

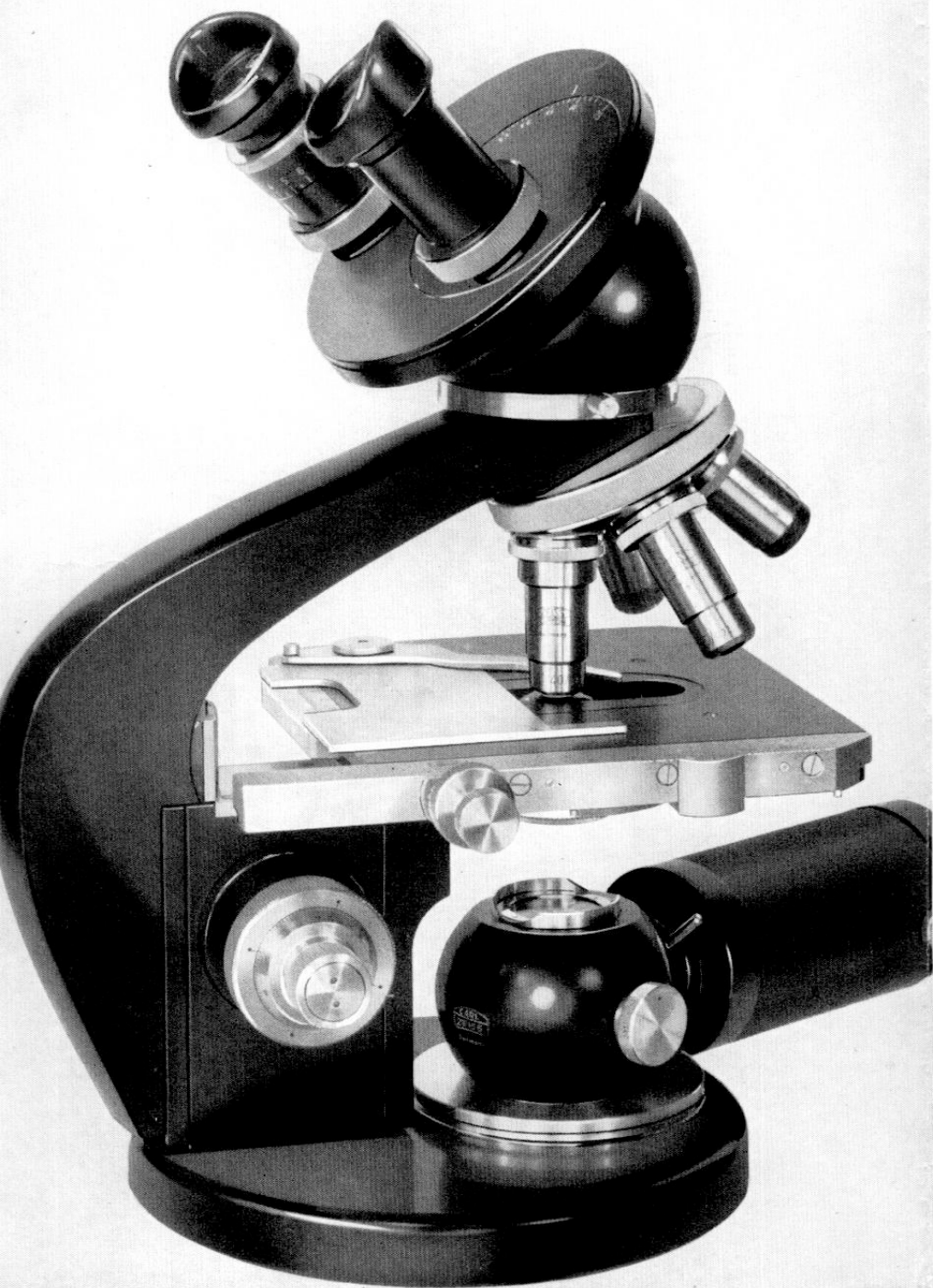
ZEISS

**MODEL
W**

Microscope for Laboratory Routine and Research Work

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A **new principle of construction** gives the characteristic stamp to Microscope **Stand W**. Realization of this principle was made possible by our **modern production methods**.

This **construction principle** is characterized by a ready and rapid interchangeability of **all** individual parts. In the past such a far reaching interchange was possible only at the price of a troublesome and time consuming readjustment of the instrument. However, since every individual part of Stand W is made by us strictly to gauge and precisely adjusted by means of newly developed devices, the user is spared these burdensome adjustments. All accessories exactly fit any W Stand. Stages, tubes, condensers, lamps, etc. can be interchanged with a single twist and the instrument assembled in accordance with the requirements of the moment. Every microscope is immediately and completely adjusted.

The **essential advance represented by this microscope lies precisely in this interchangeability, made possible by exactness of production combined with exact adjustment of the individual parts**. A corresponding procedure has been widely employed in the manufacture of precision miniature cameras. However, in microscope production it is employed **for the first time for Stand W**. Numerous advantages result. E. g. the microscope stages are immediately centered when locked in position. The rapid transition from bright-field to dark-field is impressive. A specimen observed with an oil immersion objective in bright-field illumination remains sharply focused when the change is made to dark-field. An excellent, brilliant dark-field is obtained solely by exchanging condensers. This is easily effected because of the novel precentered bayonet mount, requiring no further adjustment.

Even if there is no intention to interchange parts, the W Stand has the great advantage that it is in all respects a **well aligned and balanced microscope**. This greatly simplifies the work of the expert and also quickly leads the unpractised user to correct microscopy.

If in addition the further facilities are considered which are provided by novel accessories (e. g. the Optovar), then the W Stand fulfills the desires of many microscopists for **easy and rapid microscopy under best opticals conditions**, to an extent hitherto impossible.

The complete interchangeability of parts makes it possible to start with a simple equipment and by subsequent purchases adapt it to every special requirement as it arises. Thus, as the field of operation expands, Stand W can gradually be built up **into a large, universal research microscope**.

The special advantages of the Stand W, all of them innovations in microscope construction, may be summarized as follows:

- Precise adjustment of all individual parts and therewith of the entire microscope by means of newly developed devices in the factory. The elimination of all burdensome adjustments on part of the user the results in considerable saving of time in working with the microscope.
- **Most simple and precise operation:** peak performances for the expert microscopist, and for the beginner rapid acquirement of faultless technique under best optical conditions.
- **Greatest of ease in interchangeability of all parts** of the microscope. Hence easy rearrangement for special purposes as well as subsequent extension of the equipment by purchase of adjusted additional parts up to the final completion of an universal research microscope. All individual parts precisely fit any stand.
- **Coaxial arrangement** of the operating knobs for coarse and fine adjustments of the stand, as well as for the two movements of the mechanical stage.
- **Novel binocular tube** without change in magnification and with constant tube length during change of interpupillary distance.
- **Rapid interchange of stages** permits the use of special precentered stages. Low stage level. Readily interchangeable novel stage attachments.
- **Novel gliding stage** with fine movement in any direction.
- **Precise centering of the dark-field condenser** at the time of manufacture, hence extraordinarily simple adjustment in dark-field observation. Brilliant dark-field image.
- **Phase contrast equipment** permits most simple manipulation and with certainty reproduceable results due to constantly correctly centered annular diaphragms.
- **Rapid change** of perfect illumination for bright-field, dark-field, phase contrast, and polarization.
- **Newly computed optics** according to most modern viewpoints. Outstanding image quality.



- **For the first time the oil immersion made parfocal with all the other objectives.** Nevertheless there is no danger of striking the oil immersion objective when it is swung into position.
- All high power objectives provided with **protective device to prevent damage to objectives and specimen.**
- **Only one type of ocular** for all kinds of objectives.
- **Change of oculars no longer required** with use of the accessory device "Optovar". Auxiliary microscope incorporated in the Optovar.
- **Pleasing modern form** of the microscope. The entire appearance is harmonious and in keeping with the purposes for which it is designed.

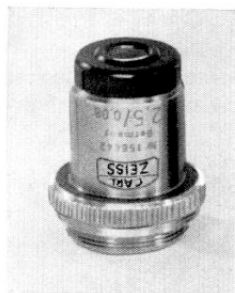
The Stand

The Stand is crucial for the centering of the total system of interchangeable parts. It is the carrier for lamps, stages, condensers, objectives, and tubes. These parts are inserted in various openings resp. receptacles located on the stand, made precisely to gauge and accurately centered to the optical axis.

The microscope lamps are inserted in the opening in the circular base. However, each stand is also provided with a plane and concave mirror for observation with daylight. The stage carrier has a bayonet thread for the condensers and a receptacle with clamping device for the stages. At the upper end of the tube carrier is the receptacle for the various tubes, the Optovar, and other accessories. The quadruple **revolving nosepiece** runs on ball bearings and the objectives swing into position with great precision.

Coarse and fine adjustments are mounted at a low level, with coaxial activating knobs. The coarse adjustment moves the tube carrier and its tension can be regulated. The fine adjustment moves the stage and therefore is not affected by the load on the tube carrier. Its activating head carries a scale graduated in 0.001 mm.

Since the stages as well as the pinion heads are mounted in the **lowest possible positions**, the entire stand acquires an unusually low form, which assures convenient manipulation of all its parts.



The Objectives

Since **all our objectives** were **newly computed** in accordance with the most modern viewpoints, their magnifications, and, as far as expedient, also their apertures were selected to form a graduated series. The power of magnification from objective to objective increases by a factor of 1.6 (DIN standardization series R 5) and thus presents a full range of magnifications in uniform steps. Since a corresponding series is used also for the oculars the total magnifications are similarly graded.

For the present the following objectives are supplied from this series:
Achromats 6.3/0.16, 10/0.22, 16/0.32, 25/0.45, 40/0.63, HI 100/1.25 and HI 100/1.25 with iris (for dark-field observation).

Planachromats 2.5/0.08, 10/0.22, 16/0.32, 40/0.63; HI 100/1.25 and HI 100/1.25 with iris (for dark-field observation).

Apochromats 10/0.32, 25/0.63; HI 100/1.32 and H 100/1.32 with iris (for dark-field observation).

Objectives for phase contrast: see page 18.

The number preceding the oblique line indicates the magnification, that following is the aperture of the objective. If only four objectives are to be provided, we recommend as first choice the magnifications:

6.3, 16, 40, 100,

which represent a series with the factor 2.5.



The above mentioned objectives are corrected for use with a cover glass (0.17 mm.). The oil immersions and low power objectives with numerical apertures up to and including 0.32 can be used also for the examination of **uncovered specimens** without appreciable loss of definition. The following dry systems, are supplied specially corrected for this purpose, and when so corrected can be used only for uncovered specimens, viz:

Achromat 40/0.63 ($D = 0$)
Planachromat 25/0.45 ($D = 0$)
63/0.90 ($D = 0$)

All objectives are **exactly parfocal** and precisely centered. That holds also for the lowest power objective, planachromat 2.5/0.08, and for the **first time also applies to the oil immersion**. A specimen focused with a low power objective and located at the center of the field of view is immediately visible when the oil immersion is swung into position. All the higher powered objectives are provided with a springy mount serving as a specimen guard.

Our objectives have the new parfocalization length of 45 mm. If objectives of shorter parfocalization length, especially objectives of former Jena manufacture, are to be used on the W Stand we recommend the interposition of our objective intermediate collars. Their optical system balances the tube length and keeps the magnification constant so that there is no deterioration of the image.





The Oculars

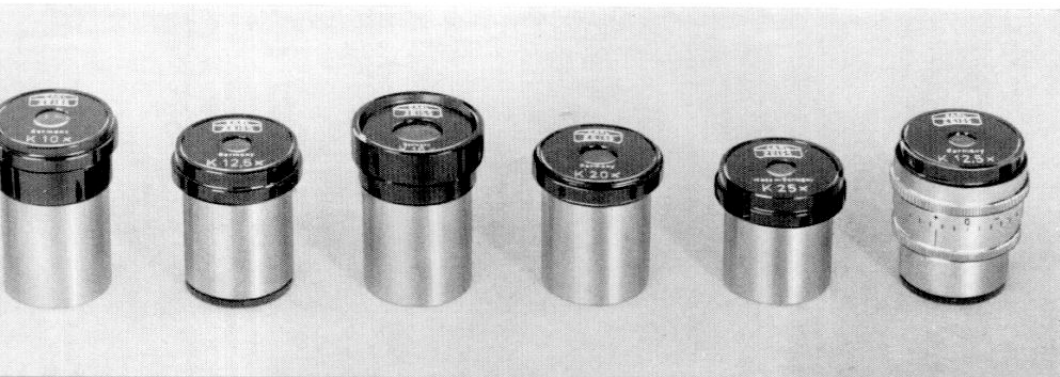
A uniform chromatic difference in magnification has been introduced by us in the new computation of our objectives of all types. Therefore apochromats, planachromats, high and low power achromats are **all used with the same oculars**. These are our compensating oculars, which produce with all objectives a maximum excellence of image. The oculars are completely parfocalized so that an emmetropic observer needs not operate the fine adjustment in changing oculars. The computation of the oculars is such that in addition to providing a maximum of central definition, also the lateral parts of the image field of achromats, when sharply focused, yield the best marginal definition (corrected astigmatism).

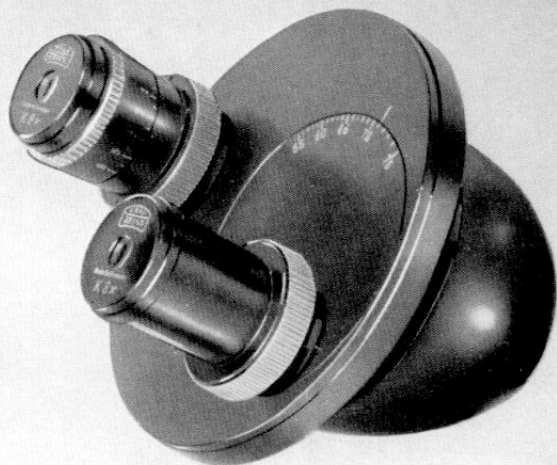
It is advisable to use eyecups. They shut out side light and assure correct position of the pupil of the eye for each individual ocular. The construction is such that the same eyecups can be used for all oculars.

The following compensating oculars are supplied:

K 5 x, K 8 x, K 10 x, K 12.5 x, K 16 x, K 20 x, K 25 x.

A change of oculars can be dispensed with when the Optovar (page 12) is used.





inclined binocular tube

The Tubes

The following tubes are supplied:

- Inclined binocular tube,
- Inclined monocular tube,
- Inclined monocular drawtube,
- Straight monocular tube.

The optical components of all the tubes are provided with a reflection reducing coating. The tubes are inserted in the circular dovetail of the tube carrier. They can be freely rotated and clamped so that viewing is possible from any direction.

The inclined binocular tube permits adjustment for interpupillary distances of from 75 to 55 mm. (upon request also down to 53 mm.). **The tube length remains constant** for any interpupillary distance and the magnification factor is always 1, so that the total magnification of the microscope, determined by the objective and ocular, is not affected by the tube. Our binocular tube for the first time combines these advantages. The so-called mechanical tube length (distance between the seating surfaces of the objective and ocular) is 160 mm. The ocular sleeves are parallel and the left sleeve is adjustable by means of a spiral focusing mount for compensating differences in the refraction of the two eyes.

The Optovar

The Optovar is a new accessory device which greatly facilitates microscopy. It embodies:

Magnification changer,
Amici-Bertrand lens (auxiliary microscope),
Analyser.

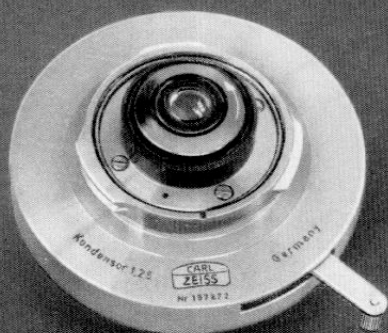
The Optovar is mounted between the tube and tube carrier (illustration). The tube length is kept constant by the incorporated optics so that there is no deterioration of image quality. All optical parts of the Optovar are coated.

The magnification changer provides magnification factors of 1 x, 1.6 x, and 2.5 x. Changes from one magnification to another are rapidly effected by turning a revolving disk. In so doing the sharpness of focus is fully maintained so that a resetting of the fine adjustment is not required. This rapid change is particularly convenient in photomicrography. With the use e. g. of ocular 8 x in conjunction with the Optovar, ocular magnifications of 8 x, 12.5 x, and 20 x are obtainable without change of oculars. If the nosepiece is equipped with, say objectives 2.5, 10, 40, and 100, then, without change of oculars, there are twelve different combinations, with best utilization of their performance, yielding eleven different magnifications which are uniformly graduated from 20 to 2000 diameters according to the normal series 20, 32, 50, 80, 125, 200, 320, 500, 800, 1250 and 2000. Correspondingly with use of ocular 10 x the magnification series 25, 40, 63, 100, 160, 250, 400, 640, 1000, 1600 and 2500 is obtained.

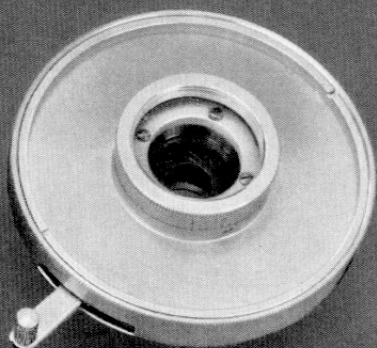
The Amici-Bertrand lens in conjunction with whichever ocular is employed constitutes a complete auxiliary microscope. It is swung into position by means of the same revolving disk which effects the change in magnification and can be focused on the rear focal plane of any objective from 16 x to 100 x. Thus it is possible at any time to observe the exit pupil of the objective, in order to check its illumination, or in phase contrast microscopy to check whether the annular diaphragms of the condenser are superimposed on the phase rings of the objectives. A special auxiliary microscope is no longer required for this purpose.

The analyser can be inserted into the path of rays by means of a lever. This provides for a rapid change between observations in polarized light and in normal bright-field. In conjunction with the Amici-Bertrand lens of the Optovar, axial images can also be observed in a conoscopic beam.

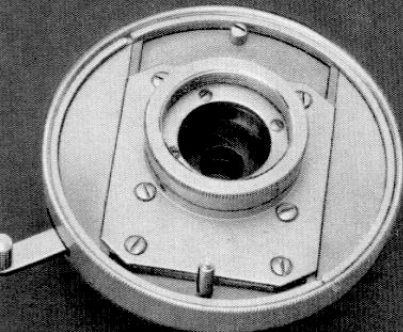




condensor II (from above)



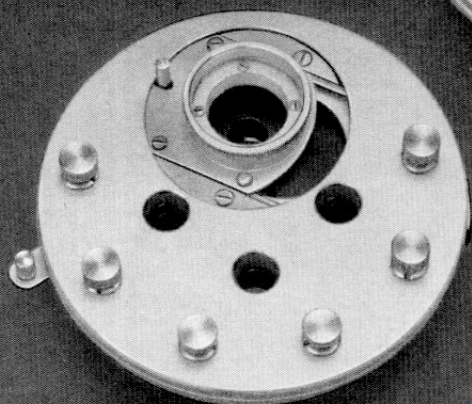
condensor II (from below)



condensor III (from below)



condensor IV (from above)



condensor IV (from below)



The Condensers

All condensers are inserted into the stage carrier by means of a bayonet thread. They are precentered. The bayonet thread provides for **convenient and rapid interchange** of condensers. A vertical coarse adjustment is not provided for the condensers, since it no longer is necessary to remove the front lens of bright-field condensers for use with low power objectives. (The field of illumination is enlarged by insertion of an auxiliary lens in the microscope lamp A, cf. page 24).

The condensers are provided solely with a vertical fine adjustment for compensating variations in slide thickness, by means of which the final sharp focusing of the radiant field diaphragm is effected. Thus a grossly incorrect focusing of the condenser is no longer possible and in general the user makes only a slight error if he disregards the fine adjustment in bright-field observations.

The following condensers are available:

Condenser I, n. a. 1.25

with iris diaphragm, without vertical fine adjustment, for lamp B.

Condenser II, n. a. 1.25

with iris diaphragm and vertical fine adjustment.

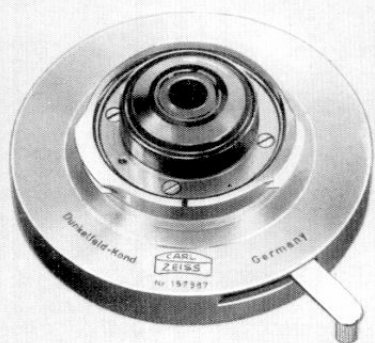
Condenser III, n. a. 1.25

with vertical fine adjustment and complete Abbe illuminating apparatus of modern construction.

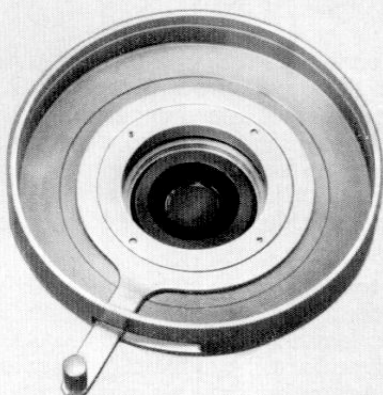
Condenser IV, n. a. 1.25

for bright-field and phase contrast, with vertical fine adjustment and complete Abbe illuminating apparatus of modern construction.

This condenser is primarily intended for phase contrast microscopy. Like condenser III it has its iris diaphragm laterally displaceable and rotatable through 360° for the production of oblique illumination. The annular diaphragms for phase contrast work are carried on a revolver disk (further details page 17). If condenser IV is available, condensers I to III are unnecessary.



condenser V (from above)



condenser V (from below)

Condenser V (cardioid condenser), n. a. 1.05

The dark-field condenser likewise is supplied **completely precentered**. Therefore its adjustment is of utmost simplicity when used in conjunction with our microscope lamp A. It is only necessary to focus the vertical fine adjustment of the condenser according to the slide thickness. Due to the precise precentering, one directly obtains a dark-field of outstanding contrast. The objectives used are either a parfocal oil immersion with iris diaphragm or achromat 40/0.63.

Condenser VI, n. a. 0.9

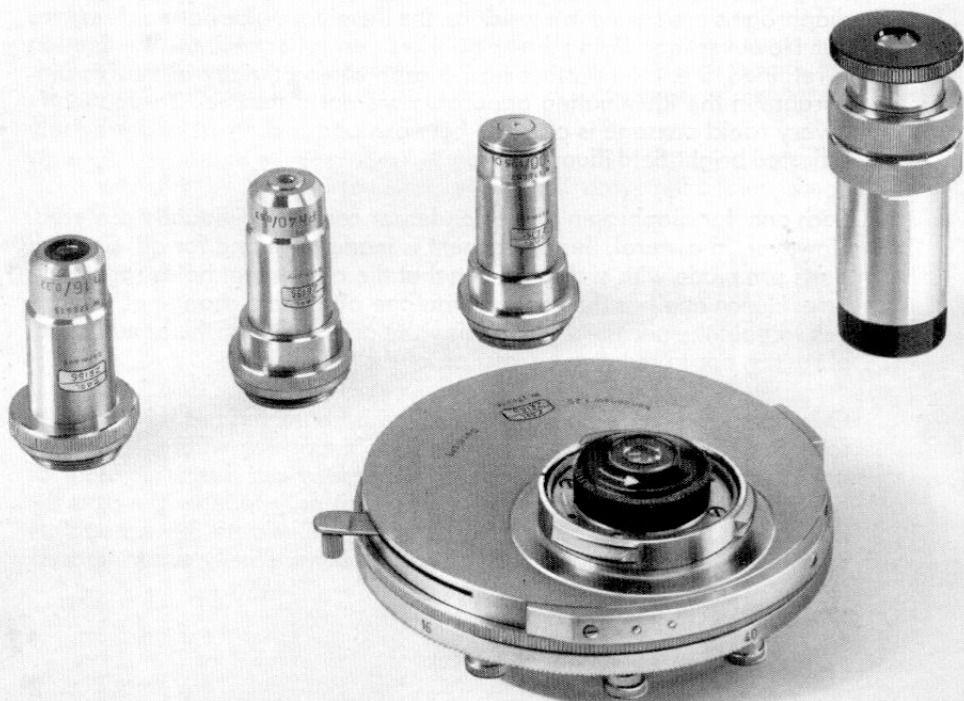
for **large fields of illumination**, with iris diaphragm and vertical fine adjustment.

With this condenser the field of illumination can be increased to about 8 mm. by operating a lever which brings a supplementary lens into position. In conjunction with microscope lamp A the field of view diaphragm is sharply imaged, also for the large fields of illumination. The aperture 0.9 suffices in most instances, also for observation with the oil immersion.

Further special and high-efficiency condensers are in preparation.

Phase Contrast Equipment

The phase contrast method was described by Zernike in 1934 and developed in the Zeiss Works into a generally applicable procedure. It permits the formation of an image rich in contrasts of objects whose details are invisible or insufficiently so because of too small differences in absorption in ordinary bright-field illumination. In this manner living objects, such as cells, bacteria, etc., which are low in contrast, can be made clearly visible without damaging them by staining or similar procedures. During recent years the phase contrast method has not only amply proved its value in cytology, microbiology and medicine, but has also found further applications in other fields of microscopy, particularly in technology.



The following equipment is required for phase contrast work:

Phase contrast objectives,
Phase contrast condenser,
Optovar or auxiliary microscope.

For the present the following objectives are supplied as **phase contrast objectives**:

Achromat Ph 16/0.32
Achromat Ph 40/0.63
Achromat Ph 100/1.25 oil immersion
Apochromat Ph 100/1.32 oil immersion.

Ph objectives differ from normal objectives in having a phase ring in their focal plane. Often they can also be employed for normal bright-field observation. However, our normal objectives are to be preferred for bright-field examinations if specially high demands are made on the image quality. In many instances it will suffice to provide for simple bright-field examinations only another oil immersion.

The phase contrast condenser (condenser IV) carries on its revolver disk, in addition to the three annular diaphragms for phase contrast, also a complete Abbe illuminating apparatus (cf. page 15). When the annular diaphragms are swung into position the illuminating apparatus is swung out. However in so doing the established central or oblique illumination is retained, i. e. the aperture and degree of eccentricity of the iris diaphragm in the illuminating apparatus are not disturbed. Consequently a very rapid passage is possible between phase contrast and precisely adjusted bright-field illumination.

Each annular diaphragm of the condenser can be individually centered. However, in general, this adjustment is made once and for all, since all parts are made with such precision that the adjustment holds for a long time. Hence one has the great advantage of a rapid change of objectives without the necessity of checking the adjustment of the annular diaphragms, not to mention correction of the adjustment.

Our phase contrast equipment therefore is characterized by providing for **infallibly reproducible results** and **rapid working without laborious adjustments**. We have deliberately discarded our former system of optically variable annular diaphragms. Not only to save the user the trouble of adjustment but above all also to eliminate the uncertainty in interpreting the images if the rings are not precisely superimposed.

By means of the OPTOVAR the centering and control of the ring diaphragms is quickly done (cf. page 12). If no OPTOVAR is available an auxiliary microscope must be used which is inserted in the tube instead of an ocular.

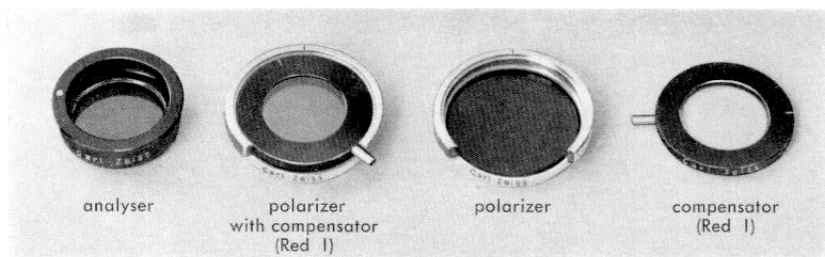
Polarization Equipment

For examinations with polarized light we recommend the **new filter set** specially produced for the Stand W. It consists of:

Polarizer,
Compensator (Red I),
Analyser,

in separate mounts. The polarizer, in whose mount the compensator can be rotated 90° , is inserted in the filter carrier of the microscope lamp. The analyser is placed in the tube carrier, therefore is located between objective and tube. Thus the **polarization** phenomena can be perfectly observed also **binocularly**. This is likewise the case with use of the Optovar, which because of its built-in analyser makes a separate analyser superfluous.

Polarization filters as described in publication Zomi 331 can also be used with the W Stand. However, with them only monocular observation is possible.



The Stages

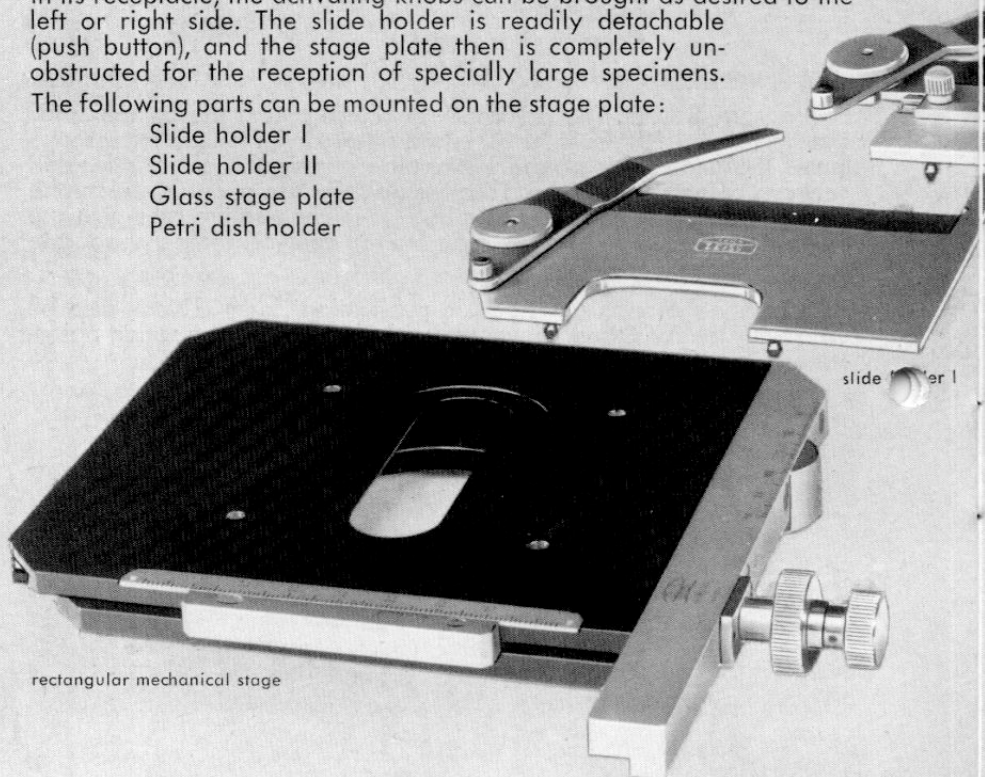
All stages can be **interchanged** by the user during observation with a single twist. They can be rotated in their receptacle and clamped in any desired position. They are so precisely centered that an object in the center of the visual field remains within the field of view when the stage is rotated, even under an oil immersion. The user is thus spared the laborious and time consuming centering of the stages. For the present we are supplying two stages:

Rectangular mechanical stage

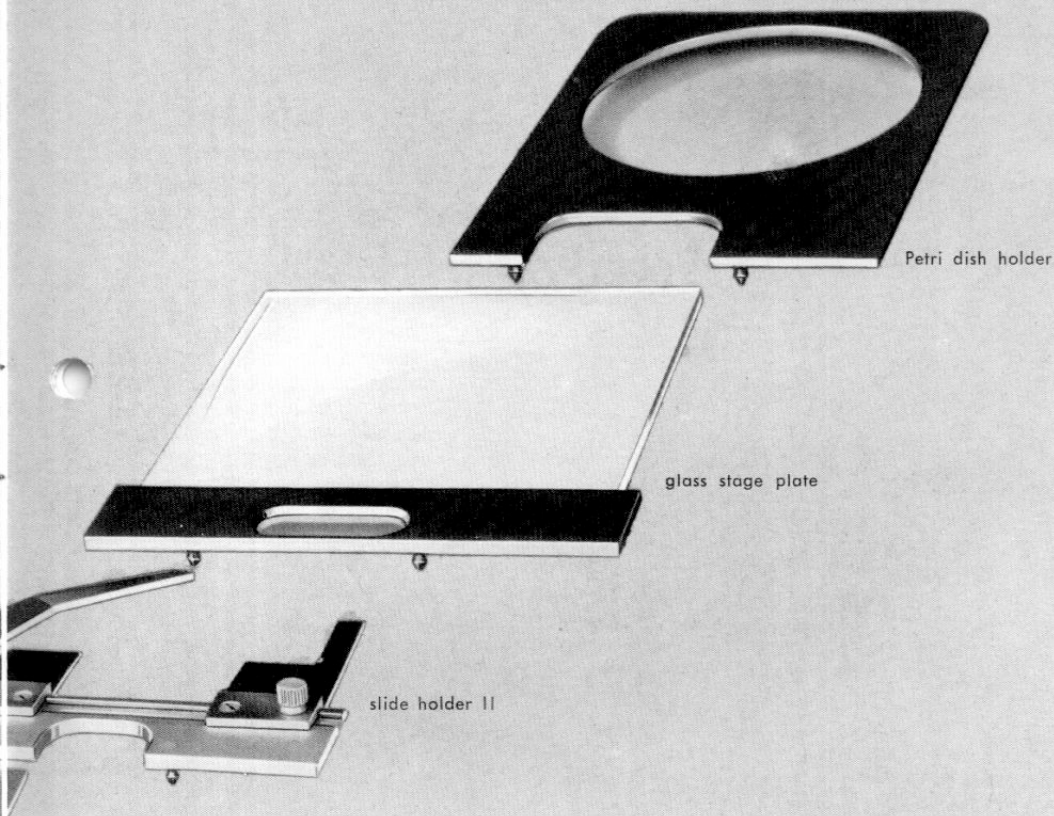
The 13 x 14.8 cm. stage plate can be moved 50 mm. in one direction. The specimen can be displaced on the stage plate through 75 mm. at right angles to this direction. The movements can be read on scales with verniers to 0.1 mm. The activating knobs for both movements are coaxial which greatly facilitates adjustment. Since the stage is rotatable in its receptacle, the activating knobs can be brought as desired to the left or right side. The slide holder is readily detachable (push button), and the stage plate then is completely unobstructed for the reception of specially large specimens.

The following parts can be mounted on the stage plate:

- Slide holder I
- Slide holder II
- Glass stage plate
- Petri dish holder



rectangular mechanical stage

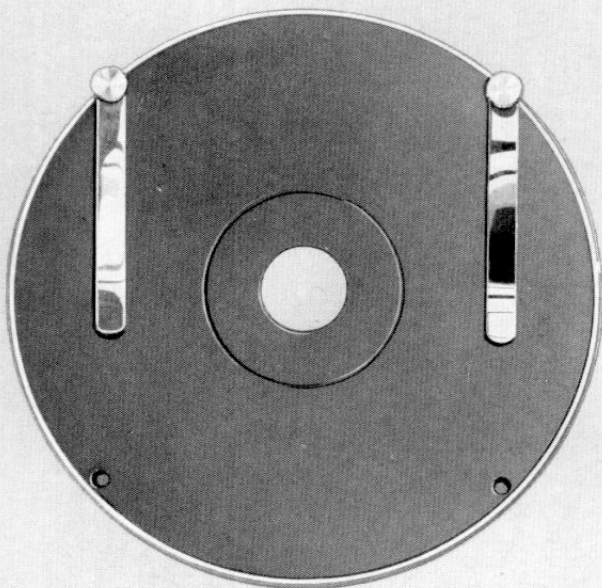


The **slide holder I** is intended for normal slides about 25×75 mm. When the center of the slide lies in the field of view the mechanical stage is in its central position and can be rotated through more than 270° .

The **slide holder II** has adjustable grips and can be used for smaller and larger slides up to about 50×75 mm. Since with its use the stage is generally well out of its central position, the degree of rotation possible is correspondingly reduced.

The **glass stage plate** is intended for work, under low and medium magnifications, which involves flooding of the stage. It covers the entire stage and participates in the stage movements.

The **dish holder** is a metal frame on which large objects (e. g. Petri dishes) can be placed, and thus participate in the stage movements.

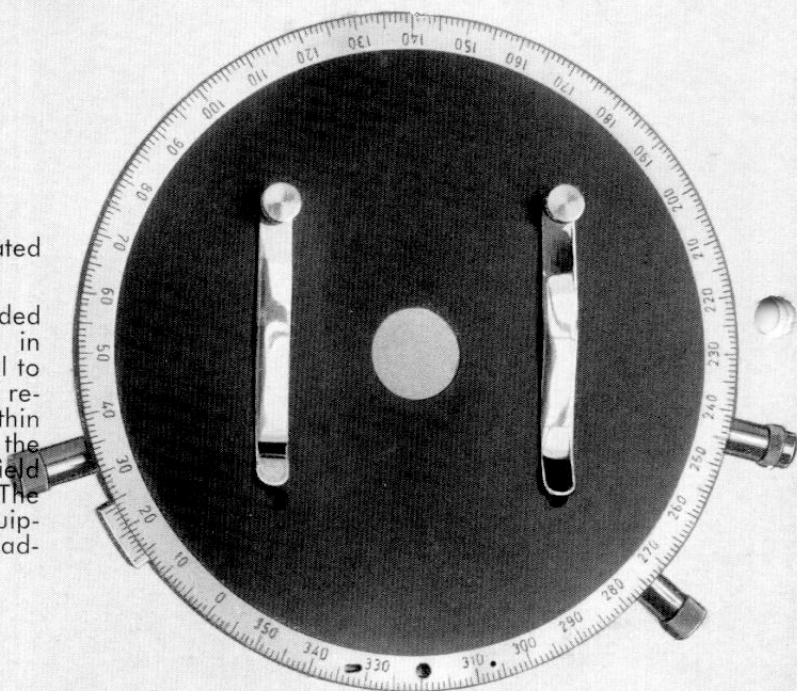


Circular gliding stage

The circular stage plate 15 cm. in diameter provides for precision movement in all directions within a circle 22 mm. in diameter. A gentle pressure of the hand against the stage moves the specimen in any desired direction and with such precision that even moving objects are conveniently and rapidly followed under highest magnifications. The stage plate cannot be removed from its base, so that soiling by the glide medium is excluded.

Precision rotating stage with graduated periphery

This stage is intended for examinations in which it is essential to have the specimen remain not only within the field but in the **center** of the field during rotation. The degree scale is equipped with vernier reading to 0.1° .



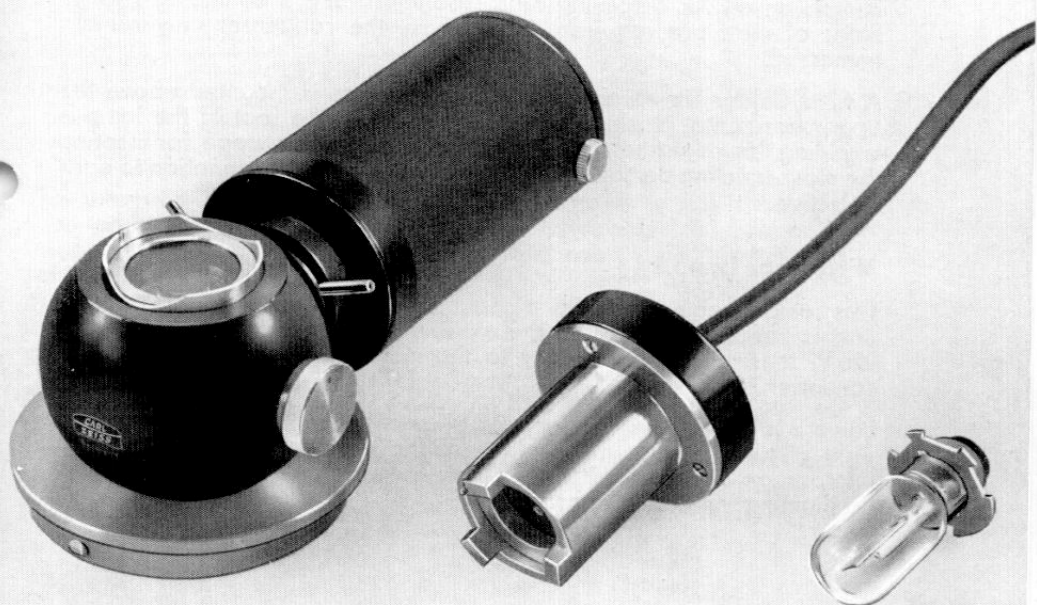
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Measuring stage (in preparation)

The stage plate of the measuring stage is moved in two directions at right angles to one another by two micrometer screws. The range of movement is about 20 x 20 mm., readable to about 0.01 mm. By means of this stage, which is now for the first time available as an interchangeable unit, the W Stand can to a certain extent be converted into a small measuring microscope, with which technical and physical measurements of various kinds can be conveniently carried out.

Microscope Lamps for Transmitted Light

The microscope lamps are delivered adjusted ready for use. The lamp is inserted in the opening in the base of the stand and engages a locking device, however, it remains rotatable. This type of connection between lamp and stand not only has **all the advantages of a permanently built-in illumination**, but beyond that has **further advantages**. After locking, the lamp is firmly joined to the stand, it cannot fall out when the microscope is carried from place to place. The lamp is completely adjusted, there is no need of inclining a mirror or displacing a lens. Nevertheless the microscope lamps are interchangeable, the base of the microscope barely gets heated, the whole stand, especially



microscope lamp A

the stage with its activating knobs, remains extremely low. This provides for convenient working and gives a harmonious compact form to the entire microscope.

Microscope Lamp A

This lamp is equipped with a low voltage bulb 6V 15W. It is connected to an alternating circuit across a transformer with adjustable secondary (page 26). For direct current a converter is required in addition. The bulb is supplied in a precentered base and requires no further adjustment.

Microscope lamp A realizes **Köhler's principle of illumination**. A collector images the lamp filament in the plane of the aperture diaphragm of the condenser. The condenser images the luminous field diaphragm in the plane of the specimen. The lamp contains in addition to the collector and the luminous field diaphragm a ground glass plate which can be moved into or out of the beam, a fixed built-in mirror, and an **auxiliary lens for producing large fields of illumination**. This auxiliary lens is inserted by turning a knurled knob, it increases the diameter of the field of illumination by 2.5x. Consequently, unscrewing or swinging aside the front lens of the condenser and the accompanying coarse readjustment of the condenser is eliminated. The easy passage from small fields of illumination (with high aperture) to large fields of illumination (with low aperture) is especially useful if the upper surface of the front lens is joined to the slide with a layer of immersion oil for achieving high resolution, and if at intervals large fields of view are required. In this case the condenser may remain immersed.

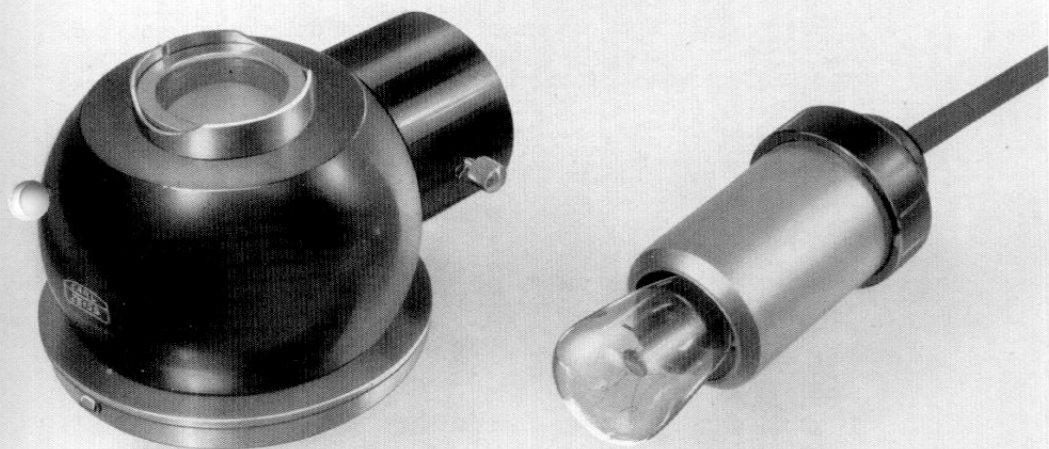
A filter holder for receiving filters of all types is mounted above the upper horizontal closing plate of the lamp. In the foot of the lamp is a gliding fine adjustment, similar to that of the gliding stage, for meeting the most exacting demands of centering the field of illumination to each objective.

Microscope Lamp B

This lamp is equipped with a commercial 15W bulb (in screw base) and is supplied in any of the standard voltages between 110 and 220 V. It is connected directly to the mains, neither transformer nor converter is required.

Lamp B is provided with a ground glass collector which condenses the light of the filament in the plane of the aperture diaphragm of the microscope condenser. It has a filter holder like that of lamp A, but no illumination field diaphragm.

microscope lamp B



The intensity of illumination supplied by lamp B is less than that supplied by lamp A. It suffices, however, for binocular observation in bright-field at all magnifications. On the other hand lamp A is required for dark-field and phase contrast and especially for photomicrography.

Special Lamps

Special lamps as per leaflet ZW 540 and ZW 545 of Messrs. R. Winkel GmbH., Göttingen, may be used in connection with the Stand W. The same applies to the micro-projection-equipment (leaflet ZW 570) and the Universal Camera 9 x 12 cm. (leaflet ZW 581). For the purposes we can supply a **base plate** and an **inset for lamps set up separately**.

Large Incident Light Equipment

The large incident light equipment (in preparation) is suitable not only for different biological and technical tasks but also for metallographic purposes. Observation in the bright field, dark field as well as polarised bright field is possible. The incident light equipment is set up on the tube carrier of the Stand W. It can also be used in connection with the magnification changer OPTOVAR. Planachromats will serve as objectives.

Equipment for Connection to the Mains

A transformer is required for connecting the low voltage lamp to an alternating circuit. Three types are supplied:

Mains connecting device with rheostat and ammeter

This equipment is specially suited for photomicrography. The ammeter permits adjusting the brightness of the lamp to a given intensity and therewith to reproduce an ascertained exposure time. The lamp intensity is controlled by means of a rotating knob which continuously, without jumps, regulates the secondary voltage.

Mains connecting device with rheostat without ammeter

With this equipment also the secondary voltage and hence the brightness of the lamp can be continuously varied. At the normal voltage (6 V) the rotating knob lightly engages a catch.

Mains connecting device without rheostat

This simplest equipment has plug boxes for three secondary voltages, so that the illumination can be varied within certain limits.

With all the transformers it is possible to use overvoltages. This increases the brightness of the lamp, at the price of a shorter life of the bulb.

If only a direct current is available, a converter is required in addition. This is plugged in between the direct current circuit and the transformer.

Photo-Micrographic Equipment

The new photo-micrographic equipment consists of:

Micro Reflex Camera and
Photo Changer.

This equipment can be kept ready for use on the Stand W during normal microscopic observation. The observation path of rays is not influenced by this. Photographs of interesting objects can be taken at any time during binocular microscoping without changing the set-up; on the other hand the observation path of rays can be switched off during photographing.

The **Micro Reflex Camera** consists of:

Prism body with focusing telescope, collet with pivot bearing, shutter 1 to $\frac{1}{125}$ sec., wire-release and plate adapter 6,5 x 9 cm.
or

adapter for use of the miniature film camera CONTAX or LEICA.



The prism body contains a built-in photo-objective so that the image is simultaneously sharp in the

- a) Binocular Tube
- b) Focusing telescope
- c) on the plate resp. film.

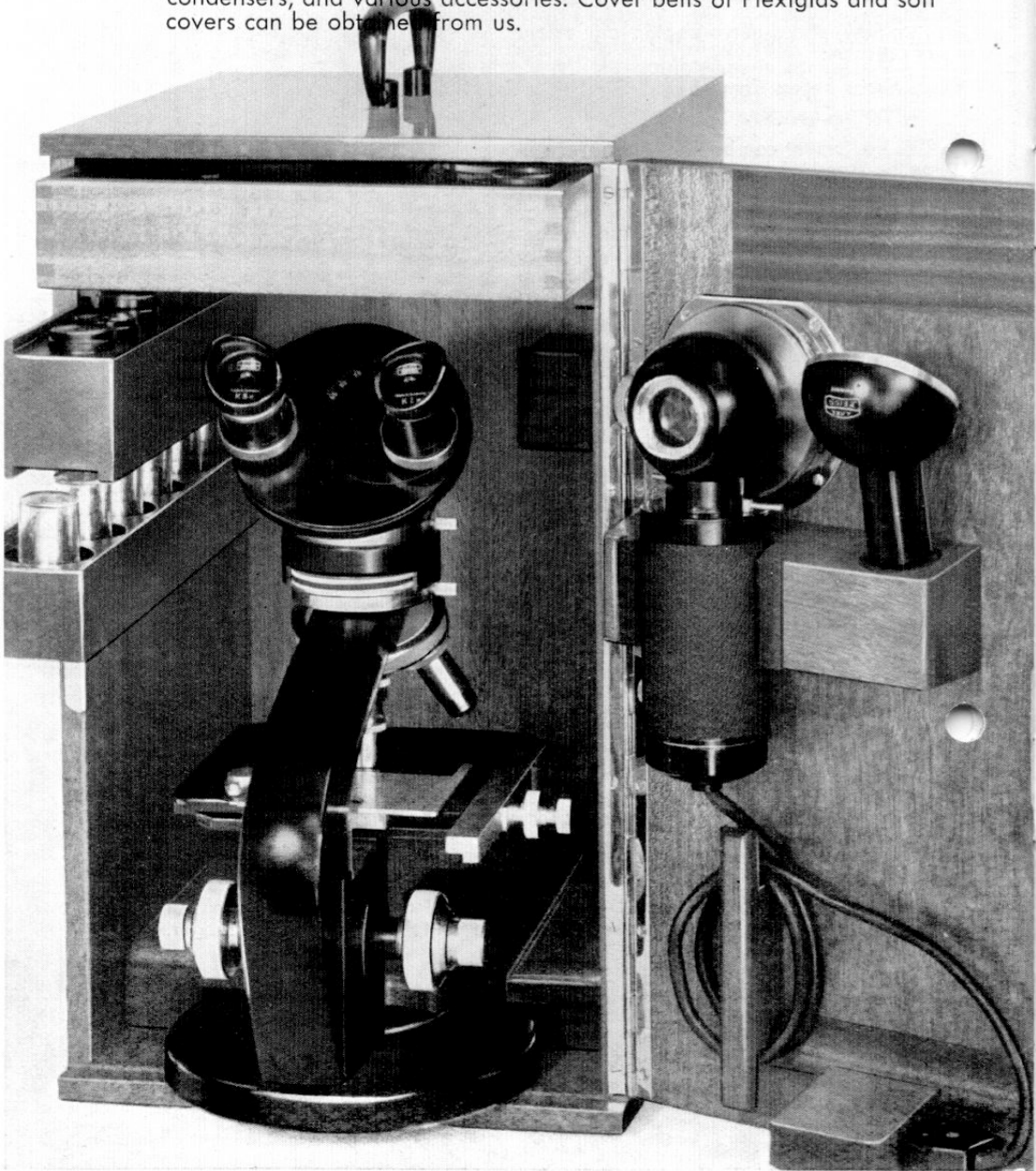
Photographs are taken by using standard objectives and oculars. Special photo oculars are superfluous due to the built-in photo-objective which realizes the maximum correction requirements for all other oculars.

Special objectives for low power survey photographs are in preparation.

The **Photo Changer** is attached to the dovetail of the tube carrier resp. of the OPTOVAR. The Reflex Camera is set up on the tube of the photo changer.

Cabinet and Protective Covers

We supply our microscope in a mahogany cabinet. This provides room for the complete microscope with optics and Optovar, also for the microscope lamps A or B, a second tube, a second stage, two additional condensers, and various accessories. Cover bells of Plexiglas and soft covers can be obtained from us.



Recommended Outfit:

Microscope Stand W with quadruple revolving nose-piece, interchangeable inclined binocular tube, daylight mirror; large mechanical stage with slide holder II; magnification changer OPTOVAR for the factors 1,0; 1,6 and 2,5 with auxiliary microscope and filter analyser; microscope lamp A with precentered microlamp 6 V 15 W, 2 spare bulbs, frosted lamp cap, daylight filter; green filter; double flask for immersion oil and Xylol; lens paper for optics; soft plastic cover for microscopes in lockup cabinet; mains connecting device for 110-130/150/220 V, secondary adjustable from 3 to 7.2 V with switch and cable

Equipment 4-bin

Recommended **optical equipment** for observations in bright-field and phase contrast; magnifications 50x to 2000x

Condenser IV, n.a.1.25 for bright-field and phase contrast with vertical fine adjustment and complete Abbe illuminating apparatus.

Achromat 6,3/6,16

Achromat Ph 16/0,32

Achromat Ph 40/0,63 with specimen safeguard

Apochromat Ph 100/1,32; parfocal oil immersion with specimen safeguard

Pair of K oculars 8x

Pair of eyecups

optical equipment 46

additionally for special demands in bright-field (specially for photomicrography and color-photomicrography).

Planachromat 10/0,22 with specimen safeguard

Planachromat 40/0,63 with specimen safeguard

Planachromat 100/1,25; parfocal oil immersion and specimen safeguard

optical equipment 38

or

Apochromat 10/0,32

Apochromat 25/0,63 with specimen safeguard

Apochromat 100/1,32; parfocal oil immersion with specimen safeguard

optical equipment 39

A list of all available individual and accessory parts, as well as other suitable equipments is contained in leaflet Zomi E 542/1.

Code number	Code word
40 11 76	ZMEOV
40 25 96	ZMOOU
40 23 69	ZMIWE
40 25 89	ZMIZU



We deliver:

Microscopes: Research-, Laboratory- and Routine Microscopes, Student Microscopes, Travel Microscopes, Polarization Microscopes, Metal Microscopes, Stereo-Microscopes, Plankton Microscopes.

Microscope Accessories: Microscope Lamps, Drawing Apparatus, Photomicrographic Equipments, Micro-Projection Apparatus, Micro-Cine-Equipments, Grinding and Polishing Machines.

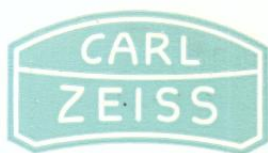
Ophthalmic and Medical Instruments: Slit Lamp Apparatus, Operation Microscopes, Ophthalmometers, Zeiss Eye-cameras, large Ophthalmoscopes, Hand Refractometers, Vertex Refractionometers, Lamps, Oscopes, Dermatoscopes, Colposcopes.

Optical Measuring Instruments: Refractometers, Spectroscopes, Electrophotometers for transmission and reflectance measurements, Pulfrich Photometers, Spectrophotometers, Polarization Apparatus.

Precision Measuring Instruments: Universal Measuring Microscope, Interference Microscope, Gauge Block Comparator.

Surveying Instruments: Levels, Theodolites.

Spectacle lenses, Photographic objectives, Magnifiers, Polarizing Filters, Colour Filters.



CARL ZEISS Oberkochen / Württ.

