

M41 POLARIZING MICROSCOPE



Vickers

M41 POLARIZING

The Vickers M41 Polarizing Microscope is a highly efficient system, the components of which have all been designed to fall within the modular concept of the instrument. They can be easily and quickly interchanged with other M41 accessories.

When microscopic objects are viewed in polarized light the orthoscopic and conoscopic images presented to the viewer provide means of identification and investigation of their organic and inorganic constituents.

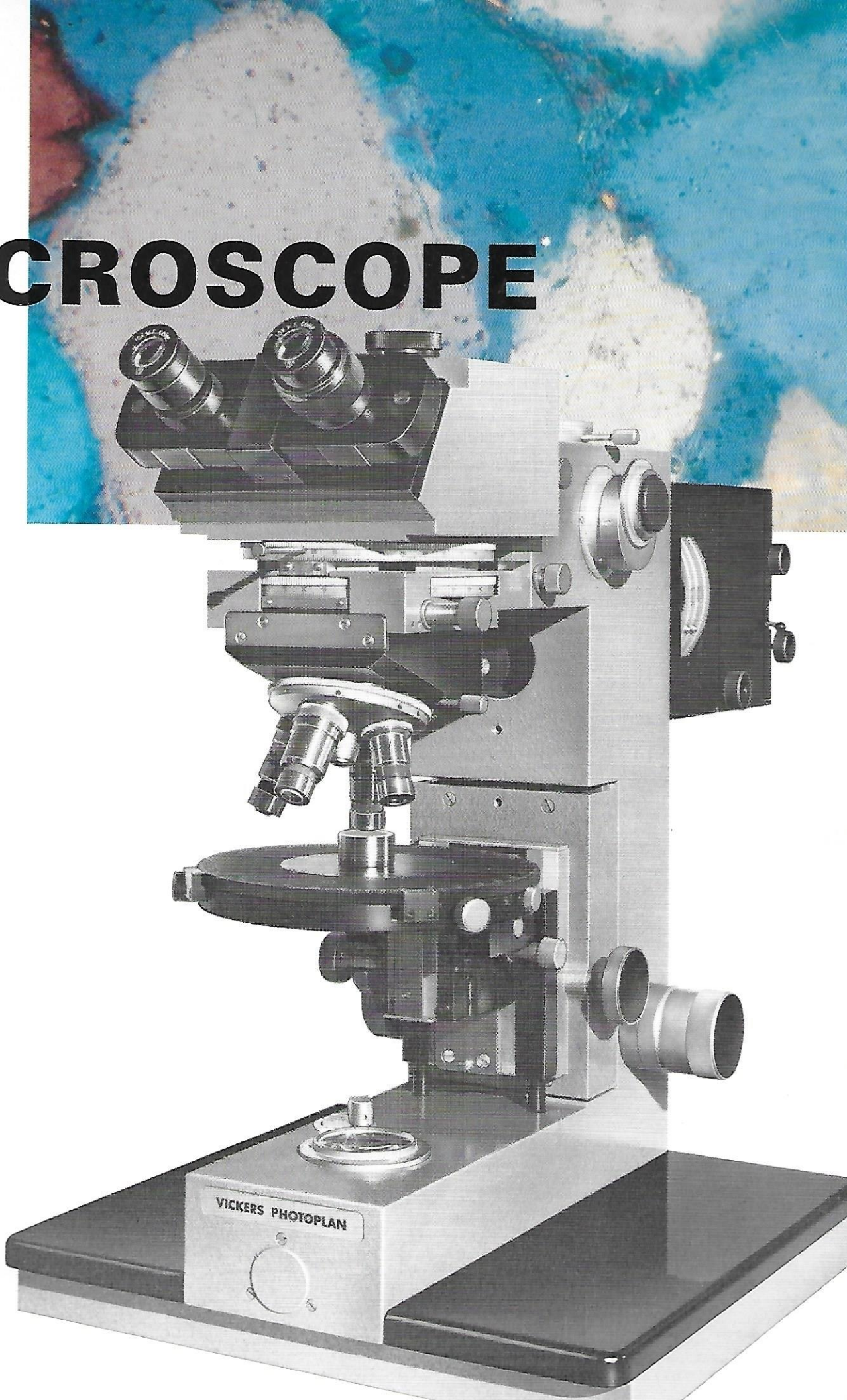
EXAMPLES OF THE USE OF POLARIZED LIGHT

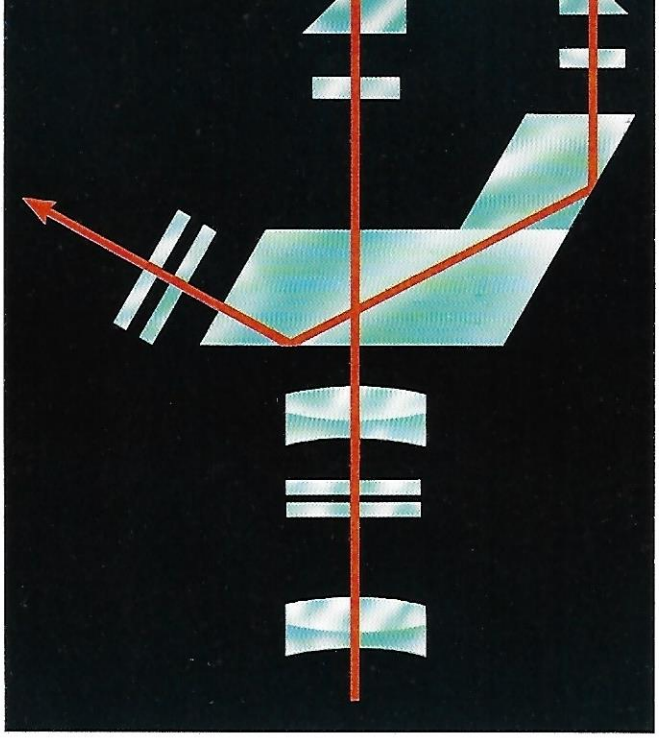
In medicine—histology, neurology, odontology
In industry
In modern criminology
In general metallurgy and mineralogy
In geological identification
In biological work and environmental studies

Both incident and transmitted illumination are available. The camera take-off in the main limb of the microscope can be used for photography of orthoscopic images, utilizing the full range of Photoplan camera and photometric facilities. Microhardness testing equipment, the Nomarski interference contrast equipment and a variety of stages and other accessories may also be attached.

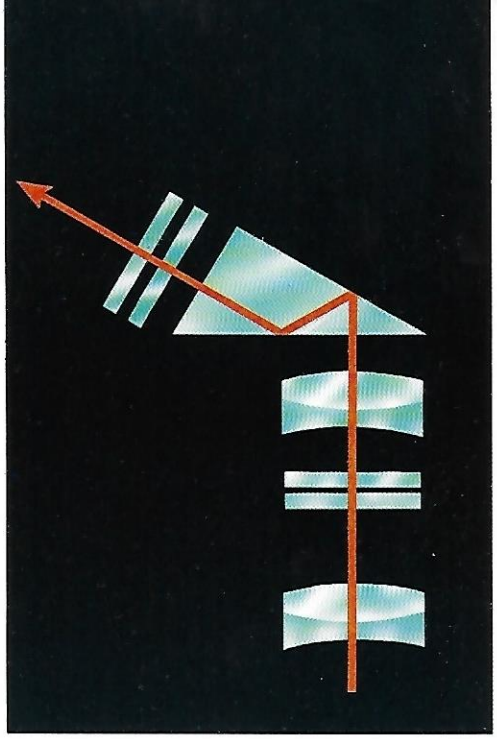
The viewing head of the Vickers M41 polarizing microscope is a completely new unit. It contains a focusing Bertrand lens, allowing binocular examination of the back aperture of the objective and of the conoscopic images (interference figures) there.

MICROSCOPE





POSITION 1



POSITION 2

This special viewing head is attached to the universal Photoplan stand by a broad dovetail slide and clamped firmly into position. The binocular tube has automatic tubelength compensation for variation of interocular separation. The binocular can be interchanged for a monocular (e.g. for microhardness testing) by simple unclamping and reclamping of a single screw. Both monocular and binocular are sealed at the interchange to prevent dust contamination.

The lower part of the main polarizing head contains the analyser. This is inserted into the light path by a push-pull rod and can be rotated over 180° against a scale engraved in single degrees and read by a vernier to 0·1°. The rotation can be fixed by a clamp.

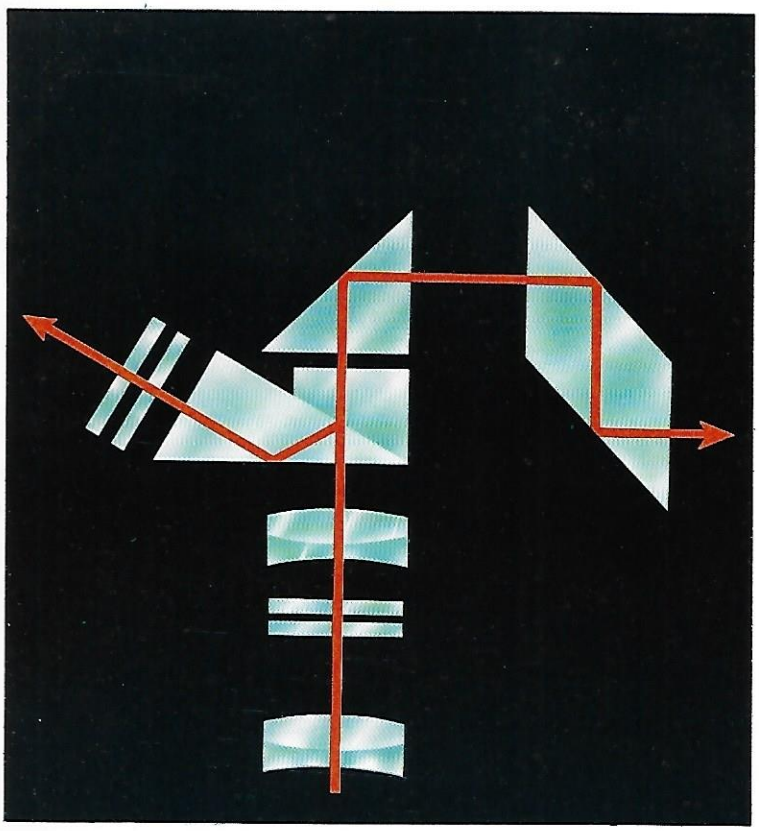
Below the analyser a slot for compensators rotates through 360° and has a scale similar to that of the analyser. Its position can be fixed by a clamp.
Between the analyser and the rotating compensator slot is a fixed compensator slot at 45° to the analyser zero position.

Above the analyser and corrector lens system several light distributing prisms are carried on an E-W slide operated by a push-pull rod. The positions on the slide direct

(i) all light through the Bertrand lens and then to the eyepieces;
(ii) all light to the eyepieces, without traversing the Bertrand lens;
(iii) 20% light to the eyepieces, 80% to the camera, without traversing the Bertrand lens.

The upper part of the polarizing unit contains the Bertrand lens system, into which light can be directed as shown above. A small isolating stop is provided and the image of the back aperture of the objective in use can be focused by means of the knob on top of the polarizing unit. The focusing range covers the back apertures of all objectives offered with the microscope and all wedges placed in the top compensator slot. The Bertrand lens facility is usable with both the monocular and binocular units.





POSITION 3

POSITION 1

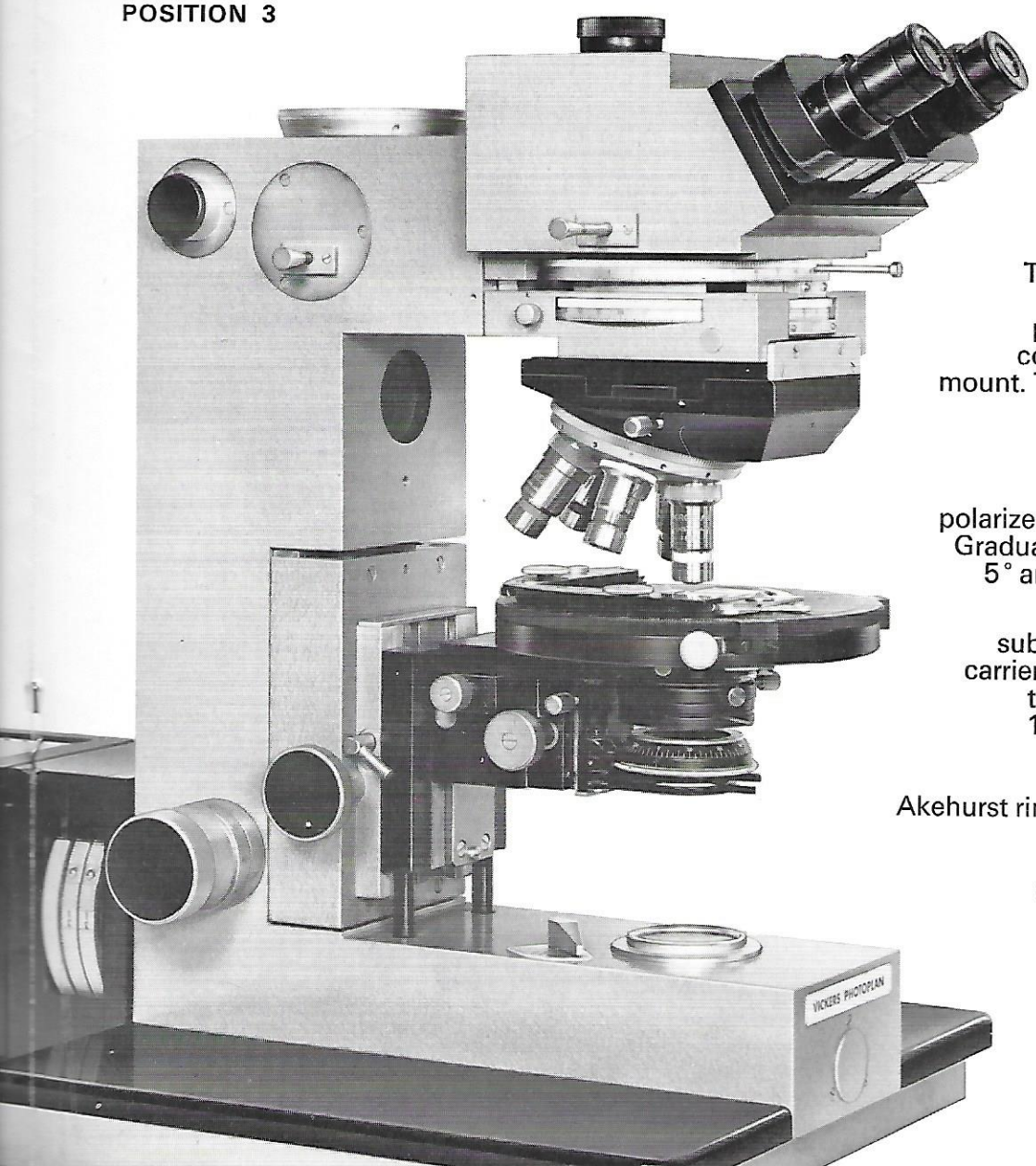
Control rod fully out. All light passes through the Bertrand lens bringing the back aperture of the objective into view, and the resulting image can be focused by the focusing control on top of the polarizing head. The beam is directed away from the optical system which takes light to the camera making photography of the conoscopic image impossible.

POSITION 2

Control rod in middle position. All light to eyepieces: orthoscopic field visible.

POSITION 3

Control rod in inmost position. Light split between eyepieces and camera. Orthoscopic field can be viewed and photographed.



TRANSMITTED POLARIZED LIGHT

The transmitted light polarizing substage is attached in place of the standard substage condenser carrier in a clamp-on mount. The polarizer and the two filter trays beneath it can be swung in and out of position independently of one another. When in position the polarizer can be rotated through 360°. Graduation marks are provided every 5° and click-stops at 90° intervals.

Above the polarizer the substage unit carries an Akehurst carrier slide which will take a simple two lens Abbe condenser (n.a. 1·2) or an aplanatic condenser (n.a. 1·3) in centring mount. Both must be carried in an Akehurst ring mount. They are strain free. The rotating ball-bearing stage is interchangeable with other Vickers stages by simple unclamping and sliding off its horizontal dovetail slide.

INCIDENT POLARIZED LIGHT

For polarized incident light a special incident illuminator is provided, fitting on to a dovetail slide beneath the polarizing head. It provides in its turn a slide for the incident light objective changer. The incident illuminator employs a Smith two-reflector system which has the advantage of producing nearly homogenous extinction over the field of view when using crossed polars. This illuminator is especially designed for the polarizing build-up.

The incident polarizer can be removed from the light path on a push-pull rod. When in position it can be rotated through 90° against a scale engraved every 5°.

The incident illuminator also contains a field iris with focusing lens and aperture iris.

STAGE

The circular stage fits on to a broad horizontal dovetail slide on the upper face of the stage carrier which is attached to the focusing block. It is 150 mm in diameter and has a marginal scale which can be read to 0·1°. The stage rotates on precise ball-bearing tracks. A pair of knurled screws at its edge allow it to be centred with respect to the objective in use.
A mechanical stage with 40 × 25 mm vernier movements can be attached to the main stage. Transverse verniers reading to 0·1 mm are fitted. Further adaptors to take slides of different proportions may also be fitted.

FOCUSING

The focusing mechanism, which operates on the stage, consists of easily reached coarse and fine spindles which operate independantly of one another. The total vertical run of the motion is 37·5mm coarse and 3 mm fine. The stage carrier may, additionally, be raised and lowered on a dovetail slide by release of a clamping lever. This allows accommodation of objects up to 62·5 mm in height.

EYEPIECES

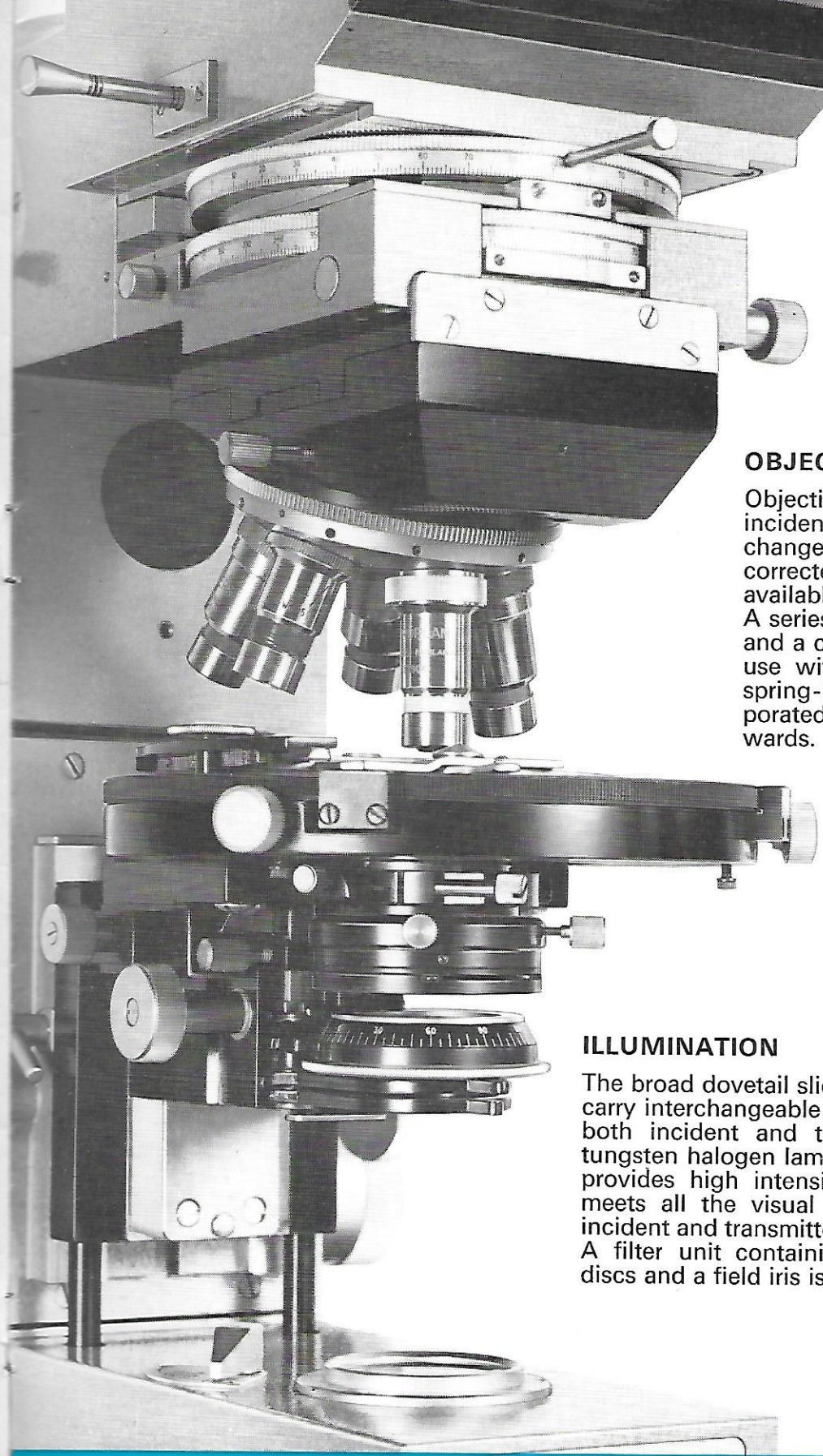
Compensating eyepieces, available with a 6·3× or a 10× magnification, and having a 20 mm field, have been designed for use with the M41 polarizing head. One eyepiece of each pair is fitted with a cross-line graticule adjustable by means of a location key to be inserted into a slot in the collar.

COMPENSATORS

The following range of compensators are available:

Mica quarter wave plate
Elliptic compensator
de-Senarmont plate
Quartz sensitive tint plate
Nakamura half shadow plate
Graduated and ungraduated quartz wedges.

The plates are mounted in holders marked, where applicable, with the slow direction and fitted with removable rods which, when the compensator has been located in the microscope, unscrew to allow full rotation of the slot.



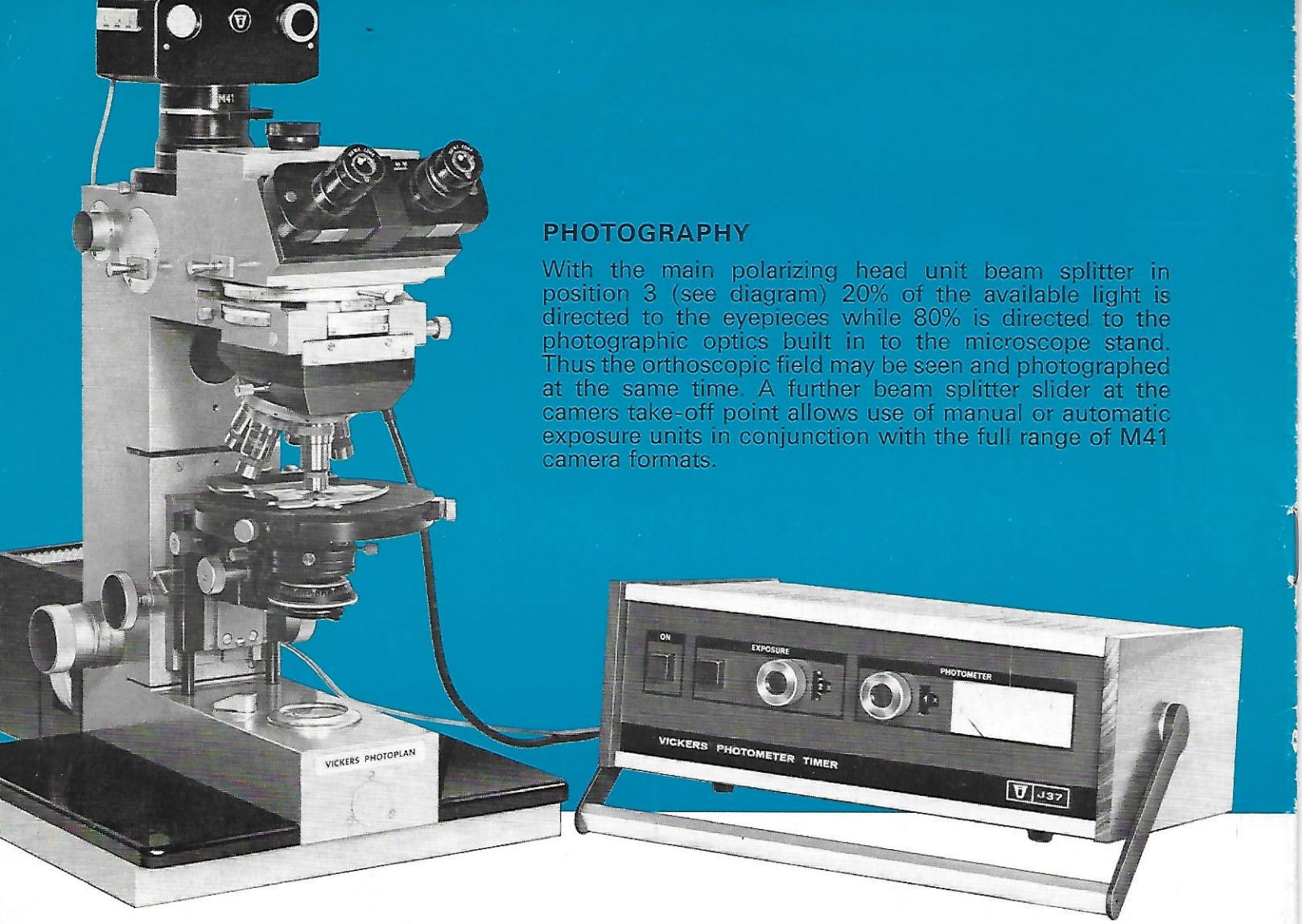
OBJECTIVES

Objectives are carried on the standard M41 incident and transmitted light revolving changers. Strain-free parfocal objectives, corrected for 160 mm tube length are available in a wide range of magnifications. A series is designed for metallurgical work and a corresponding series is corrected for use with a cover slip 0·18 mm thick. A spring-loaded retracting system is incorporated in all objectives of 20× and upwards.

ILLUMINATION

The broad dovetail slides at the rear of the main limb will carry interchangeable lamp units in positions suitable for both incident and transmitted light. The 12V 100W tungsten halogen lamp in the standard size lamphousing provides high intensity white light illumination which meets all the visual and photographic needs in both incident and transmitted polarized light.
A filter unit containing two quadruple revolving filter discs and a field iris is attached to each lamphousing.

CHOICE OF FILTER SETS		
Heat absorbing Dark green Daylight blue Blank	Heat absorbing Neutral Light red Blank	Neutral 1 Neutral 2 Neutral 3 Blank



PHOTOGRAPHY

With the main polarizing head unit beam splitter in position 3 (see diagram) 20% of the available light is directed to the eyepieces while 80% is directed to the photographic optics built in to the microscope stand. Thus the orthoscopic field may be seen and photographed at the same time. A further beam splitter slider at the camers take-off point allows use of manual or automatic exposure units in conjunction with the full range of M41 camera formats.

ACCESSORIES

Accessories to complement the polarizing capabilities of the M41 are also offered.

Vickers microhardness tester

Used in conjunction with the monocular viewing head and with polars uncrossed the microhardness tester allows the microhardness of materials to be measured by diamond indentation.

Nomarski interference contrast

A system which adds a new dimension to incident light images. It provides an extremely sensitive, qualitative technique for the detection of slight surface irregularities in opaque specimens.

Auto-levelling stage

Presents a level object surface to the objective by using spring pressure to press the specimen up against a previously aligned top plate.

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