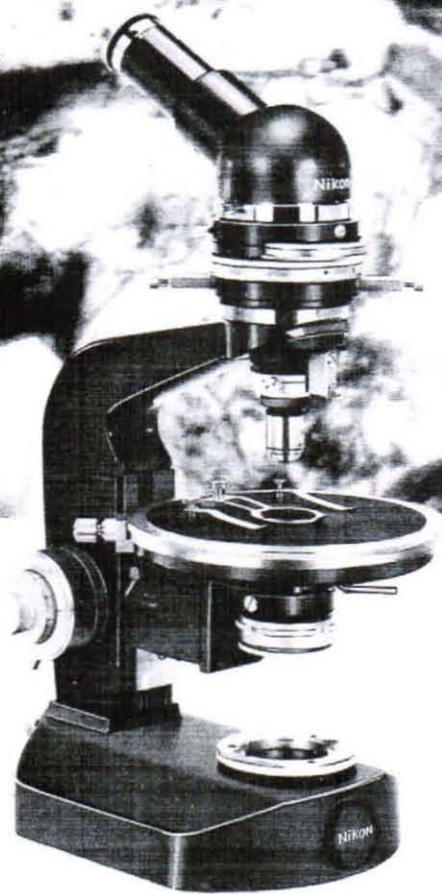


Nikon



**POLARIZING
MICROSCOPE
POH-2**

NIKON POLARIZING MICROSCOPE

Nikon perfection In precision polarization performance

Many minerals, rocks, metals, fibers and chemicals, as well as animal and plant tissues, have intrinsic birefringent properties which only show up under polarized light. The polarizing microscope, making use of these properties, magnifies minute details of these materials for distinguishing the nature of their component parts. Long used in petrological and mineralogical studies of the optical properties of specimens, the polarizing microscope is now extensively used in the chemical, plastics, metal, synthetic fiber and food industries, as well as in medicine, biology and pharmacology. The Nikon Polarizing Microscope Model POH-2 fills all the requirements for polarization studies in these fields. It provides the following features:



MICROSCOPE MODEL POH-2

■ Extra-Long Range of Stage Elevation and Focusing

The stage, together with substage, can be lowered by 71mm for a distance of 104.6mm from the objective shoulder to the stage surface to accommodate a universal stage with hemispheres. The stage can, of course, be clamped at any intermediate position from which coarse or fine focusing can be conducted within a range of 38mm. Fine focusing is calibrated in two-micron increments and is operated by an incorporated differential gear train which serves the whole range of focusing without interruption.

■ Interchangeable Single and Multiple Revolving Nosepieces

Single Objective Nosepiece

A strain-free objective is screwed into a centerable clutch and inserted into the dovetail of the single mount adapter. It is furnished with a locking bar which assures easy interchange of objectives. The single mount adapter is fastened securely to the dovetail on the microscope arm by a clamping lever.

Revolving Objective Nosepiece

A four-place nosepiece to interchange strain-free objectives easily and in succession from one magnification to another. The nosepiece is slid into the dovetail on the microscope arm and is locked in position. Each objective, after being screwed into the lens receptacle, can be centered to the microscope optical axis by manipulating two screws inserted into two holes on each side of the objective receptacles on the nosepiece assembly.

■ Built-In Illuminator Base

A tungsten illuminator is built into the microscope base. A precentered 6v 18w flat filament bulb is used as light source. Supplied with a step-down transformer with a main switch, pilot lamp and variable voltage control. The knurled ring on the top surface of the microscope base, when rotated, faces the internal reflecting mirror in the opposite direction so that an external light source, such as a sodium vapor lamp, may be directed through the front opening when precise measurement of minute retardations is to be carried out.

■ Easy Interchange of Eyepiece Tubes With Intermediate Tube

The intermediate tube mounted on top of the microscope arm contains (1) a rotating turret on which a focusable and centerable Bertrand lens for conoscopic observations, a magnifier for the Babinet compensator and an empty opening for orthoscopic observations are provided, (2) a push-pull filter analyzer, rotatable 180° reading to 6 minutes with vernier, and (3) a slide on which are mounted a 1/4-wavelength plate ($\lambda=589.3m\mu$), a sensitive tint plate ($\lambda=530m\mu$) and an empty opening, or as an alternate on the same slide, a Sénarmont compensator. As these elements are contained in the intermediate tube, the eyepiece tubes, either a 30° inclined monocular, a vertical photo-tube or a 30° inclined trinocular tube, can be interchanged without deterioration of optical performance.

■ Graduated, Circular Rotatable Stage (ball bearing)

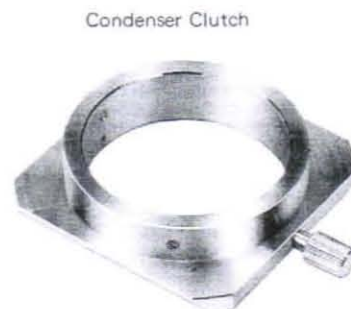
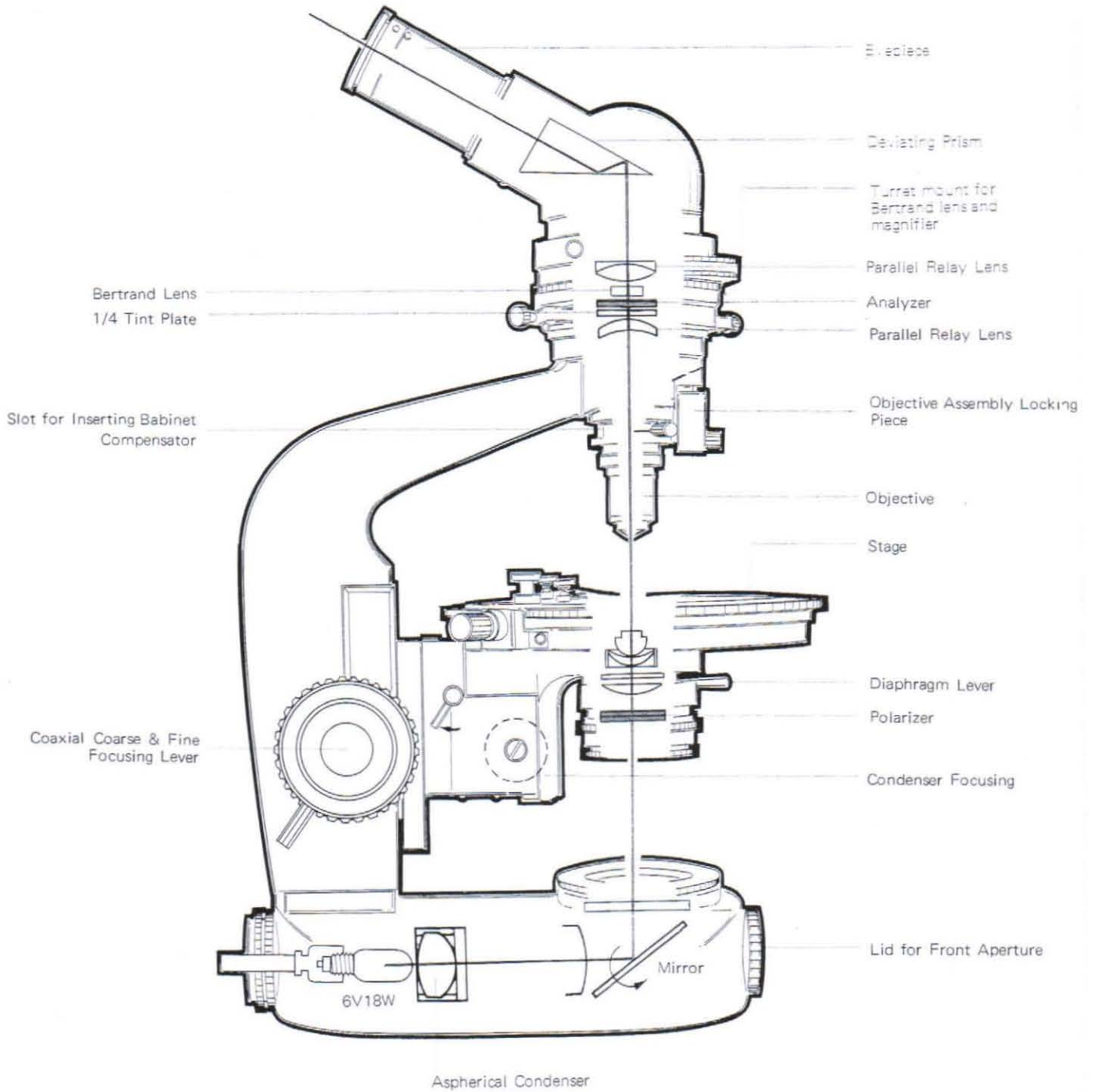
150mm in diameter, 360° rotatable. The goniometer is divided into 1-degree increments and reads to 6 minutes with either of two verniers placed 90° apart, with click stops at each 45° division. The position from which the 45° division is counted can be set at any optional point with a lever on the side of the stage. A clamping knob and two stage clips are provided. On the stage surface there are two screw-threaded and six straight holes for attaching a universal stage, an attachable mechanical stage or stage clips.

■ Epi (Surface)-Illuminator

The epi-illuminator can be attached between the dovetail on the microscope arm and the single-nosepiece assembly. It has a 1.2X magnification factor and is used for examination of opaque specimens. The filter polarizer is 90° rotatable with an index mark at the 45° position. A 6v 18w precentered bulb is used. A built-in push-pull auxiliary lens and field and aperture diaphragms assure optimum illumination at all magnifications. When the mirror holder is pulled out of the optical path, the microscope can be used for normal, transmitted light observations.



Details of the Instrument



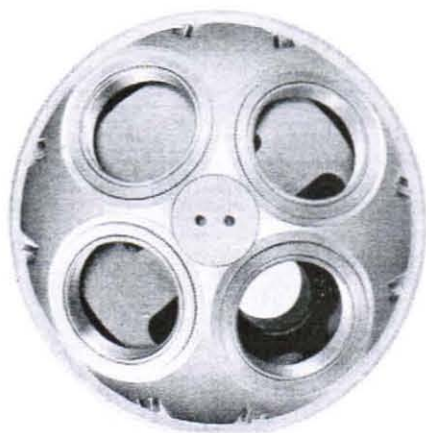
Specifications

Total Magnification: 20X - 1000X (Attainable range with standard lens series. When epi-illuminator is used: 30X - 1200X, when trinocular tube F is used: 25X - 1250X)

Mechanical Tube Length: 160mm

Objective Nosepieces and Objectives: Single-objective nosepiece or four-objective revolving nosepiece readily interchangeable and clamped into position.

■ **Single-Objective Nosepiece:** Composed of centerable clutch and single mount adapter with objective assembly locking piece and a slot to insert a Babinet compensator at a 45° angle. ■ **Four-Objective Revolving Nosepiece:** Directly slid into microscope arm dovetail. Each objective is individually centerable. (Note: When this nosepiece is used, the Babinet compensator cannot be used simultaneously.)



OBJECTIVES

| Type | Individual Magnification | Numerical Aperture | Focal Length | Free-Working Distance |
|---------------------|--------------------------|--------------------|--------------|-----------------------|
| Achromatic Dry | P* 4X | 0.10 | 28.3mm | 9.50mm |
| | P* 10X | 0.25 | 14.8mm | 7.10mm |
| | P* 20X | 0.40 | 7.5mm | 5.70mm |
| | P* 40X | 0.65 | 4.3mm | 0.54mm † |
| Oil-immersion | P* 100X | 1.25 | 1.8mm | 0.16mm † |
| | P Plan 4X | 0.10 | 29.5mm | 18.20mm |
| Plan Achromatic Dry | P Plan 10X | 0.25 | 15.6mm | 7.00mm |
| | P Plan 40X | 0.65 | 4.0mm | 0.24mm † |
| | P Plan 100X | 1.30 | 1.6mm | 0.12mm † |
| | Oil-immersion | | | |

For opaque objects, epi-illuminator use

| | | | | |
|----------------|----------|------|--------|----------|
| Achromatic Dry | P M 5X | 0.10 | 25.0mm | 15.00mm |
| | P M 10X | 0.25 | 14.8mm | 7.10mm |
| | P M 40X | 0.65 | 4.3mm | 0.52mm † |
| Oil-immersion | P M 100X | 1.25 | 1.8mm | 0.16mm † |

For use with universal stage and hemispheres

| | | | | |
|----------------------------|---------|------|--------|--------|
| Achromatic (Oil-immersion) | U** 5X | 0.10 | 30.9mm | 5.30mm |
| | U** 10X | 0.22 | 22.7mm | 2.90mm |
| | U** 20X | 0.33 | 11.8mm | 1.10mm |

* Strain-free objective lens ** Universal stage objective lens † Spring-loaded



Eyepiece Tubes and Eyepieces: Monocular or trinocular eyepiece interchangeable. Vertical photo-tube is also available. Inclined Monocular Eyepiece Tube: 30° inclined, 360° rotatable. diameter eyepieces 5X, 7X and 10X allow wide field of view. The piece has a diopter adjustment collar on top to permit internal crossline to be sharply focused.

| Type | Individual Magnification | Focal Length | Field No. | Reticle |
|-----------------------|--------------------------|--------------|-----------|----------------|
| Wide-field, Huygenian | 5X | 50.0mm | 28mm | Crossline |
| | 7X | 35.8mm | 25mm | 1mm scale, 100 |
| | 10X | 25.0mm | 22mm | Crossline |

The eyepiece has a locating stud on its side so that it seats snugly into eyepiece tube in relation to either one of two matching notches. The orientation of the crossline is such that the line is vertical or perpendicular or alternately 45° to the vibration plane of the polarized light when the polarizer and the analyzer are set to zero (crossed Nicols). The 7X eyepiece is designed to be used for measuring purposes, with a reticle graduated scale of 0.1mm divisions.

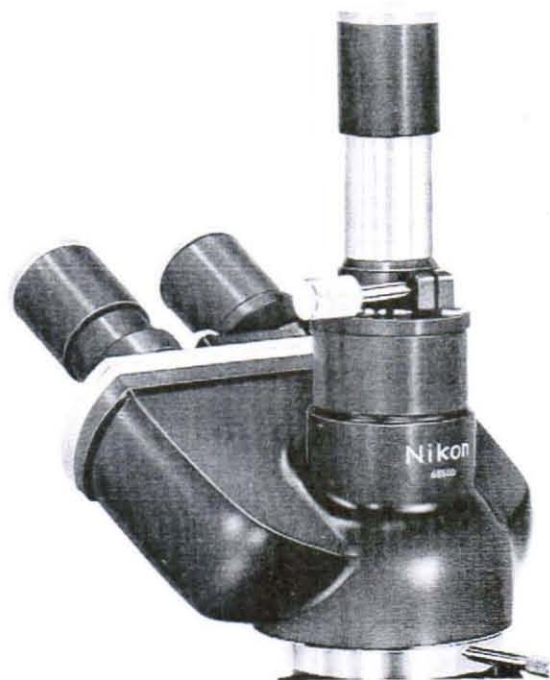
With magnification factor 1.25X. Observing binoculars are inclined 30°, photo-tube upright. Has provision for adjusting the discrepancy between photo-tube and observation binocular has interpupillary distance adjustment from 54mm to 74mm. With built-in sliding prism system, the light transmission can be alternated the following two ways:

1. To blank out the binoculars by sliding the deviating prism out of optical path and transmit 100% of the light directly to the vertical photo-tube.

2. To blank out the vertical photo-tube by sliding the prism into the optical path and transmit 100% of the light to the binoculars. This permits the observation binocular or vertical photo-tube to make full use of available light independently. The outer diameter of the eyepiece used should be the normal 23.2mm. Pairs of HK 5X and HKW 10X eyepieces are supplied as standard assortment, with one of each pair provided with a crossline reticle and a locating stud on its side to permit insertion of the binocular into the tube, with the wall notched for orientation photomicrography, a set of 5X and 10X photo-eyepieces, which serve as relay/projection lenses, and a DHKW 10X finder eyepiece with 5X and 15X reticles for framing and focusing are included as standard accessories.

| Type | Individual Magnification | Focal Length | Field No. | Reticle |
|---|--------------------------|--------------|-----------|-----------|
| High eyepoint compensating | 5X | 50mm | 21.0mm | Crossline |
| High eyepoint, compensating, wide-field | 10X | 25mm | 18.0mm | Crossline |

Remarks: To change the crossline reticle to the 1mm-increment 100-micron scale, a micrometer holder sleeve is supplied separately.



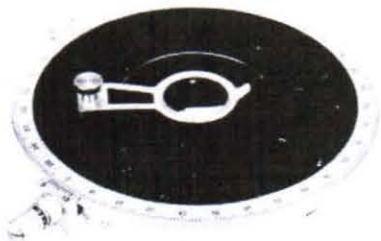


Condenser: Consists of three lens elements, N.A. 0.65 corresponding to a conoscopic angle of 82° . When the condenser is oil-immersed, the numerical aperture becomes 1.0. The top element of the condenser can be swung out of the optical path for orthoscopic observation and used with a universal stage, in which case the remaining two lower lens elements are used and the numerical aperture is lowered to 0.25. An iris diaphragm is provided. The condenser is mounted on a precentered clutch and is slid into the dovetail of the substage. A clutch is also available as an accessory to be used for mounting another condenser, e.g., phase contrast for measurement of refractive index of a specimen.



Stage: 150mm diameter, 360° rotatable. Goniometer is divided into one-degree increments and reads to 6 minutes with either of two verniers, 90° apart. Click stops are provided at every 45° position and can be set to work from any point with the release lever. Has rotation locking clamp and two stage clips. Stage surface has two screw-threaded and six straight holes for mounting a universal stage, an attachable mechanical stage or slide clips. The stage with substage construction can be lowered 71mm from the standard position and clamped at any intermediate position, from which coarse and fine focusing can be conducted.

1/4-Wavelength Retardation Plate: A $1/4$ -wavelength retardation plate ($\lambda=589.3m\mu$) and a tint plate ($\lambda=530m\mu$) are mounted on a slider which is inserted into a slot in the intermediate tube. For measuring crystal axis, positive or negative direction, weak birefringence, etc.



Coarse Focusing: Range of travel, 25mm x 25mm; reading to 0.1mm by vernier.

Special 1/4-Wavelength Retardation Plate: A special $1/4$ -wavelength retardation plate ($\lambda=546.1m\mu$). Mounted on a slider which replaces the regular $1/4$ -wavelength retardation plate and tint plate slider.

Coarse Focusing: Focusing knobs are located on both sides of the instruments. Vertical motion of stage by means of rack and pinion. Range, 38mm. The torque of coarse-focusing control can be adjusted to suit user's preference by a large-diameter, scalloped knob found inside the right-hand focusing knob. A clamping lever between the coarse-focusing knob and the torque control ring presets the limit of stage motion and prevents inadvertent physical contact between the objective and the specimen slide; it can also be preset to stop at any desired in-focus position.



Fine Focusing: Coaxial with coarse-focusing knob. With differential gear trains, covers whole coarse-focusing range. Increments, 0.002mm.

Analyzer: Mounted in the intermediate tube. Can be brought into and out of the optical path and is rotatable 180° , with a minimum reading of 6 minutes by vernier. The analyzer mount has two holes, by means of which, when a rod is connected to the polarizer, both the polarizer and analyzer can be rotated in synchronization.

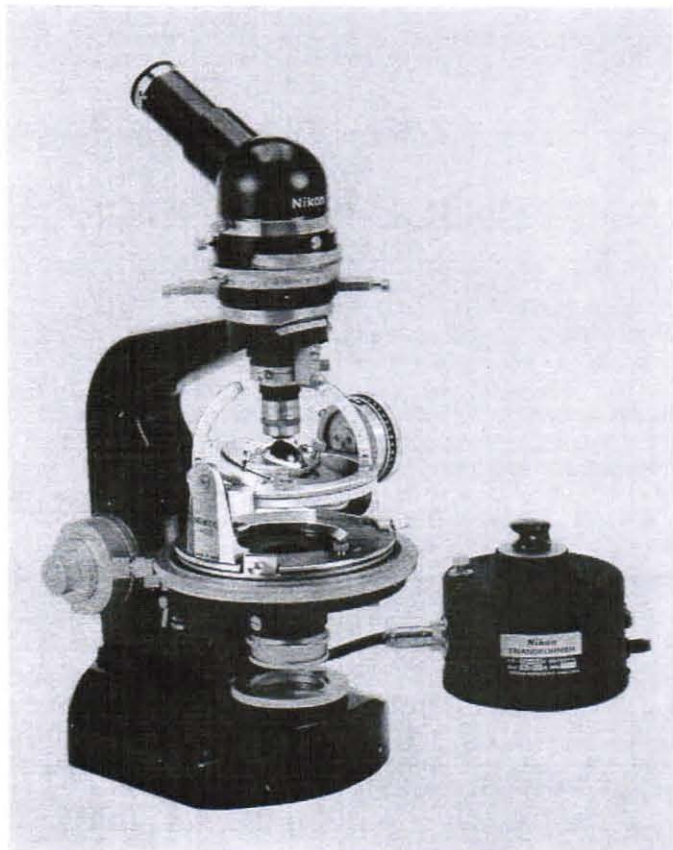
Polarizer: The polarizer is inserted from below into the condenser barrel and can be rotated 360° . With index marks at 90° , 180° and 270° .

Conoscopic Filter: Centerable and focusable. Mounted on a turret in the intermediate tube and can be brought into and out of the optical path. For observation of conoscopic figures.

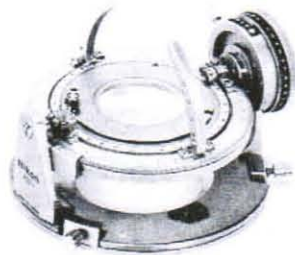
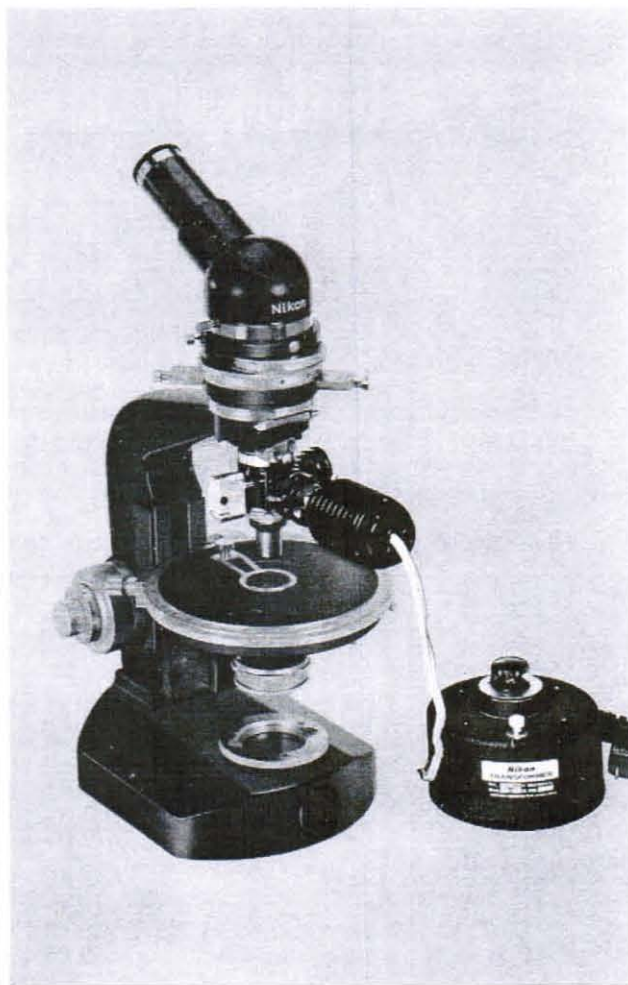
Tungsten Illuminator: Houses a tungsten illuminator as light source, using a precentered 6v 18w bulb. Supplied with a step-down transformer provided with a main switch, pilot lamp and variable voltage control. When the knurled ring on the top surface of the microscope base is rotated to the red index mark in the opposite direction, it revolves an internal reflecting mirror to the front aperture so that an external light source, e.g., a monochromatic source, such as sodium vapor lamp, may be employed for measurement of minute retardations. The ring accepts inlaid 45mm-diameter filters.

Special Accessories

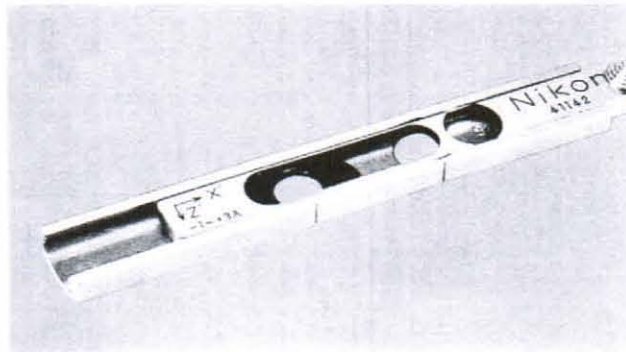
Universal Stage: Four-axis type. The stage is mounted on top of the graduated, circular rotatable stage by two thumb screws and permits tilting of a thin specimen at any angle to the optical axis of the microscope for measuring the optical structure of a birefringent crystal specimen. Provided with two centering screws. Supplied with three pairs of 13.5mm-diameter hemispheres with ND=1.516, ND=1.556 and ND=1.649. Objectives to be used with the hemispheres: U 5X (N.A. 0.1, W.D. 5.3mm), U 10X (N.A. 0.22, W.D. 2.9mm) and U 20X (N.A. 0.33, W.D. 1.1mm).



Equipmount Polarizer: Attached between the dovetail of the scope arm and the single-objective nosepiece. Has 1.2X magnification factor and is used for examination of opaque specimens. Polarizer is 90° rotatable. Incorporates a precentered 6V bulb, collector lens, aperture diaphragm, field diaphragm, half-reflecting mirror. When the half-reflecting mirror is out of the optical path, the microscope can be used for transmitted light observations. The openings of the two diaphragms are adjusted by turning external rings. Use of P M 5X, P M 10X and P M 100X objectives is recommended.



Babinet Compensator: Consists of two quartz wedge vibration planes set crossed to each other; one wedge is fixed, the other is slid to determine the retardation of a thin specimen. The scale graduation is read through the magnifier mounted on the turret on which the Bertrand lens is also attached. Range of measurement, -1 to +3. To be inserted into the slot of the turret mount adapter at 45° from the rear.



UNIVERSAL 4 AXIS STAGE

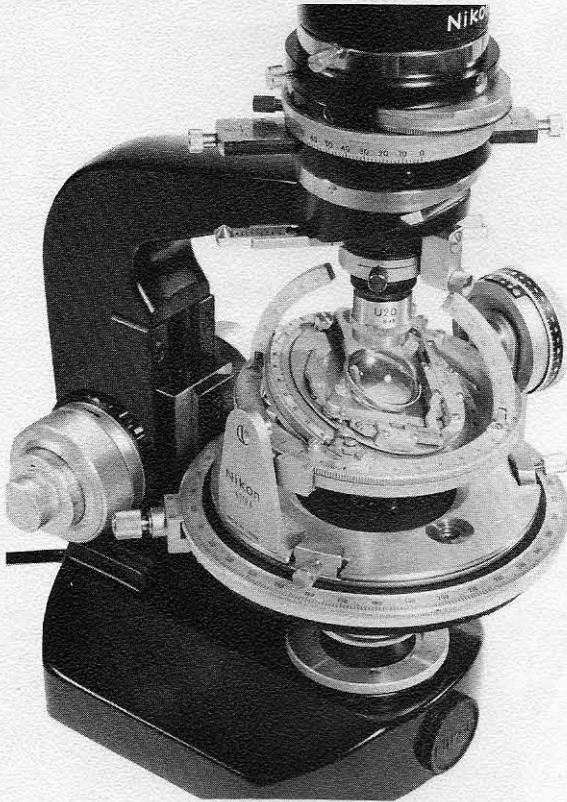
77240 Universal stage, 4 axis with 3 pairs of 13.5 mm diameter hemispheres with ND 1.516, 1.556 and 1.649, stage plate, 2 centering screws and fitted case 1100.00

OBJECTIVES For Use With Universal Stage and Hemispheres Long Working Distance

77250 Achromat U 5x, n.a. 0.10 60.00
 77252 Achromat U 10x, n.a. 0.22 67.00
 77254 Achromat U 20x, n.a. 0.33 87.00
 Photomicrographic equipment and other microscope accessories that can be used with the POH-2, see centerfold and listings.

Trinocular Polarizing Microscope, POH-2 (F) consisting of:

| | | |
|-------|--|------------------|
| 77200 | Basic stand | \$1020.00 |
| 76165 | Transformer (variable) only with on/off switch 6V/3A | 24.50 |
| 77246 | Trinocular Eyepiece Tube (F) | 405.00 |
| 77855 | Eyepiece HK 5x | 18.50 |
| 77210 | Eyepiece DHK 5x with cross line reticle | 41.50 |
| 77857 | Eyepiece HKW 10x | 22.00 |
| 77212 | Eyepiece DHKW 10x with cross line reticle | 45.00 |
| 76802 | Achromat objective P 4x | 14.50 |
| 76804 | Achromat objective P 10x | 23.50 |
| 76810 | Achromat objective P 40x | 48.00 |
| 76815 | Achromat objective P 100x (oil) | 73.00 |
| 77213 | Micrometer holder sleeve with 10/100 reticle | 14.00 |
| 77214 | Single objective holder adapter | 41.50 |
| 77217 | Set of 4 single objective holders | 38.00 |
| 77224 | Babinet compensator | 304.00 |
| 77230 | Daylight filter, 27.3mm | 2.00 |
| 76930 | Green filter, 33mm | 2.50 |
| 77238 | Fitted Hardwood Cabinet | 35.00 |
| | Total | \$2172.50 |



SUGGESTED ASSEMBLIES

We are listing two suggested configurations of the POH-2 microscope. One set is with the Monocular Tube (M), the other set is with the new Trinocular Tube (F). You may and should vary the sets to suit your individual needs.

Monocular Polarizing Microscope, POH-2 (M) consisting of:

| | | |
|-------|--|------------------|
| 77200 | Basic stand | \$1020.00 |
| 76165 | Transformer (variable) only with on/off switch 6V/3A | 24.50 |
| 77202 | Monocular Eyepiece Tube IP | 45.00 |
| 77204 | Huygenian Eyepiece POH 5x with cross line reticle..... | 37.50 |
| 77206 | Huygenian Eyepiece POH 7x with 10/100mm reticle..... | 37.50 |
| 77208 | Huygenian Eyepiece POH 10x with cross line reticle.... | 37.50 |
| 77214 | Single objective holder adapter | 41.50 |
| 77217 | Set of 4 single objective holders | 38.00 |
| 76802 | Achromat objective P 4x | 14.50 |
| 76804 | Achromat objective P 10x | 23.50 |
| 76810 | Achromat objective P 40x | 48.00 |
| 76815 | Achromat objective P 100x (oil) | 73.00 |
| 77224 | Babinet Compensator | 304.00 |
| 77230 | Daylight filter, 27.3mm | 2.00 |
| 76930 | Green filter, 33mm | 2.50 |
| 77238 | Fitted Hardwood Cabinet | 35.00 |
| | Total | \$1784.00 |

