ML9400 Series

POLARIZING MICROSCOPE

WITH REFLECTED AND TRANSMITTED
LIGHT ILLUMINATORS

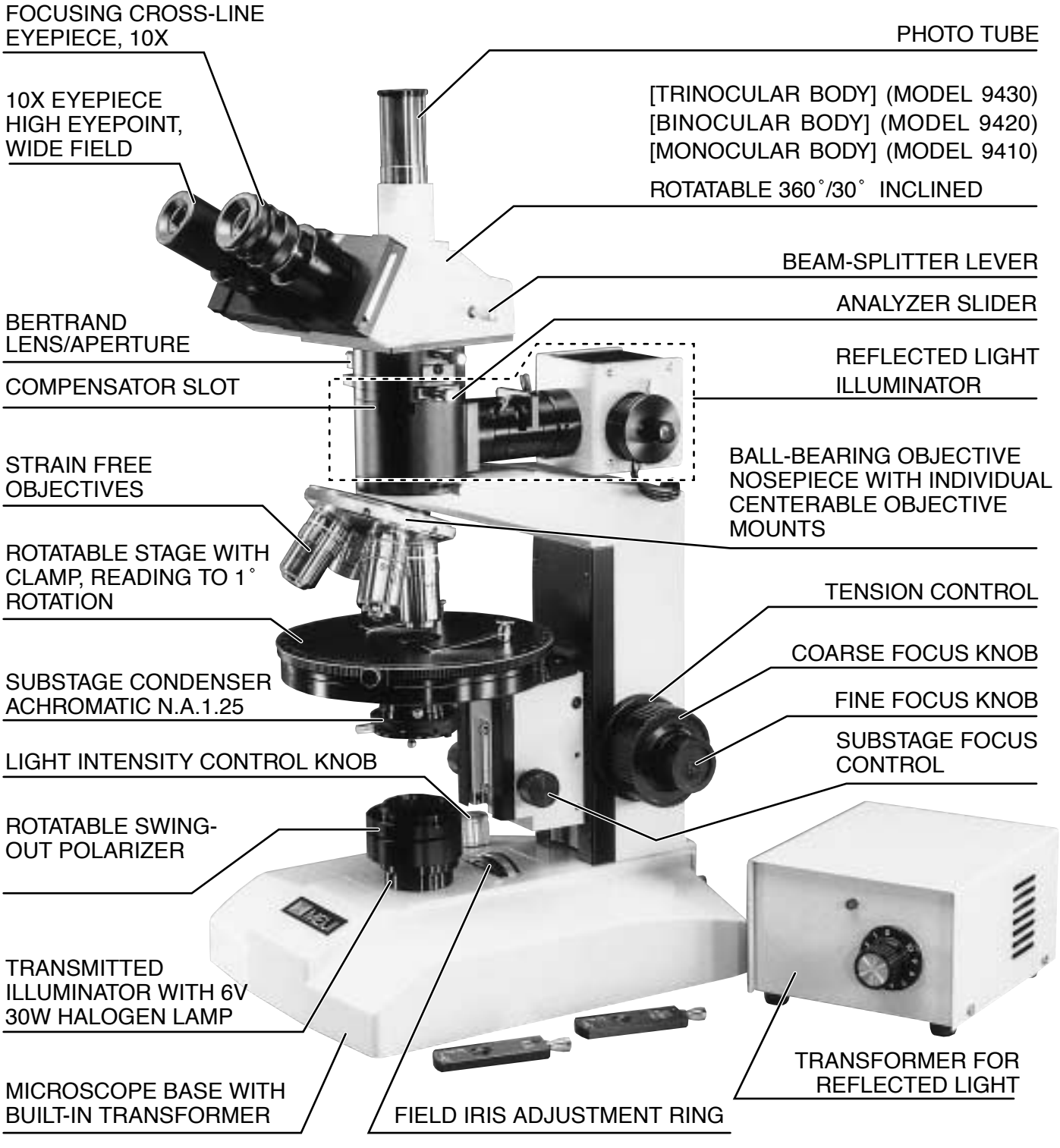
INSTRUCTION MANUAL

MEIJI TECHNO CO.,LTD.

JAPAN

ML9400 Series

MEIJI TECHNO



MODEL ML9430 [TRINOCULAR MODEL]

UNPACKING, ASSEMBLY, PREPARATION FOR USE

UNPACKING

All MEIJI TECHNO microscopes are usually supplied in an expanded polystyrene, 2-part case and this should be used for storage, possible transport in the future, etc. If your order includes a wooden storage cabinet, release the fixing screws holding the limb and base from the cabinet and withdraw.

Unpack the microscope and its parts carefully. Do not throw away any boxes or packing materials until the contents of the shipping container have been checked against your order and the packing list sent.

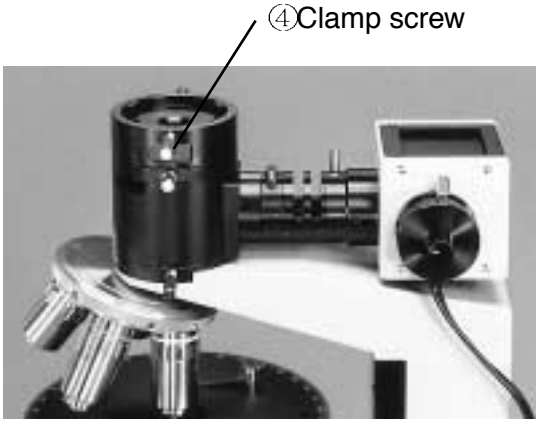
ASSEMBLY

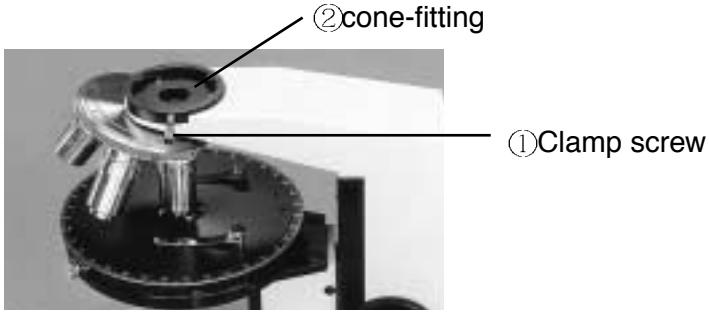
REFLECTED LIGHT ILLUMINATOR, unpacked from the separate case, goes onto the microscope limb in the following way:

(1)Loosen the Clamp Screw① of the femal cone-fitting② at the Limb top.

(2)The male cone-fitting of Vertical Illuminator is mounted into the femal cone-fitting at the limb top so the Clamp Screw① gears into the slot③ of the male cone-fitting. Now, screw it up by the same Clamp Screw①.
The above gearing secures the right position of REFLECTED LIGHT ILLUMINATOR.

(3)Likewise, mount the Viewing Head into the female cone-fitting of Vertical Illuminator, gearing the slot and the Clamp Screw④.





Place the microscope and parts on a sturdy table or desk which gives firm and stable support. This should be located in the atmosphere as clean as possible, avoiding the places where there is excessive dust, moisture, heat or fumes.

When in place insert eyepieces in the eyetubes of the binocular body and mount the objectives on the centering objective nosepiece, starting with the lowest magnification, but positioning the 10X in the fixed (not centerable) opening. Then position the others to the right in order of increasing magnification.

A focusable cross-line eyepiece should be used in the slotted eyetube. Make sure that it is "Keyed" into the slot in the eyetube, as its orientation is important and should not change. The cross-line should be sharply focused by turning the focusing ring.

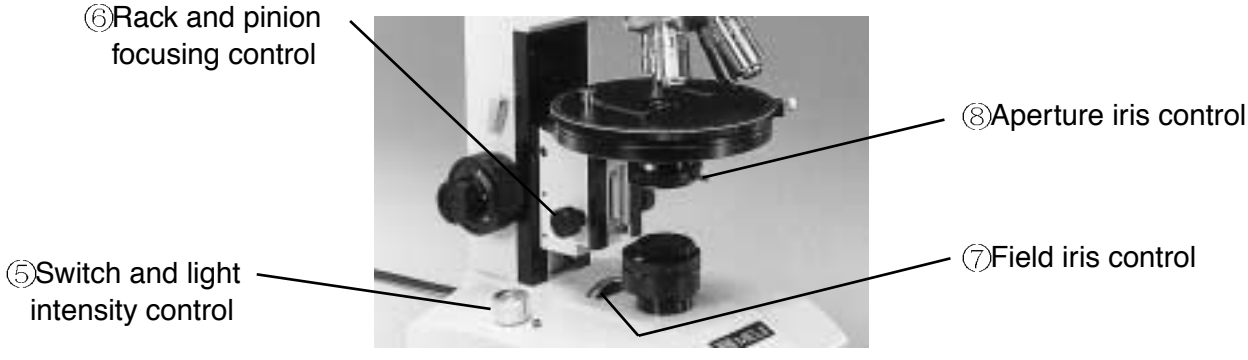
★IMPORTANT!
Before plugging the illuminator into any electric outlet, make sure that transformers and illumination bases supplied to you are suitable to the current available (See voltage indication at the bottom of limb).

OPERATING INSTRUCTIONS

OPTICAL SET-UP AND TRANSMITTED LIGHT ILLUMINATION

(1)Turn on the Transmitted Light Illuminator by turning the Switch⑤. Place the specimen slide you wish to examine on the microscope stage and rotate the 10X objective into position for focus.

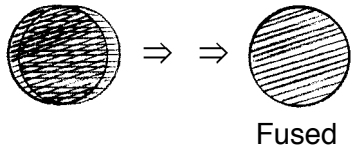
(2) Move the substage condenser up to its top position, using the rack and pinion focusing control⑥. Check to make sure that both the field iris⑦ and the aperture iris⑧ are fully open.



(3) Focus down on your specimen slide until detail can be seen. Adjust the brightness of the in-base light source, using the intensity control knob⑤, left-hand back on the base.

BINOCULAR ADJUSTMENT

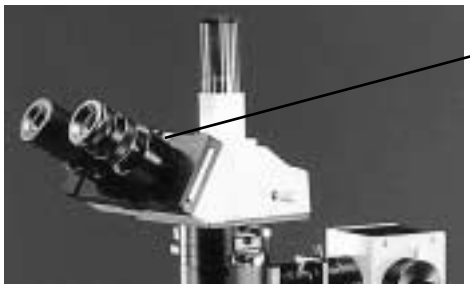
Comment: Using a binocular body is much more efficient and less tiring than a monocular body, but it must be adjusted correctly. When it is perfectly adjusted the images coming from the two eyepieces are "fused" into one better image in eyes of the observer.


Fused

《 ◆After you have focused on the specimen proceed as follows:- 》

(1)Move the sliders on which the two binocular eyepiece tubes are mounted in and out until the distance between them is exactly the same as the distance between the pupils of the observers eyes. (This is the "interpupillary distance".)

(2)When this is done, note the dimension which is displayed in the window⑨ of the slider. Always remember to set to this distance when using the microscope. It will be different for different observers, so they will have to check the best setting for themselves.

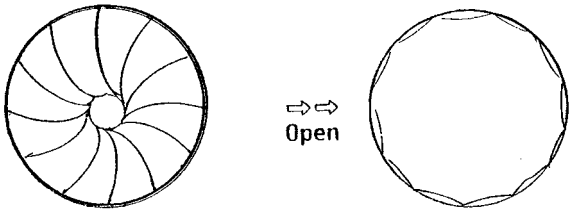


(3)Now use the fine focus to get a sharp image in the right-side eyepiece using your right eye.

(4)Using the left eye, adjust the diopter adjustment collar on the eyepiece in the left-hand eyepiece tube to get the sharpest possible image. Do not use fine focus.

(5)Now turn the field iris adjustment ring⑦ until the field iris is seen in the field of view.

(6)Raise or lower the substage condenser so as to focus the field iris as sharply as possible in the plane of your specimen. When this is done open out the field iris until it is just outside the field of view.



Focused image of closed field iris

(7)Removing one of the eyepieces, observe the disc of light coming from the back of the objective in use. Close down the aperture iris⑧, using the lever on the substage condenser, until only about 70%-80% of the disc of light observed remains visible. (Note that the microscope is now set up for use with the 10X objective. Similar adjustments to those mentioned above should be made when using any of the objectives required.)

(8)Regarding the note above, if you choose the 100X objective, immersion oil must be applied to the specimen slide so that, when this objective is swung in and focused, both the specimen slide and the 100X objective are in good, bubble-free contact.

(9)The tension control knob⑩ is provided to allow the individual user to adjust the focus tension to his/her own preference. Tension may be increased by turning the knob with a counterclockwise motion. A lighter tension may be set by turning clockwise.

SAFETY AUTO-STOP FOR OBJECTIVES AND STAGE PLATE

In order to protect specimen slides and objective lenses from accidental damage, the 20X or bigger power lenses are designed to retract at the tip by built-in spring. Besides, Auto-Stopper is equipped in the microscope limb for further safety.

⑪Auto-Stop lever

《HOW TO AUTO-STOP》

(1) Make sure that the Auto-Stop lever⑪ is loose. If not, please turn the lever counterclockwise to unlock.

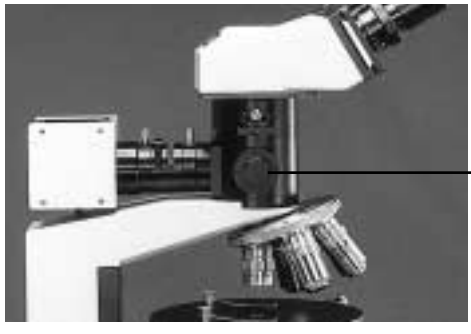
(2) Focus the highest power objective onto the specimen, and at the focused position, fasten the lever by turning it clockwise. Then, the stage plate can not go up over the level set by the lever.

SPECIAL POLARIZING FACILITIES

Please note that the applications and detailed techniques of polarizing microscopy are beyond the scope of this manual. What follows is a description of the special features of the ML9400 Series Polarizing Microscope which are often used in geological, mineralogical, chemical and other optical studies which have long been associated with the polarizing microscope.

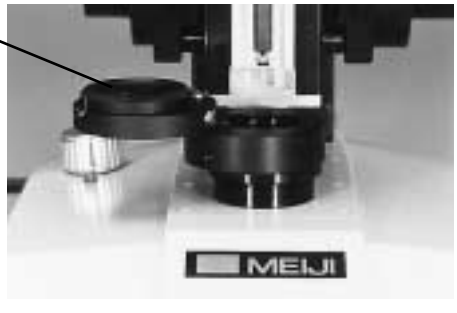
POLARIZATION UNDER TRANSMITTED LIGHT

The Reflector of the Reflected Light Illuminator should be removed from the light path by pulling the Knob⑫ of the Reflected Light Illuminator to the full to get a brighter image.



⑫Knob

⑬Substage Polarizer

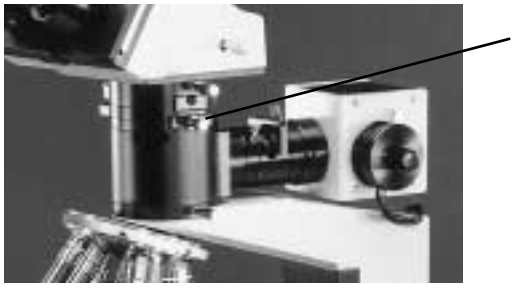


The substage polarizer⑬ is fully rotatable with a swing-out, click-in mount. When the polarizer is swung out, the light is not polarized.

(This picture shows that substage polarizer is swung out.)

When the Polarizer⑬ is swung into the path and clicked into its correct position, the polarizer may be rotated, sending polarized light within angles from 0-360 degrees up to the specimens. Angular settings for 0 degrees and 90 degrees are marked and clicked on the mounting so that these common settings can be located quickly and precisely.

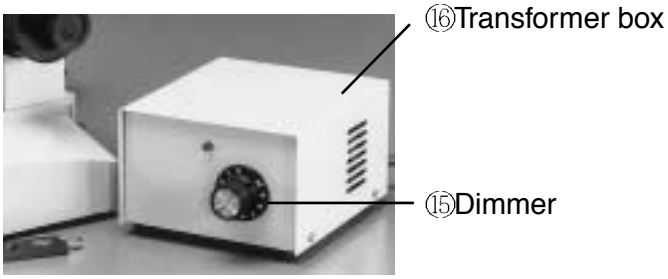
The Analyzer⑭ is mounted in an in-tube slider which moves the analyzer in and out of the optical path. When “in”, and with the substage polarizer also “in” and set at 0 degrees, these elements are said to be “crossed” and the field of view is said to be “extinguished”. In this condition the field of view is dark - except for optically active elements in the field, which rotate the angle of polarization and thus become visible against a dark background. This is the basic advantage of a polarizing microscope.



POLARIZATION UNDER REFLECTED LIGHT

The Reflector of the Refelected Light Illuminator should be placed in the light path by pushing the Knob ⑫ until the Reflector occupies the light path completely.

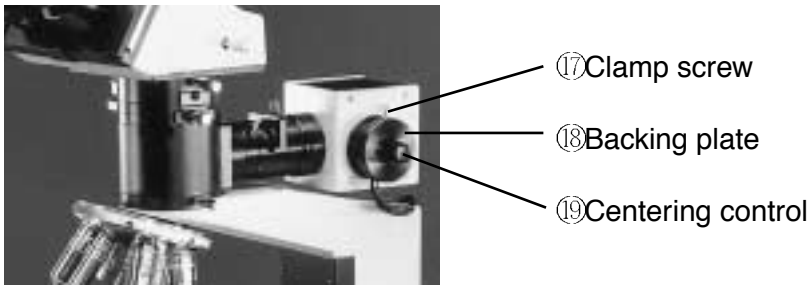
Turn on the Reflected Light Illuminator by turning the Dimmer⑮ on the front panel of the separate Transformer Box⑯ as Dimmer functions as ON-OFF switch, too.



When uneven illumination occurs on the field of view, bulb in the lamp house requires centering in the following way:

To move the bulb vertically, loosen the Clamp Screw⑰ and turn the Backing plate⑱clockwise or counterclockwise slightly.

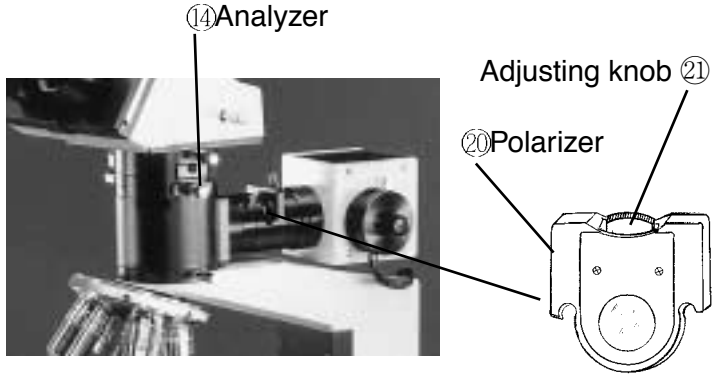
To move the bulb horizontally, turn the Lamp Centering Control⑲.



The Polarizer⑳ should be inserted into either of the Filter Receptacles on the Reflected Light Illuminator.

Slide in the Analayer⑭ into the optical path.

The above two processes bring on a state of "CROSSING" between Polarizer and Analyser, making the field of view quite dark. In case it does not become dark enough, move the adjusting knob㉑ of the Polarizer⑳ to and fro gently to find the fittest position.



BOTH TRANSMITTED AND REFLECTED ILLUMINATORS CAN BE USED SIMULTANEOUSLY FOR THE OBSERVATION OF SEMI-TRANSPARENT MATERIALS.

ROTATING STAGE

A ball-bearing circular stage, precisely rotatable through a full 360 degrees, is supplied as standard. With rotation angular measurements can be made, reading by a vernier to 0.1 degrees.

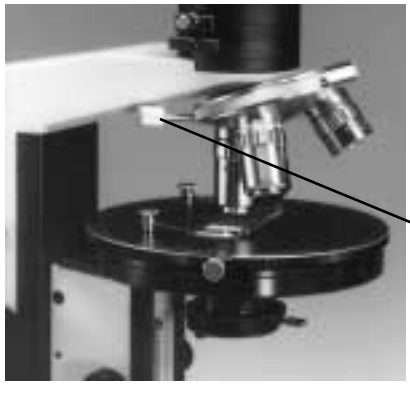
CENTERING OF OBJECTIVES

When the microscope is shipped to you the objectives are factory par-centered. Therefore, check and make sure that the objectives have been precisely seated on the optical axis. If it is even lightly off axis the centering is required with the Hexagon keys supplied in the following way:

(1) Focus down on your specimen through the 10X objective mounted in the non-centerable locked-up opening, aside from the other floating centerable nosepiece holes, and memorize the point of the specimen appearing just on the eyepiece cross-line center.

(2)Turn the nosepiece and bring the next higher power objective to the position, and focus on the specimen if necessary, and see whether the pinpoint of the specimen you memorized before is located just at the cross point of the mark.

(3)In case the memorized pinpoint is seen away from the cross point, it must be brought to the cross point by the use of the provided two Centering Screws, which can be inserted into the key holes on the nosepiece ring and turned to move the pinpoint to the cross point.



This picture shows the Hexagon key inserted into the key hole on the nosepiece.

◆Note: It is important that you change magnifications by rotating the milled nosepiece ring, not by grasping and pulling the objective barrels. Doing this puts strain on the objective housings which can cause some decentering.

BERTRAND LENS

The ML9400 series polarizing microscope features an in-tube, slide-in Bertrand Lens. Fitted with it is a field-limiting aperture which allows isolation of small features in the center of the field. Thus the characteristic interference figures for small crystalline elements can be observed and studies. These effects only occur when both analyzer and polarizer are in the optical path, the polarizer being set at 0 degrees. The in-tube design of the Bertrand Lens makes it possible to use it equally well with binocular, trinocular and monocular bodies.

COMPENSATORS

A sensitive tint plate (first order red) and mica 1/4 wave plate are supplied with the ML9400 series polarizing microscope as standard. These are fitted in plates with standard DIN dimensions, sliding in a slot cut in the tube just above the objective nosepiece.

PHOTOGRAPHY AND TELEVISION

PHOTOGRAPHY

Photographic documentation of microscope visual images is most conveniently achieved by using the trinocular (photo-binocular) bodies for use with 35mm SLR Camera or PMX100 Large Format Camera.

In the case of the ML series of biological, metallurgical and polarizing microscopes a trinocular body is equipped with a sliding switch-over beam-splitter component which either (1) allows all of the light to go to the visual eyepieces or (2) directs 80% of the image-forming light upwards to the film plane of a 35mm SLR camera, while still sending 20% of the light to the binocular eyepieces.

In the system the MA150/50 or MA150/60 Camera Attachment should be used with the SLR camera of your choice. Please note that one of the large range of T2 Adaptor Rings suiting to your camera should be ordered separately.

These adaptor rings are intended to compensate for the small differences in effective distance of the film plane in your camera - so as to ensure that photographs are optimally sharp, and achieved without wastage of film in trial shots and experimentation.

In addition special low-power camera eyepieces (2.5X, 3.3X and 5X) are available and recommended - these will give you maximum field coverage on your specimen while using the convenient and economical 35mm film format.

CAMERA OPERATION

(1)Fix your 35mm SLR camera, T2 Adapter and a photo (camera) eyepiece on the MA150/50 or MA150/60 Camera Attachment, then mounting this assembly on the straight tube of the trinocular body.

(2)Pull out the lever on your trinocular body so as to send the image both to the camera and the visual eyepieces.

(3)Rotate the adjustment ring on the straight tube so as to set correctly for optimum conditions of simultaneous visual observation and photography.

TELEVISION

For television the MA151/10 "C" Mount should be used, threaded into your TV camera, then placed and adjusted on straight tube of your trinocular body.

Adjustment can then proceed as per paragraph(3) above. You should understand that the comparatively large magnification factors inherent in most TV camera/monitor systems will restrict your field of view (while blowing up total magnification).

A correct optical set-up and adjustment is, of course, crucial to obtaining a good TV monitor image, but keep in mind that the monitor controls for brightness and contrast adjustment are also important and should also be experimented with in order to obtain the best monitor image.

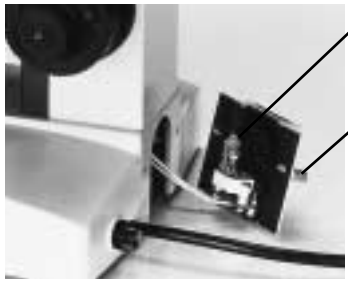
MAINTENANCE AND CARE

BULB REPLACEMENT

When changing light bulbs in the illuminators, always disconnect the plug from the electrical source, and make it sure that the green monitor light is off. Never work on the electrical system without first disconnecting. The bulb is held in a socket block inserted in the light source housing at the back of the Reflected Light Illuminator.

TRANSMITTED LIGHT ILLUMINATOR

(1)Remove the socket block from the microscope base by unscrewing the Screws ㉒ and pulling the Backing plate ㉓ clear of the instrument.



(2)After making certain the old bulb is cool to the touch, remove it by pulling straight out of its socket. Do not twist as the lamp pins may break off and stay lodged in the socket.

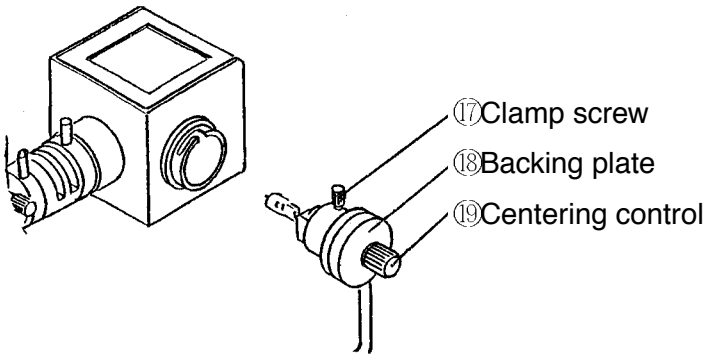
(3)Handle the new bulb only with tissue paper or the plastic in which it is wrapped and insert the two pins into the two holes in the socket.

REFLECTED LIGHT ILLUMINATOR

(1) Loosen the Clamp screw⑰ and turn the Backing plate⑱ clockwise to the slot. Then pull out the Backing plate from the light source housing.

(2) After making certain the old bulb is cool to the touch, remove it by pulling straight out of its socket. Do not twist as the lamp pins may break off and stay lodged in the socket.

(3) Handle the new bulb only with tissue paper or the plastic in which it is wrapped and insert the two pins into the two holes in the socket.



★★★ DO NOT HANDLE WITH BARE FINGERS ⇒
⇒ BULB MAY EXPLODE WHEN HEATED IF NOT TREATED CORRECTLY.

CARE

Always cover the instrument with plastic dust cover provided when the microscope is not in use.

Keep eyepieces in the microscope body at all times in order to prevent dust from falling on the internal optics.

Store the microscope in a safe, clean place when not in use for an extended period of time.

CLEANING

Clean exposed lens surfaces carefully with a pressurized air source, soft brush or clean soft cloth. Too much finger pressure may damage lens coatings.

To remove oil, fingerprints and grease smudges, moisten the cleaning cloth with a very small amount of alcohol or xylene.

Immersion oil should always be promptly cleaned from high power oil immersion objectives after every use.

Painted or plastic surfaces should be cleaned only with a cloth moistened with water and a small amount of detergent.

◆ DO NOT ATTEMPT TO MAKE ADJUSTMENTS TO THE INTERNAL OPTICS OR MECHANICS !!

If the microscope does not seem to be functioning properly or you have questions about its operation, call your supplier (or an authorized repair service) for advice.

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