Olympus

POLARIZING MICROSCOPE INSTRUCTIONS

POM

POLARIZING MICROSCOPE

OLYMPUS OPTICAL CO., LTD.

INSTRUCTIONS
FOR
OLYMPUS POLARIZIING MICROSCOPE MODEL POM

The polarizing microscope is a useful instrument to study optical characteristics of materials by means of polarized light.

A standard microscope is used to observe shades and colors of a specimen by trans-illumination or vertical illumimation.

The polarizing microscope further enables the user to observe the optical characteristics of the specimen and to rccognize more detailed data. Therefore, even an extremely minute article may be made an cbject of the observation. In some cases, based on the optical caracteristics thus obtained, even the chemical elements of the specimen can be conjectured.

For this reason, a polarizing microscope is widely utilized for the optical observation and research not only in the field of mineralogy and petrology, but also in chemistry, pharmacy, biology, medical science, and ceramics, as well as in chemical and textile industries.

The Olympus Polarizing Microscope Model POM is with an inclined head. It is equipped with the excellent objective lenses ot 4X to 200X magnifications and various attachments.

✠ CHARACTERISTICS

1. Inclined head.
2. Builtin bertland lens. The entire optical system dust-proof.
3. Wide range of up and down movement of the stage. Universal rotatable stage attachable.
4. Extra accessories such as vertical illumination unit, and photomicrographic equipment.
5. Connecting rod attachable for the synchronous movement of the polarizer and the analyzer.
6. Wide field eyepieces.

✠ SPECIFICATIONS & FEATURES

Magnification : 20X-1,000X

Objectives : Centering type

Tube ; 30° inclination, iris diaphragm for the conoscopic observation, helicoid screw for adjustment of conoscopic image.

Range of Vertical Movement of the Stage ; 70mm, with minimum intervals of 0.005mm

Stage : 140mm in diameter, rotatable through 360°(w/1/20° verniers) with clamping mechanism.

Polarizer & Analyzer : Polarizing filter (of Dichrome made by Mitsubishi Electric Co.)

Polarizer - Rotatable through 360°, with minimum intervals of 5°, click stop at 0° position.

Analyzer - Rotatable by 90°, with minimum intervals of 5°, with a clamp.

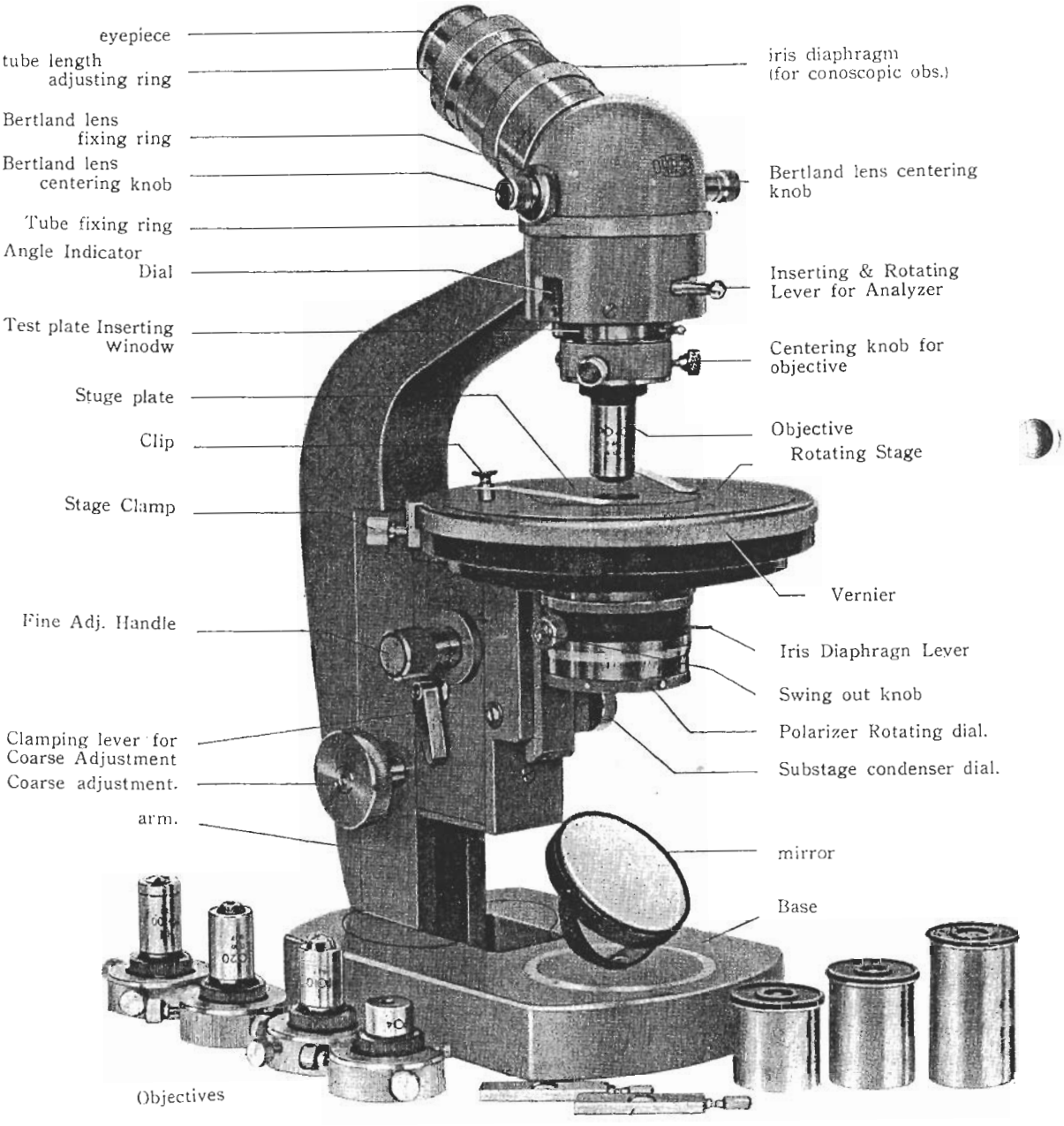
Bertland : Centerable.

Test Plates : 1/4 wave length retardation plate and tint plate of 530mμ.

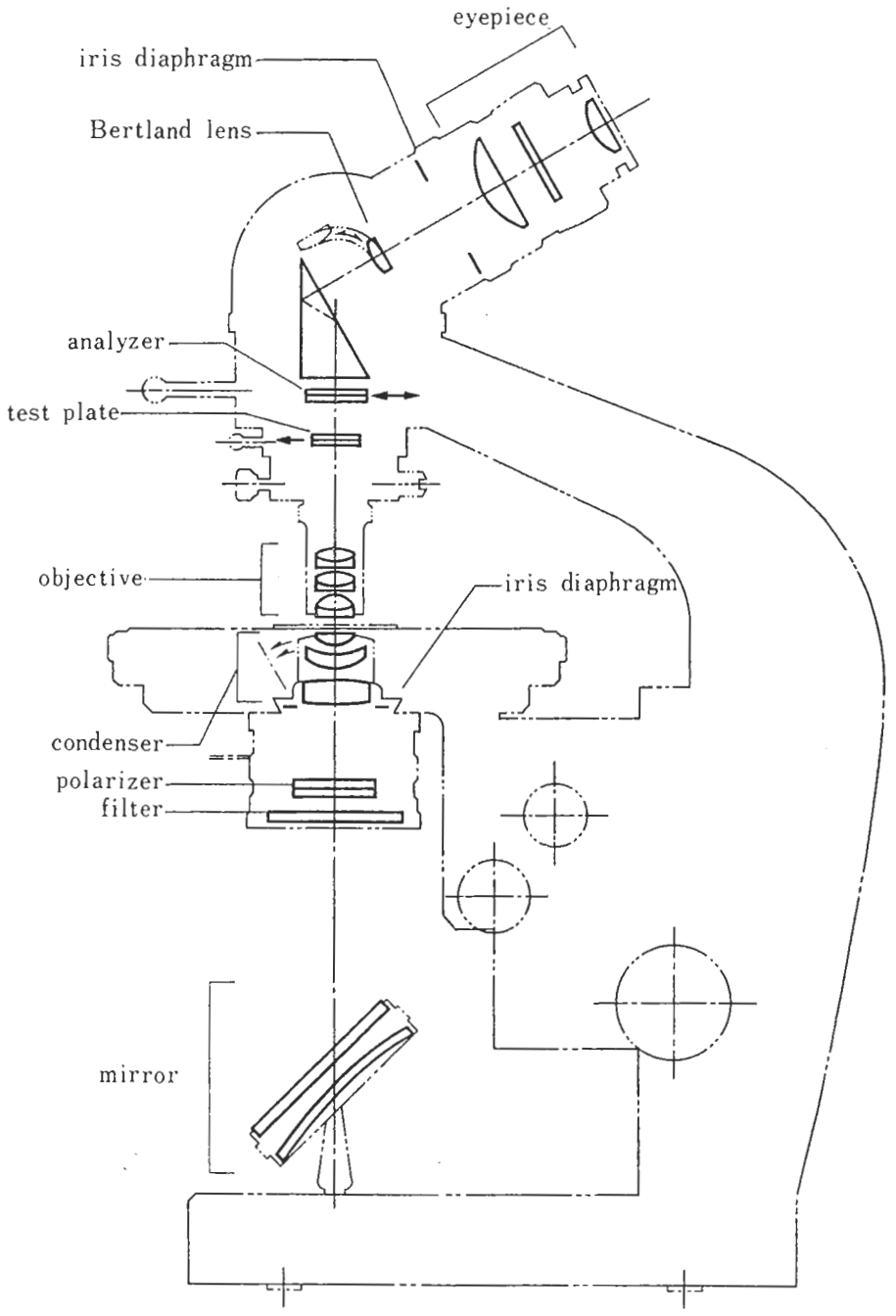
✠ SPECIAL ACCESSORIES

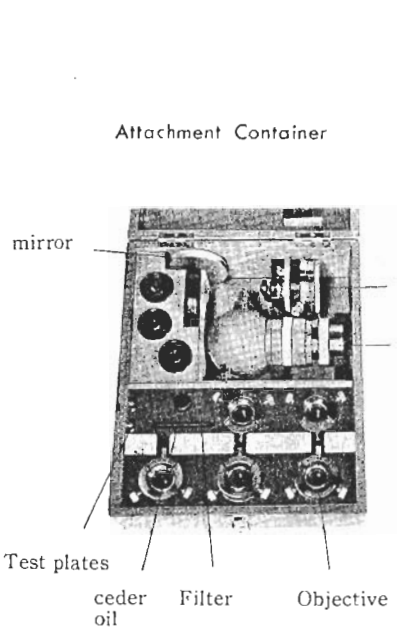
1. Cross Movement Mechanical Stage
2. Berek Compensator with a compeneation table
3. Eyepiece adaptor

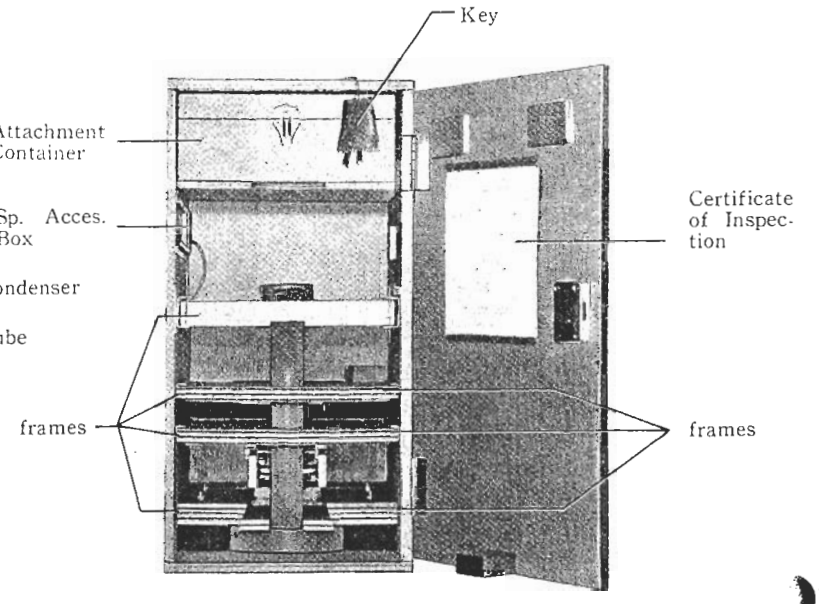
✠ NAME OF PARTS



✠ OPTICAL PATH







✠ **Contained in the Attachment Container are:**

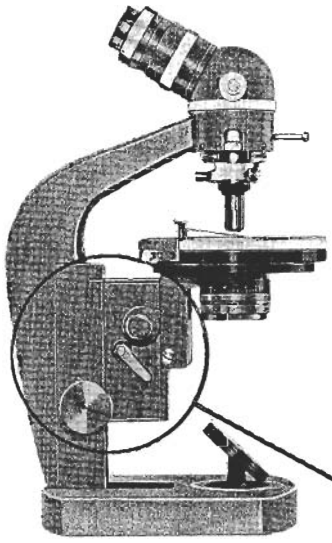
Tube	1
Condenser	1
Reflector (mirror)	1
Objectives	5
Eyepieces	3
Test Plates	2
Clips	2
Ceder Oil	1 btl.
Filter	1

1. Remove fixing screws and frames to take out the body from the cabinet.
2. Take the tube from the Attachment Container and set it onto the body. Turn the fixing ring till it no further goes.
3. Attach the condenser, the objective, and the evepiece in the same order as in the case of a standard microscope.
4. Fix the reflector and clips.
5. Also included in the Attachment Container are a bottle of ceder oil and a filter. Use them as required during the observation.

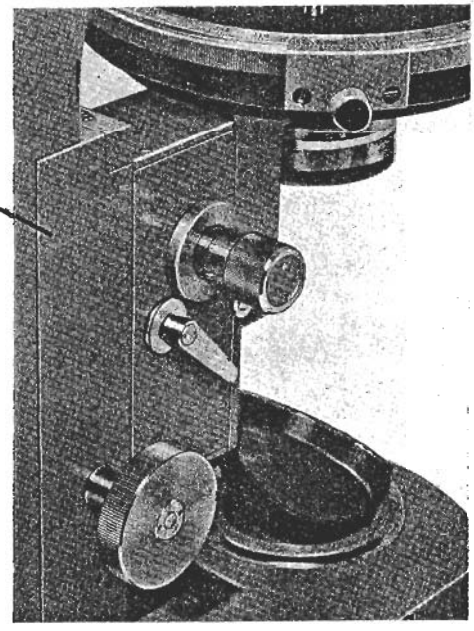
✠ CAUTIONS:

1. A sudden change in humidity and temperature causes moisture on the surface of the lens, resulting into the hazy effect during an observation. It further brings about mildews and corrosion. In general, a high temperature is not preferrable.
2. Avoid giving a severe impact to the instrument. The very fine adjustment may be ruined. Be sure to carry the instrument carefully.
3. After its use, wipe off ceder oil at the tip of the objective with a piece of gauze soaked with xylene; if anisole is used, simply clean it with a piece of dry gauze. Any trace of oil left on the surface of the lens will cause an adverse effect on it.
4. Dust, along with humidity, will also cause an adverse effect and mildews on the lens. The instrument is dust-proof but an utmost precaution will never do a harm. Especially, dust accumulated in the optical path from the polarizer to the analyzer, will cause the bi-refringence resulting into a low contrast. After the use, therefore be sure to cover it with the alastic cover provided. If it is not to be used for a long time, return it to the cabinet.
5. The polarizing filters used for the polarizer and the analyzer will become inferior in its efficiency if exposed to the temperature over 60°C. It is risky to expose it to sunshine or to the strong illumination for a prolonged time.
6. A microscope is a very finely adjusted instrument. Refrain from disassembling the mechanical parts. Particularly the optical system requires a rigid and minute adjustment and, therefore, must absolutely be left to the specialist. In case of any neeessity for repair, please contact our company or our agents.

Arm & Bed:



The arm which has been carefully designed considering the center of gravity while being carried, along with the stable bed, firmly holds the inclined head. Focusing is performed by up-and-down movement of the stage (rang of movement-70mm, with fine adjustment intervals of 5μ). This fixed-head system ensures an accurae focus during a prolonged observation and keeps the observer free of fatigue because of the fixed eye-level. All operational parts are placed at the lower part of the microscope enabling the user an easy operation without changing the posture.

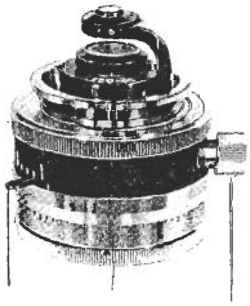


Mirror:

The foot of the reflecting mirror sits in the receptacle on the bed and can be turned to any direction. It can easily be removed by hand and replaced with the illuminator.

Condenser:

It moves vertically (up and down) by a rack and pinion.
The top position is the optimum stop for the conoscopic observation.
The top condenser lens swings out, i.e. it can be swung out or set back by the handle provided. The opening is 0.9 with the top lens and 0.25 without, suited for the conoscopic and orthoscopic observations respectively.
Polarizer : Set in at the bottom of the condenser; rotatable through 360°, with minimum intervals of 5°; click stop at 0°; a color-temperature converting filter attachable.
Iris Diaphragm : The lever stop scale indicates the diameter of the diaphragm (mm). The female screw bored at the scale 180° of the polarizer rotaion indicator is used for the connecting rod for the synchronus movement of polarizer and the analyzer.



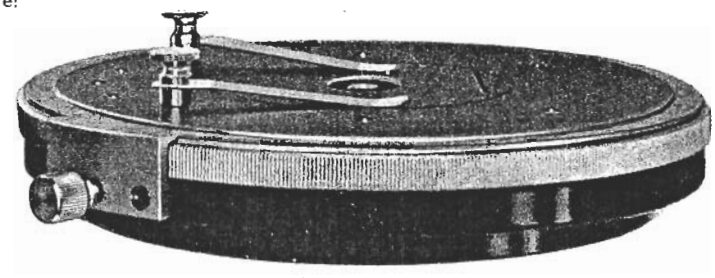
iris diaph. lever

polarizer rotation dial

condenser swing-out knob

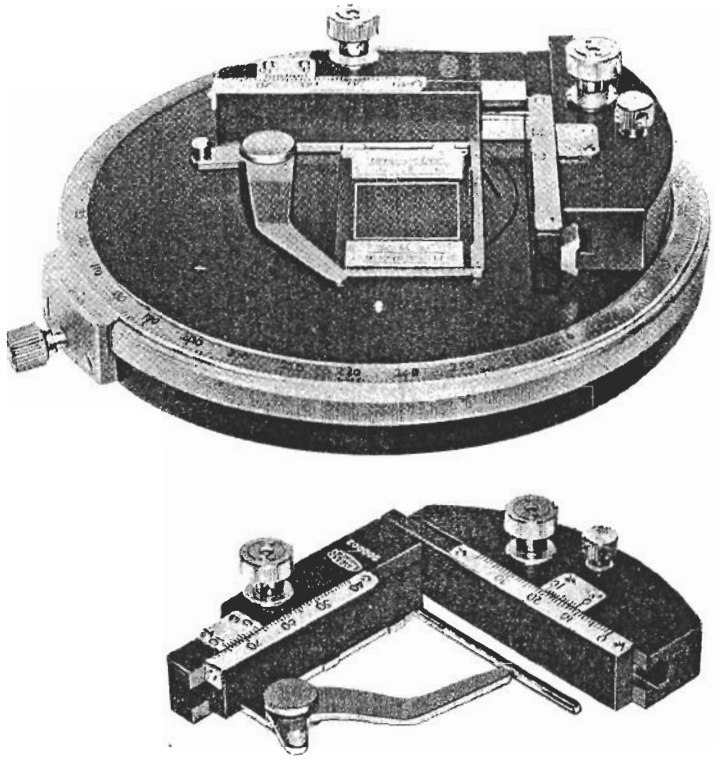
✠ BODY

Circular Rotating Stage:

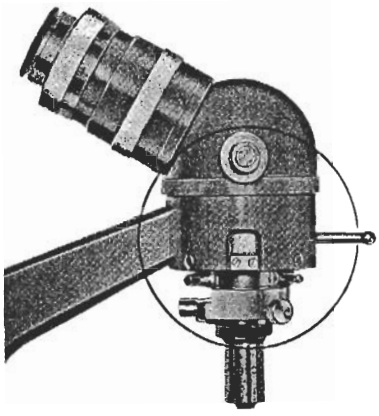


Outer diameter-140mm; the stage plate outer diameter-60mm, the inner diameter-15mm; smooth rotation by means of ball-bearings; with 360° scale and 1/20° verniers; may be clamped at any position; 4 holes for clip fixing, 3 holes for mechanical stage setting, 2 holes for universal stage setting; a ring provided at the bottom of the stage for the connecting rod for the analyzer and the polarizer.

Mechanical Stage (cross-movement):



The mechanical stage is attached to the rotating stage. Then a slide glass is set onto it and the portion of the specimen to be examined is aligned with the center of the rotating stage. The maximum range of movement, in four directions-back & forth and left & right, is 30mm each and readings may be obtained as small as 0.1mm on verniers: In such a case as the observation of ores by the vertical illumination, first fix the specimen on the slide glass by rubber, etc., and set the glass onto the mechanical stage. The handpress for the metallurgical microscope can be used to prepare a specimen.

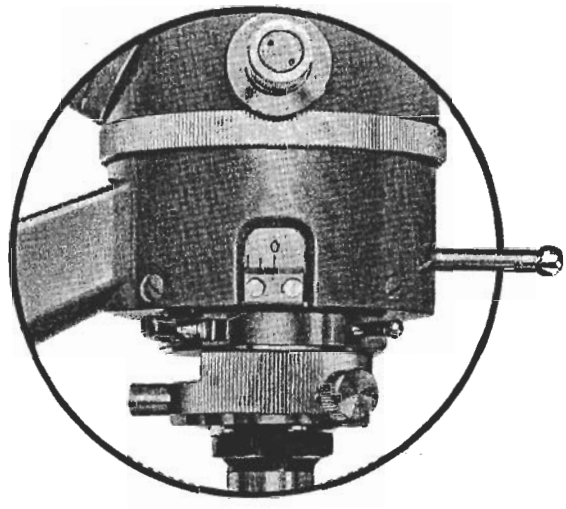


Head:

The inclined head with an angle of 30°, when the instrument is placed on a desk of the normal height, avails the observer a comfortable of the observation, as the eyepiece will position at the height of approximately 36cm from the bed.

Bertland Lens:

Set at the lower part of the inclined head is the shifting knob for the Bertland lens along with its centering knob. With this lens on, the interferential figure formed at the back focusing plain of the objective may be observed.



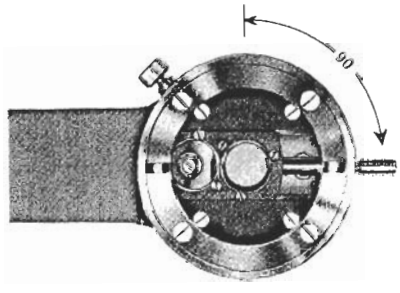
Iris Diaphragm:

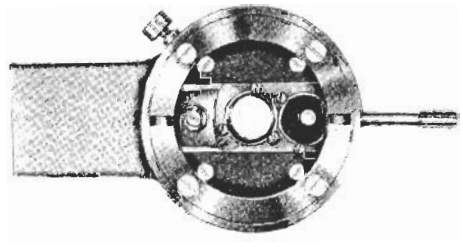
When the Bertland lens is inserted the specimen forms its image at the vicinity of the iris diaphragm (in the middle of the head). When an observer's interest is centered at a certain portion of the specimen, this diaphragm is used to cover up the unnecessary portions.

Inserting and Rotating Lever for the Analyzer:

When the lever is pulled out to the fullest, the analyzer is set in the optical path. It can be rotated throngh 90° as illustrated. The analyzer is usually kept in the optical path during the observation, except for a standard observation.

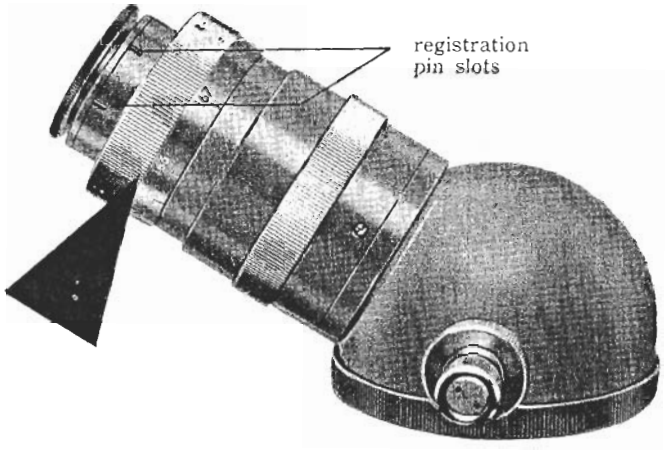
When the lever is pushed in as illustrated, the analyzer will not work and this is the position used for a normal observation.





✠ BODY

Tube Length Adjustment Ring:



By means of a helicoid screw inside the adjustment ring, the tube length will be adjusted from 160mm (position 0) to 167mm (position 7). For an orthoscopic observation, use position 0. For an orthoscopic observation, use position 0. For a conoscopic observation, the position of the interferential image will be different according to the objective used and, therefore, the tube length must be adjusted so as to obtain the clearest conoscopic image.

The most preferrable tube lengths according to each objeetive are as follows:

OBJECTIVE	PO20X	PO40X	PO100X
TUBE LENGTH (Position)	4.5-5.0	4-4.5	0.7-1.0

Registration Pin:

Two slots for the registration pin are cut on the eyepiece tube (of 30mm inner diameter). Facing from the observer, if the registration pin is inserted in the righthand side siot, the cross line in the eyepiece will align with the vibrating direction of the analyzer position 0 and the poralizer position 0. If it is inserted into the other slot the cross line will align diagonally.

✠ BODY

Objectives:

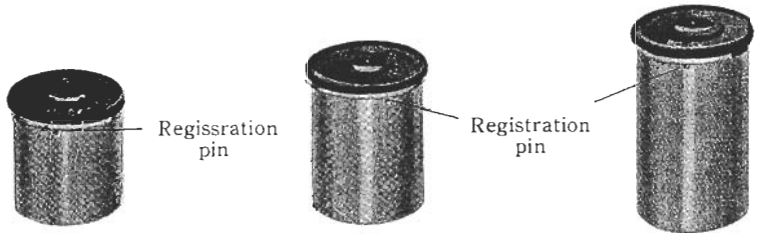
PO100× PO40× PO20× PO10× PO4×

Excellent strain-free lenses carefully screened are encased in a holder indicating the magnification.

MAGNIFICATIONS	4X	10X	20X	40X	100X
NUMERICAL APERTURES	0.1	0.25	0.40	0.65	1.30
WORKING DISTANCES	35.0	5.6	1.55	0.56	0.14 (mm)

On each holder is attached a centering knob. Insert the objective from the right hand side of the tube and turn 90° to the left.

Eyepieces:



PW10× PW7× PW5×

The cross line in each wide-field eyepiece can be aligned with the direction of the vibration by the registration pin. The eyepiece can be heightened or lowered by the helicoid screw to adjust the eye sight.

VIEW FIELD

PW 5X	29.0	With crossline
PW 7X	24.0	0.1mm scale
PW10X	20.0	With crossline

pin-hole cap

The pin-hole cap, a special attachment, can be used, replacing an eyepiece, for a general observation of the interferential image without the help of the Bertland lens.

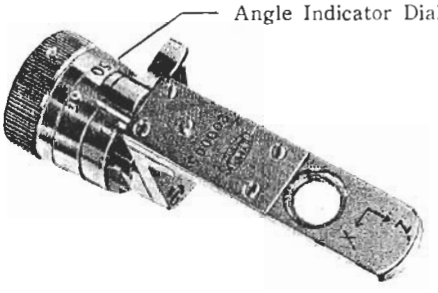
✠ BODY

Test Plates:

Insert the 1/4 wave length retardation plate (mica 147mμ) or the ting plate (gypsum 530mμ) into the provided windw at an angle of 45°. They are used for examiation of the bi-refringence or warps and for determination of the axis.

✠ SPECIAL ACCESSORIES:

Berek Compensator:



A piece of calcite is set in this compensator to measure the bi-refringence of the specimen. The compensator is inserted into the test plate window. Readings taken from the angle indicator dial combined with the data taken from the attached compensation curve table will determine the retardation.

A bi-refringent specimen may be set at the extinct position stage 45° by the scale and clamp it at the diagonal posittion. Then insert the compensator, turn the dial until the interferential color in zero order appears in the center of the field. Take the reading of the angle. Compare it on the compensation curve and obtain the micron valus of the retardation. If the order doesn't lessen even by turning the compensation dial, turn the specimen 90° and repeat the same procedure.

At the position of 30° on the indicator dial, the test plate will become perpendicular to the optical axis with 0 retardation; therefore, insertion and removal of the test plate is performed at this position.
If it is overly slanted it will get stuck at the inserting window.

Eyepiece Adaptor.

If the observer prefers to use an evepiece of a standard microscope (with a smaller JIS diameter), he may remove the POM eyepiece and replace with this adaptor. Then the normal evepiece may be inserted in it. This will make possible the of the general eyepieces, grain-size measuring evepieces, other specialized eyepieces.

✠ OBSERVATION METHODS:

Standard:

When the instrument is to be used as (standard) microscope, the polarizer, test plate, and the Bertland lens are not necessry. In principle those are to be removed from the optical path, but ordinarily the polarizer is left in operation.

Orthoscopic:

With the microscope properly set for this type of the observation, only the light passing in almost parallel to the optical axis will enter the view field, thus enabling the user to observe the optical characteristics of the specimen in that direction.

In principle the parallel light source is to be applied, but since this will darken the field and lower the resolving power of the lens extremely, it may be alluminated by allowing the low aperture at the lower condenser lens only (swinging out the top lens). Therefore, mainly the low magnification objectives of 20X, or under, are utilized. It is recommended to adjust the contrast by means of the aperture diaphragm at the bottom of the condenser in accordance with the objective used.

The centering knob on the objective fixing ring can be utilized to align the center of the specimen with that of the view field.

Conosopic:

It is necessary to illuminate the specimen by corn lighting. Put the top condenser lens back into the position, then attach a high magnification objective, such as 40X or 100X. After appropriate focusing on the specimen, insert the Bertland lens and now focus on the interferential fringe formed at the back focusing plain of the objective (bcteer known as the conoscopic image). by helicoid movement of the tube.

Also a pin-hole cap may be used in place of an eyepiece to directly observe the interferential image mentioned above. In this case the Bertland lens is moved out of the position.

If only a portion of the specimen is of interest to the observer, he must first remove the Bertland lens, align the center of the stage with that of the view field, then place the specimen at that center and trim the field to the desired portion by operating the iris diaphragm. Put the Bertland lens back into the position, obtain its center by the centering knobs provided, and align it with the center of the ocular field. Now it is ready for the observation of the deviation of the interferential fringe or its measurement by a scaled eyepiece.

● オリンパスの対物レンズには色帯が入っています。

今回，お買上げの対物レンズには，**色帯**が入っています。

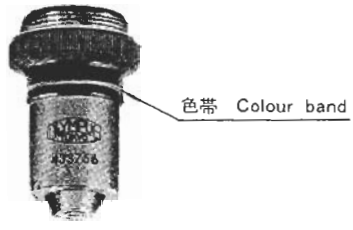
これは，対物レンズに表示されている倍率数値を見なくても，この**色帯を見れば，倍率がわかる**ように取扱い時の便を計ったものです。

取扱い説明書には，色帯の説明をしてありませんが，現品は下記の通り色帯を入れてありますので，確認の上，有効に活用して下さい。

● OLYMPUS OBJECTIVE HAS ITS COLOUR BAND

THE OLYMPUS OBJECTIVE, you just purchased, has **a colour band** on it. This new step has been adopted for your convenience, that **you may understand the magnification, if you only see the colour,** without looking at the magnification number engraved on the tube. Though there is no mention about the colour band in the instruction booklet, upon your recognition of our new colour system, the olympus products wait for your further efficient usage.

色 Colour		生物用 Biological use			金属用 Metallurgical use		倍率範囲 Range of magnification
		Plan	Fl	Ach	Plan	Ach	
紫	Purple	1.3×			1.3×		0 ～Less than 2×
茶	Brown	2×			2×		2×～Less than 4×
赤	Red	4×		4×	5×	5× 6×	4×～Less than 7×
橙	Orange	10×		10×	10×	10×	7×～Less than 20×
黄	Yellow	20×		20×	20×	20×	20×～Less than 40×
黄緑	Brilliant green	40×	40×	40×	40×	40×	40×～Less than 60×
青緑	Cobalt blue			60×			60×～Less than100×
淡青	Light blue	100×	100×	100×	100×	100×	100×. and over



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