

**Frederick National Laboratory
for Cancer Research**

sponsored by the National Cancer Institute

Vaccine, Immunity and Cancer Directorate
Standard Operating Procedure

SOP Title: Use and Maintenance of the Inverted Microscope

Document ID: 26015

Version

3.0

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Supersedes

2.0

Effective Date: 20Aug21

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1. PURPOSE

- 1.1. The purpose of this procedure is to describe the proper use and maintenance of the Inverted Microscope.

2. SCOPE

- 2.1. This procedure applies to all Inverted Microscopes.

3. REFERENCES

- 3.1. Nikon Inverted Microscope TMS User Manual
- 3.2. 10007: Non-Routine Equipment Maintenance
- 3.3. 10009: General Record Review
- 3.4. HSL_GL_001: Waste Disposal at the Advanced Technology Research Facility

4. RESPONSIBILITIES

- 4.1. The Research Associate, hereafter referred to as Analyst, is responsible for reviewing and following this procedure, and documenting performance of equipment maintenance.
- 4.2. The Scientific Manager or designee is responsible for training personnel in this procedure and reviewing associated documentation.
- 4.3. The Quality Assurance Specialist is responsible for quality oversight and approval of this procedure.
- 4.4. Trained personnel perform equipment maintenance record review per "10009: General Record Review."

5. DEFINITIONS

- 5.1. As Needed Maintenance – maintenance that is performed outside of routine maintenance but is not performed in response to equipment malfunction.
- 5.2. Routine Maintenance – maintenance that is performed at planned intervals to identify and prevent problems before they result in equipment failure.
- 5.3. Non-Routine Maintenance – maintenance that is performed in response to equipment malfunction or failure.

6. REAGENTS, MATERIALS, AND EQUIPMENT

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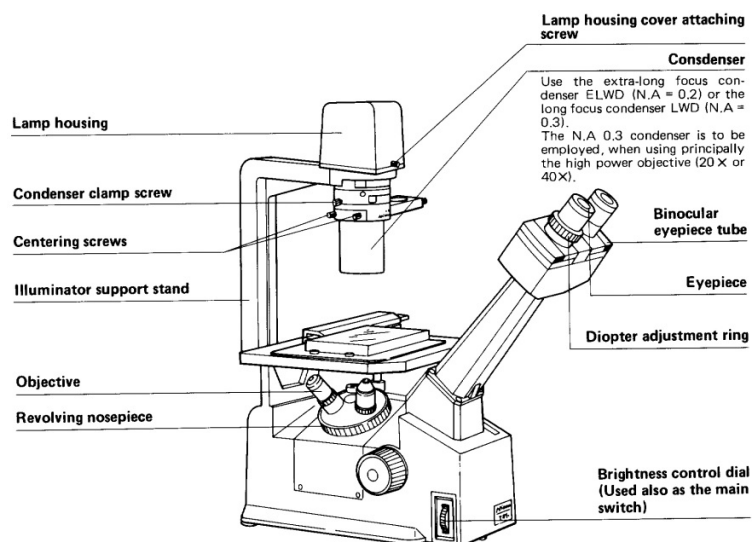
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- 6.1. 12V/20W Bulb, Halogen (Home Depot, Cat # 417204 or equivalent)
- 6.2. 70% Ethanol (Ster-ahol, VWR, Cat # 14003-358 or equivalent)
- 6.3. Fuse (1A/250V or 0.5A/250V)
- 6.4. Inverted Microscope, Nikon TMS
- 6.5. Optical Lens Paper (Thomas Scientific Cat # 6292F10 or equivalent)
- 6.6. Primary Disinfectant (Cavicide, FNLCR Warehouse, Cat # 79300360 or equivalent)
- 6.7. Wipe, Low-Lint, Wypalls (FNLCR Warehouse, Cat # 79300335 or equivalent)

7. HEALTH AND SAFETY CONSIDERATIONS

- 7.1. Proper safety precautions should be taken while working in a laboratory setting. This includes, but is not limited to, proper protective equipment such as lab coats, safety glasses, closed-toe shoes, and non-latex gloves.
- 7.2. Refer to the respective Safety Data Sheet (SDS) when working with any chemicals.
- 7.3. Refer to "HSL_GL_001: Waste Disposal at the Advanced Technology Research Facility," "EHS-WM-1: Disposal and Minimization of Chemical Waste," and "EHS-WM-2: Biological Waste Handling and Disposal" for waste disposal processes.

8. MICROSCOPE OVERVIEW



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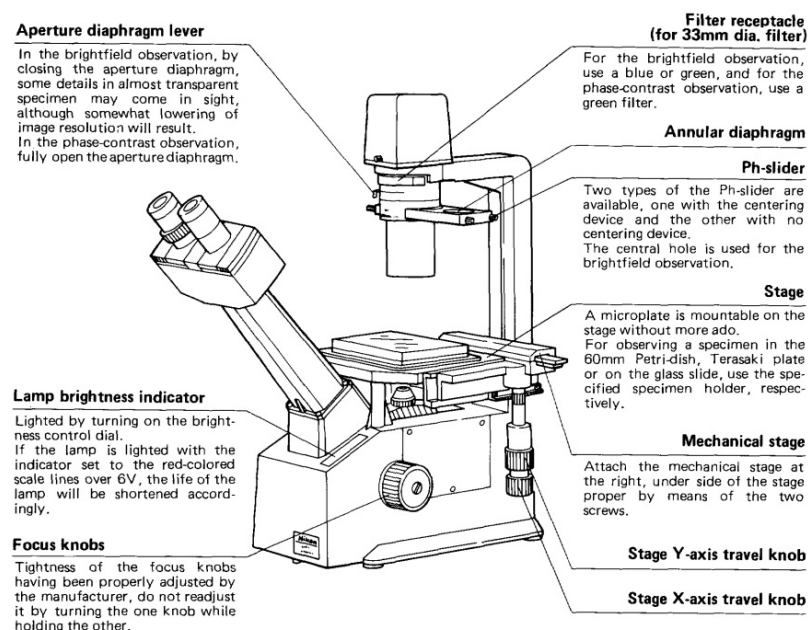
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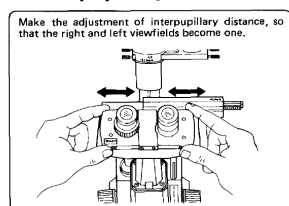
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9. OPERATION

- 9.1. Rotate brightness control dial located on the left front side of Inverted Microscope upward to turn on lamp.
- 9.2. Select desired lamp brightness level by rotating dial. The lamp brightness indicator is in the front of the Inverted Microscope.
- 9.3. Adjust both eyepieces so viewfinder can be clearly seen through both.



- 9.4. Rotate revolving nosepiece to choose desired objective magnification.

Note: Use lowest power objective to bring object/specimen into clear view first before proceeding to highest power magnification.

- 9.5. Place object/specimen being observed on stage.

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9.6. Progress through higher magnification objectives until desired image is obtained.

Note: Do not drive the objective into object/specimen as this could damage objective. Best to “focus out”, or away from the specimen to avoid objective damage.

9.7. Observe through the binocular eyepiece tube and use the fine focus knobs, Y-axis and X-axis travel knob to focus and adjust stage location.

9.8. Turn brightness control completely down to turn off lamp.

10. MAINTENANCE

10.1. Monthly Lens Cleaning

10.1.1. Lightly moisten lens paper with 70% ethanol and wipe lens surface of the objective’s lenses.

Note: NEVER use harsh cleaners, or those that contain acetone on objectives; acetone will dissolve the cement that holds the magnification lens in place.

10.1.2. Document maintenance on “26015-01: Inverted Microscope Maintenance Form.”

10.2. As Needed Maintenance

Note: Document As Needed Maintenance on “26015-01: Inverted Microscope Maintenance Form.”

10.2.1. Replace Bulb in Lamp

Note: Do not handle new bulb with bare fingers as oils from hands will deteriorate the life of the bulb.

10.2.1.1. Turn off Inverted Microscope and unplug from electrical outlet.

10.2.1.2. Loosen the Lamp Housing screw, and open Housing.

10.2.1.3. After bulb has cooled, pull bulb upward.

10.2.1.4. Replace with new bulb.

10.2.2. Spills

10.2.2.1. Turn off Inverted Microscope and unplug from electrical outlet.

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10.2.2.2. Perform Monthly Lens Cleaning, if needed (Step 10.1.)

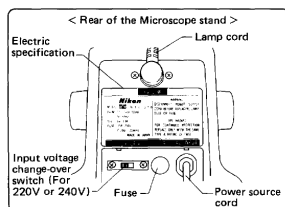
10.2.2.3. Wipe down non-lens surfaces with primary disinfectant and low-lint wipe.

10.2.3. Change Fuse

10.2.3.1. Turn off Inverted Microscope and unplug from electrical outlet.

10.2.3.2. Remove fuse cover from rear of Inverted Microscope and remove fuse.

10.2.3.3. Insert new fuse and replace fuse cover.



10.3. Non-Routine Maintenance

10.3.1. In the case that the Inverted Microscope is not operating correctly, transition processes being performed to another unit (when applicable), post a sign stating the equipment is out of service and initiate non-routine maintenance documentation per "10007: Non-Routine Equipment Maintenance."

10.3.2. Document the nature of any failures or malfunctions, how and when it was discovered, and the personnel involved on "10007-01: Non-Routine Equipment Maintenance Form."

10.3.3. Initiate a service request and complete the non-routine maintenance process following 10007.

10.4. Annual Preventive Maintenance

10.4.1. Facilities, Maintenance, and Engineering (FME) or a qualified contracted vendor will service the Inverted Microscope annually.

10.4.2. Inverted Microscopes are assessed for recalibration after repair, damage, or if physical, or electronic changes occur that could impact the operation, range, accuracy, or tolerance of the equipment. This is determined by the Scientific Manager or designee.

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11. ATTACHMENTS

11.1. Attachment 1: 26015-01: Inverted Microscope Maintenance Form

12. REVISION HISTORY

Version	Change	Reason
1.0	Create new SOP for use and maintenance of inverted microscope.	New SOP.
2.0	1. Correct bulb information: Amazon, Catalog # 54261_3 2. Transferred procedure and forms to new template; forms now separate.	1. Part number in SOP incorrect. 2. Consistency between procedures.
3.0	Added 70% ethanol in Reagents Used Added Lens paper in Reagents Used Added Lens paper and 70% ethanol as options for monthly maintenance Added definitions for as needed, routine, and non-routine maintenance Added procedure for changing bulb Added Non-Routine Maintenance section	Reflect current GCLP practices

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Attachment 1: 26015-01 Inverted Microscope Maintenance Form

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Maintenance Year:

Equipment ID:

Monthly Maintenance

Month	January	February	March	April	May	June
Ster-ahol Lot#:						
Ster-ahol Exp Date:						
Recorded by/date:						
Reviewed by/date:						
Month	July	August	September	October	November	December
Ster-ahol Lot#:						
Ster-ahol Exp Date:						
Recorded by/date:						
Reviewed by/date:						

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As Needed Maintenance: ☐ N/A

Date	Activity Performed	Recorded by/date	Reviewed by/date
<input type="checkbox"/> N/A			
<input type="checkbox"/> N/A			

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