Leitz 6V 30W Lamphouse - Maintenance Notes

Leitz 6V 30W lamphouse (Figure 1) was developed to be used with Ortholux and some Dialux and Labo lux microscopes during the “black era” from approx. 1937 to 1974. It was typically sold under catalog no. 512003 and order word ("Bestellwort") EYMZE, although these designations could vary depending on the accessories (e.g., filters) that were included. It cost US $75 in 1961, which equals almost $800 in 2024.

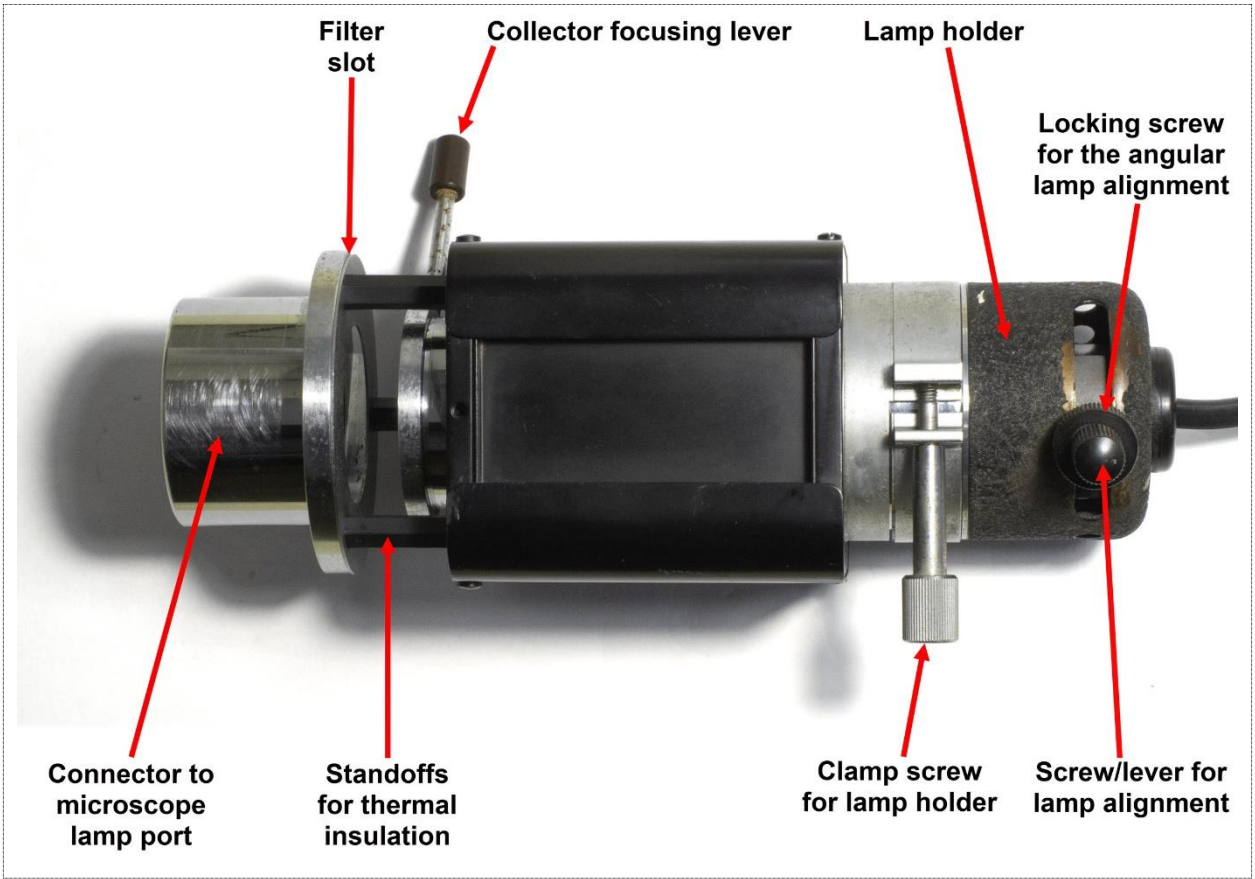

Figure 1: Leitz 6V 30W lamphouse with a 42.5 mm microscope port connection.

The lamphouse typically has a 42.5 mm lamp port for transmitted illumination to be attached on the backside of the microscope. With a different 30 mm lamp port connector it can alternatively be used for reflected/vertical illumination (Leitz order word OLTUB) on some microscope models. The design varied somewhat through the years, but essentially the lamphouse has a 6V/5A (30W) incandescent bulb with E14 threads, a mechanism for alignment of the bulb, a focusable collector with a frosted front lens, a filter holder, and a standardized, thermally insulated port connecting it to the microscope. The illumination is close to Köhler illumination, albeit strict Köhler illumination it is not due to the frosted lens in the collector. The lamphouse is cooled by air convection thanks to a baffle design that also minimizes leaking of disturbing stray light. Power is supplied by an external, variable 6 V AC power supply.

One may wonder why time and effort should be spent on maintaining a mundane accessory like a 50+ years old microscope lamphouse. Some sluggishness of the moving parts could perhaps be tolerated

because once aligned, a microscope lamp doesn't require much subsequent adjusting. Another issue is that incandescent lamp bulbs are more and more difficult and expensive to get hold of, which is one reason why even many older microscopes are being retrofitted with LED illumination. An interesting and useful task would be to design and 3D print parts to replace the incandescent bulb in this lamphouse with a modern LED.

The collector lens focus is adjusted with a focusing lever (Figure 1.)

A lamp alignment screw/lever (Figure 1 and Figure 2) is available to align the lamp bulb properly with the microscope's optical axis. Radial bulb alignment is done by turning the outer screw, while angular alignment is done by moving the screw/lever along the slit in the side of the lamp holder. Tightening its coaxial (inner) locking screw locks the angular alignment only.

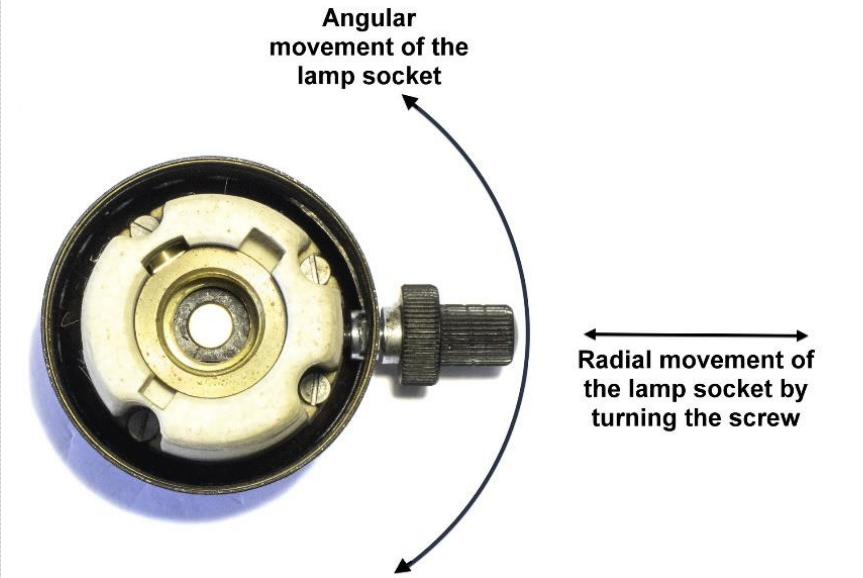

Figure 2: The function of the lamp alignment screw/lever. The coaxial locking screw (the inner screw) only locks the angular alignment.

Scope

Microscope maintenance typically pertains to cleaning and greasing, repair or replacement of worn or broken parts, and adjustment or calibration. These work notes describe the disassembly, cleaning, greasing and reassembly of the Leitz 6V 30W lamphouse. Typically, the following moments may be performed:

- Changing of the lamp bulb
- Cleaning and greasing of the lamp alignment mechanism
- Cleaning (and optionally greasing) of the collimator
- Repair of broken standoffs (between the lamphouse and the microscope port)
- Cleaning and polishing of corroded parts
- Cleaning of the collimator's lens surfaces
- Repair of broken/corroded electric connections

Grease

The choice of grease in the lamphouse is not too critical. I have used Mobilgrease 28 or Super Lube Multi-Purpose Synthetic Grease with Syncolon (NLGI grade 2), mostly because of more or less anecdotal references on the Internet but also because they are easy to obtain.

Maintenance Notes

1. Disassembling and cleaning of the lamp holder

Figure 3: The lamp holder removed from the lamphouse.

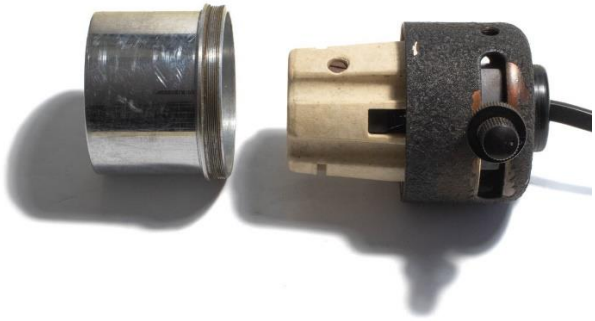

Figure 4: The lamp holder after removal of the bulb and the sleeve. The beige ceramic part still attached to the lamp holder is the lamp socket.

The lamp holder (Figure 3) is the rear part of the lamphouse. It contains the lamp bulb and the mechanism for the lamp alignment (Figure 5.) It is attached to the lamphouse by a sleeve and a clamp screw (Figure 1.)

Figure 5: The lamp holder parts laid out, in order from left to right:

- *Plastic nut/grommet*
- *Backside of the lamp holder with a groove and a guide for the lamp alignment screw*
- *Wave washer*
- *Angular actuator (and below two E-clips, the radial actuator, the locking screw for the lamp alignment, and the lamp alignment screw)*
- *Bushing (with its collar facing upwards)*
- *"Horseshoe"*
- *Base of the bridge (and below two springs and the bridge)*
- *Red cord stopper*
- *Lamp socket (and below the four screws used to attach it)*
- *Lamp holder sleeve*

The lamp and the electrical cord are not included in the image.

Loosen the lamp holder clamp screw (Figure 1) and pull out the lamp holder from the lamphouse. It is easier to remove if it is turned clockwise while pulling it out.

Remove the lamp bulb. Remove the shiny sleeve by unscrewing it from the black lamp holder (Figure 4.)

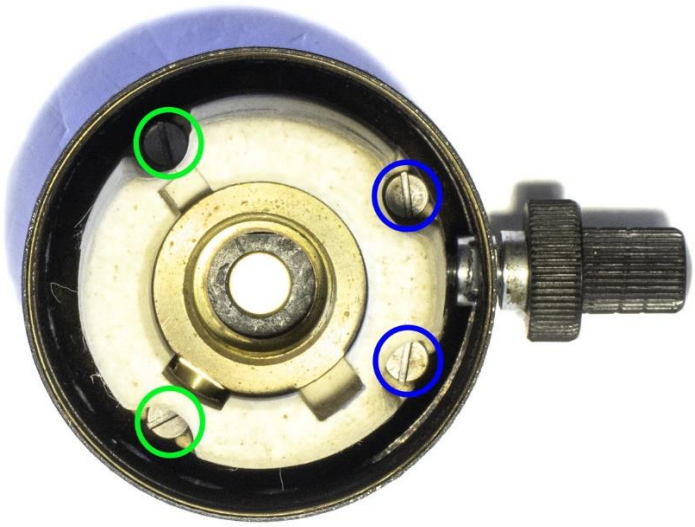

Figure 6: The lamp holder with the ceramic lamp socket seen from above.

Figure 7: The lamp socket.

Remove the ceramic lamp socket (Figure 7) from the lamp holder. It is attached with two 10 mm screws (with green circles in Figure 6) and two 15 mm screws (with blue circles in Figure 6.) Below and within the socket is a spring-loaded bridge (Figure 8 and Figure 9.) that is free to move vertically. The bridge's movements are guided by the cutting-outs (Figure 11) in the sides of the socket. One of the lamphouse's two electrical wires is soldered to the wire connection on the underside of the bridge. The spring-loaded bridge makes the electrical connection by pushing the foot contact against the foot of the lamp bulb.

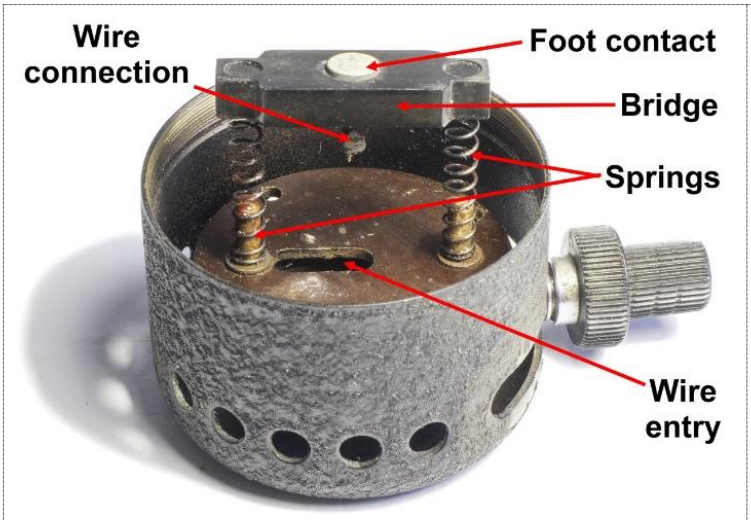

Figure 8: The lamp holder with the bridge.

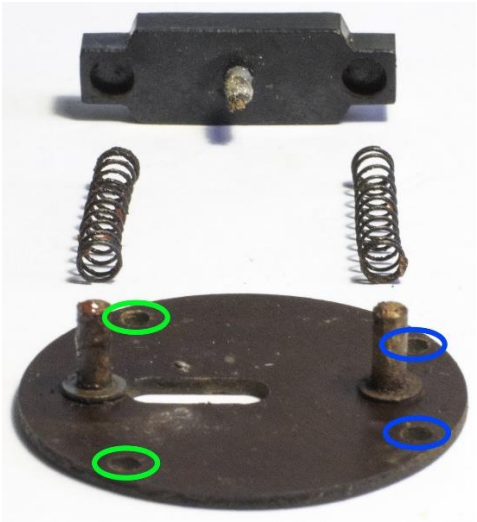

Figure 9: The bridge removed from the lamp holder and disassembled.

The electrical cord goes through a hole in the base of the bridge (Figure 9), then there is a plastic cord stopper (Figure 5) attached before the cord's wires are soldered to the terminals of the lamp socket.

The other end of the cord had originally a special 3-prong plug (Figure 10) where the middle prong wasn't electrically connected to anything; presumably its purpose was just to avoid disaster by preventing the plug from being mistakenly plugged into the similarly looking European 220 V AC outlet. The original plugs may of course be replaced with other plugs, e.g., banana plugs, that may be better suited to whatever power unit one may have available.

Figure 10: Two types of power plugs found with the 6V 30W lamphouse.

The wire in the lamphouse shown in these images was found to be severed from the bridge's foot contact due to heavy corrosion of the copper strands. But even if the wire connections appear to be in good order, it may make sense to temporarily desolder and disconnect them anyway to get the cord out of the way and allow easier access to the internals of the lamp alignment mechanism.

The springs (Figure 9) found in the lamphouse were also quite rusty. Rust can be removed from the springs and other rusty parts by soaking in an aqueous citric acid solution (approx. one part of citric acid in ten parts of tap water). After soaking for a few hours or days depending on the severity of the rust, the parts are brushed with a hard toothbrush and washed with clean water to remove any remaining acid. Then the parts should be greased to provide some protection from further rusting.

The other electrical wire is soldered to a rectangular brass strip (Figure 12) that is connected to the lamp thread by a screw in the socket's side (Figure 11.)

Figure 11: The lamp socket viewed from the side. The screw seen in the upper right part of the socket is a part of the electrical connection to the bulb cap.

Figure 12: The lamp socket seen from below. The rectangular brass strip is an electrical connection soldered to a wire.

Once the bridge has been removed the lamp alignment mechanism can be accessed (Figure 13.)

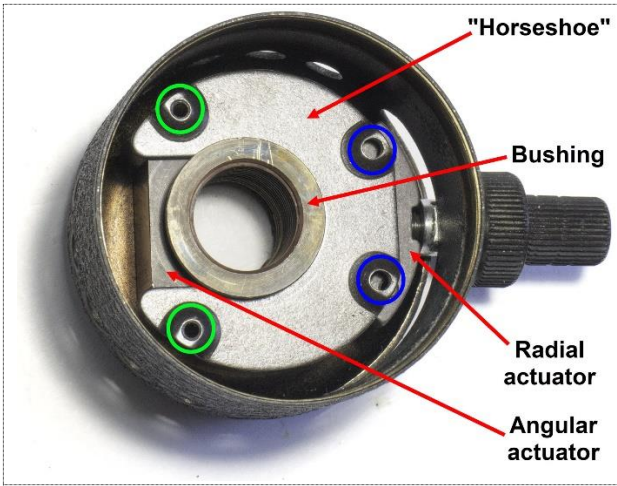

Figure 13: The lamp alignment mechanism below the lamp socket.

Figure 14: The lamp holder seen from below showing the black plastic nut/grommet.

The green circles in Figure 13 are threaded screw holes for attachment of the same lamp socket screws that also are circled in green in Figure 6.

The blue circles in Figure 13 are unthreaded holes for letting through the same lamp socket screws that also are circled in blue in Figure 6. These screws go into the threads in the radial actuator just below (Figure 13 and Figure 15.)

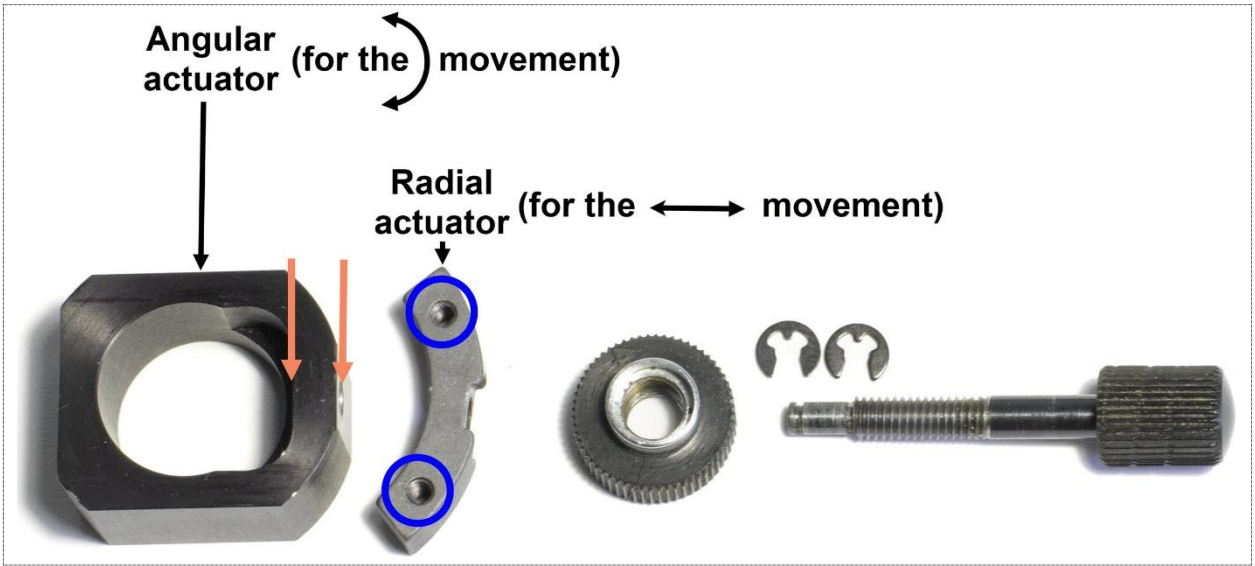

Figure 15: The actuators and the lamp alignment screw.

The bushing (Figure 13) acts as a pivot point for the angular lamp alignment. It has threads on the inside and is attached to the lamp holder with the black plastic nut/grommet from the outside of the lamp holder (Figure 14.) Remove the black plastic nut/grommet from the underside of the lamp holder using a face-pin spanner. The nut/grommet is not difficult to remove why some suitable pliers also could be used; in that case be gentle to the nut and put some protection on the sharp jaw teeth. The brass bushing has knobs (Figure 16) that fit into notches in the lamp holder (Figure 17) to ensure that it remains fixed in its proper position.

Remove the brass bushing and the “horseshoe” (Figure 13) just below it. Now the angular actuator, the radial actuator, and the lamp alignment screw (Figure 15) are accessible.

The tip of the lamp alignment screw is locked to the angular actuator by two E-clips, one on the inside of the actuator and the other on the outside (orange arrows in Figure 15.) Remove the E-clips by prying them off with a suitable tool, for example, a small screwdriver. When the small E-clips release they tend to fly far away and disappear; to prevent that, do the prying with the lamp holder in a clear plastic bag. The thread of the lamp alignment screw is left-handed so release the screw from the radial actuator by turning it clockwise. Also remove the locking screw from the side of the lamp holder. A wave washer (Figure 16) sits between the angular actuator and the lamp holder house.

Figure 16: The wave washer, the bushing, and the “horseshoe”.

Figure 17: The lamp holder removed from the lamphouse.

With the lamp holder now disassembled use solvent to clean all affected parts from old grease.

2. Greasing and reassembling the lamp holder

Refer to Figure 5 for the parts and their assembly order.

Grease both sides of the spring washer and put it in the inside of the lamp holder base around the hole in the bottom.

Grease the inside and the upper side of the angular actuator and put it on top of the spring washer in the lamp holder. Note that the upper side is different than the bottom side, see Figure 18 where the actuators are shown with their upper sides facing up.

Figure 18: The angular actuator (to the left) and the radial actuator (to the right.) The actuators are shown with their upper sides facing up.

Attach the locking screw to the side of the lamp holder. Screw it all the way down, but don’t tighten it.

Put some grease on the thread of the lamp alignment screw. Push it through the hole in the locking screw, screw it into the threaded hole in the middle of the radial actuator, and then get it through into the hole in the side of the angular actuator. It is somewhat tricky to get the radial actuator in the proper position; it helps to hold it with tweezers.

Don't forget 1) to keep track of which side of the radial actuator is the upper side [see Figure 18], and 2) to turn the lamp alignment screw counterclockwise to get it into the left-handed threads of the radial actuator. Turn the lamp alignment screw until the E-clip groove that is closest to the screw tip is accessible on the inside of the angular actuator, and attach the E-clip. Retract the screw until the other E-clip groove is accessible on the outside of the angular actuator, and attach the other E-clip.

Put the "horseshoe" on top of the angular actuator making sure that the screw hole bulges face upwards.

Grease the outside of the brass bushing and also apply some grease to the underside of the collar. With the collar facing upwards put down the bushing through the "horseshoe", the angular actuator, the wave washer, and down to the lamp holder base. Align the two knobs on its bottom with the cutting-outs around the hole in the bottom of the lamp holder base. The wave washer tends to slip and get in the way but can be pushed back where it belongs with a toothpick. Secure the bushing by attaching the black plastic nut/grommet from the backside of the lamp holder base. Screw it all the way down but don't yet tighten it.

Put the assembled bridge (Figure 8 and Figure 9) on top of the "horseshoe". All four screw holes should be properly aligned with the screw holes in the "horseshoe". Also make sure that the screw holes in the radial actuator (with blue circles in Figure 15) are at least in some alignment with the "horseshoe" and the bridge. This can easily be accomplished by poking the screw holes with a toothpick.

Attach the cord from the backside of the lamp holder and all the way through the base plate of the bridge. Attach a cord stopper to the cord above the base plate leaving enough cord above it for safe attachment to the lamp socket. Unsurprisingly, the original narrow red cord stopper is difficult to put back on the cord but can of course be replaced by a different, new cord stopper. A cruder option is to tie an overhand knot on the cord just above the base plate of the bridge.

Solder the cord wires to the lamp terminals. Solder one of the wires to the terminal on the underside of the bridge (Figure 8) and the other wire to the brass strip in the ceramic lamp socket (Figure 12.) The brass strip is attached to the socket with a screw on the side of the socket – it is easier to solder the wire to the strip if it is temporarily removed from the socket.

Attach the black bridge, now connected to one wire, on top of the springs on the base (Figure 8.) Attach loosely the ceramic lamp locket, also now connected to the other wire, allowing the bridge to slide into the grooves along its sides. This is somewhat difficult because three things need to be done simultaneously: Fitting the bridge into the socket groove with the springs remaining properly seated, avoiding pinching any of the wires between the bridge base and the socket, and aligning the screw holes of the socket, the bridge base, the "horseshoe", and the radial actuator. The screw hole alignment pertains to the four screws (shown below the socket in Figure 5) that are used to secure the socket to the lamp alignment mechanism. Start with the screw holes for the two long (15 mm) screws. These screw holes have been indicated with blue circles in the images, listed here from the top and down: The socket (Figure 6), the base of the bridge (Figure 9), the "horseshoe" (Figure 16), and the radial actuator (Figure 15.) Poke with a toothpick to align the screw holes while manipulating the parts as required to get them into position. Attach the long screws but don't tighten them yet. Proceed in the same way with the two shorter (10 mm) screws. They are indicated with green circles in the images, from the top and down: The socket (Figure 6), the base of the bridge (Figure 9), and the "horseshoe" (Figure 16.) Successively tighten all four screws to secure the lamp socket.

Use your fingers to tighten the black nut/grommet on the backside of the lamp holder. It needs to be tightened so it doesn't release and fall off when it is used, but not so tight that the angular lamp alignment is hampered.

Apply a little grease on the rim of the groove for the angular lamp alignment.

Test that the lamp socket moves when the lamp alignment screw is turned and when it is moved back and forth in its groove. Attach a 6 V / 5 A lamp bulb into the lamp socket, connect the cord to a 0-6 V source (capable of at least 5A) and check that the lamp bulb illuminates.

Finish by attaching the sleeve (Figure 5) to the lamp holder and tighten it so it doesn't unscrew. The lamp holder is now ready for attachment to the lamp house.

3. Removing the collector from the lamphouse

To access the collector, unscrew the upper lamphouse cover (Figure 19) that is attached with four M2.5x5 screws. The lamphouse has two covers, the upper cover is on the same side as the collector focus lever. Below the cover is a loose baffle that can just be lifted off (Figure 20 and Figure 21) to provide access to the focusable collector (Figure 22.)

Figure 19:The lamphouse with its upper cover.

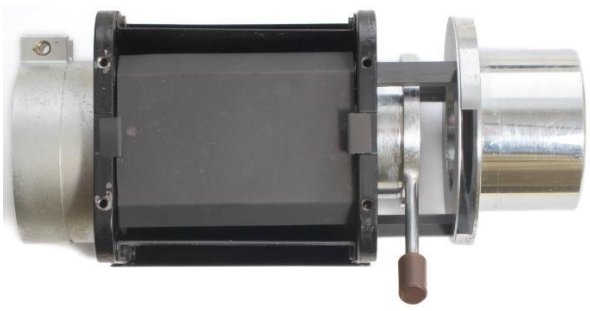

Figure 20: The lamphouse showing the baffle below the upper cover.

Figure 21: One of the lamphouse's baffles.

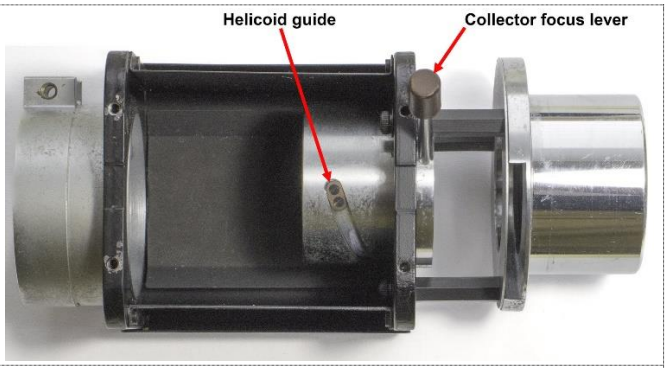

Figure 22: The lamphouse with the baffle removed.

Remove the lamphouse connector with its filter slot. It consists of two parts (Figure 24) and is attached to the lamphouse with three plastic spacers. It can be released from the spacers after removal of three screws (Figure 23.) The spacers can be left attached to the lamphouse.

Figure 23: The lamphouse connector showing two of the three attaching screws.

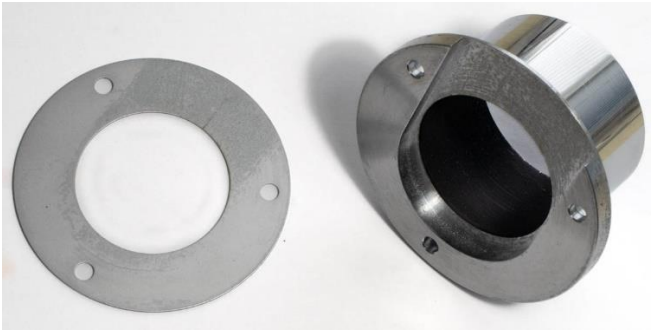

Figure 24: The two parts of the removed lamphouse connector.

The focus of the collector is adjusted with a lever screwed into the collector's side. A helicoid guide converts the lever turning into the linear focusing movement. The helicoid guide is attached the collector with two small screws (Figure 25.) After removal of the screws and the helicoid guide the collector can simply be pulled out of the lamphouse.

Originally Leitz didn't apply any grease to the collector slide between the collector and the lamphouse. Applying some grease would allow for a smoother collector focus movement, but the heat from the lamp combined with accumulated dust would probably eventually cause the focus mechanism to become sluggish.

Figure 25: The collector removed from the lamphouse. The removed helicoid guide is shown below the collector.

If required, the collector lens surfaces are now accessible for cleaning.

The standoffs shown here are not original. The lamphouse was left attached to the microscope during shipping and, not surprisingly, it broke off from the heavy microscope. The original standoffs were destroyed and had to be replaced by new nylon standoffs sourced from Amazon. Metal standoffs should not be used because of their poor ability for thermal insulation.

4. Returning the collector to the lamphouse

Reassembly is straightforward; just repeat the above work moments in reverse order.

Appendix: The Lamp Bulb

I have used Osram 6V 5A incandescent bulbs, type 8110, for my Leitz 6V 30W lamphouses. They have a rather nice and compact tungsten filament.