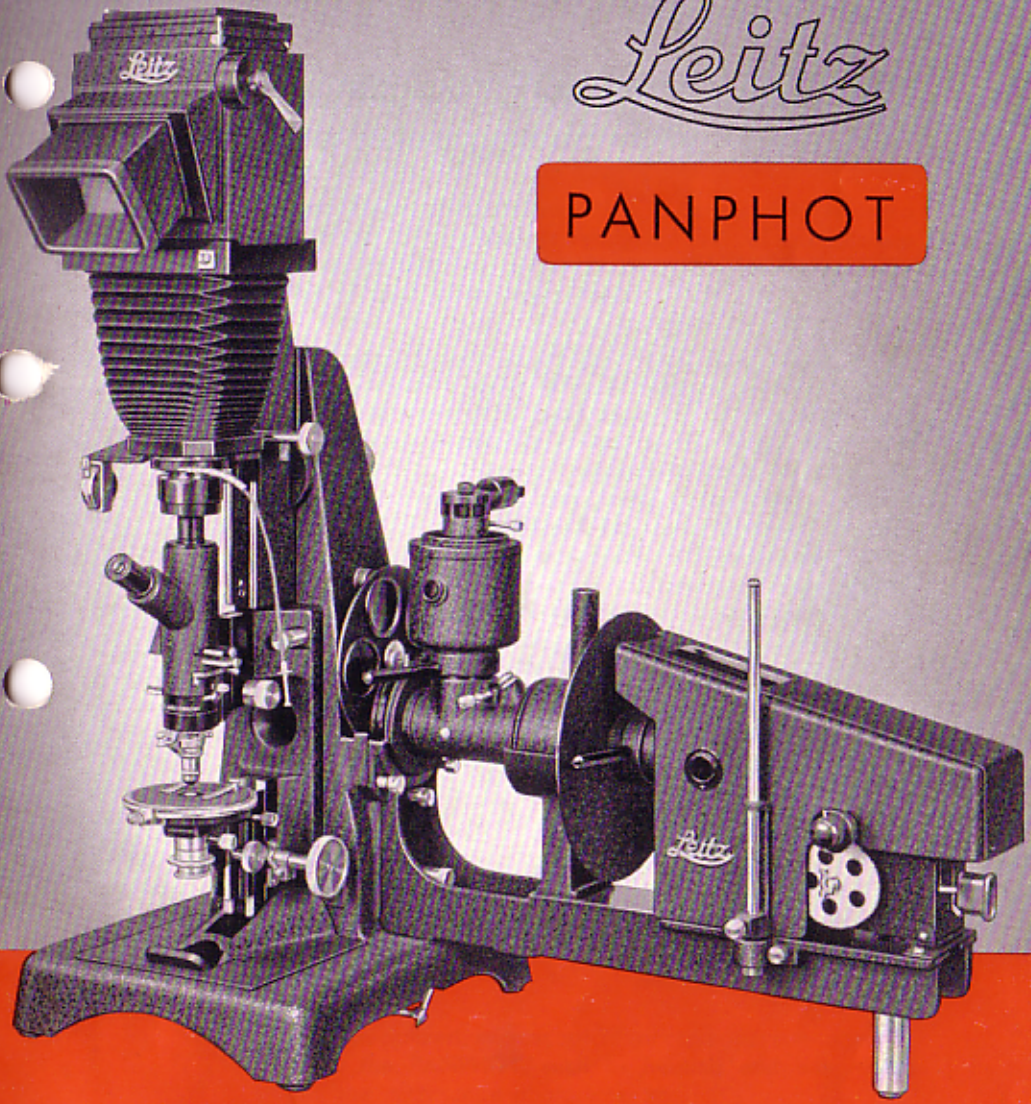
Leitz

PANPHOT



POLARIZING MICROSCOPE WITH PHOTOGRAPHIC EQUIPMENT

ERNST LEITZ · GMBH · WETZLAR

55-1/Engl.

PANPHOT Polarizing Microscope with photographic equipment

The PANPHOT Camera Microscope combines in a compact unit a high-grade universal microscope, two sources of light with optical illuminating arrangement and a vertical reflex camera.

The centration of the illumination is permanently retained so that the outfit is always ready for use. All controls are so arranged that they are easily accessible for the operator seated in front of the apparatus.

An unrivalled feature of the PANPHOT design is its extraordinary versatility which not only allows its successful application in all fields of microscopic research or routine work but also makes it possible to start with a simple outfit and extend its range of uses by subsequent addition of supplementary equipment. The basic outfit already has provision for making full use of fittings for transmitted and incident light while the camera allows photomicrographs and macro photographs to be taken with a minimum of extra adjustments. Optimum quality is ensured for all photographs since there is no reflecting surface between the microscope proper and the negative material when the latter is exposed.

The scope of the PANPHOT includes the following types of microscopic illumination and observation:

Transmitted light
Incident light
Bright field
Dark field
Phase contrast
Polarized light
Fluorescence light

Micro drawing
Micro projection
Micro ciné work
Photomicrography
Macro photography in transmitted light and reflected light

Highly specialized microscopical accessories can also be fitted to the PANPHOT, such as heating and integrating stages, the microscope photometer etc.

This catalogue mainly deals with the PANPHOT equipped with a polarizing microscope and pertaining accessories, while outfits for purely biological or metallographic work are more fully described in special literature.

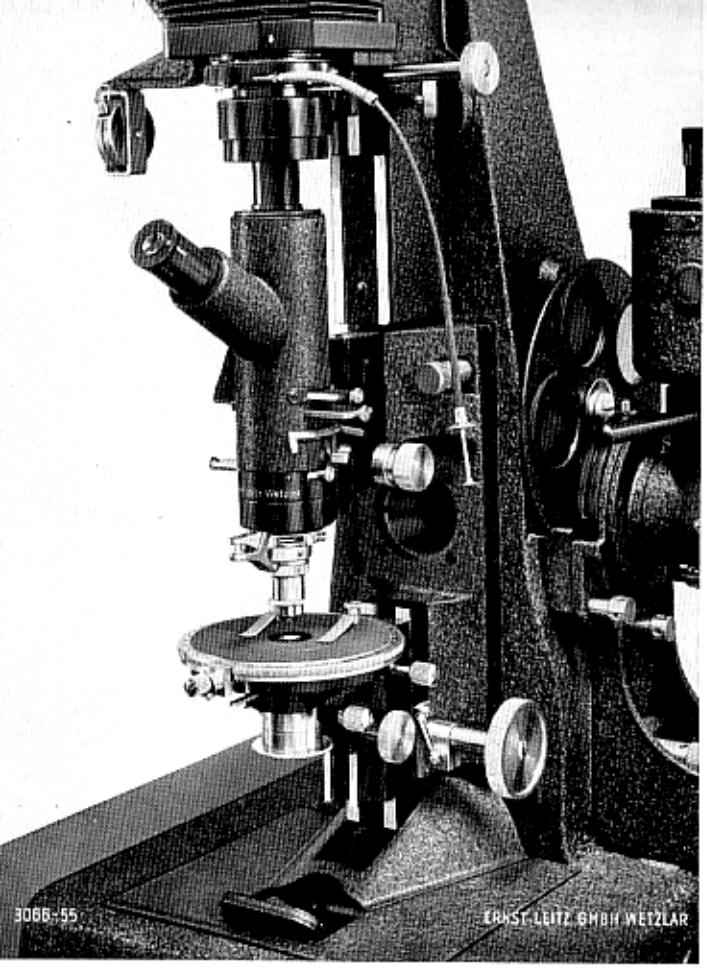


Fig. 1
Microscope arrangement for polarized transmitted light.

Technical Description

BASIC STAND WITH ILLUMINATING ARRANGEMENT

The stand of the PANPHOT comprises a cast light-metal base with upright provided with changing devices for the camera, the microscope and the sources of light as well as two built-in deflecting mirrors for adjusting transmitted or incident illumination.

The combined illuminating arrangement with 6 volt 5 amp filament lamp and a high-power arc lamp for alternative illumination easily controlled by a swing-out mirror is laterally attached to the stand which also carries a revolving holder with a set of filters to vary the illumination as required. This arrangement can also be supplied with a Xenon discharge lamp (in place of the arc lamp) which is superior in the case of A.C. as a steady light-source for continuous operation.

MICROSCOPE

The front of the stand takes the microscope bracket with tube and objective changing devices, interchangeable object stage and condensers.

The ***polarizing condenser*** is available in two types:

(a) large 5-lens condenser *a* No. 52
with swing-out top lens; field of view and aperture diaphragms

(b) 3-lens condenser *b* No. 54
with swing-out top lens and an iris diaphragm.

Either type can be supplied with prism polarizer (p) or filter polarizer (f) as desired.

The centered ***rotating stage*** No. 234 is fully graduated (360°) and fitted with vernier and frictional clamping device. It is vertically adjustable by rack and pinion while most accurate and smooth rotation is ensured by precision ball-bearings. The large dimensions of the microscope permit the accommodation of universal rotating stages (Federov stages) and of the integrating stage for planimetric analyses.

The interchangeable ***polarizing microscope tube*** FP 41 combines a wide photographic tube with an inclined monocular observation tube fitted with a rotating anastigmatic tube analyser and a Bertrand auxiliary lens both mounted on independently adjustable horizontal slides.

For ***binocular observation*** without the aid of polarized light an inclined binocular body S or a combined photographic tube with inclined binocular observation tube FS can be attached in place of the standard FP 41 polarizing tube.

The transition from visual observation to photomicrography is simply effected by lateral adjustment of a deflecting prism on slide. Thereby free access is given to the photographic plate or film, no reflecting body remaining between the image forming optics and the negative so that optimum definition is ensured.

The ***objective changing clutch*** is detachable for the use of a vertical illuminator.

CAMERA

The standard PANPHOT outfit incorporates a vertical ***reflex camera with extensible bellows*** for plates 9×12 cm. or 3¼"×4¼". The lower panel of the camera carries a time and instantaneous shutter with flash synchronization and a screw thread for a light-screening sleeve (when taking photomicrographs) or a photographic lens (when doing macro work) for which a rack and pinion for focusing is also provided.

A ***LEICA 35 mm. camera*** (negative frame 24×36 mm.) with micro mirror reflex housing can be substituted for the standard bellows camera. Such an equipment will be preferred when a great deal of photographic work has to be carried out including sequence and colour photographs. This method is economical and advantageous when records have to be kept of findings or tests or when the photographs are required in the form of 2"×2" slides for teaching purposes.

The front cover shows a complete PANPHOT with illuminant, vertical camera and microscope for work in transmitted polarized light.

Explanatory Notes on Specifications

To order a complete PANPHOT apparatus it should be noted that additions must be made to the Basic Outfit in the form of a Supplementary Equipment and Accessories for the various fields of application. Particulars on further accessories for even more specialized work, which are not included in this catalogue, will be gladly furnished on request. PANPHOT outfits specially arranged for biological work and metallography without the application of polarized light will be found described and specified in separate catalogues No. 54-5/Engl. and No. 56-10/Engl. respectively.

The interchangeability and standardization of all principal components make the PANPHOT not only the most versatile microscope and photographic equipment but allow of the purchase of a simple outfit at a moderate initial cost and the addition of accessories whenever the necessity arises at any time later on.

A special **PANPHOT Working Desk** should be included in a complete outfit whenever possible since it not only allows of setting up the apparatus for most convenient and efficient operation but also enables the user to store the accessories in easily accessible drawers which can be provided with adequate fittings.

Full information on assembling and supplementing PANPHOT outfits for all its uses will be found in the special PANPHOT INSTRUCTION BOOK while the theory behind the microscope and its correct operation are fully dealt with in THE MICROSCOPE AND ITS APPLICATION. These publications are obtainable from all LEITZ agents.

PANPHOT POLARIZING MICROSCOPE

Base with upright cast integrally and incorporating a revolving mirror for setting transmitted and incident illumination.

Vertical reflex camera with extensible bellows for plates 9×12 cm. (3¼"×4¼"), rack and pinion for focusing macro lenses, time and instantaneous shutter with flash synchronization and wire release, tape measure on bracket, 2 metal darkslides, 2 ground glass and 1 clear glass focusing screens, as well as focusing magnifier.

Detachable microscope carrier
with rack and pinion focusing motion to the object stage and micrometer slow motion on double precision ball-bearings actuating the tube changing slide.

Detachable three-point objective centring clutch
with compensator slot and 4 objective centring collars.
Compensator slide with gypsum red 1st order.
Compensator slide with mica ¼ W. L.

Rack and pinion substage fitting
with fork bracket to take interchangeable condensers.

Combined illuminating arrangement
on bracket with 6 volt 5 amp filament lamp, high-power arc lamp with clockwork feed for 10 amps D.C. or 15 amps A.C., adjustable condenser lenses, swing-out mirror for alternative illumination, double heat-absorbing filter, revolving holder with daylight and photographic filters, light-screening shield, spare bulb and forked cable with mains plug and two equipment plugs.

Interchangeable polarizing tube FP 41 p
with rotating prism analyser on horizontal slide with graduation in 1° intervals, built-in Bertrand auxiliary lens on horizontal slide, vertical photographic tube and inclined observation tube with adjustable deflecting prism.

Centered rotating stage (130 mm. dia.) No. 234
with precision ball-bearing movement and 360° graduation with vernier, frictional clamping device, removable ring plate (for accommodating universal rotating stages), two object clips, bracket with dovetail slide and clamping screw.

Polarizing condenser b No. 54 p
numerical aperture 0.90 mounted on dovetailed holder with detachable two-lens system, aperture diaphragm, swing-out top lens and removable rotating prism polarizer.

PANPHOT Polarizing Microscope
Basic outfit exclusive of objectives, eyepieces and electrical accessories Codeword IDVID

* Particulars and quotation for a Xenon discharge lamp on request.

ELECTRICAL ACCESSORIES

If not stated otherwise on the order PANPHOT outfits will be supplied complete with **electrical equipment for 220 volt A.C. mains** additional codeword IDIKY

The electrical equipment comprises:

Transformer or resistance with regulation for the 6 volt 5 amp filament lamp.

100 pairs of carbons and resistance for the arc lamp with special connecting cables and plugs:

for 110/120 volts A.C. (15 amps) . . . . . IDIFT

„ 220 volts A.C. (15 amps) . . . . . IDIKY

„ 110 volts D.C. (10 amps) . . . . . IDILS

„ 220 volts D.C. (10 amps) . . . . . IDIMB

(for individual prices of electrical items see page 21)

OPTICAL EQUIPMENT B 1

for work in transmitted polarized light

Achromatic objectives (free from strain) Oil immersion

P 3.2/0.12 . . . . . PETTA

P 10/0.25 . . . . . PETRI

P 45/0.65 . . . . . IAZYI-FE*

P oil 100/1.30 . . . . . PELIM-FE*

Immersion condenser cap N.A. 1.40 fitting the polarizing condenser in place of the standard N.A. 0.90 top component . . . . . PUKAB

Huygens eyepiece P 5× with cross lines and focusing eyelens . PIIVS

Huygens eyepiece P 8× with cross lines and focusing eyelens . PIIWF

Optical Equipment B 1 . . . . . PEBEZ-FE*

(For further objectives see page 14)

PANPHOT Polarizing Microscope as specified under IDVID and with optical equipment B 1, complete for connection to 220 volts A.C. IDWIF-IDIKY

PANPHOT Polarizing Microscope as IDWIF but with polarizing and analysing filters (in place of polarizing prisms) . . . . . IFDIR-IDIKY

* FE indicates medium and high-power objectives with receding spring-loaded mounts as an extra front lens and cover glass protection.

INDIVIDUAL PRICES AND SUPPLEMENTARY EQUIPMENT

Objective changers:

Three-point objective centring clutch on detachable bracket with compensator slot and 4 objective centring collars (included in outfit IDVID) . . . . . PEZAX

Objective centring collars . . . . . each PIZUT

Revolving objective nosepiece with centring mounts **for 3 objectives** on detachable bracket with compensator slot . . . . . PEZEY

Revolving objective nosepiece with centring mounts **for 4 objectives,** on detachable bracket with compensator slot . . . . . PEZIZ

Interchangeable microscope tubes:

(a) **for work in polarized light:**

Polarizing tube FP 41 p, vertical photo tube combined with change-over prism, prism analyser and Bertrand auxiliary lens (as included in outfit IDVID) . . . . . PFIIY-QIIHM

Polarizing tube FP 41 f, as specified above, but fitted with a filter analyser . . . . . PFIFT-QIIHM

(b) **for binocular observation in non-polarized light**

Inclined binocular observation tube . . . . . ORSEH

Fitted case for tube S . . . . . OEEPB

Inclined binocular observation tube FS with vertical photographic tube combined and with change-over prism . . . . OIYEE-SINE

Fitted case for tube FS . . . . . MPSII

Standard eyepieces:

	Single	Pair
Huygens eyepieces 6×	HYZWA	GIZRA
Huygens eyepieces 10×	HYVIR	GIVYR
Periplanatic eyepieces 8×	PEROT	GIROT
Periplanatic eyepieces 10×	PEZEN	GIZEM
Periplanatic eyepieces 12×	PEZWO	GIZOV

Wide-field eyepieces for visual observation and photomicrography in transmitted light with all standard objectives and in particular with the plano objectives to turn the excellent performance of the latter to best effect (in ordinary transmitted light).

	Single	Pair
Periplanatic wide-field eyepieces GF 10×	PERIR	PESIS
Periplanatic wide-field eyepieces GF 16×	PEROS	PESOT
Periplanatic wide-field eyepieces GF 20×	PERUT	PESUV
Periplanatic wide-field eyepieces GF 25×	PESAP	PETAR
Periplanatic measuring eyepieces MGF 25× with scale 10/100 mm.	PESER-OCASY	

High-point eyepieces of the Huygens and Periplanatic types are designed to enable visual microscopic work for the wearers of spectacles without the necessity of having to remove the glasses and without any reduction of the normal field of view.

	Single	Pair
Huygens high-point eyepieces 6.3×	HUFEB	HUFIR
Periplanatic high-point eyepieces P 10×	PERAN	PEREP

Special eyepieces for photomicrography are available for use in the vertical photographic tube of the PANPHOT in which they are superior to standard eyepieces in that they yield optimum image quality right to the edge of the field (not suitable for use in conjunction with plano objectives).

N 6.3× m photographic eyepiece for use with medium-power objectives (see table) . . . . . MZIIY

N 8× h Photographic eyepiece for use with high-power objectives (see table) . . . . . MUIID

Object stages:

Centered rotating stage (130 mm. dia.) No. 234 with ball-bearings, 360° graduation, vernier and frictional clamp (as included in IDVID) . . . . . PIIUE-PNLII

Attachable mechanical stage with traversing range 30×30 mm., scales and verniers . . . . . PIRUX

Condensers:

Polarizing condenser b No. 54 p
with prism polarizer (contained in outfit IDVID) . . . . . PEWAT

Polarizing condenser b No. 54 f
with filter polarizer (in place of a prism) . . . . . PEWOX

The following more elaborate condensers can be substituted for the above types when most critical adjustment of the illumination is desired.

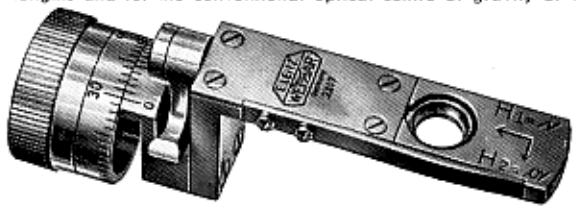
Polarizing condenser a No. 52 p (N.A. 0.85)
on interchange slide with aperture and iris diaphragms, swing-out top lens and interchangeable rotating prism polarizer with graduation in intervals of 5° . . . . . PEVOW

Polarizing condenser a No. 52 f (N.A. 0.85)
as specified under PEVOW but fitted with filter polarizer (in place of a prism) . . . . . PEVUX

Compensators
Metal slide with gypsum plate red 1st order (included in outfit IDVID) . . . . . KOGIP

Metal slide with mica plate 1/4 W.L. (included in outfit IDVID) . . . . . KOMER

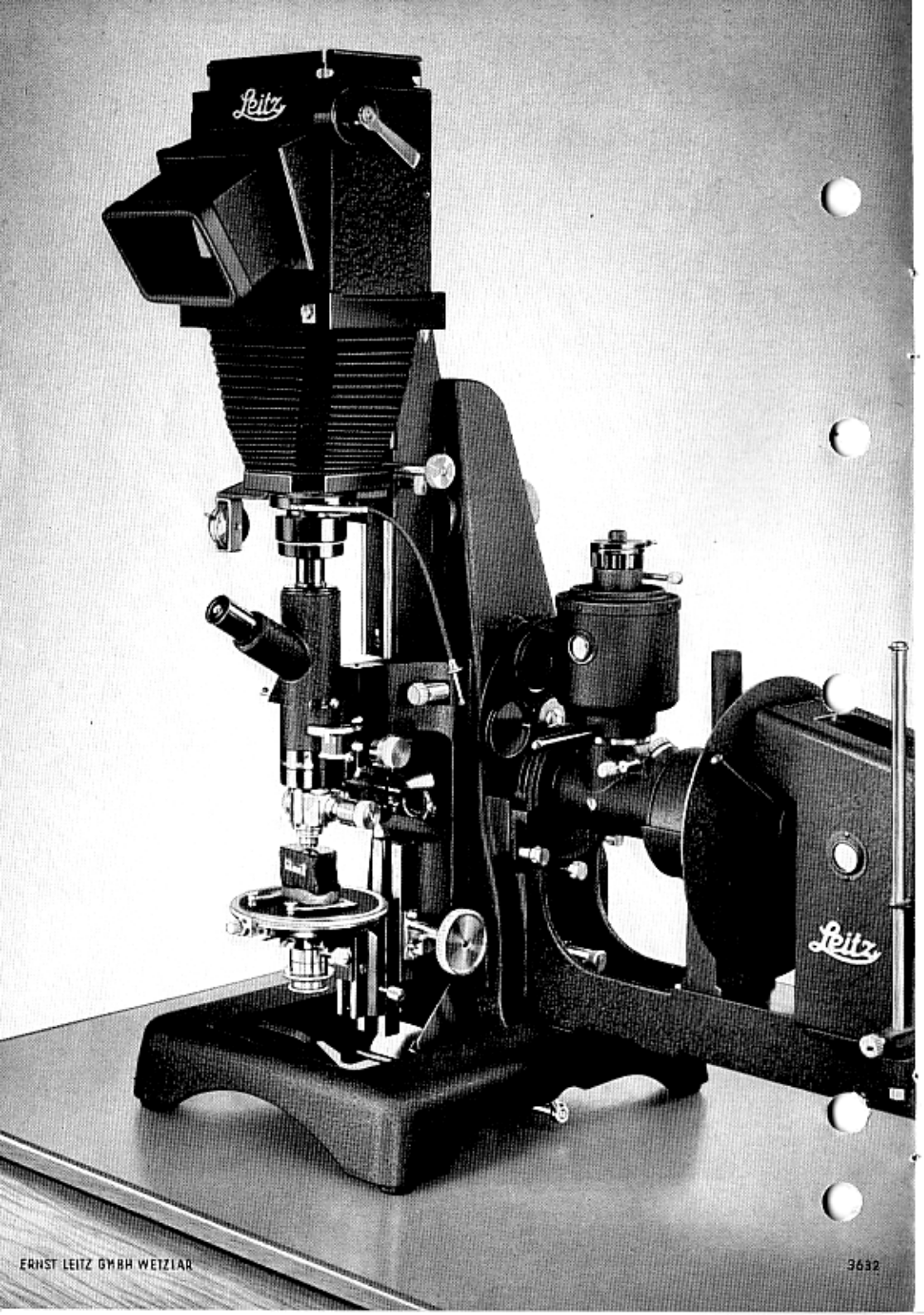
Berek compensator, fitting tube slot, designed on the principle of the rotating compensator by Biot-Bravais but with considerably greater range of measurement (four orders). The measuring results can be evaluated in a simple manner. The compensator possesses a considerably greater sensitivity for smaller and medium path variations than be Babinet compensator; as it is further more used in the tube slot above the objective, it is not necessary to use a top analyser to carry out the measurements. The compensator can also be employed for qualitative detection of lesser double refraction instead of gypsum and mica, and is of very particular advantage in the determination of optical characters. With directions for use and calibration for three wave lengths and for the conventional optical centre of gravity of white light . . BEREK



The same compensator can also be supplied with different measuring range (up to 12 orders) additional cost IBZXI
Quartz Wedge, I—IV orders, fitting tube slot . . . . . KORAZ

Exposure meter:

Light meter for determining the times of exposure required for photomicrographs, comprising an indicating instrument and a measuring eye (selenium photo cell) connected to it by a detachable cable, in case with directions . . MICROSIX



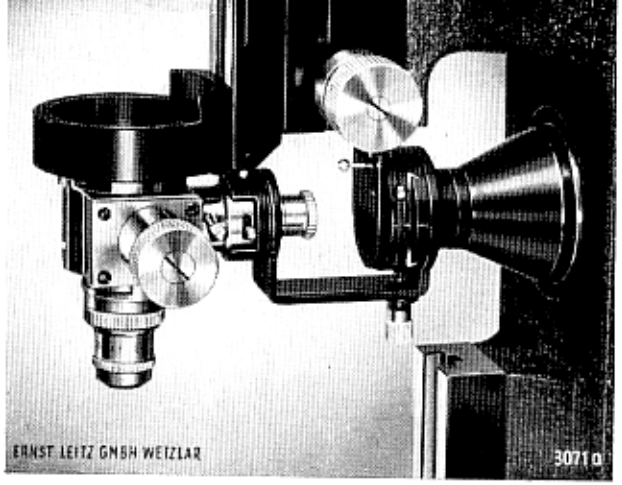


Fig. 3
Vertical Illuminator with polarizing equipment and front collector

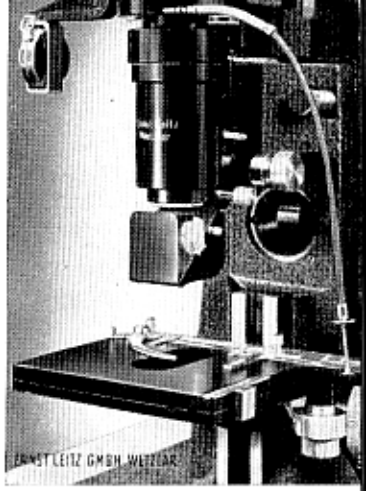


Fig. 4
General features illuminator

SUPPLEMENTARY EQUIPMENT FOR INCIDENT POLARIZED LIGHT

Large vertical illuminator on detachable bracket with compensator slot, compensating prism and plane glass plate on rapid changer, polarizing prism, objective changing clutch and 4 objective centring collars. Supplementary front collector on clamping holder, with iris diaphragm, half-stop device for oblique illumination and slide with 4 centre stops . . . . . QCPII-IRLEI

Case for vertical illuminator (not required when working desk is ordered) . . . . . QDIIC

Optical equipment (free from polarization) E 1 a

Coated F/4.5 50 mm. MILAR lens with iris diaphragm		PUZII
Coated achromatic objective	P 5.5/0.15 (P 1 b)	ICCVO
Coated achromatic objective	P 16.5/0.40 (3 b)	IICWQ
Coated fluorite objective	(P) 45/0.85 (P 6 Fl)	IICXS
Coated fluorite oil immersion	(P) 80/1.30 ($P^{1}/_{10}$ Fl)	IIDBZ

Photographic eyepiece N 6.3× m . . . . . MZIIY

Photographic eyepiece N 8× h . . . . . MUIID

Complete optical equipment E 1 a . . . . . POFOH

Standard eyepieces for visual observation are already included in the outfit B 1.

General features illuminator with wide tube for photographs without eyepiece with the aid of plane glass illumination . . . . . IWKXI

Plane mirror on bracket for oblique illumination with opaque objects . . . . . IPRTI

Hand press for levelling the specimens . . . . . MEPUX

Set of 6 metal object slides . . . . . IWMBI

Complete supplementary equipment for work in incident light as specified above . . . . . IOPQI

Additional eyepieces (for work in incident and transmitted light):
Periplanatic eyepiece 8× MOP . . . . . IMUCI
Periplanatic eyepiece 10× MOP . . . . . IMVEI

OBJECTIVES FOR WORK IN TRANSMITTED POLARIZED LIGHT

(Specially made free from strain and corrected for a tube length of 170 mm.)

Objective designation***	Focal length mm.	Free work. distance mm.	Micrometer value for 6× eyepiece	Cover glass correc-tion*	Type of eye-piece**	Code-word
P 3.2/0.12	39.8	35	47 µ	DO	H	PETTA
P 6/0.18	24.5	17	26 µ	DO	H	PETME
P 10/0.25	16.3	5.7	15 µ	DO	H	PETRI
P 25/0.50	7.1	0.88	6,0 µ	D	P	PEAPS-FE
P 45/0.65	4.0	0.60	3.3 µ	D	HP	IAZYI-FE
P 63/0.85	2.9	0.29	2.4 µ	D	P	PETIS-FE
P Ol 100/1.30	1.8	0.14	1.5 µ	D	P	PELIM-FE

OBJECTIVES FOR WORK IN INCIDENT POLARIZED LIGHT

(free from strain, for tube length 215 mm. and objects without cover glass)

Objective designation***	Focal length mm.	Free work. distance mm.	Micrometer value for 6× eyepiece	Cover glass correc-tion*	Type of eye-piece**	Code-word
Achromat P 5.6/0.15	31.9		26 µ		H	IICVO
Achromat P 16.5/0.40	13.1		9 µ		H	IICWQ
Fl.-System P Fl 45/0.85	4.4		3.2 µ		P	IICXS
Achr.-Olimm. P 12.5/0.25	16.1		12 µ		H	IICYU
Achr.-Olimm. P 25/0.65	8.1		5.6 µ		P	IICZW
Fl.-Olimm. P Fl 60/0.95	3.4		2.5 µ		P	IIDAX
Fl.-Olimm. P Fl 80/1.30	2.5		1.8 µ		P	IIDBZ
Fl.-Olimm. P Fl 105/1.32	2.0		1.4 µ		P	IIDCB
Fl.-Olimm. P Fl 125/1.32	1.7		1.2 µ		P	IIDEF

* D: with cover glass, O: without cover glass.

** This column indicates the type of eyepiece best suited to the objective concerned (H = Huygens, P = Periplanatic).

*** The first figure indicates the initial magnification and the second the numerical aperture of the objective.

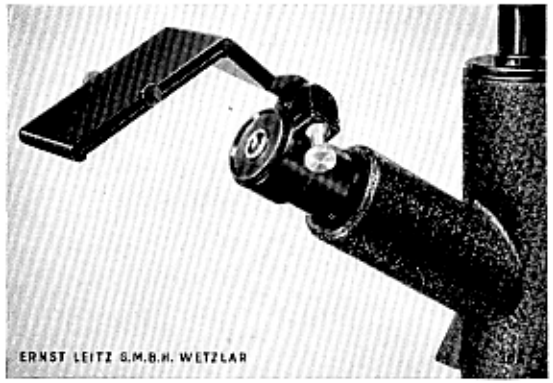


Fig. 5 Drawing mirror in position on monocular tube FP

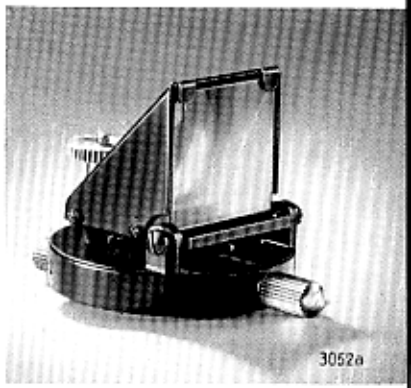


Fig. 6 Projection prism PRIAU

ACCESSORIES FOR MICRO DRAWING

Inclinable **drawing mirror,** attachable to the monocular observation tube of the FP photo tube, to project the image on the table top . . . . . PIIGL

Case for drawing mirror . . . . . IPZKI

Wooden baseboard with pull-out drawing board for attaching the drawing payer . . . . . PIIHY

Folding light-screening arrangement for drawing daylight . . . ZDHEE

ACCESSORIES FOR MICRO PROJECTION

Tilting **projection prism** fitting the vertical photo tube for wall projection, in case . . . . . PRIAU

Tilting projection prism with anti-reflection coating for optimum brilliancy . . . . . PRIAU-C

ACCESSORIES FOR MEASURING PURPOSES

Micrometer eyepiece P 6× with scale 10/100 mm. and focusing eyelens . . . . . GIIKN

Eyepiece net micrometer with size of squares 0.5×0.5 mm. . . ICKRI

Stage micrometers, in case

(a) 1 mm. scale with 100 intervals ruled on highly reflecting metal for incident illumination . . . . . IIDMU

(b) 2 mm. scale with 200 intervals photographed in glass for use in transmitted light . . . . . OBMET

* Not required when a working desk with fitted drawers is ordered.

ACCESSORIES FOR DARK FIELD EXAMINATIONS

Immersion dark field condenser D 1.20 A (No. 82) in centring mount on slide, in case* . . . . . ORCIX

Dry dark field condenser D 0.80 (No. 84) on slide, for use with dry objectives, in case* . . . . . OREBK

To reduce the objective aperture for optimum dark field effect with medium or high-power objectives one of the following accessories is required:

Drop-in funnel stop for new-type LEITZ objectives with non-detachable front (state type of objective to be used) . . . . . IRSOP

Intermediate objective adapter with iris diaphragm for use with objectives with screw-off front . . . . . IRTIS

ACCESSORIES FOR U.V. FLUORESCENCE MICROSCOPY

(a) with transmitted light and bright field illumination:
Filter UG 1, 4 mm. thick, fitting revolving filter holder . . . EEUSQ

(b) with transmitted light and dark field illumination or with incident light provided by the ULTROPAK:
Filter UG 1, 2 mm. thick, fitting revolving filter holder . . . EEUNF

UV protective filter, 2.5 mm. thick, to screw underneath the eyepiece, for visual observation and for colour photography DQCEE

Bottle-shaped glass cell . . . . . QYGII

ACCESSORIES FOR MICRO ANALYSES AT TEMPERATURES — 20° to + 350°

Microscope heating stage 350° comprising a base with heating coil and cooling arrangement, object-holder on slide, quartz cover disc, set of 3 thermometers, 50 special object slides and 100 cover glasses in fitted box, inclusive of regulating transformer for 110/220 volts A.C. with connecting cable . . . . . HEBOF

* When ordering subsequently state type of existing substage condenser (a or b).

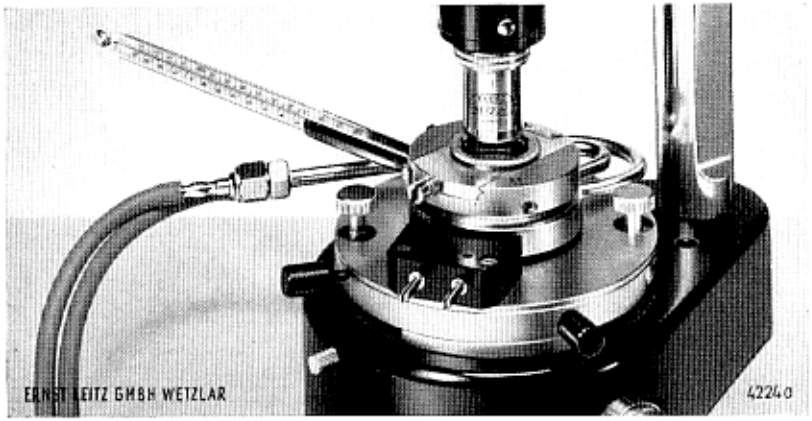


Fig. 7 Microscope heating stage (on special stand which is quoted for on request)

Ramsden eyepiece 10× with arrangement for reading the thermometer scale in the field of view, fitting the inclined observation tube . . . . . HEDOH

Recommended objectives for the heating stage:
When using the objective changing devices described on page 9 or the vertical illuminator (page 13) in conjunction with the polarizing tube, the transmitted-light objectives of low powers up to the P 10/0.25 achromat will be wholly satisfactory for the heating stage. For higher magnifications, however, specially designed objectives for tube length ∞ are indispensable:

Heating stage objective	Free working distance*	
5/0.19	13.2 mm.	RVIIN
10/0.18	13.6 mm.	RVZII
H 20/0.40	8.3 mm.	HEFAF
H 32/0.60	5.7 mm.	HEFEG

* The figures for the free working distance are inclusive of the 1.8 mm. thick quartz cover disc of the heating stage.

This optical equipment is preferably used with binocular observation tubes for ordinary light and on a:
quadruple nosepiece with bracket . . . . . ORKAT
and tube lens for infinity objectives . . . . . INFINITY

Old-type heating stages with cover disc 0.5 mm. thick are modified by:
Quartz cover disc for heating stage 350°, 1.8 mm. thick . . . . . HEFUG

MICROSCOPE PHOTOMETER FOR MEASURING REFLECTANCE IN INCIDENT LIGHT

Photometer head with optical comparison system, focusing eyepiece with slot for inserting light filters, measuring circle with auxiliary magnifier for reading the graduation, entrance tube with polarizer, adjustable precision slit, 3 eyepiece filters of the centres of gravity near the C, D and E lines, light screening shield and 10 calibration diagrams . . . . . IRZEE*

Totally reflecting prism in mount, for calibrating . . . . . IEERN

Attachable microscope photometer for the PANPHOT, complete LOIIH*

* When ordering a microscope photometer subsequently for an existing PANPHOT, the microscope carrier complete with tube and vertical illuminator must be forwarded to the LEITZ factory for proper fitting.

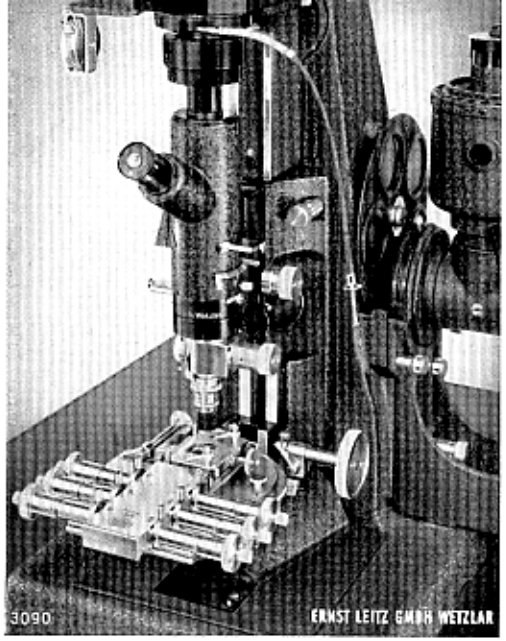


Fig. 8
Integrating stage in position on the PANPHOT

EQUIPMENT FOR QUANTITATIVE PLANIMETRIC ANALYSES

Integrating stage with 6 spindles, in case . . . . . ITEQI

Accessories for work in transmitted light:

Mica plate ¼ W.L. in threaded mount fitting the substage in place of the ordinary swing-out top lens for providing circular-polarized light in conjunction with the ¼ W.L. mica compensator IZBDI

Condenser lens for high-power work fitting into the central stage aperture . . . . . ISFEI

Set of flexible metal extensions for convenient operation of the 6 spindles free from vibration . . . . . IZCFI

Accessory for transmitted and incident light:

Small supplementary stage with 20 mm. movement by rack and pinion for bridging gaps etc. in the specimen . . . . . IFPYI

Accessory for work in incident light:

Large supplementary stage for bridging gaps etc. in the specimen with 20 mm. movement by rack and pinion and 40 mm. additional range with click stops at each 10 mm. interval, including screw and counter nut for limiting the range of the integrating stage spindles to 10 mm. . . . . PODIF

Accessory for use with universal rotating stages

Condenser with mirror on slide . . . . . ISDPI

Full particulars are available on request.

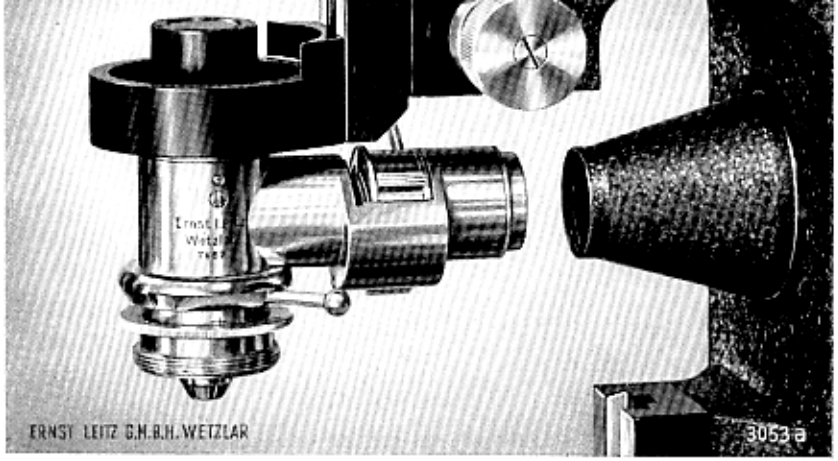


Fig. 9 ULTROPAK incident light illuminator with swing-out polarizer

SUPPLEMENTARY EQUIPMENT FOR INCIDENT LIGHT WITH THE ULTROPAK ILLUMINATOR

The ULTROPAK differs from the ordinary vertical illuminator by the use of special objectives with annular condensers arranged around them and through which the light is directed on to the specimen, whereby glare is effectively eliminated, especially with the polarizing ULTROPAK, even in the case of rough specimens. Moreover the objective aperture can be fully utilized. Dark field effects are also made possible by this method.

ULTROPAK illuminator on bracket . . . . . MIIVD

Case for the ULTROPAK (not required when a working desk with fitted drawers is ordered) . . . . . IQHZI

Optical equipment H 2a (without eyepieces)

UO 5× 0.15 . . . . . AIEES

UO 11× 0.25 . . . . . AKEER

UO 22× 0.45 . . . . . ALVEE

UO 50× 0.65 . . . . . AMEEP

Set of 6 different objective stops to enhance the depth of field . . . . . AXUEE

Object slide 79×26 mm. of polished black glass with bevelled edges, for obtaining best contrast with small objects or powders . . . . . AYEEC

Optical equipment H 2a (without eyepieces) . . . . . MUXOZ

Complete supplementary equipment for work in incident light with the ULTROPAK . . . . . MUXUB

ULTROPAK illuminator with filter polarizer, i. e. rotatable polarizer in swing-out mount for use with the analyser of the FP 41 PANPHOT polarizing tube bracket . . . . . QKIIW

Gypsum plate in mount fitting holder of polarizing ULTROPAK AFLEE

Further particulars on the ULTROPAK are given in a special catalogue No. 8731.

For eyepieces, if not already included in the PANPHOT outfit, see page 7.

ACCESSORIES FOR MACROPHOTOGRAPHY

Wooden stage lined with black felt cloth for accommodating opaque specimens to be photographed . . . . . PIIOB

Macro ring illuminator on interchange bracket with circular metal housing containing low-voltage filament lamps, separate regulating resistance with cable for 110/220 volts A.C. or D.C., for illuminating glossy and also irregularly shaped opaque objects MIISP

Photographic lenses with anti-reflection coating and built-in iris diaphragm:

(a) **F/4.5 SUMMAR systems** designed as double anastigmats of especially high correction

SUMMAR	120 mm. with adapter	SUMZO-RIING
SUMMAR	80 mm. with adapter	SUMUR-RIING
MICRO-SUMMAR	42 mm. with adapter	SUMIT-RIING
MICRO-SUMMAR	35 mm. with adapter	SUMEX-RIING
MICRO-SUMMAR	24 mm. with adapter	SUMAN-RIING

(b) **F/4.5 MILAR systems,** particularly suitable for black-and-white photographs

MILAR	100 mm. with adapter	PQRII-RIING
MILAR	65 mm. with adapter	PRTII-RIING
MILAR	50 mm. with adapter	PUZII-RIING

Range of magnifications for macro work with the PANPHOT camera 7.5× up to 30×.

(for further details and magnification tables see the PANPHOT Instruction Book)

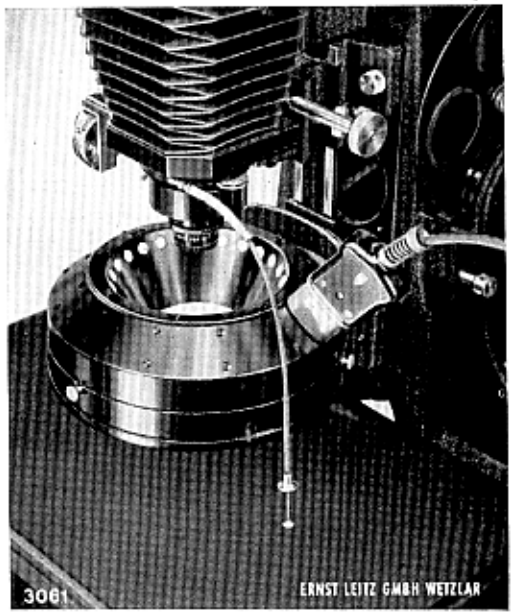


Fig. 10
Macro ring illuminator in position on the PANPHOT

SUPPLEMENTARY EQUIPMENT FOR MACROPHOTOGRAPHY WITH THE AID OF VERTICAL ILLUMINATION FOR AN OBJECT FIELD OF 60 mm. DIAMETER

Large 60 mm. macro illuminator on bracket with inclined plane glass reflector (45°), illuminating lens, square object stage focusing by rack and pinion fitting the stage interchange slide of the PANPHOT microscope carrier, auxiliary negative lens in metal frame fitting the filter holder of the PANPHOT illuminating arrangement . . . . . MRWII

(For use with 100 and 120 mm. lenses)

SUPPLEMENTARY EQUIPMENT FOR PHOTOGRAPHING GENERAL FEATURES OF POLISHED THIN SPECIMENS IN TRANSMITTED POLARIZED LIGHT

Detachable bracket fitting microscope tube changing slide with holder for 2 adjustable low-power lenses, dovetail slide to receive the analyser slide of the PANPHOT polarizing tube . . IPAMI

Intermediate substage sleeve for the existing PANPHOT polarizer IPBOI

Bracket with 64 mm. objective and condenser lens . . . . . IPCQI

Complete equipment for low-power photographs in transmitted polarized light . . . . . IPDSI

Fig. 11 Large 60 mm. macro illuminator

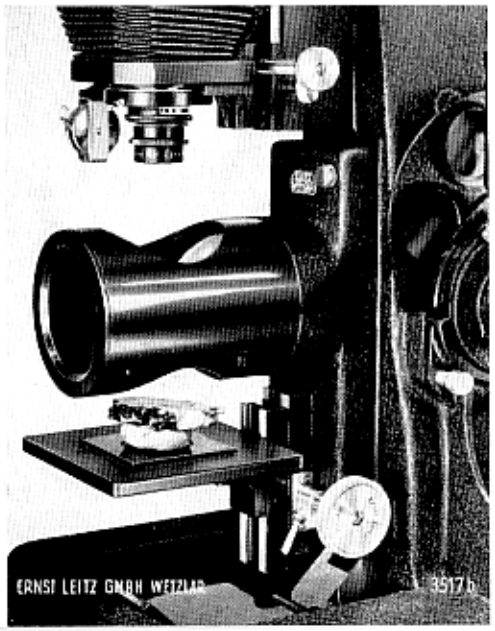


Fig. 12 Equipment for photographing general features in transmitted polarized light

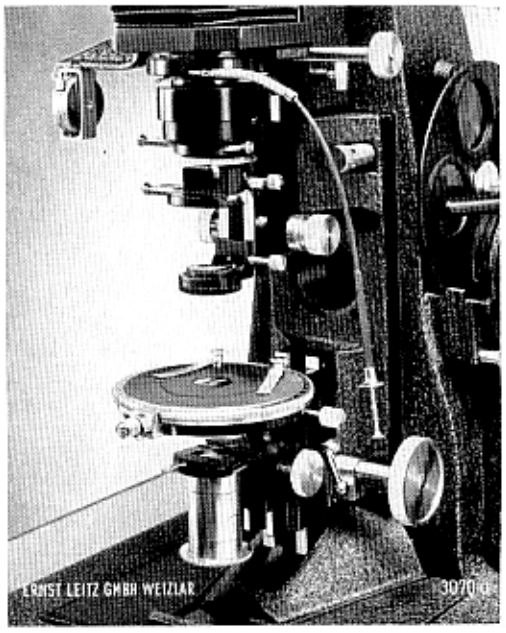


Fig. 13
LEICA 35 mm. camera with micro mirror reflex housing ⅓× intermediate adapter, lateral focusing telescope and (separate) focusing magnifier

SUPPLEMENTARY EQUIPMENT FOR MINIATURE PHOTOGRAPHY WITH THE LEICA CAMERA

The LEICA system of 35 mm. photography is ideal for micro and macro photography and particularly appreciated for its rapidity in operation and unrivalled economy when large numbers of photographs including sequence exposures have to be made. Its superiority is particularly evident in the case of colour photography now almost indispensable in scientific and technological work.

(a) *Micro work:*

LEICA micro mirror reflex attachment with swing-out mirror, rotatable field frame (24×36 mm.), ground and clear glass focusing screens in revolving holder, double release and 5× focusing magnifier, with holder fitting vertical camera bar . . . . . IFLEX-EEXRL

Intermediate adapter ⅓× with anti-reflection coating to screw between reflex attachment and focusing telescope . . . . . ZOIIL

Focusing attachment with lateral telescope with time and instantaneous shutter with flash synchronization, swing-out deflecting prism, light-screening sleeve for the microscope tube, double release for the prism and the shutter . . . . . ZOCII

LEICA micro attachment* (as an alternative for the above reflex arrangement) with lateral focusing telescope with swing-out prism, time and instantaneous shutter with flash synchronization, ⅓× intermediate adapter (coated), Periplanatic eyepiece 10× C and two wire releases for prism and shutter, in case MIKAS

Release coupler* to operate prism and shutter releases in the correct sequence CALOS

* For fuller particulars consult special catalogue.

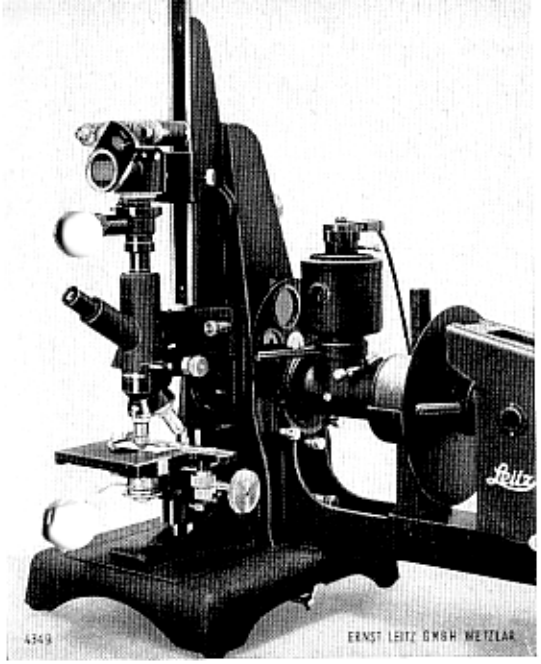


Fig. 14
Equipment for photomicrography with the LEICA and mirror reflex attachment

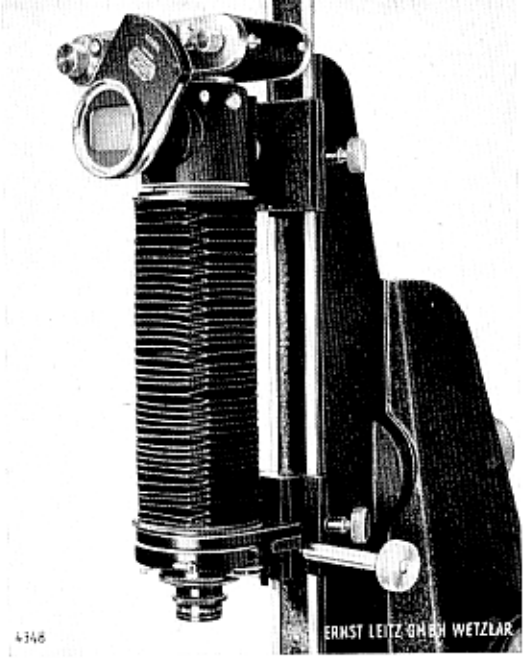


Fig. 15
LEICA camera arrangement with bellows for macro work

(b) *Macro work*

Magnifications up to 3× and reductions down to 1/30 actual size

LEICA micro mirror reflex attachment (as shown on preceding page) . . . . . IFLEX-EEXRL

LEICA focusing bellows extending to 50 cm. with thread for the mirror reflex attachment and bayonet for connection to the lower bellows carrier . . . . . EEXSN

Lower bellows carrier with rack and pinion, time and instantaneous shutter with wire release, lens thread and light-screening sleeve for the microscope . . . . . ORHAL

For camera extensions of from 14 to 18 cm. the above LEICA bellows EEXSN is replaced by the following:

Short LEICA bellows extending to 12 cm. . . . . ETXBE

(When LEICA bellows are fitted to the mirror reflex attachment they must not be screwed home but should have about half a turn play to either side.)

For photographic lenses see page 20.

ELECTRICAL ACCESSORIES

(a) *for the low-voltage filament lamp:*

Regulating transformer with ammeter, adjustable for 110 and 220 volt A.C. mains, inclusive of cable . . . . . REDYX

Resistance with tappings for 6 and 5 amps, inclusive of cable and switch

for 110 volts D.C. or A.C. . . . . REDIG/BEEUL

for 220 volts D.C. or A.C. . . . . REDUK/BEEUL

or

Regulating resistance consisting of a fixed part and a rheostat, with ammeter and cables

for 110 volts . . . . . REKUR/BEEUL

for 220 volts . . . . . REGAM/BEEUL

(b) *for the arc lamp:*

Resistance

for 10 amps D.C. 110 volts . . . . . BPCII

220 volts . . . . . BQEIL

for 15 amps A.C. 110 volts . . . . . BQIIN

220 volts . . . . . BRGII

or

Choking transformer 110 and 220 volts A.C. . . . . HMQUU

100 pairs of cored carbons

8×135 mm. (horizontal) and 8×110 mm. (vertical) for D.C. BSIIL

8×135 mm. (horizontal) and 10×110 mm. (vertical) for A.C. BTIIK

If both D.C. and A.C. are available it is recommended to connect the filament lamp to the A.C. supply through a transformer and the arc lamp to D.C. using a suitable resistance.

REPLACEMENTS

Filament lamp 6 volts 5 amps with prefocus cap . . . . . ATIIH

Filament lamp 8 volts 0.6 amps (for ring illuminator) . . . . . LISEY

Heat-absorbing filter in metal frame . . . . . QUYII

Replacement filter without frame . . . . . QWCII

Replacements for the revolving filter holder:

Green filter combination . . . . . MLIIN

Light subduing filter in mount . . . . . MLKII

Daylight filter, frosted . . . . . MNIIE

Daylight filter, clear . . . . . MNOII

Attachable darkslide 9×12 cm. (3¼"×4¼") . . . . . GIIPL

Adapter for plates 6½×9 cm. . . . . GSDII

PANPHOT WORKING DESK

Writing desk form, with sliding drawing board underneath top, 3 lock-up drawers for storing accessories, height 30", top plate 47"×28" . . . . . IWNDI

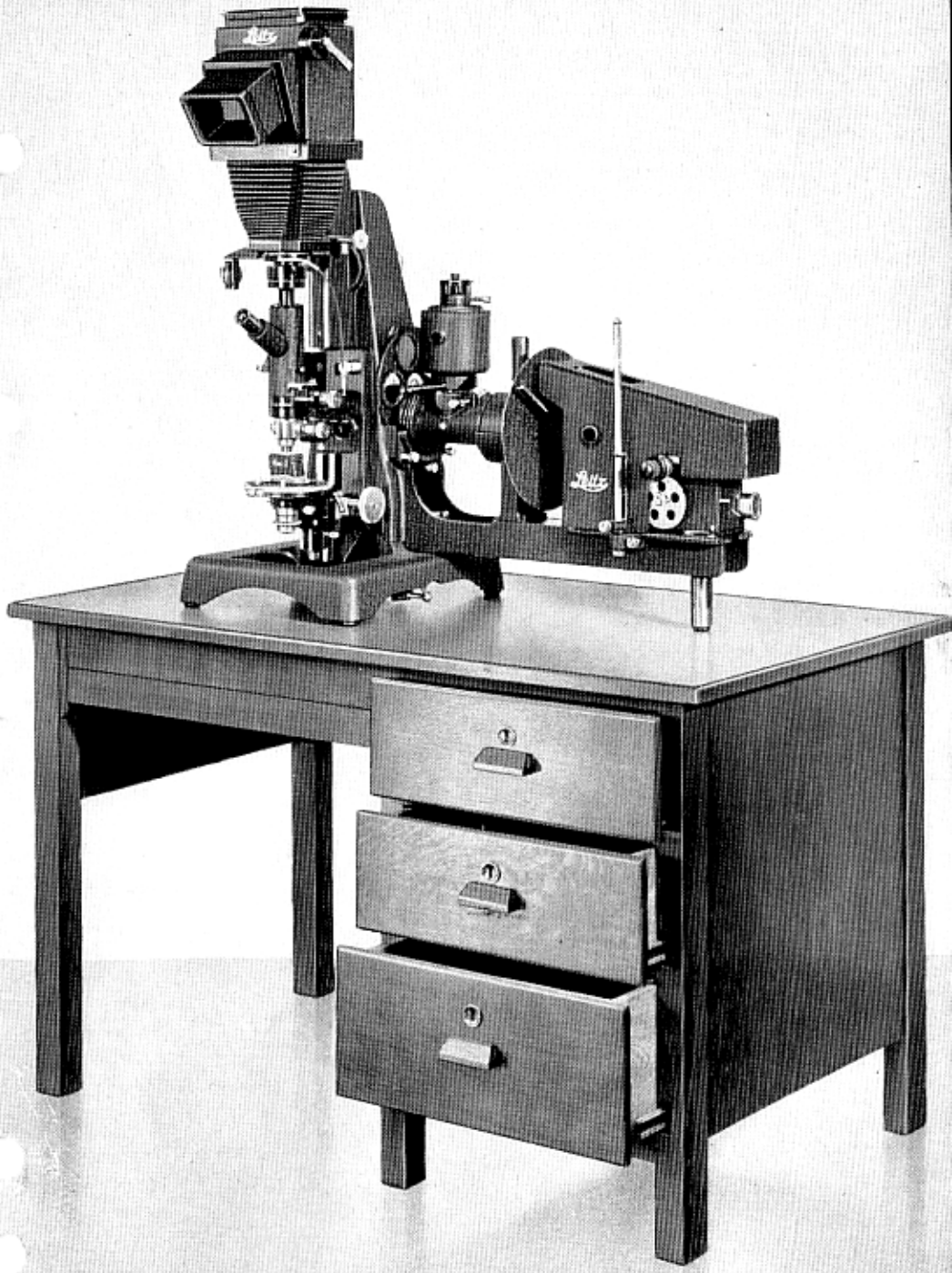
Resilient top plate with metal springs to eliminate vibrations . IXDKI

The same top plate resting on plastic dampers . . . . . IYNBI

Felt or velvet lined fittings are provided in the drawers.

Extra cost according to the number of items to be accommodated.

Index to Codewords



OUR PRODUCTION PROGRAMME ALSO INCLUDES

Microscopes of all types for general biological and medical work, metallography, mineralogy, ore microscopy, coal-petrography
Phase contrast equipment
Binocular prism magnifiers
Stereoscopic microscopes
Photomicrographic apparatus
Microtomes

Micro-refractometers
Spectroscopes
Photometers for the colorimetric and nephelometric determination of concentrations
Monochromators
Infrared spectrographs

Optical precision measuring instruments
Workshop microscopes
Contour projectors
Instruments for measuring lengths and angles
Optical dividing heads
Surface testing apparatus
Reading telescopes

Prism binoculars

The LEICA 35 mm. camera with its supplementary equipment for scientific and technological photography
Enlarging and copying equipments
Lecture hall projectors, school epidiascopes, miniature projectors, micro-projectors

Literature will be gladly sent on request. Electros of the illustrations contained in our list, also smaller sizes or photographs, are offered for scientific publications free of charge. The illustrations contained in our catalogues are not binding in every detail, since we are continually striving to improve our instruments and to perfect them in every respect.

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