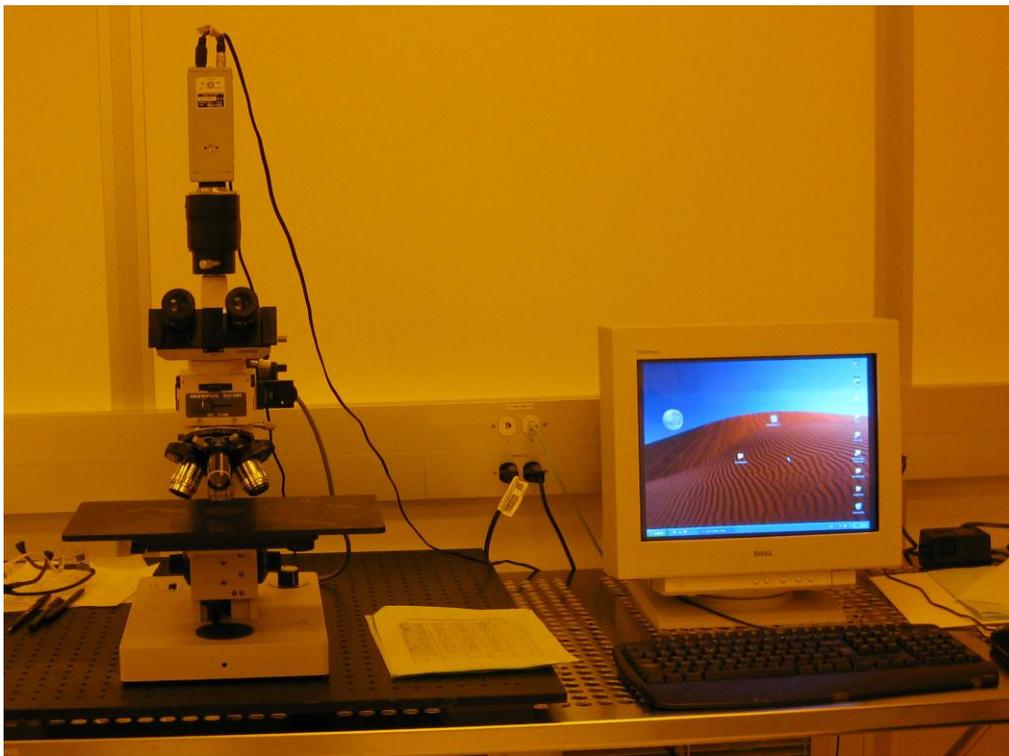
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## General Information

### *1. Description*

The model BHMJ Olympus Metallurgical Microscope is easy to operate. A camera mounted on the trinocular head of the microscope is connected to a computer, enabling the user to make measurements with the MPK Image Map Plus software.



### *2. Features*

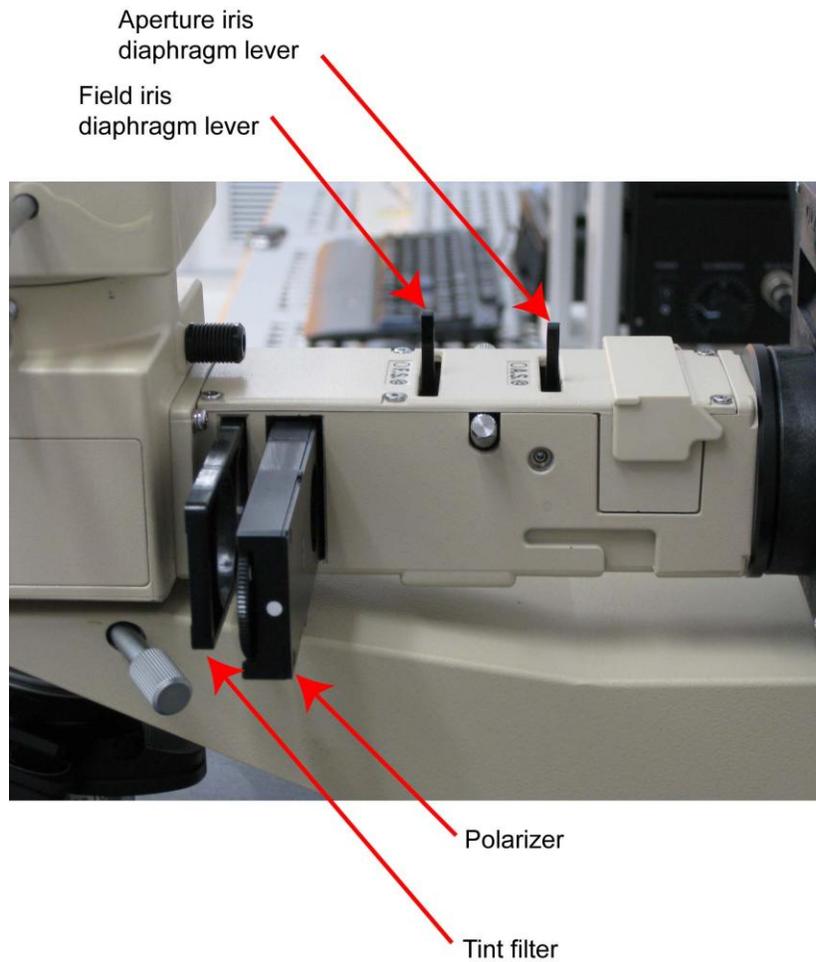
- Samples may be viewed either through the eyepieces or with a CCD camera.
- Samples are imaged with reflected light.
- Bright field, dark field, polarized light, and Nomarski differential interference contrast imaging are available.

- Eyepiece lenses are 10X.
- There are four objective lenses in the system: 10X, 20X, 50X 100X.
- “Image Map 32 Plus” is the software used for saving sample images and making measurements.
- Measurement options include: Calibrate, Measure, Area, Curve, Circle, Angle, Point to Line.

### 3. Controls



Illuminator adjustments viewed from the front.



**Illuminator adjustments viewed from the right side.**

## Operation Procedure

### *1. Bright Field Observation*

- Turn the microscope lamp power on.
- Move the Bright Field / Dark Field Selector knob at the front of the illuminator all the way to the left.
- The Analyzer, at the front of the illuminator, may be either in or out. To protect the Analyzer filter, it is recommended that it be left in, unless the illumination intensity is insufficient.
- Slide the Polarizer, on the right side of the illuminator, to its empty position, i.e., slide it to the right position.

- Slide the Tint filter, on the right side of the illuminator, to either of its empty positions, i.e., slide it fully right or fully left.
- Move the Nomarski prism levers on the 10X, 20X, and 50X objectives to their **OUT** positions.
- Load the sample on the stage and select the appropriate objective lens for finding the structure you are interested in. Start with a lower magnification such as the 10x objective.
- Move the concentric black knobs under the stage to find the region of interest. After finding the structure, you can change to a higher magnification.
- Adjust the interpupillary distance and diopter as described in the section “Interpupillary Distance and Diopter Adjustment”.
- Adjust the lamp brightness and focus on the region of interest.
- The field iris diaphragm and aperture iris diaphragm should be set to minimize scattered light. They are adjusted by the two levers on top of the illuminator between the lamp housing and observation tube.
  - Field iris diaphragm: The lever for the field iris diaphragm is closer to the observation tube. While looking into the eyepieces, move the lever until the diaphragm is just outside the field of view.
  - Aperture iris diaphragm: The lever for the aperture iris diaphragm is closer to the lamp housing. While looking into the eyepieces, move the lever until the contrast is best.
- Once you are satisfied with the focus, if you wish to measure the size and/or save the image proceed to the “CCD Camera” section.

## ***2. Observation with Polarized Light***

Polarized light imaging is the same as Bright Field imaging, except that the polarizing filter and Analyzer must be in the light path. Ensure that the label “PO” on the Polarizer faces to the front. The orientation of the polarizing filter may be changed using the knurled ring on the Polarizer.

### ***3. Nomarski Differential Interference Contrast***

Nomarski Differential Interference Contrast enhances slight optical differences due to changes in refractive index or thickness. In the latter case, it can create a quasi-3D image of a film edge, particle, or pit.

- Turn the microscope lamp power on.
- Move the Bright Field / Dark Field Selector knob at the front of the illuminator all the way to the left.
- Ensure that the Analyzer, at the front of the illuminator, is in.
- Ensure that the label "NIC" on the Polarizer faces to the front.
- Slide the Polarizer, on the right side of the illuminator, so that the polarizing filter is in the light path, i.e., slide it to the left position.
- Slide the Tint filter, on the right side of the illuminator, so that the " $\lambda$ " filter is in the light path, i.e., the slider is in its centre position.
- Move the Nomarski prism levers on the 10X, 20X, and 50X objectives to their **IN** positions. The prism on the 100X objective is always in.
- Load the sample on the stage and select the appropriate objective lens for finding the structure you are interested in. Start with a lower magnification such as the 10x objective.
- Move the concentric black knobs under the stage to find the region of interest. After finding the structure, you can change to a higher magnification.
- Adjust the interpupillary distance and diopter as described in the section "Interpupillary Distance and Diopter Adjustment".
- Adjust the lamp brightness and focus on the region of interest.
- The field iris diaphragm and aperture iris diaphragm should be set to minimize scattered light. They are adjusted by the two levers on top of the illuminator between the lamp housing and observation tube.
  - While looking into the eyepieces, move the field iris diaphragm lever until the diaphragm is just outside the field of view.
  - While looking into the eyepieces, move the aperture iris diaphragm lever until the contrast is best.
- Rotate the Polarizer with the knurled disk to obtain optimum contrast. Depending on the Polarizer setting, a defect may appear to be either a particle or a pit and a film edge may appear to be either a step

up or down. Typically, it is necessary to adjust the Polarizer on a known feature first.

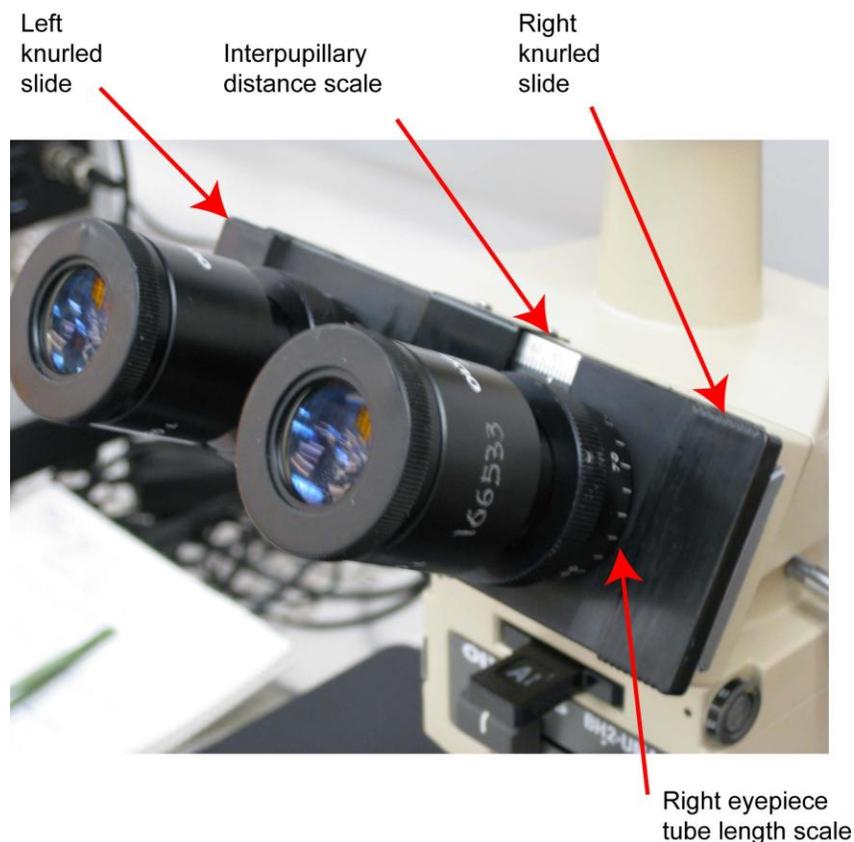
- Once you are satisfied with the focus, if you wish to measure the size and/or save the image proceed to the "CCD Camera" section.

#### ***4. Dark Field Observation***

- Turn the microscope lamp power on.
- Load the sample on the stage and select the appropriate objective lens for finding the structure you are interested in. Start with a lower magnification such as the 10x objective.
- You may wish to find the region of interest using Bright Field imaging first (see the previous section).
- Move the Bright Field / Dark Field Selector knob at the front of the illuminator all the way to the right.
- Pull out the Analyzer, located at the front of the illuminator.
- Slide the Polarizer, on the right side of the illuminator, to its empty position, i.e., slide it to the right position.
- Slide the Tint filter, on the right side of the illuminator, to either of its empty positions, i.e., slide it fully right or fully left.
- Fully open the field iris diaphragm by moving the lever on top of the illuminator all the way to the left.
- Fully open the aperture iris diaphragm by moving the lever on top of the illuminator all the way to the left.
- Move the Nomarski prism levers on the 10X, 20X, and 50X objectives to their **OUT** positions.
- Adjust the lamp brightness. Usually it is necessary to set it to maximum.
- Adjust the interpupillary distance and diopter as described in the section "Interpupillary Distance and Diopter Adjustment".
- Adjust the focussing knob to obtain a sharp image.
- Once you are satisfied with the focus, if you wish to measure the size and/or save the image proceed to the "CCD Camera" section.

## 5. Interpupillary Distance & Diopter Adjustment

- While looking into the eyepieces hold the two knurled dovetail slides, outside each eyepiece tube, with each hand and push or pull to align the eyepiece tubes with your eyes.
- Read your interpupillary distance on the scale above the right eyepiece and rotate the tube length adjustment ring at the base of the right eyepiece until the setting on the scale around the eyepiece is equal to your interpupillary distance. The index mark is on the right side of the right eyepiece.
- While viewing a sample through the right eyepiece only, rotate the coarse & fine focus knobs to obtain the clearest image.
- While viewing a sample through the left eyepiece only, rotate the tube length adjustment knob at the base of the left eyepiece to obtain the clearest image.

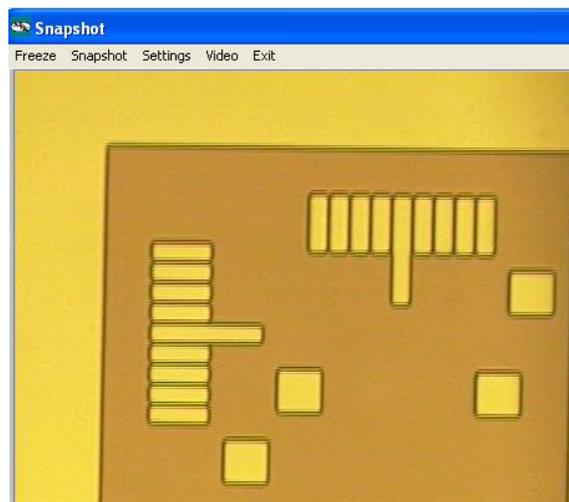


**Eyepiece adjustments.**

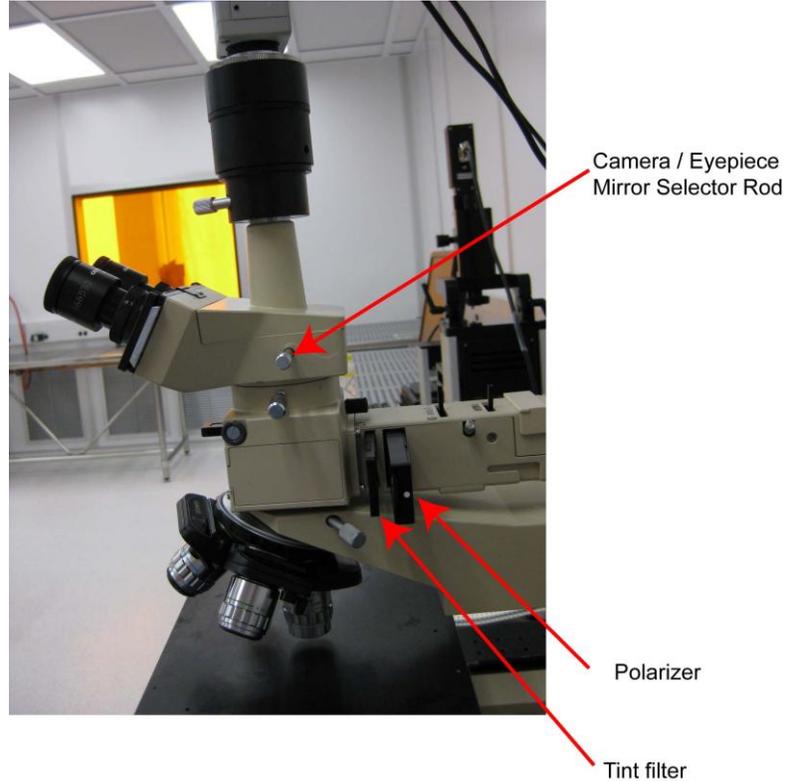
## 6. CCD Camera

To view and save CCD camera images:

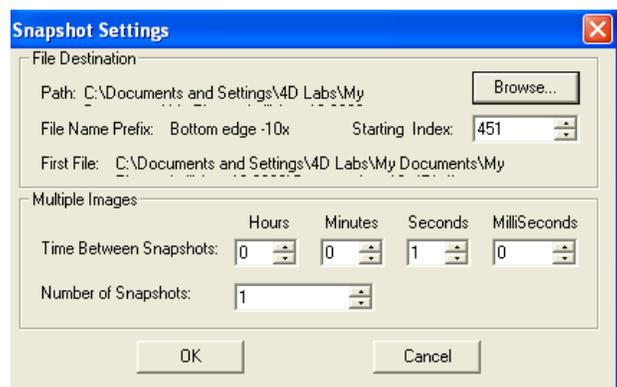
- Log on to the Olympus microscope computer using:
  - ID = 4dlabs
  - PW = 4duser
- Double click **Image Map32 Plus** on the Desktop to open the software
- Click on **Acquire** to obtain the image.



- If the Snapshot window is black but the sample is visible in the eyepieces, check the camera/eyepiece mirror selector rod on the right side of the trinocular head. If the rod is pushed all the way in, the mirror is out and light goes to the eyepieces only. If the rod is pulled all the way out, the mirror is in and light goes to both the eyepieces and the CCD camera.



- In Snapshot window, Click on **Settings**.
- Click on **Browse** to select the directory and filename you want to save to. Each user should save files to their own directory, identified by the user's name.
- Choose a **Starting Index** number, which will be appended to your first snapshot. For each successive snapshot, the index number is automatically incremented by one.
- Click **OK**.

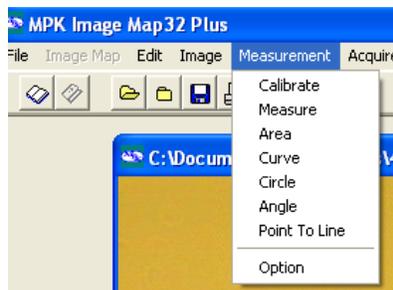


- Click on **Snapshot** (in snapshot window) to save the image.

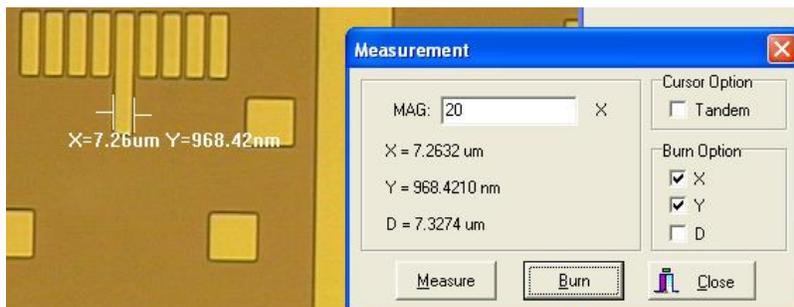
## 7. Using the Measurement Modes

### 7.1 Line Measurement

- Click on **Acquire**, and then click on **Freeze** to begin using the Measurement menu.  
 NOTE: You can only use the measurement feature with a Frozen image or an open, saved image. These measurement features will not work when you are viewing a Live image or if you are use Zoom features.
- Click on the **Measure** menu item in the **Measurement** menu.



- Position the left cursor by moving the mouse to the desired position and left-clicking.
- Position the right cursor by moving the mouse to the desired position and right-clicking.
- Click **Measure** to display the X, Y, and Diagonal separation of the cursors.
- If you wish to add the measurement information to the image, select the desired Burn Options and click **Burn**. Note that once the information is burned, it cannot be removed from the image.
- If you are satisfied with the result, select **Save** from the **File** menu.



### 7.2 Area Measurement

- On the **Measurement** menu, select **Area**.
- Hold on the left button of the mouse to define an area to be measured.
- Release the left button and click on a different position (it will draw a straight line between these two points).
- Continuously click and release the left button until an area of interest is completed.
- Press on the right button to complete the drawing process.
- Click the **Measure** button to get the area measurement.

### 7.3 Curve Measurement

- On the **Measurement** menu, select **Curve**.
- Hold on the left button of the mouse to draw a curve.
- Release the left button and click on the right button, then click **Measure**.

### 7.4 Circle Measurement

- On the **Measurement** menu, select **Circle**.
- Use the left mouse button to select three points (those three points will define a circle to be measured).
- Click the **Measure** button to measure the area.

### 7.5 Angle Measurement

- On the **Measurement** menu, select **Angle**.
- Use the left button of the mouse to define two vectors (the start and end points will define the direction of the vector).
- Click on the **Measure** button to get the angle.

## ***8. Options Menu***

Use this option to burn annotation and measurement results to an image with either white or black fonts for the best analytic viewing.

## **References**

Olympus Metallurgical Microscope manual and Image Map Plus manual.

## **Contact Information**

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