TITLE: Leica Fluorescent Microscope	Revision Date: 07-April-2017	Issue Date: 07-April-2015
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Distribution: Mycobacteria Manual	Page: 1 of 7	
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PURPOSE:

To standardize the basic use and maintenance of the fluorescent Leica DM 2000 Microscope and describe the principles and health risks of the Mercury HXP Short Arc Lamp.

SPECIAL SAFETY PRECAUTIONS:

- Handle all patient samples and testing reagent using “Routine Practices”
- Please refer to the Northwest Territories Infection Prevention and Control Manual, march 2012
- Prior to testing all patient are to be identified as per I-0500 Use of Two Patient Identifiers.

LEICA DM2000 FLUORESCENT MICROSCOPE

Equipment	Information
“Mycobacteria” Microscope	
	Location: “Water Room” Manufacturer: • Leica • Model : DM200 • Stanton #: 0808904 • SIN # 281061/03.2006 Lamp housing: • Stanton # 0808903 **Refer to document HEM40100 for complete microscope information.**

Notes about the Fluorescent Leica Microscope:

- Light source: HXP® Short Arc Lamp made by OSRAM.
- What this is: A lamp that produces light (though an electric arc) using vaporized mercury.
- Electric Arc: Forms between two conductors separated by insulating gas. Creates ionized mercury, heat (950°C), pressure (200x ATM) and results in fluorescent light production.
- How light is produced: Mercury (Hg) is a liquid at room temperature (Hg droplets can be seen through the bulb). Switching the lamp on causes Hg to move from liquid to vapor under high pressure. An electric arc burns when enough ionized mercury is produced.
- Warm-up/Cool-down period: This lamp type requires a 15 minute “warm-up”. After the microscope is powered down, allow a 15 minute “cool-off” period before switching it on again.

Rationale:

This waiting for powering will allow all the Hg molecules to warm up and ignite into vapour. A 15 minute warm up gives a better wavelength and intensity of light. 15 mins of “cool-down” allows the vaporized Hg to completely cool into its liquid state. If this does not happen and the bulb is turned on again, the mercury vapor may burn holes into the bulb, causing black spots. Result is decreased transmittance and weaker beam of light.

Replacing the lamp:

End-user serviceable lamp: The HXP Short Arc lamp can be replaced by the technologist.

Note: This is not the same for the Bacteriology Leica Gram Smear microscope, which produces light via LED.

In LED light microscopes, a bulb does not exist that can be replaced by the end-user. So if the light goes out and power is "ON", check electric cord connection. If the cord has not been jiggled loose, the microscope must be sent out.

Handling of a cold lamp:

- The lamp is not over pressurized when cool, therefore the lamp is safe to handle.

Handle with care: Touch only at the outer reflector surface or ceramic parts.

Lamp operation:

- During operation the lamp becomes over pressurized and becomes very hot. It emits an extremely bright light, and significant amounts of Ultra-Violet and Infra-Red radiation. For this reason, the lamp must always be used within properly functioning lamp housing.
- Never use lamps that appear broken, cracked or if the discharge vessel is loose in the reflector.

Lamp Housing:

- Shutter should be in the "IN" position if microscope is left on.

Rationale: The beam of light, while the microscope is left on, keep on transmitting down the filters and can cause "burning" in them.

Microscope operation:

Refer to document HEM40100 for complete microscope information.

How to get the fluorescent beam of light through the objective:

Dial position: Dial #1 on the microscope is for fluorescent light.

- Use this position for AFB smears and AO smears.

Leica Microscope cleaning notes:

Daily (with use):

- Wipe objectives with a moistened Kim Wipe to remove dust and lint.
- *Note 1:* Never wipe with a dry Kim Wipe, as this may cause scratching of the lenses.
- *Note 2:* Never apply liquid directly on the lenses or objectives but they are not sealed (including the oil objective).
- *Note 3:* To save on Lens Cleaner, the Technologist may use 99% or 70% Alcohol 1st to loosen grime and then follow up with Lens Cleaner to remove the residue left behind by alcohol.

Weekly:

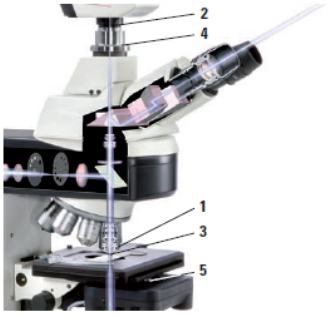
- Clean condenser with 99% or 70% alcohol. Take it out and wipe it (oil may get into condenser if not regularly cleaned and can gum up the leafs and bend them).

CLEANING CHART:

1 Considerations before cleaning

Which image quality do you expect?
Optimize all microscope settings:
Aperture, Köhler, correction ring, etc.
Check your specimen
I Use standard with proven quality
II Use cleaned specimen
Check slide and cover glass
Check immersion medium
I Same type as embedding medium of specimen
II Is immersion medium from the same lot?
III Only use recommended types
IV No Anisol

2 Where to clean and where not



Where to clean
1 Front lens of objective
2 Cover glass of camera sensor
3 Cover slip and specimen slide
4 C-mount
5 Condenser lens
6 Misc. glass surfaces
Where not to clean
I Filter cubes
II All inside optics of a microscope

3 How to locate dirt

Turn camera and inspect image
I If dirt is turning in the image → not located in camera
II If dirt stays → camera
Turn objective, condenser, C-mount
I If dirt is turning with image → objective, condenser, etc.
Control the relevant elements macroscopically
I Magnifying glass or oculars upside down
Front lens
I Turn it
II Look from the back against a bright background

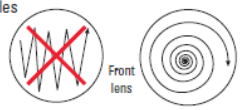
4 Different kinds of dirt

Loosely or not permanently attached dirt
I Glass (broken slides, cover slips, etc.)
II Skin, dander
III Pollen, etc.
Attached dirt
I Water soluble
II Solvent soluble
III In practice often a mixture

5 How to clean

Aim of cleaning
I Complete elimination of dust and dirt for perfect image quality
II No remaining residues on the optical parts
III No damage of optical parts
General procedure
I Locate dirt
II Inspect dirt
III Remove dust
IV Remove water soluble dirt
V Remove solvent soluble dirt
VI Inspect result
VII Repeat from **III** to **VI** if necessary
Remove dust
I If possible do it manually
II Only use specified compressed air
a Contamination with oil may cause difficulties to remove residues
III Perfect tool: bellows

Remove attached dirt
I Never use rubbing materials, papers, microfibre cloths
II Never clean dry
III Always start to clean water soluble dirt
a If you can see grease start with solvents
IV All solvents for cleaning should be absolutely clean
a PA solvents (ultra pure)
b Destilled or demineralized water
c No ammonium containing glass cleaner like Sidolin, Sparkle, etc.
V All tools should be absolutely clean
a Use certified wound cotton sticks and dental cotton pads to avoid lint (no Q-tips or similar!)
Remove water soluble dirt
I Use only clean, deionised water
a Simple method: breathe upon the surface
II Use a cotton stick
a Clean from the centre toward the edge in concentric circles
III Inspect result



Remove solvent soluble dirt
I Use ultra pure solvents
a Ethanol PA
b Acetone PA (be careful, may harm plastics and objective labels)
II Use a cotton stick, dental cotton pad
a Cotton stick and cotton pad should only be moist, not dropping wet
b Clean from the centre toward the edge in concentric circles
III Inspect result
IV Still smudgy?
a Combine the methods: breathe upon the surface and clean with cotton stick and acetone

Leica Optics Cleaning Kit
Order number **11505508**

MERCURY HXP SHORT ARC LAMP HEALTH HAZARDS:

Inhaling Hg vapor or small particles or Hg compounds can be harmful to the lungs, kidney and nervous system. Injuries to one's health may occur by puncturing the skin through broken bulbs, resorption through the gastro-enteric tract, or inhalation of Hg vapour.

LAMP BREAKAGE:

HXP Short Arc Lamp breakage is rare. If the lamp breaks or burts, Hg content may be released. If this occurs the following actions are recommended to be taken by te manufacturer:

- All personnel should leave the surrounding area immediately to prevent inhalation of Hg vapour.
- A code BROWN in the Bacteriology Lab should be called.
- The area should be ventilated thoroughly for at least 20→ 30 minutes
- Once the lamp has cooled, any Hg residue should be picked up with a special absorbent such as *Mercurisorb* or other material/method according to the lab's chemical spill kit.

Note: If the lamp bursts, contact OSRAM distributor.

LAMP DISPOSAL:

HXP Short Arc Lamp contains a maximum of 20 mg Hg per lamp. At this amount, the lamp is a potentially harmful item. The lamp must be treated as special waste in accordance to local regulations for disposal.

REFERENCES:

- Leica Microsystems. (n.d.). *http://www.leica-microsystems.com/fileadmin/downloads/Leica%20DM2000/Brochures/Cleaning_of_Microscope_Optics-Flyer_en.pdf*. Retrieved January 2015, from www.leica-microsystems.com.
- OSRAM. (2006). Technical Information HXP Short Arc Lamps. In OSRAM, *Product Insert* (07/2006 ed., Vol. No. FO 5148). Berlin.

RELATED DOCUMENTS:

- Köhler Illumination of the Leica DM1000, document # "HEM40100"

REVISION HISTORY:

REVISION	DATE	Description of Change	REQUESTED BY
1.0	13-Feb-15	Initial Release	L. Driedger