

Stereoscopic microscopes
Binocular prism magnifiers



511-80/Engl.

Stereomicroscopy

Stereoscopic microscopes are indispensable for many investigations in medicine, biology and agriculture. They are particularly useful for the examination and preparation of small objects too difficult or impossible with the unaided eye or with conventional microscopes. This applies increasingly to many industrial products whose critical tolerances are progressively harder to observe. Stereoscopic microscopes have been found most useful in the electrical industry for the manufacture of small components such as transistors, switch components, etc., in the watchmaking and precious metal industries, the woodworking and paper industries, foundries and rolling mills. Last, but not least, stereoscopic microscopes are used in geology and mineralogy for the examination of rocks and dressing products in ordinary and in polarized light.

LEITZ-Stereoscopic Microscopes

LEITZ Stereoscopic microscopes are based on Greenough's principle. Two separate beam paths, inclined to each other at approximately 14° , pass through two optical systems; binocular observation conveys the impression of natural roundness and depth in the object.

Achromatically corrected objectives, of long working distance, produce a clear, contrasty image. Brightness, purity of colours, and resolution are fascinating. Due to a prism system the image appears upright, right-way-round, and orthoscopic.

The precision finish and robust construction of the LEITZ stereoscopic microscope deserve special mention. Combined these advantages ensure smooth operation and above all, allow difficult manipulations on a great variety of objects. The outfits are moderately priced.

LEITZ stereoscopic microscopes are available for the most varied purposes. For research and versatile laboratory tasks an instrument providing convenient operation will be preferred, such as the stereoscopic microscope with rapid changer for three magnification ranges. For quality control in the factory, on the other hand, the version with a single paired-objective changer will generally be more suitable since here magnifications need hardly ever be changed. The stands are available for exclusively incident light observations as well as examinations in incident- and transmitted light. Special stands can be supplied for work in polarized light or for systematic scanning of objects. Pillar stands for continuous quality inspection, e.g. directly on the machine, complete the range of these instruments. The following pages deal with the individual types of stand for transmitted- and incident light, single or rapid changer etc.

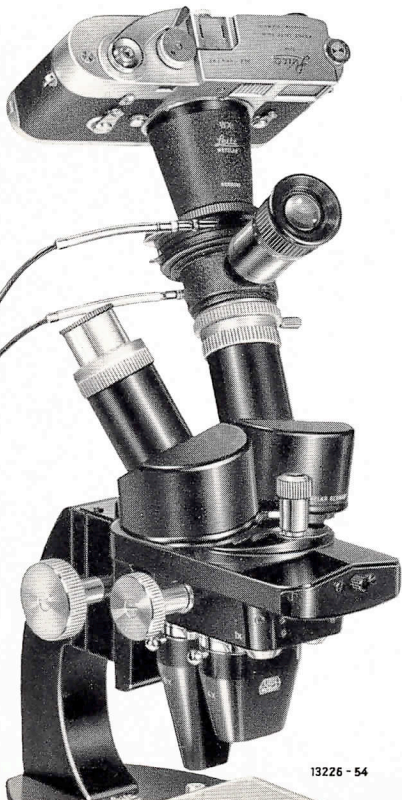


Fig. 1 LEITZ stereoscopic microscope with MIKAS micro attachment and LEICA 35mm camera. Outfit for photomicrography (non-stereoscopic).

Title page: Frontal aspect of the optical paths in the stereoscopic microscope.



Fig. 2
Stereoscopic microscope,
integral stand, with rapid
objective changer

Stereoscopic microscopes

LEITZ stereoscopic microscopes are available in a two-part and an integral stand version. A two-part stand, originally for use exclusively with incident-light, can be converted into an incident- and transmitted-light stand by attaching a special base; the integral stand is basically designed for both methods of illumination, however, it is available with rapid-changing tube only. The other characteristic features are shared by both types of stand.

Characteristic features

- Upright and right-way-round image, of great brilliance, purity of colours, resolution, and depth of field
- Natural roundness of the object
- Total magnifications 8 x – 216 x
- Long working distance
- Large field of view due to eyepieces of high field-of-view index
- Interchangeable paired objectives and eyepieces with systematically spaced magnifications
- Relaxed position due to inclined eyepieces
- Choice of stereo-tube with single or rapid objective changer
- Focusing adjustment on both sides of the stand
- Robust construction, precision finish

Stereoscopic microscope, two-part
+ Base
= Stereoscopic microscope for incident- and transmitted light



Fig. 3
Stereoscopic microscope for incident and transmitted light with stereo-tube for single objective change.

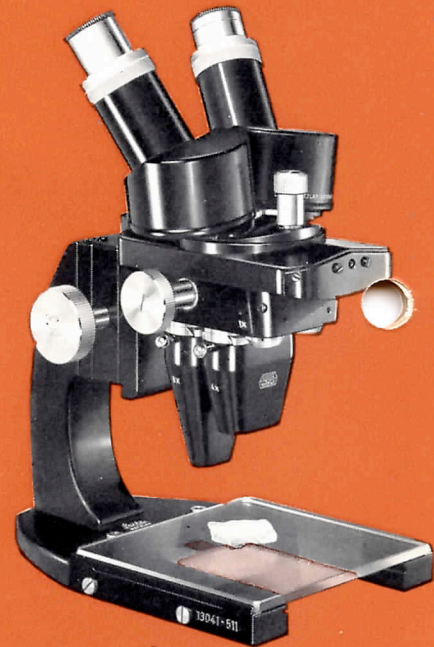


Fig. 5
Stereoscopic microscope for incident light with stereo-tube for rapid objective change.

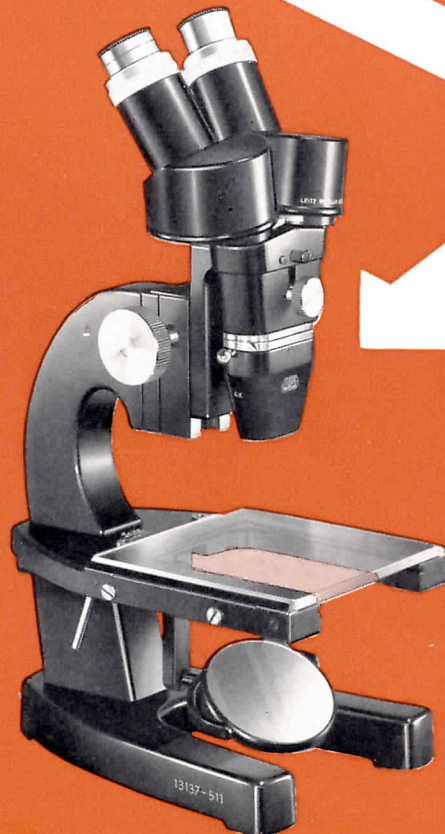


Fig. 4
Stereoscopic microscope for incident and transmitted light with stereo-tube for single objective change.

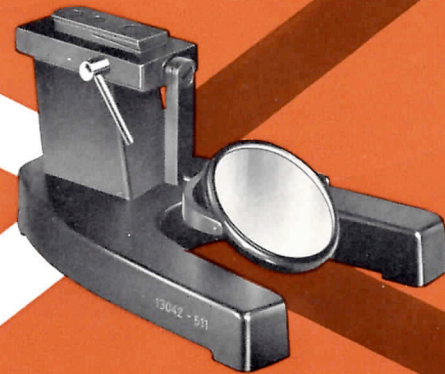


Fig. 6
Stereoscopic microscope for incident and transmitted light with stereo-tube for rapid objective change.

Two-part stereoscopic microscopes are available in the following versions:

1. for incident light

The simple version for incident light is adequate if the stereoscopic microscope is used for the examination of opaque objects only. It consists of the stand* with a glass plate serving as object stage, 115 x 115mm; choice of stereo-tubes, see (Figs. 3 and 5).

2. for transmitted- and incident light

By combining the incident-light stand with a special base the range of the incident light microscope can be extended for use with transmitted light. A tilting mirror in the base serves for transmitted light illumination. Arm rests on request. Choice of stereo-tubes (Figs. 4 and 6).

All stereo-tubes have inclined observation tubes. Two versions are available:

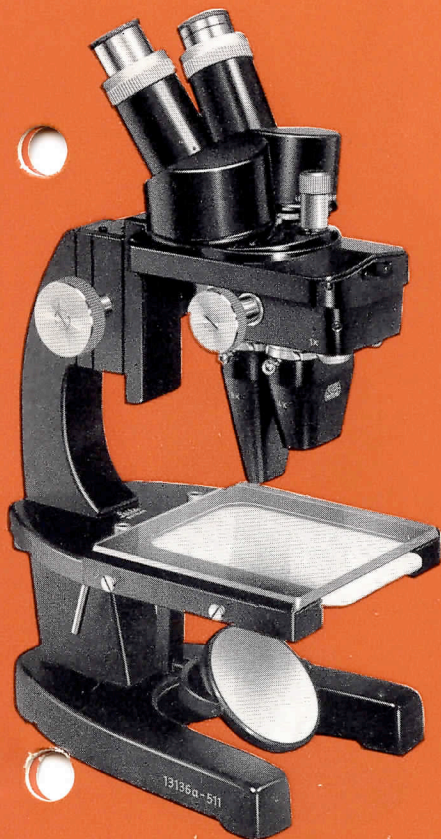
Stereo-tube with single objective changer

This is the simplest version of the stereo-tubus. The paired objectives are mounted on a slide which is inserted in the carrier of the tube (Figs. 3 and 4).

Stereo-tube with rapid objective changer

Three paired objectives are mounted in a slide, and can be successively inserted into the beam path by rotating a bilateral knob. The microscope remains within the sharpness range; slight refocusing may occasionally be necessary. Two of the three paired objectives can be inserted in the rapid changer as desired. Only the 1 x paired objective is permanently built into the rapid changer (Figs. 5 and 6). The top part with the eyepiece tubes can be rotated through 180°. This is especially useful when the stereo-tube is to be mounted on pillar stands.

Objectives, eyepieces etc. see p. 9.



* The stands differ slightly depending on the stereo-tube with which the microscope is supplied.

Stereoscopic microscope for polarized light

For orientating investigations in transmitted polarized light the stereoscopic microscopes are supplied in a special pol version. They consist essentially of the same structural elements as the types for transmitted light described on p. 5, but include also a polarizing device and a rotating stage.

Polarizing device

This consists of a polarizer, analyser, and accessories such as compensators, crossline plate etc. The substage polarizer is rotatable. In the stereoscopic microscope with rapid objective changer the analysers can be removed from the optical path individually by means of a lever; in the version with the single objective changer the paired analysers are mounted on a slide in the objective carrier. Basically, the analysers are rigid, so that extinction is achieved by rotating the polarizers. Guides are provided for λ - or $\lambda/4$ plates.

Rotating stage

The rotating stage is pushed into the guide rail of the stand in place of the glass plate. It can be centred and is graduated from 0° to 360° ; with the aid of a vernier scale, reading is possible to $1/10^\circ$.

Optical system

For investigations in polarized light the achromatic objectives can be used, since they have no depolarizing effect.



Fig. 7a

Figs. 7a and b
Stereoscopic microscope-pol with tube for single objective change and tube for rapid objective change

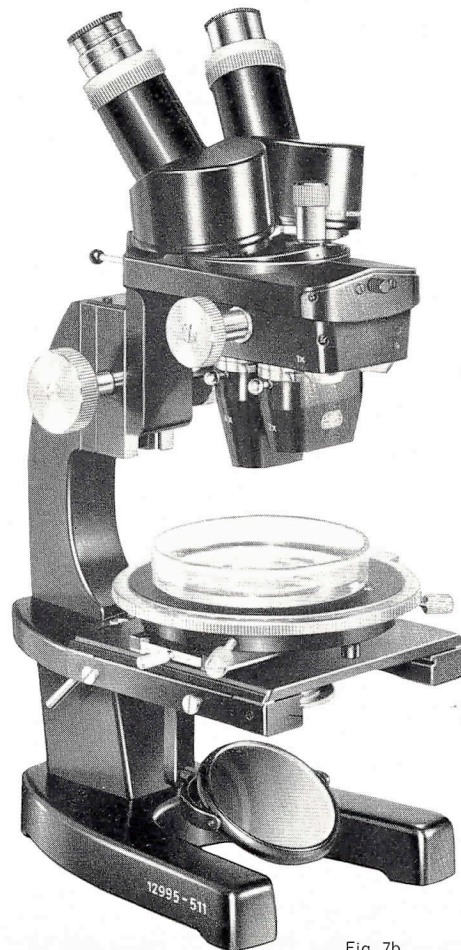


Fig. 7b

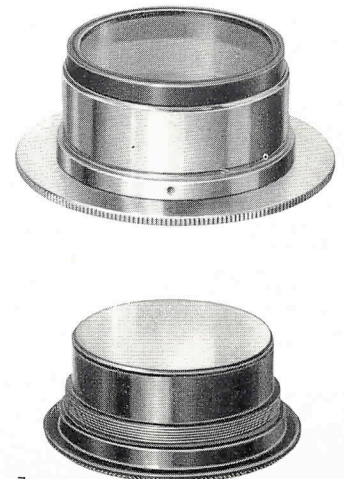


Fig. 7c

Fig. 7c
Top: polarizer, bottom: screw-in-groundglass disc.

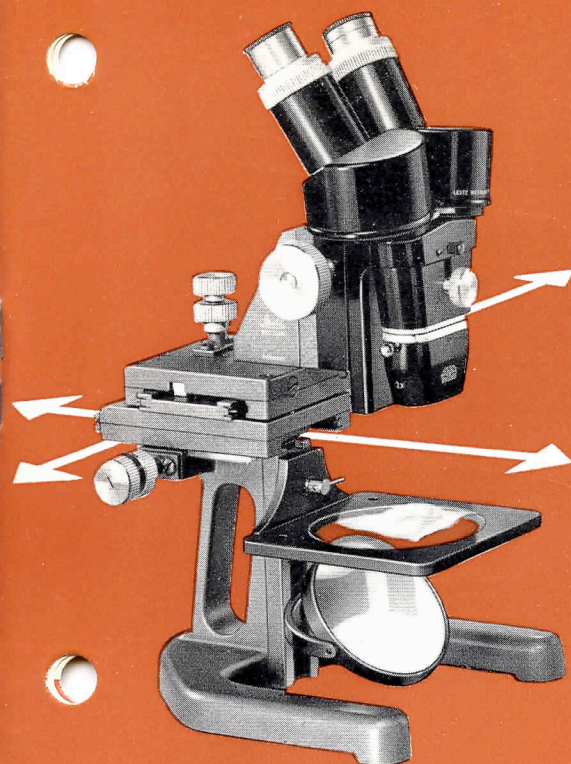


Fig. 8
Stand UK IV with tube for single objective
change

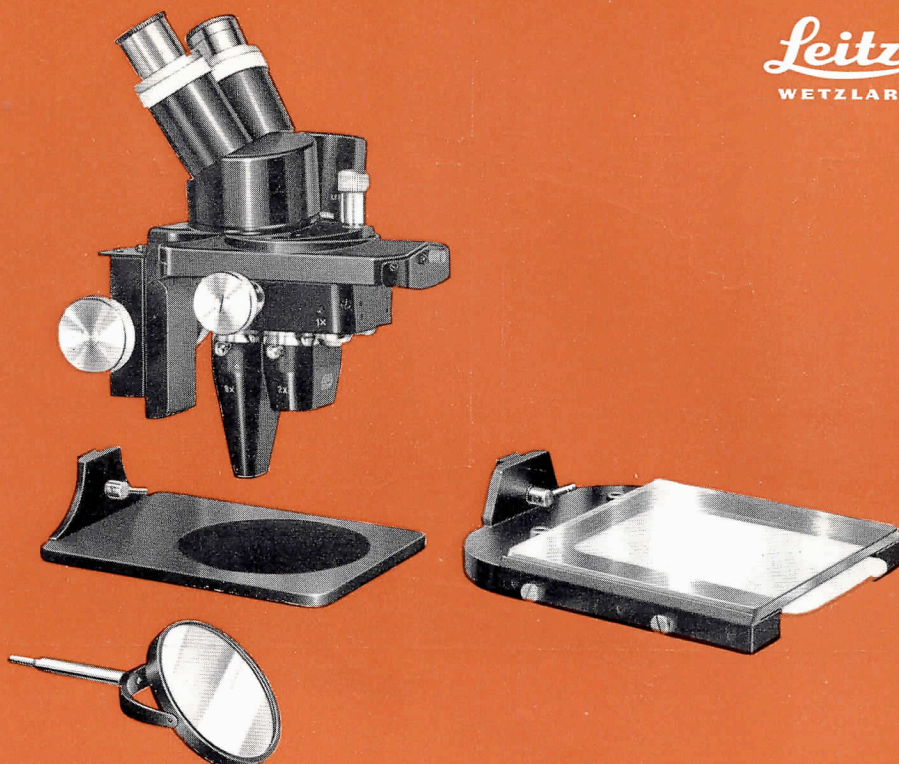


Fig. 9
Tube with rapid objective changer and
140 x 105mm object stage

Fig. 10
U-shaped stage

Stand UK IV with cross movement

For systematic scanning of objects in transmitted and incident light ordinary stands are unsuitable; it must be possible either to adjust the object with the aid of a mechanical stage, or to carry out the cross movements by means of the stand, which is the method adopted for our UK IV stand.

Construction

The UK IV Stand is designed for investigations in transmitted and in incident light. It includes an interchangeable object stage and a stereo-tube of the user's choice. The cross movement acts on the top part of the stand and thus indirectly on the tube. The traversing range covers an area of 50 x 50mm. It is controlled by two knurled double knobs, one of which functions as drive, the other as clamping element. The cross movement can be read to an accuracy of 0.1mm by means of vernier scales.

A square object stage with a circular glass insert for transmitted- and metal insert for incident-light examinations is available for stereo-tubus with single objective changer.

The 140 x 105mm object stage or a U-shaped stage can be supplied for stereo-tubus with the rapid objective changer. Arm rests, and matt- or black-glass plates for increasing the contrast in incident-light investigations complete the outfit. See also Equipment list.

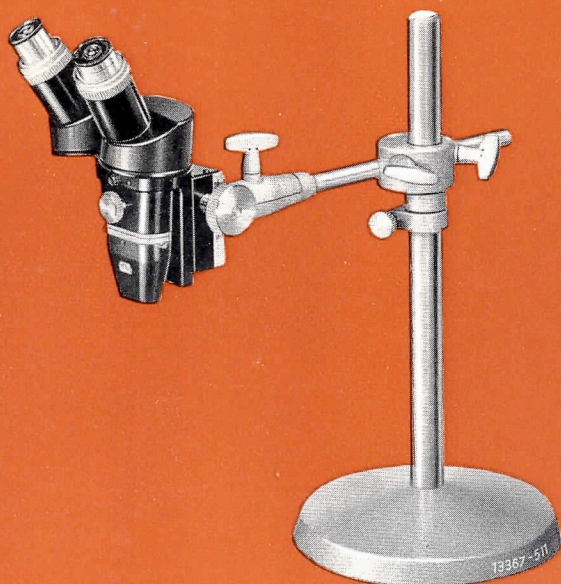


Fig. 11 Simple pillar stand

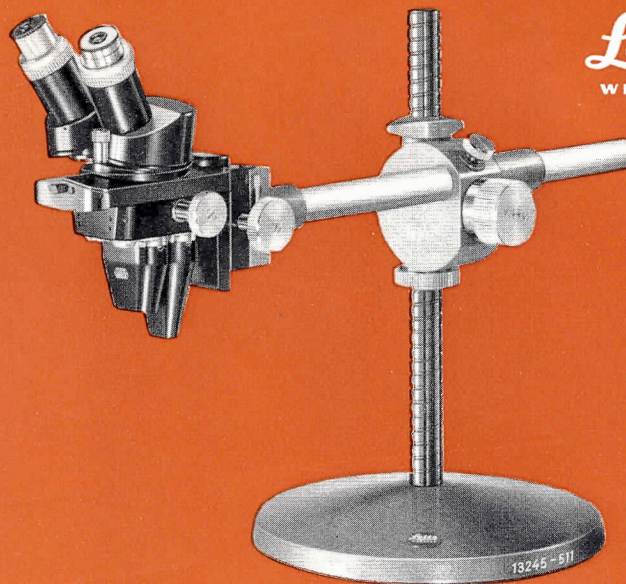


Fig. 12 Pillar stand US II

Pillar stands

Our pillar stands are recommended for the examination of objects of any size and shape. This type of stand combined with a stereo-tube has proved particularly useful for continuous quality control on machine tools etc. However, it is also eminently suitable in veterinary medicine, dermatology, or for cosmetic examinations.

Two types of stand are available:

Simple pillar stand

The pillar, mounted on a massive base plate, is 350mm high and supports the horizontal carrier arm, with a cross clamp. It can be rotated and vertically adjusted, and is fitted with a dovetail guide for the stereo-tube. Only the tube with single objective changer is suitable for the simple pillar stand; in the interest of increased operating comfort, however, its viewing direction has been rotated through 180°. A ball-and-socket joint makes it possible to align the tube according to the surface of the object.

Pillar stand US II

This pillar stand represents an extension of the simple pillar stand. The vertical column has a worm drive and guide groove which together with a large knurled knob ensures smooth, positive vertical adjustment of the tube. Height of stand 400mm, maximum horizontal extension 400mm. The vertical adjustment can be clamped in any position. Independent of this fixation the tube can be rotated full-circle in the horizontal plane. In addition a rack-and-pinion movement provides a horizontal adjustment of the tube over the entire length of the carrier arm.

The pillar stand US II is available with stereo-tube with single objective changer or with rapid objective changer. These tubes are described on p. 5.

Optical outfit



Fig. 13




Fig. 14

Objectives

The image in the stereoscopic microscope is formed by two independent optical paths, calling for two complete optical systems. The paired objectives have the most important function in this system. Not only are they responsible for the quality of the image; the objectives must also be set at such an angle to each other so that the picture areas covered complement each other and the impression of three-dimensional vision is created. Achromatically corrected paired objectives are available at 1 x, 2 x, 4 x, 8 x and 12 x magnification. Together with suitable eyepieces they produce clear images of excellent stereoscopic effect, at magnifications from 8 x to 216 x.

Eyepieces

LEITZ stereoscopic microscopes have specially designed eyepieces whose correction is matched with that of the objectives. They differ from the eyepieces of conventional microscopes in their larger diameter and corresponding field-of-view indices, i. e. they cover a very large area of the object.

Three paired eyepieces are available, G 8 x, G 12.5 x, and G 18 x; one of each pair has a focusing eyelens for the compensation of different visual acuities, paired eyepieces G 8 x  are available for spectacle wearers.

The eyepieces can be clamped in the eyepiece tube with a knurled collar. The table below contains the optical data.

Magnifications, object distance, and field of view

Paired Objectives	Free Object distance	Micrometer value with G 12.5 x and G 18 x	G 8 x		Paired eyepieces G 12.5 x		G 18 x	
			Total magnification	Object field	Total magnification	Object field	Total magnification	Object field
1 x	88mm	100 μ	8	20	12.5	18	18	12
2 x	57mm	50 μ	16	10	25	9	36	6
4 x	44mm	25 μ	32	5	50	4.5	72	3
8 x	24mm	13 μ	64	2.5	100	2.3	144	1.5
12 x	16mm	8.4 μ	96	1.7	150	1.5	216	1



Fig. 15 MONLA Lamp

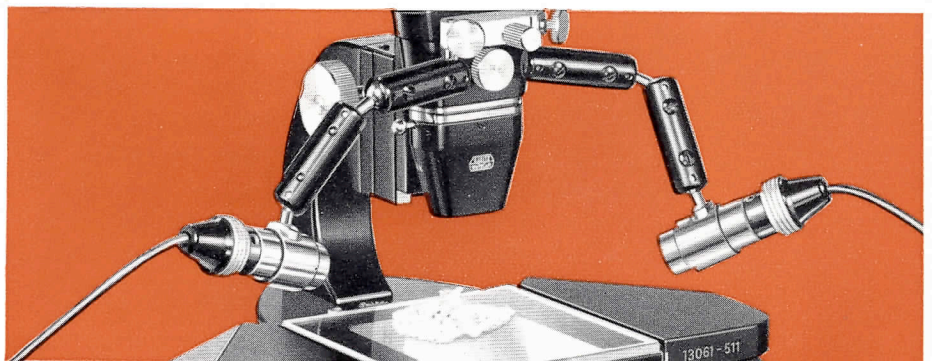


Fig. 16 Attachable 8 v 5 W incident-light illuminators

Accessories

Illuminators

Generally daylight is adequate for examinations with the stereoscopic microscope. In poor lighting conditions, especially with high magnifications or in incident light, however, the use of an artificial light source is recommended.

One or two 8 v 5 W incident-light lamps, adjustable on ball-and socket arms, provide incident-light illumination. These articulated arms make it possible to adapt the angle of illumination to the surface of the object and thus produce the best possible lighting.

The 6 v 30 W microscope lamp provides excellent illumination for examinations in transmitted- and incident light as well as for work in polarized light. It is set up at a distance of 25–30cm in front of the microscope and its light directed onto the microscope mirror or, in the case of incident light, directly onto the object. This permits unobstructed manipulation of the object during observation.

For further accessories such as transformers, drawing and photographic accessories, micrometer eyepieces, etc. please consult our outfit list.

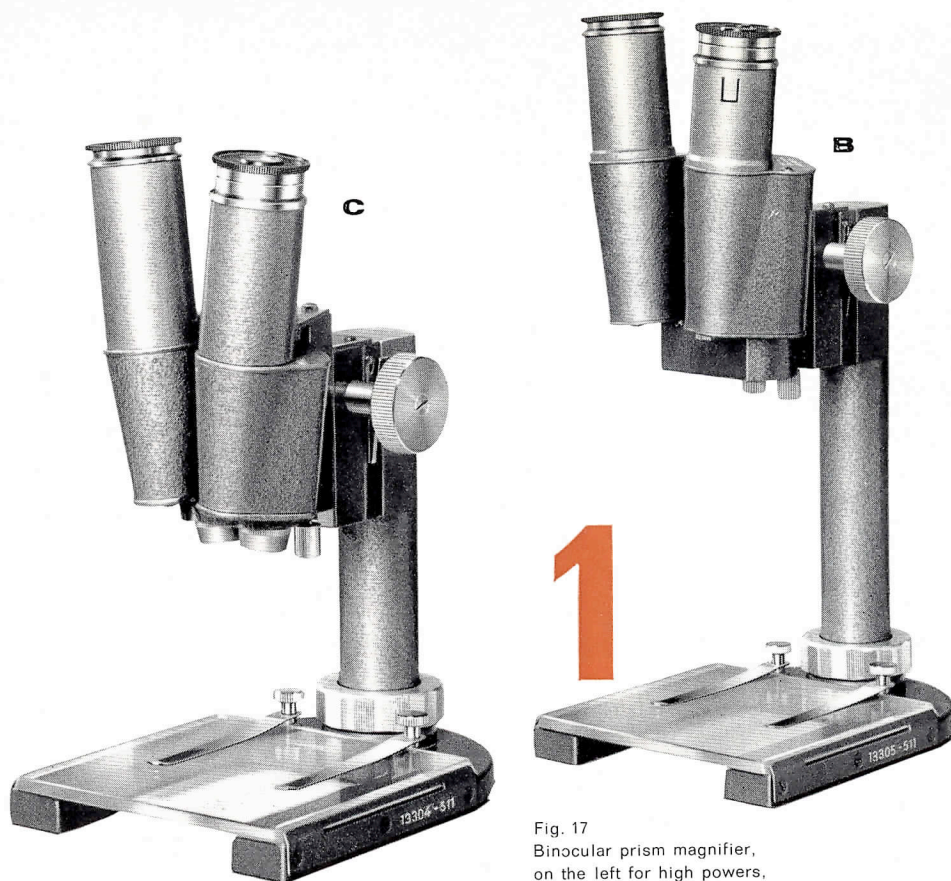


Fig. 17
Binocular prism magnifier,
on the left for high powers,
on the right for low powers.

Binocular prism magnifiers

Low-power stereoscopic microscopes are called binocular prism magnifiers. Their maximum magnification lies at about 30–40 x. This enlarges working distance and field of view considerably, an advantage which is greatly appreciated during experiments or the preparation of specimens. In addition, the previously mentioned favourable points of the stereoscopic microscopes apply also to binocular prism magnifiers so that the choice of instrument most suitable for his purposes must be left to the user. If high magnifications are necessary or increased operating comfort desirable, he will decide in favour of the stereoscopic microscope. A binocular prism magnifier is indicated if neither high magnifications nor a change of objectives is required.

Technical description

Binocular prism magnifiers are available in three versions:

- A** Working distance 200mm for low powers
5 x, 7.5 x, (not illustrated)
- B** Working distance 144mm for low powers
3.5 x, 7 x, 10.5 x
- C** Working distance 79mm for high powers
10 x, 20 x, 30 x.

The versions for low and high powers differ in their magnifier bodies, which are all fitted with a rack-and-pinion drive with focusing knobs on both sides, and with fixed paired objectives. The various magnifications are obtained by changing the pairs of eyepieces or the magnifier bodies. All paired eyepieces can be used with all magnifier bodies. The eyepiece tubes can be adjusted for interpupillary distance like binoculars; likewise, one of the paired eyepieces has a focusing eyelens to compensate for different visual acuities. Eyepiece graticules and drawing equipment can be used.

Stands

The binocular magnifiers can be used on the following stands:

- 1** Stand for examinations in incident light
- 2** Stand for investigations in transmitted and incident light
- 3** Pillar stand for examinations of large objects.

Optical data, magnifier bodies, paired eyepieces

Magnifier body for **low** powers
Free working distance appr. 200mm

Pair of eyepieces	a 10	a 15
Magnification	5 x	7.5 x
Diameter of field of view approx.	55mm	40mm

Magnifier body for **low** powers
Free working distance appr. 144mm

Pair of eyepieces	a 5	a 10	a 15
Magnification	3.5 x	7 x	10.5 x
Diameter of field of view approx.	45mm	30mm	21mm

Magnifier body for **high** powers
Free working distance appr. 79mm

Pair of eyepieces	a 5	a 10	a 15
Magnification	10 x	20 x	30 x
Diameter of field of view approx.	16mm	11mm	8mm

Fig. 18
Binocular prism magnifier
with stand for examinations in incident
and transmitted light,
with arm rests.

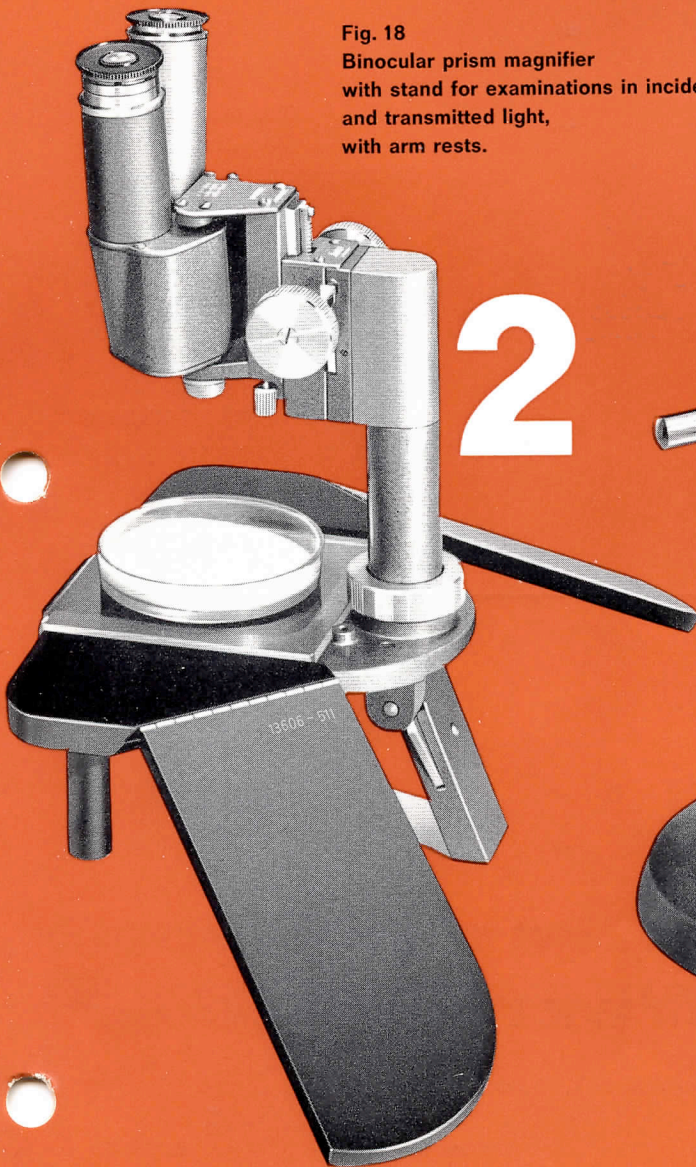


Fig. 19
Binocular prism
magnifier on simple
pillar stand.



Our production programme includes:

Microscopes

Microscopes of the most modern design for all examinations in transmitted, incident and polarized light.
Microscope accessories, such as phase contrast equipment, heating and cooling stages.
Universal rotating stages
Special equipment for microscopy, e. g. micromanipulator, interference microscope, forensic comparison microscope, binocular prism magnifiers and stereomicroscopes
Photomicrographic apparatus.
Fully automatic microscope camera ORTHOMAT®.

Various types of Microtomes

Ultra-microtome for electron microscopy.

Physical research instruments based on optical methods

Infra-red spectrophotometer
Monochromators
E-photometer
Micro-refractometer
Instrument for the examination of dust

Optical material-testing instruments

Miniload hardness tester
Dilatometer
Heating microscopes

Optical-mechanical precision measuring instruments

Measuring microscopes
Angle measuring instruments
Profile projectors
Alignment- and direction testers
Optical installations and attachments
Surface measuring instruments

Photographic equipment

LEICA® miniature camera with accessories
Accessories for scientific and technical photography
LEICAFLEX®
LEICINA® 8mm cine-camera

Projectors

Classroom projectors
Miniature projectors
PRADOVIT® automatic miniature projector,
Epidiascopes
Microprojectors,
Large lecture hall projectors,
8mm CINOVID® narrow-gauge
cine-projector

Binoculars

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