

*scanned by JGM on 15 dec 09 -- for personal use only, not for sale*

# INSTRUCTION MANUAL

# 取扱説明書

POLARIZING ATTACHMENTS MODELS AH-P-2 & AH-P-3

INSTRUCTION MANUAL

オリンパス光学工業株式会社  
**OLYMPUS OPTICAL CO., LTD.**

東京都渋谷区幡ヶ谷2-43-2  
TEL 03(377)2111

The Polarizing Attachments Models AH-P-2 and AH-P-3 are a useful aid in conjunction with the Universal Research Microscope Model VANOX to study the optical characteristics of materials in polarized light.

Generally, an ordinary compound microscope is used to observe a specimen by differences between contrasts or colors with a transmitted light or reflected light, but a polarizing microscope further enables the microscopist to measure the optical properties of materials, contained in specimens. Therefore, even extremely small specimen details can be made objects for polarizing microscopy. A polarizing microscope can be used in determination or identification of the chemical constituents of specimens.

Each of the Attachment permits microscopy in polarized light not only in mineralogy and petrography, but also in chemistry, pharmacology, biology, medical science and ceramics, as well as in the chemical and textile industries.

The difference between these two attachments is that the Model AH-P-2 solely includes a polarizing monocular tube and a set of objective centering devices, while the Model AH-P-3 exclusively includes a centering revolving nosepiece and extra eyepieces BiK5X and AH-WF10X, in addition to the standard equipment provided for both models.

	<u>Page</u>
I. STANDARD EQUIPMENT .....	3
II. SPECIFICATIONS .....	4
III. IDENTIFICATION OF VARIOUS COMPONENTS .....	6
A. Polarizing Monocular Tube with Photo Tube .....	6
B. Intermediate Polarizing Tube .....	7
C. Circular Rotatable Stage .....	8
D. Mechanical Stage .....	9
E. Swing-out Condenser .....	9
F. Berek Compensator .....	10
G. Centering Revolving Nosepiece .....	10
H. Single Objective Adapter and Objective Mounts .....	11
IV. ASSEMBLY .....	12
V. OPERATING THE MICROSCOPE .....	14
o Summary of Microscope Operation .....	14
o Detailed Adjustments of Various Parts .....	15
A. Interpupillary Adjustment and Diopter Correction .....	15
B. Alignment of Polarizer and Analyzer .....	16
C. Stage Centration .....	16
D. Objective Centration .....	17
E. Operating of 45° Click Stop Lever .....	18
F. Use of Compensator Plates and Berek Compensator .....	18
G. Use of Analyzer Rotation Knob .....	19
H. Use of Bertrand Lens .....	20
I. Use of Specimen Slide Glasses .....	21
J. Use of Iris Diaphragm .....	21
K. Combination of Illuminator and Condenser Elements .....	21
o Orthoscopic Observation .....	22
o Conoscopic Observation .....	22
o Photomicrography .....	23
VI. OPTICAL DATA .....	24
VII. CARE FOR STORING .....	24

I. STANDARD EQUIPMENT

	AH-P-2	AH-P-3
Polarizing Monocular Tube with Bertrand Lens . . . . .	1	0
Intermediate Polarizing Tube with Analyzer and Bertrand Lens . . . . .	1	1
Swing-out Condenser, N.A. 0.9/0.25, with Polarizer and Iris Diaphragm . . . . .	1	1
Centering Revolving Nosepiece . . . . .	0	1
Single Objective Adapter . . . . .	1	0
Centering Objective Mounts for PO4X, PO20X, PO40X, PO100X (set of four) . . . . .	1	0
Non-centering Objective Mount for PO10X . . . . .	1	0
Circular Rotatable Stage . . . . .	1	1
Mechanical Stage . . . . .	1	1
Berek Compensator . . . . .	1	1
Sensitive Tint Plate (530mu) . . . . .	1	1
Quarter Wave Plate . . . . .	1	1
Objectives: (Strain-free) Achromat PO 4X . . . . .	1	1
PO 10X . . . . .	1	1
PO 20X . . . . .	1	1
PO 40X . . . . .	1	1
PO100X, oil . . . . .	1	1
Eyepieces: BiK5X . . . . .	0	1
K5X (with cross hairs) . . . . .	1	1
WF10X (with cross hairs) . . . . .	1	1
WF10X (with 10/100mm micrometer) . . . . .	1	1
AH-WF10X . . . . .	1	1
Pinhole Cap . . . . .	1	1
Wooden Carrying Case . . . . .	3	2

## II. SPECIFICATIONS

- Polarizing Monocular Tube:** 30°-inclined monocular tube with vertical photo tube. Light path selector knob for transition of light path between observation and photomicrography. Built-in Bertrand lens, detachable and centerable. Provided with aperture iris diaphragm, graduated N.A. scale and mechanical tube length adjustment.
- Intermediate Polarizing Tube:** Magnification IX, compatible with various test plates and Berek Compensator. Incorporates a depolarizer to compensate for brightness difference between the right and left eyepiece tubes; a Bertrand lens mounted in a rotating turret; a polarizer rotatable 180° in a slide to enter into the light path, with scale graduated in 2° increments.
- Centering Revolving Nosepiece:** Rotatable 360°, on ball bearings, with four objective holes for three centering objective mounts and one non-centering objective mount.
- Circular Rotatable Stage:** Rotatable 360°, on ball bearings. Outside diameter 170mm, with verniers reading to 6 minutes, engraved opposite each other on the stage periphery. Clamping screw for stage rotation. Click stop in increments of 45° from any position preset; two centering screws.
- Mechanical Stage:** Attachable to the circular rotatable stage. Working range: North-south 30mm; East-west 30mm. Vernier scales reading to 0.1mm. Adjustable and removable specimen holder for different sizes of biological and metallurgical slides.

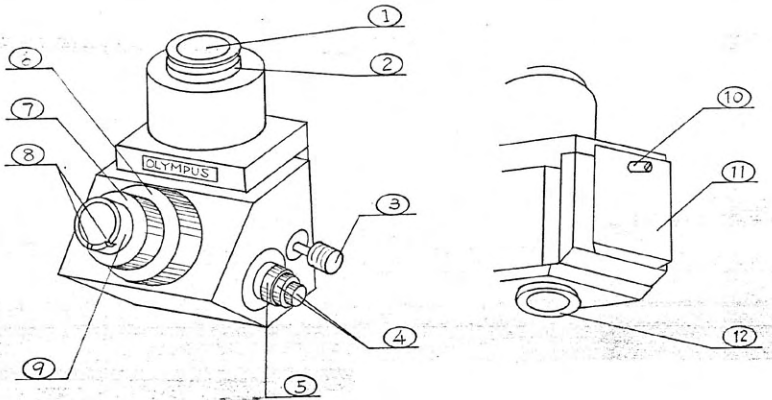
Swing-out Condenser: On dovetail mount N.A. 0.9 with top lens swung in; N.A. 0.25 with top lens swung out. Provided with aperture iris diaphragm, graduated N.A. scale. Built-in polarizer rotatable  $360^\circ$ , with scale graduated in  $5^\circ$  increments. Click stop at position "0" with adjustment knob.

Compensator Plates: Sensitive tint plate  $530m\mu$ , and quarter wave plate; both are mounted in slides and fit into the intermediate polarizing tube.

Berek Compensator: Angle indicator dial graduated from  $0^\circ$  to  $60^\circ$  with vernier scale reading to 6 minutes.

### III. IDENTIFICATION OF VARIOUS COMPONENTS

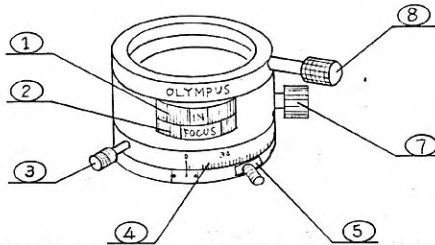
#### A. Polarizing Monocular Tube with Photo Tube



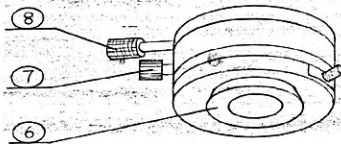
- ① Eyepiece Tube for Photo Eyepiece: Accepts FK photo eyepieces, designed exclusively for photomicrography.
- ② Camera Ring Dovetail Mount: Accepts the Photomicrographic System Camera Model PM-10.
- ③ Light Path Selector Knob: As pulled out all the way, light is directed to the photo tube.
- ④ Bertrand Lens Centering Knobs (coaxial)
- ⑤ Knurled Ring for Removal of Bertrand Lens
- ⑥ Iris Diaphragm Ring
- ⑦ Focusing Adjustment Ring
- ⑧ Eyepiece Positioning Groove: When eyepiece positioning pin is aligned to the lower groove on the tube, the cross lines in the eyepiece coincide with the vibration direction of polarizer and analyzer at 0 settings. When aligned to another groove, the cross lines coincide with the diagonal directions.

- ⑨ Eyepiece Tubes
- ⑩ Dovetail Positioning Pin
- ⑪ Dovetail Slide
- ⑫ Nosepiece Dovetail Mount

B. Intermediate Polarizing Tube



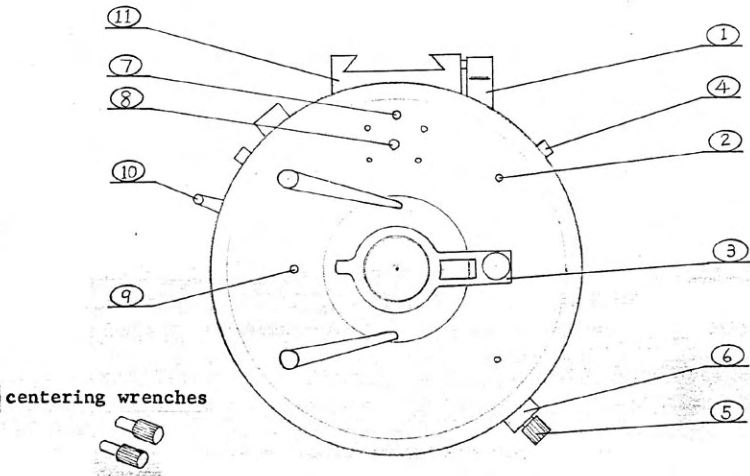
- ① Bertrand Lens Turret Ring: Engraved letters "IN" for insertion of Bertrand lens into the light path; "OUT" for removal of the Bertrand lens from the light path.
- ② Bertrand Lens Focusing Ring: Rotate the ring to bring the conoscopic image into focus.
- ③ Analyzer Rotation Knob
- ④ Analyzer Scale: At 0 setting, the vibration of analyzer is in the east-west direction.
- ⑤ Dust Slider: Remove the slider to insert compensator plates or the Berek compensator.



- ⑥ Circular Dovetail Mount: Accepts the centering revolving nosepiece or objective adapter.
- ⑦ Analyzer Positioning Screw: Stops the analyzer at desired position within a 180° range.
- ⑧ Clamping Screw: Locks the intermediate polarizing tube to the observation tube.



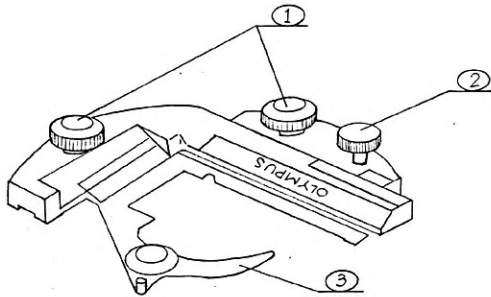
C. Circular Rotatable Stage



centering wrenches

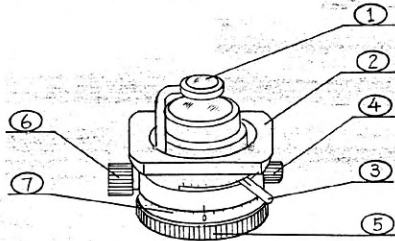
- ① Clamping Lever
- ② Positioning Holes for the Specimen Holder
- ③ Circular Specimen Holder: Make a choice between the stage clips or the circular specimen holder according to the dimensions of the specimen slide under observation.
- ④ Centering Knobs: Accepts the centering wrench for stage centration.
- ⑤ Clamping Screw for Stage Rotation
- ⑥ Verniers
- ⑦ Positioning Holes for the VANOX Mechanical Stage (AH-FMP)
- ⑧ Positioning Holes for the POM and POS Type Mechanical Stages (FMP)
- ⑨ Positioning Hole for the Circular Specimen Holder
- ⑩ 45° Click Stop Lever: When pushed to the end of the slot, away from the observer, the lever frees the stage. When pulled back towards the observer, the lever clicks the stage in increments of 45° of rotation, from any preset position.
- ⑪ Dovetail Mount

#### D. Mechanical Stage



- ① Specimen Drive Control Knobs: Working range: North-south 30mm, East-west 30mm. Vernier scales reading to 0.1mm.
- ② Clamping Knob: Inserting the positioning pin into the groove on the surface of the circular stage, clamp the knob.
- ③ Specimen Holder: Spring-loaded.

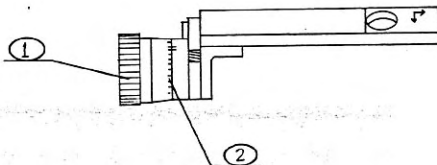
#### E. Swing-out Condenser



- ① Top Lens
- ② Dovetail Slide: Fits in the condenser mount of the VANOX.
- ③ Aperture Iris Diaphragm Lever: With N.A. scale.
- ④ Clamping Screw: Tighten the screw after aligning polarizer and analyzer for optimum extinction.

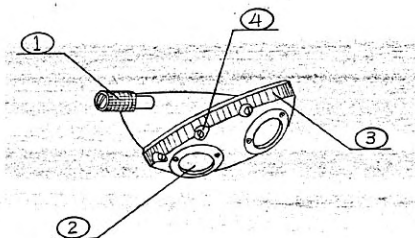
- ⑤ Polarizer Rotation Ring
- ⑥ Swing-out Knob for Top Lens
- ⑦ Polarizer Rotation Scale: At 0 setting, the vibration of polarizer is in the north-south direction.

F. Berek Compensator



- ① Knurled Ring
- ② Angle Indicator Dial ( $0^{\circ}$  -  $60^{\circ}$ )

G. Centering Revolving Nosepiece



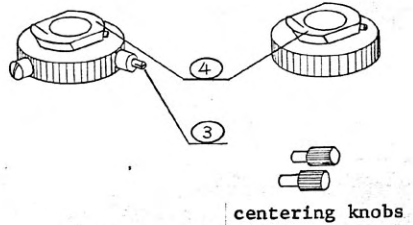
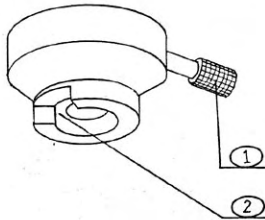
- ① Clamping Screw
- ② Objective Holes: Three holes for centering objective mounts and one hole for non-centering objective mount.
- ③ Knurled Ring: Hold here to rotate the nosepiece.
- ④ Objective Centering Screw

## H. Single Objective Adapter and Objective Mounts

Single Objective Adapter

Centering Mounts

Non-centering Mount



- ① Clamping Knob: Locks the objective mount to the circular dovetail mount of the intermediate polarizing tube.
- ② Dovetail Groove: Accepts the dovetail mount of the objective seats.
- ③ Centering Screws
- ④ Dovetail Mounts: With stop pin. Insert this mount into the dovetail groove ② and rotate clockwise by  $90^\circ$  to lock.

#### IV. ASSEMBLY

In order to attach the polarizing attachment, remove the standard observation tube, revolving nosepiece, stage, condenser, objectives and eyepieces from the microscope, while keeping the light source, condenser mount and auxiliary lens system in place. Do not remove dust caps from various components until these components are needed for assembly on the microscope.

1. Mount the swing-out condenser.

Turning the arrow mark on top of the condenser slide towards the condenser mount, slide the condenser into the dovetail and lock with clamping screw as you do when mounting the standard condenser (achromatic/aplanatic).

2. Mount the circular rotatable stage. (Fig. 1)

Insert the circular stage into the mounting block of the microscope stand in the same manner as the standard stage, slide the stage all the way down, and lock with the clamping lever.

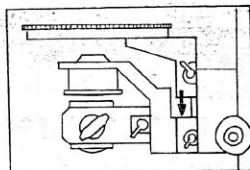


Fig. 1

3. Attache the mechanical stage by aligning the positioning pin and groove and clamp it to the stage with the clamping knob.

4. Attach the observation tube. (Fig. 2)

1) First turn the selector turret on top of the microscope stand to position "M.P."

2) (a) For AH-P-2:

Insert the dovetail slide of the polarizing monocular tube into the dovetail mount on the microscope stand and lower the tube as far as possible.

(b) For AH-P-3:

Insert the dovetail slide of the standard binocular tube into the dovetail mount on the microscope stand and lower the tube as far as possible.

3) Lock the tube with the upper clamping lever.

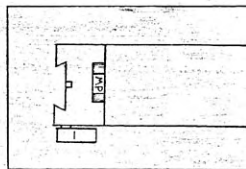


Fig. 2

5. Attach the intermediate polarizing tube. (Fig. 3)

- 1) Lower the stage as far as possible.

NOTE: Following steps 2) through 4) will be the same as the nosepiece is attached to the microscope.

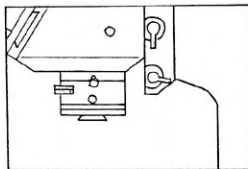


Fig. 3

- 2) Unscrew the clamping screw of the intermediate tube until it clears the thread. Pull the spring-loaded clamping screw. This will cause the locating pin to withdraw.
- 3) With the clamping screw pulled, insert the intermediate tube into the ring dovetail of the observation tube, aligning locating pin with locating groove on the ring dovetail. Release clamping screw slowly and the locating pin will drive home into the locating groove. Tighten clamping screw. (See the instruction manual for VANOX at Page 15.)
- 4) Locating groove and pin are in alignment if the tube stays in place when slightly rotated to the right and left before tightening knob.

6. Attach the single objective adapter (in case of the AH-P-2) or the centering revolving nosepiece (in case of the AH-P-3) to the lower end of the intermediate tube.

7. Mount the objectives.

- (a) For AH-P-2:

Attach the P04X, P020X, P040X and P0100X objectives to the centering objective mounts, and P010X to the non-centering objective mount. Then you can attach the objective/objective mount combination of your choice to the single objective adapter, rotating counterclockwise by 90°.

- (b) For AH-P-3:

Mount any three of the P04X, P020X, P040X and P0100X objectives into the centering objective holes and P010X into the non-centering hole in the centering revolving nosepiece.

8. Insert the eyepieces.

(a) For AH-P-2:

Insert an eyepiece with cross hairs (or micrometer) into the monocular tube, aligning the positioning pin and groove.

(b) For AH-P-3:

(1) Insert an eyepiece with cross hairs (or micrometer) of your choice into the right eyepiece tube, aligning the positioning pin and groove.

(2) Insert an eyepiece of corresponding magnification into the left eyepiece tube.

## V. OPERATING THE MICROSCOPE

It is good policy to keep the microscope immaculately clean. Remove visible spots, specks of dirt, dust or grease from all exposed glass surfaces.

### o Summary of Microscope Operation

1. Connect the electrical cords.  
(See the instruction manual for the VANOX at Page 16.)
2. Switch on the tungsten light source.
3. Center the light bulb.  
(See the instruction manual for the VANOX at Page 17.)
4. Place a specimen slide on the mechanical stage.
5. Push in the light path selector knob on the observation tube all the way.
6. Remove the Bertrand lens in the polarizing monocular tube and/or intermediate polarizing tube by turning the turret ring of the Bertrand lens to position "OUT".
7. Insert the objective PO10X into the light path and make sure that the top lens of the condenser is in the light path.
8. Coarse focus with the coarse adjustment knob.
9. Make diopter adjustment (for AH-P-2), or interpupillary and diopter adjustments (for AH-P-3).
10. Center the condenser.  
(See the instruction manual for the VANOX at Page 17.)

11. Check the field of view for optimum extinction after positioning the polarizer and analyzer at "0". Improve extinction, if necessary, by slightly rotating the polarizer rotation ring and then clamp the ring. After alignment of the polarizer and analyzer, do not move the condenser. (For detailed adjustment, see para "B. Centration of Condenser" in the following steps.)
12. Stop down the field iris diaphragm first, then, widen the diameter of the field diaphragm progressively, until the diaphragm image becomes inscribed in the field of view.

o Detailed Adjustments of Various Parts

A. Interpupillary Adjustment and Diopeter Correction

1. Interpupillary Adjustment (for AH-P-3 only):

Because of the constant tube length adjustment built into the observation tube, the mechanical tube length does not change at all if the interpupillary distance of the eyepiece tubes is varied. Hold the right and left eyepiece tubes with both hands and push the tubes together, or pull them apart, whichever is required, while looking through the eyepieces with both eyes, until perfect binocular vision is obtained. It is good practice to memorize the individual interpupillary distance setting. A scale is provided for this purpose, located between the eyepiece tubes.

2. Diopter Correction

(a) For AH-P-2:

Looking through the monocular eyepiece tube (with cross hairs or micrometer), focus on the cross hairs or micrometer by means of the focusing adjustment ring 7, Page 6 and then on the specimen.

(b) For AH-P-3:

- (1) Looking through the right eyepiece (with cross hairs or micrometer) with your right eye, focus on the cross hairs or micrometer by means of the eyepiece front lens in screw mount and then on the specimen.



- (2) Next, look through the left eyepiece with your left eye and turn the diopter adjustment ring on the eyepiece to focus on the specimen.

#### B. Alignment of Polarizer and Analyzer

1. Insert the objective 10X into the light path, swing in the condenser top lens, and center the condenser.
2. Loosen the clamping screw (see Page 9 A ) of the condenser.
3. Make sure that both polarizer and analyzer are set at position "0", to attain "crossed Nicol" position.
4. Move the specimen out of the light path so that a transparent area comes into the light path.
5. Making sure again that the polarizer rotation scale is positioned at "0", check the field of optimum extinction. Improve extinction, if necessary, by slightly rotating the polarizer rotation ring and then clamp the ring.

#### C. Stage Centration

1. Engage the objective 10X and eyepiece 10X with cross hairs.
2. Looking through the eyepiece tube, determine a certain point "A" as eyemark on the specimen. As you rotate the stage the point "A" moves in a circular path (A-B-C-D-A or A-D-C-B-A).  
(Fig. 4)

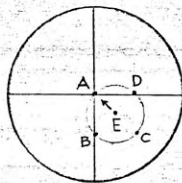


Fig. 4

3. Bring the center of the circular path "E" to the center of the cross hairs by means of the centering wrenches connected to the stage centering screws.  
\* Repeat this step until the two centers completely coincide, then remove the centering wrenches.

#### D. Objective Centration

##### a) AH-P-2:

After the stage has been centered with the objective 10X, other objectives can be centered by adjusting the centering objective mounts.

- 1) Mount the objective and centering mount combination of your choice except the PO10X into the single objective adapter.
- 2) Connect the centering knobs to the objective centering pins provided on both sides of the centering objective mount.
- 3) As you rotate the stage, an eyemark on the specimen moves in a circular path as in step C. 2).

Bring the center of the circular path to the center of the cross hairs by means of the centering knobs.

\* Repeat this step until the objective is completely centered, then, remove two centering knobs.

##### b) AH-P-3:

After the stage has been centered with objective 10X in step C, other objectives can be centered only by means of centering screws provided on each centering hole.

\* Do not move the stage center for the objective centration.

- 1) Swing the desired objective except PO10X.
- 2) Connect the centering knobs to the objective centering screws beside the objective hole.
- 3) Looking through the eyepieces, rotate the stage and an eyemark on the specimen moves in a circular path as in step C. 2). (Fig. 5)
- 4) Bring the center E of the circular path to the center of the cross hairs by means of the centering knobs.

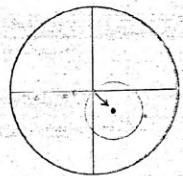


Fig. 5

\* Repeat this step until the objective is completely centered, then remove the centering knobs.

#### E. Use of 45° Click Stop Lever

As the stage is provided with a 45° click stop device, it is easy to rotate the stage in 45° increments from any position without having to refer to the angular scale.

#### F. Use of Compensator Plates and Berek Compensator

The compensator plates and Berek compensator can be inserted into the slot in the intermediate tube after removal of the dust slider. These devices are used for examination of specimen birefringence and determination of the optical axes.

##### 1) Quarter Wave Plate

This plate has retardation of 147.3 $\mu$ , a quarter wave length of light (589.3 $\mu$ ). It is useful in determining crystal types by converting elliptic polarized light into linearly polarized light, and vice versa.

##### 2) Sensitive Tint Plate (gypsum, 530 $\mu$ )

With a retardation of 530 $\mu$ , its purplish-red interference color changes rapidly in proportion with the retardation change. That is, if the retardation is increased slightly, the interference color turns purple (or near blue), and when decreased, the color turns orange (or near yellow). Thus in either case, this sensitive tint plate converts small variations in specimen retardation into color changes to which the eye is quite sensitive.

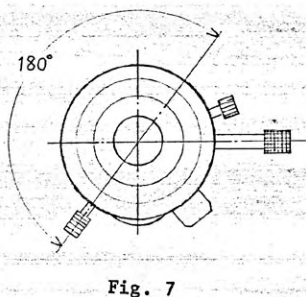
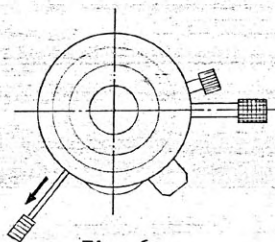
##### 3) Berek Compensator

A piece of calcite is incorporated in this instrument to measure the birefringence of a specimen. The compensator is inserted into the slot in the intermediate polarizing tube. By comparison of readings taken from the angle indicator dial with the attached compensation curve table, the retardation of the specimen detail under observation can be determined.

After a birefringent specimen is brought to the extinct position by free rotation of the stage, pull the 45° click stop lever, and the stage clicks at the diagonal position. Then insert the compensator, turn the dial until the interference color of the 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 value of the retardation. If the interference color does not change even by turning the indicator dial, turn the specimen 90° and repeat the same procedure. At position 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 the test plate is tilted too much it might not be possible to remove the compensator from the intermediate polarizing tube.

#### G. Use of Analyzer Rotation Knob

If the knob is pulled out all the way as illustrated in Fig. 6, the analyzer is disengaged and this is the position used for normal observation. If the knob is pushed in all the way (Fig. 7), the analyzer is inserted into the light path, and can be rotated through 180°. The analyzer is usually kept in the optical path during the observation, except for a standard observation.



## H. Use of Bertrand Lens

(a) For AH-P-2:

The Bertrand lens built in the intermediate polarizing tube is used for photomicrography and another Bertrand lens in the monocular polarizing tube is used for observation.

(b) For AH-P-3:

The Bertrand lens built in the intermediate polarizing tube is used for both observation of conoscopic interference image and photomicrography.

1. Bertrand lens built in the intermediate polarizing tube.

To insert the Bertrand lens in the light path, turn the turret ring to position "IN", where it click stops. You can now observe the magnified interference figure at the rear focal plane of the objective. To focus with objectives from P020X to P0100X, use the focusing ring.

2. Monocular Polarizing Tube

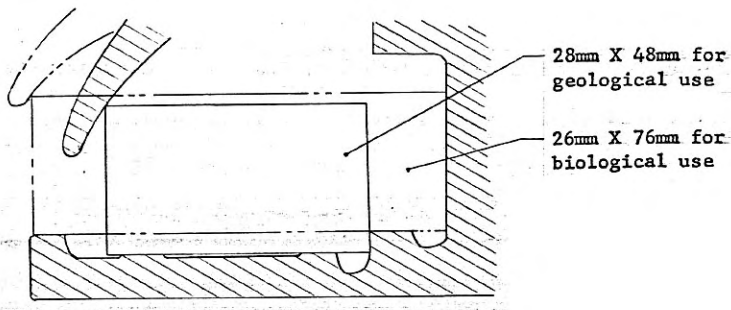
To insert the Bertrand lens into the light path, turn the turret ring to position "IN", where it click stops. (Make sure that the turret ring of the intermediate polarizing tube is at position "OUT".) You can now observe the magnified interference figure at the rear focal plane of the objective. To focus, use the focusing ring.

The focusing ring is provided with a scale which is graduated 0-7.

When it is necessary to alternately observe the conoscopic and orthoscopic figures, first obtain a clear conoscopic figure and then adjust focusing on an orthoscopic figure. At this, the magnification of the objective is slightly influenced.

### I. Use of Specimen Slide Glasses

Slide glasses are held on the mechanical stage as shown below.



### J. Use of Iris Diaphragm

The diaphragm built in the polarizing monocular tube can be stopped down as desired to spot the desired area and increase contrast by blocking unnecessary area.

### K. Combination of Illuminator and Condenser Elements

For use of the halogen illuminator provided with VANOX, make sure the swing-out frosted glass should be engaged at the light exit of the microscope base.

Objective mag.	Orthoscopy				Conoscopy			
	Swing-out condenser top lens	Auxiliary lens system	Frosted glass	Lever position of swing-out auxi. lens	Swing-out condenser top lens	Auxiliary lens system	Frosted glass	Lever position of swing-out auxi. lens
4X	OUT	L	OUT**	VERTICAL	<div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <span style="position: absolute; top: 0; left: 0; right: 0; border-bottom: 1px solid black;"></span> </div>			
10X								
20X								
40X								
100X	OUT*				IN	IN	IN	VERTICAL

Remarks:

\* When brighter illumination is required, the top lens can be inserted into the light path, although orthoscopic vision is affected slightly due to the higher numerical aperture of the condenser.

\*\*When the opening of the aperture iris diaphragm is reduced than insert the frosted glass into the light path.

o Orthoscopic Observation

When the top lens of the condenser and Bertrand lenses are removed from the light path, you can start orthoscopic observation with your microscope. With the microscope properly adjusted, polarized light almost parallel to the optical axis enters the field of view, enabling you to view the optical characteristics of the specimen.

Since this method will darken the field and lower the resolving power of the objective extremely, the top lens of the condenser must be swung out, using only the lower aperture of the lower condenser lens in conjunction with the low magnification objective 20X or lower.

o Conoscopic Observation

It is necessary to illuminate the specimen with converging light. Swing the condenser top lens back into the light path, and use a high magnification objective such as 40X or 100X.

After appropriate focusing on the specimen, in case of the AH-P-2, remove the Bertrand lens of the intermediate tube, and insert the Bertrand lens of the monocular tube into the light path; then, focus on the interference figure by the focusing ring on the monocular tube; while in case of the AH-P-3, insert the Bertrand lens of the intermediate tube and focus on the interference figure formed at the back focal plane of the objective by means of the focusing ring on the intermediate tube.

For both the AH-P-2 and AH-P-3, the pinhole cap provided may be used in place of the eyepiece to directly view the interference figure mentioned above. In this case, the Bertrand lens is disengaged.

o Photomicrography

The Photomicrographic System Camera Model PM-10-A is used with the VANOX for photomicrography in conjunction with the polarizing attachment Model AH-P-2 or Model AH-P-3.

The total magnifications available are as follows:

On the 35mm film plane ..... Objective power X FK photo eyepiece  
On the large format film plane ... Objective power X FK photo eyepiece  
X 3

1. Setting up of the photographic equipment

See the instruction manual for the VANOX at page 22.

2. Orthoscopic photomicrography

- (1) Swing out the condenser top lens, and disengage the Bertrand lens of the intermediate polarizing tube.
- (2) Insert the FK photo eyepiece into the photo tube of the microscope.
- (3) Mount the photographic equipment Model PM-10-A on the ring dovetail mount of the photo tube.
- (4) Move the specimen slide so that the area of the specimen to be photographed is centered in the field of view.
- (5) Looking through the viewfinder, focus on the specimen.  
(See the instruction manuals for the PM-10-A and VANOX.)

\* Make sure that the focusing ring on the monocular tube is set at position "0".

3. Conoscopic photomicrography

- (1) Swing the condenser top lens into the light path.
- (2) Insert the FK photo eyepiece into the microscope photo tube.  
\* The FK2.5X is the standard photo eyepiece for this purpose, because it gives an appropriate picture size on the film plane.



- (3) Mount the PM-10-A on top of the microscope photo tube and clamp.
- (4) Insert the Bertrand lens in the light path.
- (5) Looking through the viewfinder, rotate the focusing ring to focus on the conoscopic image.
- (6) Pull out the light path selector lever all the way.

The rest is the same as for orthoscopic photomicrography.

#### VI. OPTICAL DATA

Objective     Eyepiece	Mag.	PO4X	PO10X	PO20X	PO40X	PO100X
	Numerical aperture	0.10	0.25	0.40	0.65	1.30
	Working distance(mm)	19.97	5.13	1.60	0.37	0.11
	Focal length(mm)	29.20	15.98	8.13	4.31	1.81
	Color band	Red	Orange	Yellow	Brilliant green	Light blue
K5X with cross hairs (Field number 21)	Total mag.	20X	50X	100X	200X	500X
WF10X with cross hairs (18)	Total mag.	40X	100X	200X	400X	1000X
WF10X with 10/100mm micrometer (18)	Total mag.	40X	100X	200X	400X	1000X

#### VIII. CARE FOR STRONG

As moisture and dust are primary harmful factors to microscopes, microscopes should be kept in containers immediately after use. If this is not possible, they should be covered with the vinyl dust cover provided.

As for objectives and eyepieces, it is best to keep them in desiccators. Failing this, they should be kept in cases containing such desiccants as silica gel. After the eyepieces are removed from the microscope,

the vacant eyepiece sleeves should be covered with protective caps. By no means should a microscope be disassembled for repairs. This should be left to the Olympus repair service. Microscopes must always be kept clean. Fine dust on parts that cannot be reached by hand should be blown or wiped off by means of an air blower or a clean feather. In particular, do not leave the polarizer and analyzer in the sunlight or intense illumination light for a long time, because the polarizing plates used in the polarizer and analyzer will be deteriorated when heated over 60°C.

scanned by JGM on 15 dec 09 -- for personal use only, not for sale

OLYMPUS OPTICAL CO., LTD.



43-2 HATAGAYA 2-CHOME, SHIBUYAKU,  
TOKYO, JAPAN

オリンパス販売株式会社

東	京	〒101	東京都千代田区神田駿河台3-4	龍名館ビル	☎03(251)8971
札	幌	〒060	札幌市中央区北三条西4丁目	日生ビル	☎011(241)4015
旭	川	〒070	旭川市宮下通7-3897-12	旭川第1生命ビル	☎0166(23)4560
仙	台	〒980	仙台市中央1-2-3	第一ビル	☎0222(25)6823
大	宮	〒330	大宮市土手町3-19	川村第5ビル	☎0486(44)8122
横	浜	〒220	横浜市西区北幸1-7-2	横浜駅西口ビル	☎045(311)2028
静	岡	〒420	静岡市追手町1-6	日生ビル	☎0542(52)3043
新	潟	〒950	新潟市東大通り1-4-1	マルタケビル	☎0252(45)7339
本	松	〒390	松本市深志1-2-11	松本昭和ビル	☎0263(36)5333
金	沢	〒920	金沢市香林坊1-2-24	千代田生命金沢ビル	☎0762(22)3434
古	屋	〒460	名古屋市中区錦3-23-31	栄町ビル	☎052(961)7451
大	阪	〒542	大阪市南区塩町通り3-45	オリンパス大阪センター	☎06(252)6695
大	京	〒604	京都市中京区柳馬場通り御池下ル柳八幡町65朝日ビル内		☎075(255)2316
高	松	〒760	高松市天神前10-5	高松セントラルスカイビル	☎0878(33)0670
山	島	〒730	広島市中区八丁堀16-11	日生第2ビル	☎0822(28)1921
岡	山	〒700	岡山市下石井1-1-3	日本生命岡山第2ビル	☎0862(33)0366
福	岡	〒810	福岡市中央区天神1-14-1	日生ビル	☎092(711)1881
北	九	〒803	北九州市小倉北区金田1-5-1	金田ビル	☎0935(92)4168
南	九	〒892	鹿児島市新屋敷町16-2-214	公社ビル	☎0922(24)7820