# OUR PRODUCTION PROGRAMME ALSO INCLUDES

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

#### Micro-refractometers

Spectroscopes Photometers for the colorimetric and nephelometric determination of concentrations Manochromators Infrored spectrographs

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

#### Prism binoculars

The LEICA 35mm. 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 affered 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.

### ERNST LEITZ GMBH WETZLAR GERMANY

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# POLARIZING MICROSCOPE WITH PHOTOGRAPHIC EQUIPMENT

# RNST LEITZ · GMBH · WETZLAR



PANPHOT Polarizing Microscope with photographic equipment The PANPHOT Camero Microscope combines in a compact unit a high-grade universal microscope, two sources of light with optical illuminating arrongement and o vertical reflex camera.

The centration of the illumination is permanently retained so that the outfit is always ready for use. All controls are so arronged 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 stort with a simple outfit and extend its ronge of uses by subsequent addition of supplementary equipment. The basic outfit olreody 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 drowing Micro projection Micro ciné work Photomicrography Macro photogrophy in transmitted light and reflected light

Highly specialized microscopical occessories 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 orrangement 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 far the camera, the microscope and the sources of light as well as two built-in deflecting mirrors for odjusting transmitted ar 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) lorge 5-lens condenser a No. 52

with swing-out top lens; field of view ond operture 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) os 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  $9 \times 12$  cm. or  $3\frac{1}{4}'' \times 4\frac{1}{4}''$ . 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 rock and pinion for focusing is also provided.

A LEICA 35 mm. camera (negative frame  $24 \times 36$  mm.) with micro mirror reflex hausing can be substituted for the standard bellows camera. Such on 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  $2'' \times 2''$  slides for teaching purposes.

The front cover shows a complete PANPHOT with illuminant, vertical comero ond 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 glodly furnished on request. PANPHOT outfits specially arranged for biological work and metallography without the application of polorized 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 of any time later on.

A special **PANPHOT Working** Desk should be included in a complete outfit whenever possible since it not only ollows of setting up the opparatus 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 APPLI-CATION. 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  $9 \times 12$  cm. ( $3\frac{1}{4} \times 4\frac{1}{4}$ ), 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 clackwork 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 abservation 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 dovetoiled holder with detachable two-lens system, aperture diophrogm, swing-out top lens and removable rotating prism polarizer.

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

\* Particulars and quotation for a Xenon discharge lomp 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 electricol equipment comprises:

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

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

110/120	volts	A.C.	(15	omps)			•	•	•	•	÷	٠	•	×			•	•	•	IDIFT	
220	volts	A.C.	(15	amps)	•								,	10						IDIKY	
110	volts	D.C.	(10	omps)	•	•	•	•		•	•	•	•	•	•			•	•	IDILS	
220	volts	D.C.	(10	amps)	•				,	•	•	•			•		•	•	•	IDIMB	
2	20	20 Volts	20 Volts D.C.	20 Volis D.C. (10	20 voirs D.C. (10 dilips)	20 voirs D.C. (10 dilips) .	20 Volis D.C. (10 dilips)	20 voirs D.C. (10 dilips)	20 Volts D.C. (10 dilips)	20 Volis D.C. (10 dilips)	20 voirs D.C. (10 dinps)	20 volis D.C. (10 dilps)	20 volis D.C. (10 dilips)	20 Volis D.C. (10 dilps)	20 Volis D.C. (10 dilips)						

(for individual prices of electrical items see page 21)

# **OPTICAL EQUIPMENT B1**

# far work in transmitted polarized light

Achromatic	P 3.2/0	.12																PETTA
objectives	P 10/0	.25					,									•	•	PETRI
(free from strain)	P 45/0	.65																IAZYI-FE*
Oil immersion	Poil	100/	1.30	)			•		•							•		PELIM-FE*
Immersion conden ser in place of the	ser cap stando	N./ ard	A. 1 N.	1.4( A.	0 f 0.9	ittin O t	ng	th c	e p	ool npa	ori	zin nt	g	ca	nd	ler	ף-ר י	PUKAB
Huygens eyepiece	P5×	with	n cr	os	s I	ine	s c	and	d f	foc	usi	ng	ey	yel	len	IS	÷	PIIVS
Huygens eyepiece	P8×	with	n cr	os	s I	ine	s c	and	d f	foc	usi	ng	e	yel	ler	IS	•	PIIWF
<b>Optical Equipment</b>	B1.					•			•				÷					PEBEZ-FE*
(For further objec	tives se	e p	bag	е	14)													
PANPHOT Polariz with optical equipr	ing Mi nentB1	cros , coi	n pl	ete	as e fe	sp or c	or	ifi	ed ecti	u ior	nde n to	r   22	0 v	oli	D o	an 4.(	d C.	IDWIF-IDIK

PANPHOT Polarizing Microscope as IDWIF but with polarizing and analysing filters (in place of polorizing 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 o	bjec	tive o	er	ıtri	ng	clu	uto	h	on	d	ete	ac	ho	Ы	е	br	ac	ke	et e	wi	th	
compensator	slot	ond	4	al	oje	ctiv	ve	C	ent	rii	ng	С	ol	lar	S	(ir	ncl	UC	le	d	in	
autfit IDVID)		• •	2	2	• •	*	×	•		e		•			2	2		×.		×	×	PEZAX
Objective ce	ntring	g col	la	rs			÷	÷	r	•	e	æ				а.	5			eo	ch	PIZUT

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

# Interchangeable microscope tubes:

#### (a) for work in palarized light:

(b)

Polarizing tube FP 41 p, vertical photo tube combined with change-over prism, prism onolyser ond Bertrond auxiliary lens (as included in outfit IDVID)	PFIIY-QIIHM
Polarizing tube FP 41 f, as specified obove, but fitted with a filter analyser	PFIFT-Q11HM
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 photo-	
graphic tube combined ond with chonge-over prism	OIYEE-SINE
Fitted case for tube FS	MPSII

# Standard eyepieces:

												Single	Pair
Huygens eyepieces	6×		•	٠	•	٠	•	•	•	•		HYZWA	GIZRA
Huygens eyepieces	$10 \times$	÷		i.	•							HYVIR	GIVYR
Periplanatic eyepieces	$8 \times$				1						×	PEROT	GIROT
Periplanatic eyepieces	$10 \times$									×		PEZEN	GIZEM
Periplonatic eyepieces	$12 \times$	a										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 ardinary transmitted light).

							Single	Pair
Periplanatic	wide-field	eyepieces	GF 10×	•		•	PERIR	PESIS
Periplanotic	wide-field	eyepieces	GF 16×			•	PEROS	PESOT
Periplanatic	wide-field	eyepieces	GF 20 $\times$		•		PERUT	PESUV
Periplanotic	wide-field	eyepieces	GF $25 \times$	180			PESAP	PETAR
Periplonotic	measuring	eyepieces /	MGF 25×					
with scale 1	0/100 mm.				1		PESER-OCASY	

**High-point eyepieces** of the Huygens and Periplanatic types are designed to enable visual microscapic 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	Poir
Huygens high-point eyepieces 6.3 $ imes$	•		 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	n medium-pow	rer	
	objectives (see table)	• •	1.	• •		. MZI	IY
N8×h	Photographic eyepiece	for	use	with	high-power of	b-	
	jectives (see table)					MUI	ID

# **Object stages:**

Attachable mechanical stage with traversing range  $30 \times 30$  mm., scales and verniers

# Condensers:

Polarizing condenser b No. 54 p with prism polarizer (contained in autfit 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 abave types when most critical adjustment of the illumi- nation 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 measure- ment (four orders). The measuring results can be evaluated in a simple man- ner. The compensator possesses a considerably greater sensitivity for smal- ler 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	

tap analyser to carry out the measurements. The compensator of a lab be employed for qualitative detection of lesser double refraction instead of gypsum and mica, and is af very porticulor advantage in the determination of optical characters. With directions for use and colibration 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

#### Exposure meter:

Light meter for determining the times of exposure required for photomicrographs, comprising on 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 polorizing equipment and front collector

Fig. 4 General features illuminator

FITZ GMI

# 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 far oblique illumination and slide with 4 centre stops

Case for	ve	rt	ico	ıl	ill	un	nir	at	or	()	no	t	red	qu	ire	d	w	he	en	w	or	ki	ng	d	es	k	
s ordere	d)																									,	ODIIC

#### Optical equipment (free from polarization) Ela

Coated F/4.5 50 mm. MILAR ler	IS V	vith	iris	di	oph	rag	m	•		•			PUZII
Coated achromatic objective	Ρ	5.5	5/0.1	5 (F	16	)		2					ICCVO
Coated achromatic objective	Ρ	16.5	5/0.40	) (3	3b)						×		IICWQ
Coated fluorite objective	(P)	45	/0.85	5 (P	6 F	I)	140	•				3	IICXS
Coated fluarite oil immersion	(P	) 80	)/1.30	) (F	> 1/ <sub>10</sub>	FI)	•		•	ÿ			UDBZ
Photographic eyepiece N $6.3  imes$	m	÷				0.500		:*)	240				MZIIY
Photographic eyepiece N $8 \times h$		÷		-	•		÷	·	÷			2	MUIID
Complete optical equipment E 1	a			s									POFOH
Standard eyepieces for visual obse outfit B 1.	rval	ion	ore	olr	eady	in	clu	de	d	in	11	e	

General features illuminator with wide tube for photographs with- out eyepiece with the aid of plane glass illumination	IWKXI
Plane mirror an 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 IMVEI

# OBJECTIVES FOR WORK IN TRANSMITTED POLARIZED LIGHT

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

de	Objective signotion***	Focal length mm.	Free work. distance mm.	Micrometer value for 6× eyepiece	Cover glass correc- tioa*	Type of eye- piece**	Code- word
P	3.2/0.12	39.8	35	47 10	DO	н	PETTA
Ρ	6/0.18	24.5	17	26 14	DO	н	PETME
P	10/0.25	16.3	5.7	15 10	DO	н	PETRI
Ρ	25/0.50	7.1	0.88	6.0 .0	D	P	PEAPS-FE
Ρ	45/0.65	4.0	0.60	3.3 14	D	HP	1AZYI-FE
Ρ	63/0.85	2.9	0.29	2.4 /	D	Р	PETIS-FE
PC	01 100/1.30	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 volue for 6× eyepiece	Cover glass correc- tion*	Type of eye- piece**	Code- word
Achromat P 5.6/0.15	31.9		26 14		н	IICVO
Achromot P 16.5/0.40	13.1		9 14	1.1.1.1	H	IICWQ
FL-System P FI 45/0.85	4.4		3.2 14	6.00	P	IICXS
AchrOlimm. P 12.5/0.25	16.1		12 14		н	IICYU
AchrOlimm, P 25/0.65	8.1		5.6 a		P	IICZW
FL-Olimm, P FI 60/0.95	3.4		2.5 /	1.	P	IIDAX
FLOlimm, P FI 80/1.30	2.5		1.8 /4	-	P	IIDBZ
FlOlimm, P Fl 105/1.32	2.0		1.4 4		Р	HDCB
FlOlimm, P Fl 125/1.32	1.7		1.2 14	1.1.5.8	Р	IIDEF

\* D: with cover gloss, 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

nclinable <b>drawing mirror</b> , attachable to the monocular obser-	
able top	PIIGL
Case for drawing mirror	IPZKI
Wooden baseboard with pull-out drawing board for attaching he drawing payer	PIIHY
olding light-screening arrangement for drawing daylight	ZDHEE

# ACCESSORIES FOR MICRO PROJECTION

ilting projection prism	fitting the vertical	photo tube for walf	DDIAII
Filting projection prism	with anti-reflection	coating for optimum	FRIAU
prilliancy			PRIAU-C

# ACCESSORIES FOR MEASURING PURPOSES

Aicrometer	e	/e	pi	eci	9	Ρé	X	wil	th	sc	ol	е	10	11/1	00	m	m.	a	nd	f	00	:09	in	g	
yelens			÷.				•	•														•		Ξ.	GIIKN

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

#### Stage micrometers, in case

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

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

# ACCESSORIES FOR DARK FIELD EXAMINATIONS

Immersion dark field condenser D 1.20 A (No. 82) in centring 

Dry dark field condenser D 0.80 (No. 84) on slide, for use with 

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 nondetachable front (state type of objective to be used) . . . . . IRSOP

Intermediate objective adapter with iris diaphraam for use with 

# 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 eveniece, for visual observation and for colour photography DQCEE

Bottle-shaped glass cell QYGII

# ACCESSORIES FOR MICRO ANALYSES AT TEMPERATURES $-20^{\circ}$ to $+350^{\circ}$

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 an request)

Ramsden eyepiece 10x with orrangement for reading the thermometer scole in the field of view, fitting the inclined observation 

#### 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:

stage objective	Free working distance													-
5/0.19	13.2 mm.							$\mathbf{x}$		٠				NIIV
10/0.18	13.6 mm.													RVZII
1 20/0.40	8.3 mm.				•									HEFAF
1 32/0.60	5.7 mm.				•									HEFEG
sures for the free	working distance are inclu	siv	re	0	FI	the	1	.8	mr	n.	t	hie	ck	

\* The figures for the free working distant auartz cover disc of the heating stage.

Heating

This optical equipment is preferably used with binocul	ar observation tubes for	
guadruple nosepiece with bracket		ORKAT
and tube lens for infinity objectives		INFINIT
Old-type heating stages with cover disc 0.5 mm. thick a Quartz cover disc for heating stage 350°, 1.8 mm. thi	are modified by: ick	HEFUG

#### MICROSCOPE PHOTOMETER FOR MEASURING REFLECTANCE IN INCIDENT LIGHT

Photometer head with opticol comparison system, focusing eyepiece with slot far 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 aravity near the C, D and E lines, light screening shield Totally reflecting prism in mount, for calibrating IEERN Attachable microscope photometer for the PANPHOT, complete LOUR\*

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



Fig. 8 Integrating stoge in position on the PANPHOT

# EQUIPMENT FOR QUANTITATIVE PLANIMETRIC ANALYSES

#### Accessories for work in transmitted light:

Mica plate ¼ W.L. in threaded maunt fitting the substage in place of the ordinary swing-out top lens for providing circularpolarized light in conjunction with the ¼ W.L. mico compensator IZBDI

Condenser lens for high-power work fitting into the central stage operture

#### Accessory for transmitted and incident light:

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

#### 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.

#### Accessory for use with universal rotating stages

Candense	r with	mirror	on	slide			a.		3		ŝ	R	÷		•	ISDPI	
Full partic	ulars	are avo	ailat	ole on	r	eq	ue	st									



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 palarizing ULTROPAK, even in the case of rough specimens. Moreover the objective operture can be fully utilized. Dark field effects are also made possible by this method.

JLTROPAK illuminator on bracket	MIIVD
Case far the ULTROPAK (not required when a working desk with itted drawers is ordered)	IQHZI
Optical equipment H 2 a (without eyepieces)	
JO 5× 0.15	
JO 11× 0.25	
JO 22× 0.45	
JO 50× 0.65	
Set of 6 different objective stops to enhance the depth of field	
bevelled edges, for obtaining best contrast with small objects or powders	
Optical equipment H 2a (without eyepieces)	MUXOZ
Complete supplementary equipment for work in incident light with the ULTROPAK	MUXUB
JLTROPAK illuminator with filter polarizer, i.e. rotatable pola-	
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 cata- ogue No. 8731.	
The second secon	

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

## ACCESSORIES FOR MACROPHOTOGRAPHY

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 olso irregularly shaped opague 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			٠.			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	

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  $\times$  up to 30  $\times$  .

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



Fig. 10 Macro ring illuminotor 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 orrangement

(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 chonging slide with holder for 2 adjustable low-power lenses, davetail slide to receive the analyser slide of the PANPHOT polarizing tube . IPAMI Intermediate substage sleeve for the existing PANPHOT polarizer IPBOI

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

Complete equipment for low-power photographs in transmitted polarized light

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 Vax intermediate adapter, lateral focusing telescope and (seporate) 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) Micra 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 5x focusing magnifier, with holder fitting vertical comera bar . . . . . . IFLEX-EEXRL

Intermediate adapter 1/3 x 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 

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,  $V_{3} \times$  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 bellaws for macro work

#### (b) Macro work

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

LEICA	micro	mirror	reflex at	tachment (	as shown on	preceding	
page)							IFLEX-EEXR
LEICA	focusi reflex	ng bell k attac	ows exter hment an	nding to 50 d bayonet	cm. with thre for connecti	ad for the on to the	
lower	bellov	vs carri	er				EEXSN

Lower bellows carrier with rack and pinion, time and instantaneous shutter with wire release, lens thread and light-screening 

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.

RNST LEITZ GHBH WETZLAR

# ELECTRICAL ACCESSORIES

(a) far the low-valtage filament lamp:

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

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

for	110 volts	D.C.	or	A.C.	•	•		•	•	•	ä	•	•	•	•	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										1	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

 $8 \times 135$  mm. (horizontal) and  $8 \times 110$  mm. (vertical) for D.C. BSIIL  $8 \times 135$  mm. (horizontal) and  $10 \times 110$  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 ATII
Filament lamp 8 volts 0.6 amps (for ring illuminator) LISE
Heat-absorbing filter in metal frame
Replacement filter without frame
Replacements for the revolving filter holder:
Green filter combination
Light subduing filter in mount
Daylight filter, frosted
Daylight filter, clear
Attachable darkslide 9×12 cm. (3¼″×4¼″)
Adapter for plates 61/2×9 cm

# PANPHOT WORKING DESK

Nriting desk form, with sliding drawing board underneath top,	
B lock-up drawers for storing accessories, height 30", top plate	
17"×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.	

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