DIRECTIONS FOR USE

Lux UV

OPTICAL WORKS
C·REICHERT
VIENNA XVII · AUSTRIA

REICHERT

DIRECTIONS FOR USING

THE

Large Fluorescence Equipment " Lux UV " .

Inserting the Burner in the Lamp.

Unscrew the two small screwD holding the lamp excluder portion on the lamp-housing, unlock the bayonet joint ring, and remove the excluder portion from the lamp-housing in an upward direction. Screw the burner, like an ordinary filament bulb, into the socket inside the lamp excluder portion. Then place the excluder portion, with the burner screwed in, back into the lamp-housing, lock the bayonet ring, and afterwards tighten up the two small screws that were previously slackened off.

Connecting the Lamp to the Mains Supply.-

The burner, a High-pressure Mercury Vapour Arc Lamp (No. 7706 can be run off alternating current only. When the mains supply voltage is below 190 volts, the lamp is connected up through a Transformer (No. 7818), and if above 190 volts, through a Choke (Choking Coil) (No. 7819). In view of the small amount of current the lamp consumes, a special heavy-duty fuse is not necessary in the supply circuit.

Take the 5 ft. length of flex connected to the lamp and plug its connector pins into the sockets of the transformer having the word "Lampe" (Lamp) below them. Then take the 4 ft. length of flex and place the coupler on the contact pins of the transformer marked "Netz" (Mains) underneath. Insert the connector at the other end of this flex in the wall-box of the mains supply.

Lighting the Lamp.

The lamp is lighted by pressing down the black push-botton of the switch incorporated in the lamp flex. Note: The burner does not attain its full intensity until it has been switched on for about 5 minutes. If the burner has been extinguished by pressing down the red push-botton in the flex switch, it cannot be lighted again until it has completely cooled down — a matter of 5 to 10 minutes.

"Lux 7556 e" - 220339.Dr.Gr./Werb/Me.

Centring a newly inserted Burner relatively to the Reflector and the Lamp Collector.

The burner must be mounted in the lamp-housing so that its position satisfies the three following requirements:

1. The wire which holds the actual burner in the glass balloon must come well to the side of the burner tube, so that this wire does not impede the light coming directly from the arc or from the reflector inside the lamp-housing.
2. The direct image of the arc, and its image projected by the reflector, must coincide in height.
3. The direct image of the arc, and its image projected by the reflector, must coincide laterally.

The centring of the burner to meet these three requirements is performed from the image of the arc and its reflected image as projected by the lamp collector. To obtain a sufficiently clear projected image for centring purpos without using any additional optical components, proceed as follows: First of all, screw off the two screws fixing the cover of the filter box, and remove this cover and lay it on one side for the time being (see section "The Filter Box", page 4). Next light the lamp (see section "Lighting the Lamp", page 1). Then hold a sheet of paper on the inside of the wall of the filter box facing the microscope base-plate, i.e., over the hole there which leads to the base-plate. On this paper will be visible a very bright but as yet unclearly defined spot of light — an image of the burner. Stop down the collector (condenser) field iris diaphragm in the illuminating tube until the opening is fairly narrow, and at the same time operate the helical focusing mount of the Lamp collector (condenser) so as to bring the latter at its maximum distance from the lamp-housing (see the section "The Illuminating Tube with the Lamp Collector and the Collector Field Iris Diaphragm," page 4). The spot of the light visible on the sheet of paper held inside the filter box will then change into a sufficiently clear and sharp image of the burner with the arc inside it.

Rotating The Burner.

Slacken off the long screw fixing the lampholder portion in the lamp-housing. This portion is now free to move. Begin turning it, and, while doing so, observe the projected image of the burner. A thin vertical strip — an image of

the wire holding the burner — will be seen to shift sideways from the burner whilst the lampholder is being turned. Keep on turning the lampholder portion until this wire is as far as it will go sideways from the burner tube, and then tighten up the above-mentioned clamping screw slightly at first. This concludes the centring operation to fulfil the first condition above.

Adjusting the Burner for Height.

There are three set-screws on top of the lampholder portion. Screw these up and down until two clearly separated images of the burner are visible in the projected image. One of these — the smaller and more clearly defined — is the image of the burner itself; while the other, larger and less clearly defined, is the image of the burner reflected by the reflector mirror in the lamp-housing. Slacken off again the above-mentioned long screw fixing the lampholder portion in the lamp-housing, and move the lampholder portion up or down (without turning it) until, in the projected image, the centre of the burner itself and the centre of its reflected image are on the same level. When this position is attained, finally tighten up the long clamping screw that has previously been slackened off. This concludes the centring operation to satisfy the second condition.

Lateral Adjustment of the Burner.

By manipulating the three set-screws located on the Lampholder portion of the lamp, displace the two images — the direct and reflected images of the burner — sideways relatively to each other until the two images coincide perfectly and only one image of the burner is visible. This will satify the third condition above.

Note.: This complete centring operation is performed once only, when a new burner has been fitted. As long as this burner remains in the lamp, do not alter the centring in any way. Do not slacken the long screw clamping the lampholder portion in the lamp-housing, nor touch the three set-screws on the lampholder portion.

The Illuminating Tube with the Lamp Collector and the Collector Field Iris Diaphragm.

Between the lamp-housing and the filter box is located the illuminating tube. At the end next the lamp-housing it contains the collector (condensor) in its helical focusing mount, followed, in the direction of the filter box, by the field iris diaphragm with its adjusting pin.

The Lamp Collector: Always focus the lamp collector in its helical focusing mount so that the microscopic field of view appears as strongly and evenly illuminated as possible. This is usually the case when the lamp collector is in its setting close up to the lamp-housing.

The Collector Field Iris Diaphragm: This diaphragm is used for three purposes:

1.) When a new burner is being centred, it is used as an aperture iris diaphragm, so as to obtain as sharp an image of the burner as possible (see section "Centring a newly inserted Burner, etc.", page).
2.) When the illumination is being focused, it is used for centring the rays from the lamp to the microscope on "Köhler's principle of illumination" (see section "Focusing the Illumination," page).
3.) It is used as a field diaphragm for fluorescence microscopy and fluorescence photomicrography. It is stopped down to such an extent that only the object-field directly surveyed in the microscope is reached by the ultraviolet rays. This prevents superimposed radiation caused by highly fluorescent elements outside the actual field of view. (See section "Focusing the Illumination", page).

The Filter Box.

The filter box is located between the illuminating tube and the microscope base-plate. Its cover can be lifted off after removing two screws. All the necessary filters are secured to the underneath of this cover. They are:

(a) Fixed: 1 Red Filter trap, this being either a liquid chamber (No. 7511) or a solid glass filter (No. 7512).

(b) Movable, can be put in and out of action:
2 Ultraviolet Filters of different densities, viz., 1 darker ultraviolet filter "I" (No. 8080), and 1 lighter ultraviolet filter "II" (No. 8079); and 1 White Frosted Filter (No. 8078)

The Red Filter Trap.

The ultraviolet filters allow a certain percentage of the long-wave ("red") visible light to pass through besides the invisible ultraviolet rays. To nable the correct tints of the fluorescence phenomena to be observed, this red portion of the spectrum must be absorbed by a red filter trap.

The Liquid Chamber as a Red Filter Trap: Complete absorption of the visible light of long wavelength transmitted by the ultraviolet filters is achieved by an aqueous solution of sulphate of copper. This solution is contained in the small bottle or "chamber" secured on the under-side of the filter box lid between three clamping strips. The necessary solution of copper sulphate is prepared as follows.

Dissolve 25 grams of chemically pure sulphate of copper ($CuSO_4 + 5$ a q) in about of a litre of hot water. After it has cooled, fill it into a 1,000 c.c. measuring flask. Allow it to settle for several days, and then finally filter it carefully several times until the solution is perfectly clear. Keep the solution ina bottle with a glass stopper.

Withdraw the liquid chamber (flask) from the three clips which hold it, uncork it, and fill it up with the sulphate of copper solution right to the neck. Replace the stopper and slip the chamber into position again the three clips.
Note: Make sure that the small glass tube in the rubber stopper is clear. If it is stopped up, the chamber bottle may burst in course of work owing to the heat set up.

The Solid Glass Red Filter Trap: In cases where there is no need to completely absorb all the visible light of long wave-length transmitted by the ultraviolet filters — this being feasible when the fluorescent light does not exhibit yellow, reddish-yellow or red tints — the liquid chamber can be replaced by a Solid Glass Red Filter (No. 7512). This is slipped between the three clips on the underneath

side of the filter box cover, in the same way as the liquid chamber.

The Ultraviolet Filter and the White Frosted Glass Filter.

These filters are put in and out of action by operating the pins projecting upwards from the filter box cover. They are manipulated as follows:

Ultraviolet Filter II.

Put into action by moving pin No. 3 to the right to "UV — D". Put out of action by moving pin No.3 to the left to "O".

Ultraviolet Filter I.

Put into action by moving pin No,2 to the right to "UV—H". Put out of action by moving pin No.2 to the left to "O".

White Frosted Glass Filter.

Put into action by moving pin No.1 to the left to "W". Put out of action by moving pin No.1 to right to "O".

The following general rules govern the use of the various filters:

(a) When first focusing the Illumination to the Fluorescence-microscopic Image and for the Examination of Preparations of Low Fluorescence: Ultraviolet Filter, D in action (pin No.2 at right Ultraviolet Filter II cut out (pin No.3 at left); White frosted Filter cut out (pin No.1 at right).

(b) For the Examination of highly Fluorescent Preparations: Ultraviolet Filter I in action (pin No.2 at right); Ultraviolet Filter II in action (pin No.3 at right); White Frosted Filter cut out (pin No.1 at right).

(c) Microscopy with ordinary Visible Light: Ultraviolet Filter I cut out (pin No.2 at left); Ultraviolet Filter II cut out (No.3 at left); White Frosted Glass Filter in action (pin No.1 at left.)

(d) When first focusing the Illumination with ordinary Visible Light, and for Photomicrography with ordinary Visible Light: The small clamp coupling together pins Nos.1 and 2 should be screwed up and removed, so that these two pins can be moved in opposite directions. Ultraviolet Filter I. cut out (pin No.2 at left); Ultraviolet Filter II cut out (pin No.3 at left); White Frosted Glass Filter cut out (pin No.1 at right).

Important Note: The two pins operating Ultrav iolet Filter I and the White Frosted Filter are coupled together by a small clip (clamp). This arrangement all the filters being put out of action together by an incautious manipulation of the filters whilst the observer is looking into the microscope, which would result in the extremely dazzling light of the lamp getting to the eye of the microscopist. This small clamp must therefore be released only when it is necessary to cut out all the filters when focusing the illumination with ordinary visible light and when doing photomicrographic work with ordinary visible light. After such work has been done, be sure to place the small clamp in position again so as to couple up the two pins.

The Microscope.

Genrally speaking, any good microscope can be used for fluorescence microscopy with the Large Fluorescence Equipment "Lux UV". However, the normal microscope mirror must be detached and the ordinary microscope substage be replaced by one made of "U.V." glass which is permeable to the ultraviolet rays.

Removing the Microscope Mirror.

The normal microscope mirror is either secured by a short pin to a special carrier arm (on the simple Condenser Carrier No.14.00.00. and on the Medium Condenser Carrier No.12.00.00.), or is fitted directly to the Condenser Carrier (in the case of the Medium Condenser Carriers No.13.00.00. and No. 23.00.00, and on all large Condenser Carriers). To remove the microscope mirror, withdraw it, together with the stirrup supporting it, from its carrier arm or from the condenser carrier.

Changing the Microscope Condenser.

Depending on the type of substage fitted to the microscope, two differ types of "U.V." condenser are used. If the microscope used for fluorescence microscopy has a simple or medium substage of the type in which the aperture iris diaphragm and filter ring are secured to the sleeve-mount of the condenser, it is also necessary to use a U.V. condenser mounted in a sleeve together with aperture iris diaphragm and filter ring (No. 00.12.20). If, however, the microscope substage has the iris diaphragm and filter ring mounted independently of the condenser sleeve ("Abbe Type Large Illuminating Apparatus", then a U.V. condenser on a sleeve without aperture iris diaphragm and without filter-ring (No. 00.11.20) is used. To remove the normal condenser of ordinary glass, slacken off the small screw which secures this in the condenser sleeve of the substage, and withdraw the condenser into the empty condenser sleeve as far as it will go, and secure it in position by the small clamping screw previously loosened.

Placing the Microscope in Position and Centring it.

After having lit the lamp (see section "Lighting the Lamp," page 1), swing in the white frosted glass filter and cut out the two ultraviolet filters (see the section "The Ultraviolet Filters and the White Frosted Glass Filter", Page 6). On the right-hand side of the microscope base-plate of the instrument is a knob, rotary and displaceable in all directions, for adjusting the illuminating mirror built into the base-plate. Look from above on to the glass-covered light exit aperture located approximately in the middle of the microscope base-plate, and shift and rotate the above-mentioned knob (milled head) until the illuminating mirror is adjusted in the microscope base-plate so that this light exit aperture in the base-plate appears flooded with bright light.

Then take the microscope it is intended to use fluorescence microscopy and place it on the base-plate of the Fluorescence Equipment so that its optical axis as accurately as possible through the centre-line of the glass-covered light exit aperture mentioned above. A centring cap with a small hole in the middle, is supplied with the apparatus. Lay this on the glass-covered light exit aperture in the microscope base-plate. Then look through the microscope and focus the latter with the coarse adjustment until a small bright circle of light--the image of the hole in the

centring cap — is visible in the field of view. Displace the microscope until this small circle of light lies truly in the centre of the microscopic field of view. The microscope is then properly centred to the light exit aperture in the microscope base-plate.

The next thing is to properly adjust the positioning strips and angles which keep the microscope in its centred position. Remove the two screws holding the positioning strip on the left and right hand side of the microscope base-plate, as well as the two screws holding the angle pieces to the positioning strips. Hold the Microscope firmly in its centred position on the base-plate, push the two positioning strips against of the heels of the microscope foot, and clamp these two strips in position by tightening up the screws on either side of the microscope base-plate. Then slide the right and left hand angle pieces up to the limbs of the microscope foot, and clamp these angles in position as well by tightening up the screws on the positioning strips.

If ever it is necessary to detach the microscope from the Fluorescence Apparatus, its foot is simply slipped out from between the angle pieces without loosening the screws of the latter. Later on, it can be simply slipped into its correct position without further centring.

Focusing the Illumination.

The luminous intensity and definition of the fluorescence microscopic image depend very substantially on the correct focusing of the illumination in the microscope. It is therefore essential that this focusing be performed very accurately and conscientiously, and checked over again from to time, especially after long intervals between working.

The illuminating may be focused both to the fluorescence microscopic image, and with ordinary visible light. It is usually sufficient to focus it to the fluorescence microscopic image. When examining preparations of low fluorescen power, and for fluorescence photomicrography, it is preferable to focus with ordinary visible light, and by following this method greater accuracy may be achieved in the focusing of the illumination, at least for those who are less experienced in manipulating the apparatus.

(a) Focusing the Illumination in Terms of the Fluorescence Microscopic Image.

1. Move the lamp collector in its helical focusing mount until it is quite close the lamp.
2. Put into action the Ultraviolet Filter I in the filter bax.
3. Open to its fullest extent the aperture iris diaphragm of the microscope subtage(illuminating apparatus).
4. Place on the microscope eyepiece an Eyepiece Ultraviolet Filter Trap (No.8082 or 8085).Note.Never do any microscopic or photomicrographicwork with the Large Fluorescence Equipment "Lux UV" — even work with ordinary visible light—without placing an Eyepiece Ultraviolet Filter Trap on the microscope eyepiece to protect the eye or the photographic material.
5. Place the focusing specimen supplied with the apparatus on the object stage of the microsdope so that the cross-section on this preparation comes just in the optical axis of the microscope,immediately below the microscope objective.
6. Insert a low-power objective(say,objective "10 x") in the microscope and,by means of the coarse focusing adjustment,bring it to approximately the correct working distande relative to the preparation (specimen)(say,about 7 mm when using the objektive "10 x").An actual "focusing"or "adjustment"by the microscope is usually impossible up to this juncture,as the firld of view is too dark for the purpose.
7. By displacing,tilting and rotating the milled head on the right hand side of the microscope base-plate, adjust the illuminating mirror located in the base-plate so that,on looking into the microscop image as yet,a field of view is lit up a bright yellowish-green by the fluorescence of the preparation.
8. Look into the microscope and focus the instrument on the preparation in the usual way by means of the coarse and fine focusing adjustments.
9. By means of the adjusting device on the microscope substage,raise the microscope condensermuntil it comes up against the plate of the object stage.
10. Stop down the collector field iris diaphragm until its opening is fairly narrow,then lower the microscope condenser with its adjusting(focusing)device

until a clearly outlined highly fluorescent circle is visible in the otherwise dark field of view. This circle is an image of the aperture of the collector field iris diaphragm. Note: The specimen was focused with the aid of the coarse and fine focusing adjustment of the microscope. The image of the aperture of the collector field iris diaphragm is, however, focused exclusively with the aid of the focusing device of the microscope substage, without altering in any way the focusing of the microscope on the specimen.

11. The clearly outlined highly fluorescent circle now usually lies quite excentrically in the field of view. By very carefully displacing, tilting and rotating the milled head on the right hand side of the microscope base-plate, adjust the illuminating mirror in the base-plate so that the clearly outlined, highly fluorescent circle of light comes precisly in the centre of the field of view.
12. Open the collector field iris diaphragm wide enough make the entire field of view fluoresce with uniform brightness and to eliminate any other smaller, bright surface which may be visible in the middle.
13. As a final measure, move the lamp collector gently back and forward a few millimetres in its helical focusing mount, and at same time look into the microscope to see whether there is any particular setting of the collector which makes the field of view fluoresce still more brightly and uniformly.

(b) Focusing the Illumination with ordinary visible Light

1. As " a " (1) above.
2. All the filters - including the white frosted glass filter - should be cut out.
3. Place a grey filter (No. 8029) in the filter ring of the microscope substage so as to subdue the very bright light.
4. Place any desired specimen on the object stage of the microscope.
5. As " a " (3) above.
6. As " a " (4) above.
7. As " a " (6) above.
8. By displacing, tilting and rotating the milled

head on the right hand side of the microscope base-plate, adjust the illuminating mirror in the base-plate so that, on looking into the microscope, the observer sees at least a well illuminated field of view, if not a microscopic image.

9. As " a " (8) above.
10. As " a " (9) above.
11. Stop down the collector field iris diaphragm until its aperture is fairly narrow, and, by means of the adjusting arrangement, lower the microscope condenser very slowly until a clearly outlined and highly luminous circle is seen in the otherwise dark field of view. This circle is an image of the opening of the collector field iris diaphragm. Note: Carefully observe paragraph 10 in section " a " above.
12. The clearly outlined bright circle of light will now usually lie excentrically in the microscopic field of view. By very carefully displacing, tilting and rotating the milled head on the right hand side of the microscope base-plate, adjust the illuminating mirror in the base-plate so that the clearly outlined circle of light comes exactly in the middle of the field of view.
13. Open the collector field iris diaphragm wide enough to flood the field of view uniformly with bright light, and to eliminate any other smaller surface which may be visible in the middle.
14. As " a " (12) above.
15. Remove the grey filter from the filter ring of the microscope substage.

The Objectives for Fluorescence Microscopy.

It is of course possible to make fluorescence-microscopic examinations with all the usual types of achromatic objectives. Under the influence of the ultraviolet radiation however, a certain amount of fluorescence is set at the lenses of the ordinary microscope objectives under certain conditions. For more accurate work, then, and for examining preparations of low fluorescent power, it is better to use special objectives that are entirely free from fluorescence. These special objectives — distingued by the addition " fl. " in their catalogue denominations and

engraving — are supplied (a) for ordinary specimens examined under cover-glasses, and (b) corrected for the examination of bacteriological smear preparations without cover - glasses. Depending on the particular requirements, the following special objectives are used:

Dry Achromatic Objective "10 x fl." for preparations examined with or without cover glasses.
Dry Achromatic Objective "60 x fl." for preparations with cover glasses over them.
Dry Achromatic Objective " 60 x fl od." for bacteriological smears examined without cover glasses.
Oil Immersion Achromatic Objective with incorporated Aperture Iris Diaphragm "Öl.-Im Blende A = 1.25 100 x fl." for specimens used with cover glasses.
Oil Immersion Achromatic Objective with incorporated Aperture Iris Diaphragm "Öl - Im Blende A = 1.25 100 x fl. od."

These objectives are used in the same way as are the corresponding normal objectives for microscopy with ordinary visible light. The aperture iris diaphragm of the oil immersion objectives is used as follows: It may happen that, in the field of view, there are very highly fluorescent elements the intensity of which is sufficient to cause over-radiation of their own structural details and of juxtaposed elements of lower fluorescent capacity. In cases of this kind, the aperture iris diaphragm of the oil immersion objectives should be stopped down until the microscopic image is not perceptibly impaired by over-radiation. The diaphragm should not of course be stopped down too much, as otherwise the resolving power of the objectiv will be impaired..

The Eyepieces for Fluorescence Microscopy.

For fluorescence microscopy, use only ordinary Huygheni an Eyepiece with uncemented eye-lenses. When preparations of low fluorescent capacity are being examined, use objectives of high numerical aperture relatively to their initial power in combination with low-power eyepieces, so as obta in a microscopic image that is as bright as possible.

Macro Fluorescence Analysis.

On the illuminating tube, right in front of the lamp-housing, is a fork-shaped carrier projecting upwards, having on one side a milled head. Pull out this knob against a fairly

considerable spring resistance. After having pulled out this knob, hold it firmly, and at the same time turn the entire lamp-housing upwards until its opening — which previously faced the illuminating tube — points downwards on the top of the work-table. Then release the milled knob that has been pulled out, when the lamp-housing will be held in its swung-up position. Next place the Macro-Filter Window (No. 8073) on the opening — facing downwards — of the lamp-housing, and look it in position there with its bayonet ring.

Part of the ultraviolet radiation impinging on the material examined is diffusely dispersed and reflected at the surface of the material, with the result that the fluorescence colour of these objects, when placed under the lamp for macro fluorescence analysis, appears more or less tinged with violet. In cases where it is necessary to determine the fluorescence colour accurately, it is preferable for the experimenter to use a pair of Ultraviolet Filter Trap Spectcles (No. 7508). The glasses of these spectacles have the property of absorbing all the ultraviolet reflected from the materials under examination, so that, when there are used, the observer sees only the really true fluorescence colours of the different materials, without the tint being falsified by a violet tinge.

When carrying out macro fluorescence analyses on very glossy materials (glazed pap ers and textiles, polished synthetic materials and woods, glazed pottery, metals, and the like), theobserver will find that red glints are set up, due to the fact that the ultraviolet filter of the macro filter window allows a small amount of visible light of very long wavelenght ("red") to pass through in addition to the invisible ultraviolet rays. In order to prevent mistakes in interpreting the true fluorescence colour, it is advisable, when examinig these glossy materials, to additionally insert a Red Filter Trap (No. 8072) in the macro filter window. To fit this trap, screw out the large screwed collar located on the front side of the macro filter window, place the Red Filter Trap on the ultraviolet filter situated in the macro filter window, and then screw the collar into place again.

Microscopy with Ordinary Visible Light.

When the Large Fluorescence Equipment "Lux UV" is used as an ordinary microscope lamp, and particulaly when comparative examintions are to be with ordinary light, it is

only necessary to cut out the ultraviolet filters and put the white frosted glass filter into action(see section "The Ultraviolet Filters and the White Frosted Filter," page6).The red filter trap,on the other ha nd,can usually be left where it is.Note:The eyepiece ultraviolet filter trap must of course remain on the microscope eyepiece.

Photomicrography.

Any good photomicrographic camera can be used for taking photomicrographs with the Large Fluorescence Equipment "Lux UV".If it is intended to use for this purpose one of our Camera Attachment of the "Kam V" type with viewing telescope,the customer,when ordering the camera ,should state specially that it is to be used with the Large Fluorescence Equipment " Lux UV ".In this case,the camera has to be equipped with a special Intermediate Portion (No.6273)having a semi-tranlucent,silvered dividing prism.

When microphotographs are being taken,an eyepiece ultraviolet filter trap must always be placed on the microscope eyepiece,irrespective of whether fluorescence phenomena are to be photographed,or phptographs taken with ordinary visible light.When the camer used is of the swing-out type the same ultraviolet filter trap is employed as is used for visual microscopy.If,however,the camera is of the attachabl type,it is preferable to use the Double Eyepiece Ultraviolet Filter Trap (No.8085).For the purpose of photomicrography,screw the inner portion of this filter trap — where the actual filter glass is located —out of its larger slip -on collar.Then screw off the eye-lens of the particular eyepiece used,place the screwed-out inner potion of the filter trap on the eyetube on the field-stop,and then screw the eyepiece together again.

Fluoresce nce Photomicrography.

To obtain comparatively short exposure times,observe the following points:

1.The microscope objective must have as high a numerical aperture as possible relatively to its initial power.

2.The initial magnification of the microscope eyepiece . should be as low as is feasible .

3.The scale of photographic magnification must be kept low,which means that only a short bellows extension should be used with camera of the bellows type.

4. Use highly sensitive photographic material; and, if yellow, reddish-yellow or red fluorescence colours are present, use only panchromatic material.

When specimen of very low fluorescent capacity are being photographed, involing exposures lasting sometimes for hours, it is advisable to take the photographs i a darkened room. Otherwise it may happen — especially when working with microscope objectives of very low magnifying power and having a big free working distance — that light from the room may penetrate between the microscope objective and the specimen during the prolonged period of exposure, and also reach the camera and the photographic plate or film.

If one of our cameras of the "Kam VK" type incorporating a viewing telescope, is used for taking photomicrographs, the aperture of the viewing telescope should be kept closed, even when the microscopist is working with high-power microscope objectives having a short working distance, so as to prevent any trace of the room lighting reaching the camera from this source and getting to the photographic material. The aperture of the viewing telescope is capped with a special slip-on type of light. (excluding cap No. 111.128).

Photomicrography with Ordinary Visible Light.

When doing photomicrographic work with ordinary visible light, cut out all the filters, i.e., the two ultraviolet filters and the white frosted glass filter (see section " The Ultraviolet Filters and the White Frosted Glass Filter," page 6). As regards the red filter trap, two cases must be differentiated: (1) Where the photographs are taken with a normal, photomicrographic green filter, the red filter trap can be left in the filter box. (2) Where the photographs have to be made correct as regards tone values (e.g., with a light yellow filter, or entirely without filters), then the red filter trap must be removed. (See the section "The Red Filter Trap", page 5).

Supplementary Directions
for Using the High-pressure Mercury Vapour Arc Lamp (running off Direct or Alternating Current) No.7707 for the Fluorescence Equipments "Lux UV" and"Lux UW".

Placing the Burner in the Lamp Housing.

(Referring to page 1 of the Directions "Lux 7556" for the Large Fluorescence Equipment "Lux UV", or page 2 of the Directions "Lux 7554" for the Simple Fluorescence Equipment "Lux UW".)

Slacken off the two small screws (14/12) securing the lamp excluder portion (15/13) on the lamp housing (12/11); unlock the bayonet ring fitting, and remove the lamp excluder portion upwards from the lamp housing. The burner (No.7707) is screwed, like an ordinary filament bulb, into the holder situated inside the lamp excluder portion. When fitting it, be careful to see that the bare metallic end of the small contact wire projecting from the lampholder (socket) makes good electrical+ with the metal sleeve of the burner socket. Then replace in the lamp housing the lamp excluder portion with the burner screwed into it; lock the bayonet ring, and then tighten up again the two small screws which have been slackened off.

+contact

Connecting the Lamp to the Mains Supply.

(Referring to page 1 of the Directions "Lux 7556" for the Large Fluorescence Equipment "Lux UV", or page 2 of the Directions "Lux 7554" for the Simple Fluorescence Equipment "Lux UW".)

The burner can be operated both with Direct Current and Alternating Current of 220 volts pressure. For both types of current, the connection to the house supply is made through a Mains Unit (No.7815). In view of the small amount of current the lamp consumes, no special heavy-duty fuses are necessary at the particular wall socket (plug box) used.

The lamp has attached to it a length of flexible cable (20/23). Insert the four-pin connector of this flex into the plug-box mounted on the base-plate of the mains unit.

to "Lux 7556" and "Lux 7554". 0805339.Dr.Gr./Me.

Note: The fourpin connector can only be inserted in one position in the plug-box. Insert the connector of the cable on the mains unit into the wall plug-box of the house supply.

Note: Since the burner can be used for alterhating as well as for direct current, it has no particular polarity. Even when plugged into a D.C. mains supply, then, no heed need be taken of the polarity, at least when a new burner is first connected up. When, however, the burnermhas been in use for some time on D.C. at a definite polarity, it is "burned in" and will only ignite subsequently when the polaritiy is the same as before. If, then, the burner should not light up when connected up to a D.C.supply, the reason for this is that the poles have been reversed by reversing the points of the plug in the wall-box. In this case, it is only necessary to revers the pins in the wall box (plug-box), when the burner will immediately ignite again without trouble. (See "Lighting the Lamp" in the next section of these directions.) To obviate any trouble in this connection, it is desirable to mark the pins of the mains unit connector and the wall-plug of the mains supply with the corresponding polarity signs.

Lighting the Lamp.

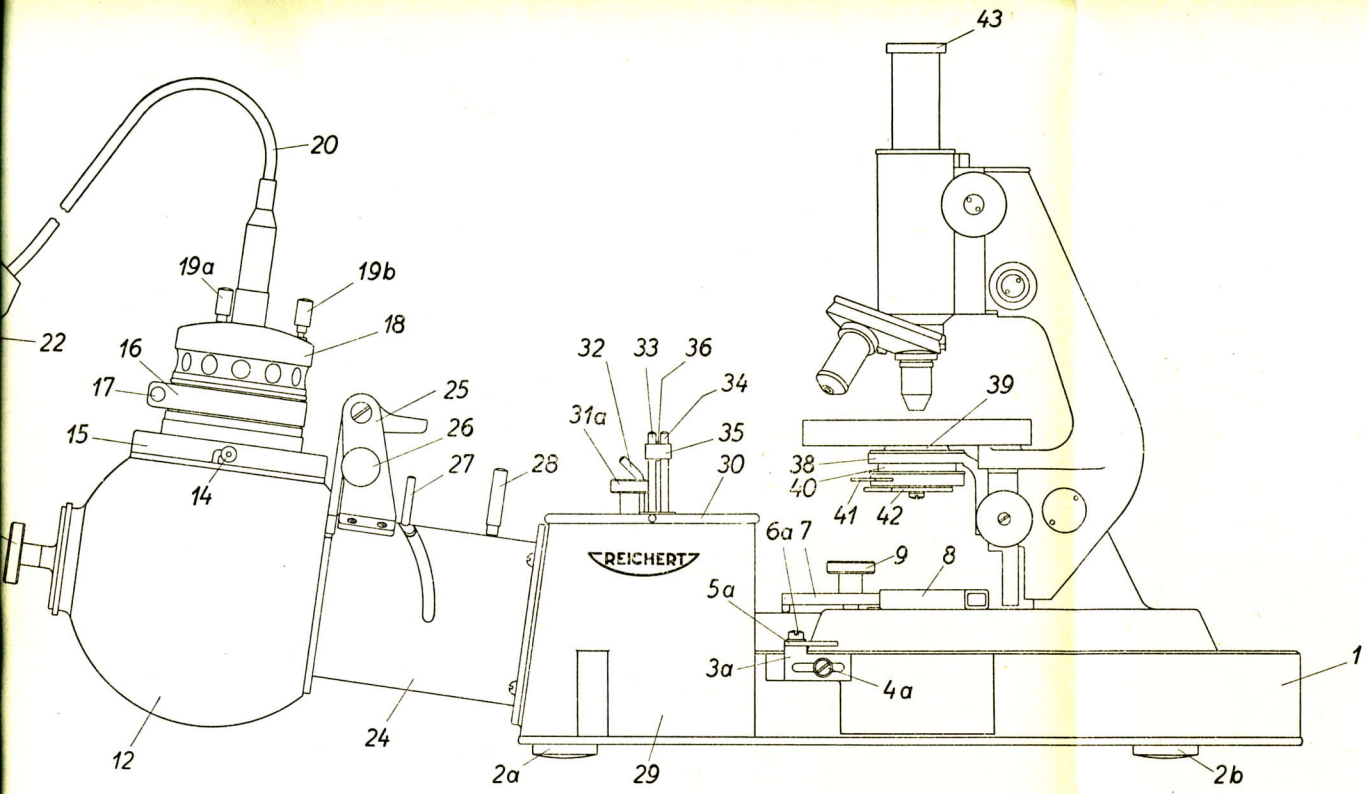
(Referring to pagelof the Directions "Lux 7556" for the Large Fluorescence Equipment "Lux UV", or page 2 of the Directions "Lux 7554" for the Simple Fluorescence Equipment "Lux UW).

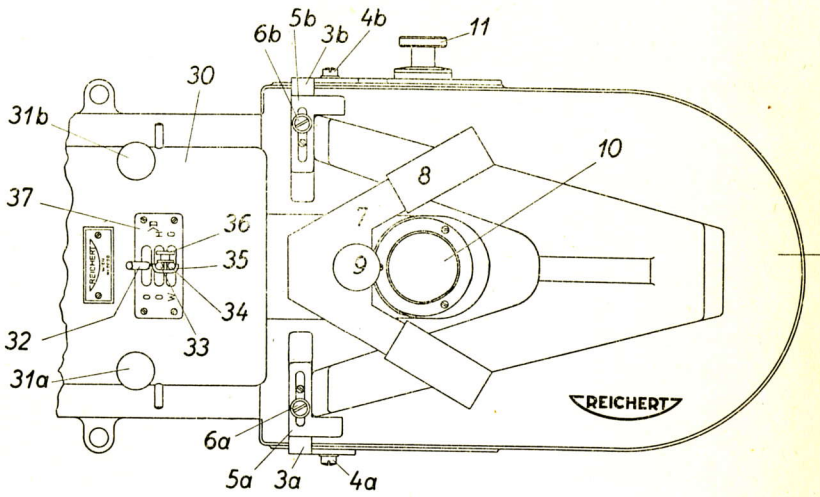
To light the lamp, first press down the black push-button (22/25) of the switch (21/24) incorporated in the lamp-flex, and then keep pressed down for about 1 second the push-button located on the casing of the resistance.
Note: The burner does not reach its full candlepower until about 5 minutes after being switched on. If the burner has been switched off by pressing down the red push-button in the flex switch, it cannot be lit again until it has completely cooled down--a matter of about 5 to 10 minutes.

Rotating the Burner.

(Referring to page 2 of the Directions "Lux 7556" for the Large Fluorescence Equipment "Lux UV", or page 4 of the Directions "Lux 7554" for the Simple Fluorescence Equipment "Lux UW".)

Slacken off the long clamping screw (17/15) which secures the lampholder portion (18/16) in the lamp housing, and then begin to rotate the lampholder portion which is now free to turn. When doing this, observe the image projected by the burner. At first, when the burner tube lies across the optical axis, the arc in the burner will be visible as a strip of light which is much longer in the horizontal direction than it is in the vertical. By turning the lampholder so that the burner tube turns through 90 degress and comes parallel to the optical axis of the lamp, the arc will assume the form of a spot of light which is approximately as wide in the horizontal direction as it is high in the vertical direction. Continue turning the burner until the image of the arc forms a spot of light which is as nearly as possible circular in shape. The narrow side of the burner will then exactly face the lamp collector (condenser) Then tighten up again, to a slight extent at first, the clamping screw which was previously slackened off. This completes the centring to satisfy the first condition.





Large Fluorescence Equipment "Lux UV"

Microscope Baseplate (Nos. 1 to 11):

1. Microscope baseplate
2a, 2b. Rubber buffers
3a, 3b. Positioning plates for microscope foot
4a, 4b. Clamping screws for 3a and 3b
5a, 5b. Positioning angle pieces for microscope foot
6a, 6b. Clamping screws for 5a and 5b
7. Clamp for microscope foot
8. Rubber sleeves on 7
9. Clamping screw for 7
10. Light exit aperture in 1
11. Milled head for adjusting deflecting mirror in 1

Lamp (Nos. 12 to 23):

12. Lamp housing
13. Handle (grip) on 12
14. Bayonet lock for securing 15 on 12
15. Lamp excluder portion
16. Clamping collar for fixing 18 on 15
17. Clamping screw for 16
18. Lampholder portion
19a, 19b. Set-screws for centring the lampholder in 18
20. Lamp flex
21. Flex switch in 20
22. Push-button in 21
23. Connector on 20

Illuminating Tube (Nos. 24 to 28):

24. Illuminating tube
25. Hinged joint for 12
26. Locking pin for 25
27. Adjusting pin for the helical focusing motion of lamp collector in 24
28. Adjusting pin for the field iris diaphragm in 24

Filter Box (Nos. 29 to 37):

29. Filter box
30. Filter box cover
31a, 31b. Clamping screws for 30
32. Free and single set-pin of Ultraviolet Filter I
33. Coupled set-pin of Ultraviolet Filter II
34. Coupled set-pin of White Frosted Filter
35. Clamp for 33 and 34
36. Clamping screw for 35
37. Indicator plate for 33, 34 and 35

Additional Optical Components on the Microscope (Nos. 38 to 43):

38. Condenser clamping sleeve of the microscope substage (Medium Condenser Carrier with Rackwork, No. 13.00.00)
39. U. V. Condenser (No. 00.12.00)
40. Condenser Sleeve (No. 00.12.00)
41. Set-pin for aperture iris diaphragm on 40
42. Filter ring on 40
43. Eyepiece ultraviolet filter trap