

**EXAKTA**  
**„Vielzweck“**

## EXAKTA „Vielzweck“

It is the particular value of the EXAKTA „Vielzweck“ that it permits an extremely versatile and efficient use of the EXAKTA and EXA reflex cameras, above all of the EXAKTA VX 1000, the EXA VX 500 and their predecessors, but also of the EXA 500 and Ia as well as of their predecessors. (In case of the EXA Ia and the earlier models there are, however, a few limitations when employing lens extension accessories.) The above-mentioned range of cameras, provided with a few basic accessories, has proved very successful in many fields of application. The addition of the „Vielzweck“, however, meets the most exacting requirements of the advanced amateur, professional photographer, scientific worker, and artist. The „Vielzweck“ or

parts of it are therefore always in place wherever the camera is employed continuously for accomplishing special tasks.

It is of decisive importance that the „Vielzweck“ has been developed on the building-block principle, i. e. that it is composed of different component parts or units which, according to requirements and budget of the user, can be employed alone or in various combinations. Accordingly, the user is enabled to gradually increase the versatility of this equipment.

The object of this booklet is to summarise the main applications of the „Vielzweck“. In addition, the equipment can also be conveniently arranged to accomplish many other photographic tasks.

## The principal applications of the EXAKTA „Vielzweck“

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There may be slight deviations between the actual models and illustrations in this booklet.

The basic equipment of the EXAKTA „Vielzweck“ consists of copying stand, bellows attachment and transparency copying equipment, all other items presented in this instruction manual must be ordered separately.

## The Swing Angle Attachment

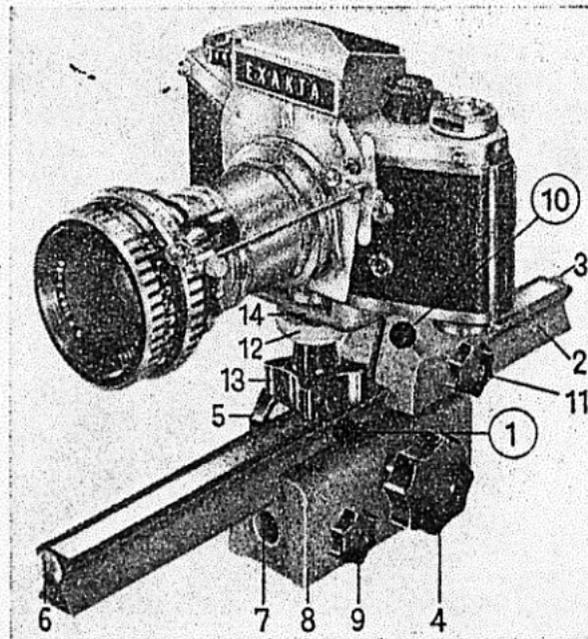
(Figs. 1 ... 2)

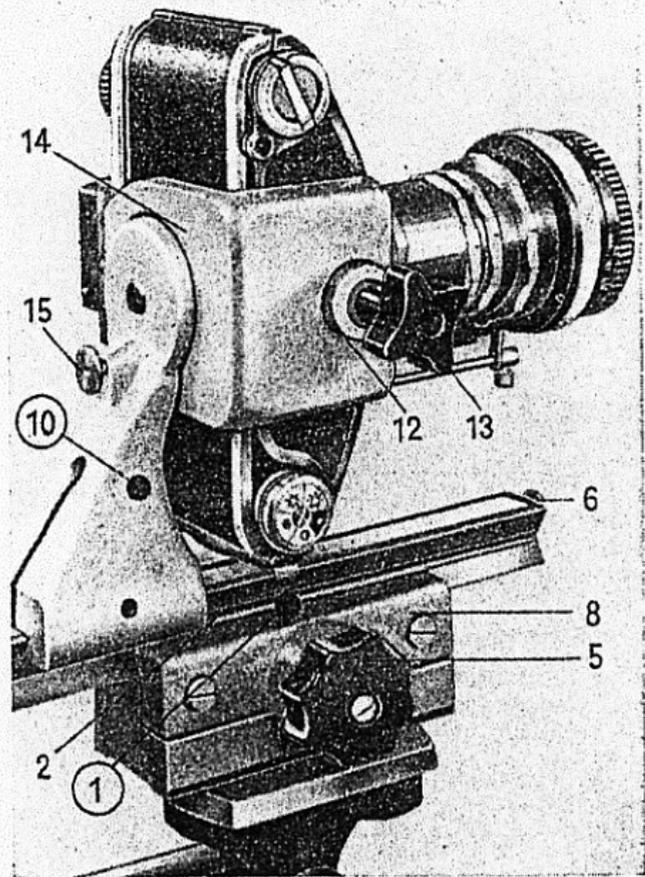
It consists of the swing angle top (10) and the focusing slide (1). The swing angle top (10) is pushed onto the slide rail (2) of the focusing slide: For this purpose loosen the locking knob (11) by turning it to the left up to the stop. Push the swing angle top on to the end of the slide rail (2) (recognizable by the large scale). Set the locking screw (3) with the cut-off part of its head on a level with the slide rail (2). With the swing angle top pushed on to the slide rail, slightly tighten the locking screw (3), causing the round part of the screw head to project a little above the slide rail, which will prevent the swing angle top from slipping off.

With the swing angle top in use, the scales on the slide rail (2) become invalid. You

are able to set the swing angle top and lock it in any desired position by simply turning down the locking knob (11) to the

Fig. 1





right. As shown in Figs. 1 and 2 the camera is fastened to the angular piece (14) by means of the fastening screw (13). This fastening screw is designed for cameras featuring an English tripod socket ( $\frac{1}{4}$ " or a Continental tripod socket ( $\frac{3}{8}$ "). Remember that the locking-nut (12) has to be screwed in between the angular piece (14) and the head of the fastening screw (13). As soon as the fastening screw has been driven deep enough into the tripod socket of the camera, the locking-nut must be screwed against the angular piece.

To move the camera from the horizontal to the vertical position, or vice versa, the angular piece (14) is movable in both directions on pulling out the locking knob (15). This knob clicks in automatically when the angular piece (14) has completed a  $90^\circ$  rotation.

Fig. 2

For horizontal working the swing angle attachment, on to which the camera has been screwed, is simply set upon a table. The swing angle attachment will be very useful when connected to a tripod either in horizontal position, or with the aid of a tilting head for a tripod, it can be fastened in a vertical position. An English or Continental tripod socket will be found at the bottom of the sliding block (8). The extension required for the picture ratio is produced by inserting bayonet rings and tubes.

For critical focusing the swing angle attachment offers two possibilities: Either you move the swing angle top (10) with the camera attached on the slide rail (2) to and fro (do not forget to loosen locking knob (11) and retighten it), or you make use of the rack of the focusing slide and shift the slide rail (2) with swing angle top and camera mounted. Shifting the tripod

will be hardly necessary, for the swing angle attachment's wide focusing allows ample play for varying the subject distance. Sharp focusing is controlled on the reflex image of the camera. Moving the slide rail (2) to and fro is accomplished by actuating the two rack-and-pinion knobs (4 and 5).

When working with the apparatus in vertical position rack-and-pinion knob (5) serves for locking the slide rail (2), preventing its being pulled down by the weight of the camera. The rack-and-pinion knob (5) is screwed clockwise tight against the sliding block (8) during which performance the opposite knob (4) must be held tight. If the rack-and-pinion knob (5) is to act once more as a focusing knob, it must be turned away from the sliding block (8) and fixed in its end position during which performance the knob (4) must again be held tight. Locking screw (6) prevents the swing angle top from

slipping off the slide rail (2) while working with the apparatus in vertical position. (Hole (7) and locking knob (9) serve to receive the transparency copying equipment; please see also page 12).

It is recommended to use between the release knobs of camera and lens the auto-couple extension release (Figs. 1 and 2) when using bayonet rings and tubes in connection with the fully automatic spring

or pressure diaphragm mechanism of the lenses.

#### Nos. for ordering

Focusing slide (1)	715.521
Swing angle top (10)	715.503
Swing angle attachment (1 + 10)	715.508

Please state whether the camera has an English or Continental tripod socket.

## Bellows Attachment

(Figs. 3 and 4)

It consists of the bellows top attachment (20) and the focusing slide (1). The locking knobs (24 and 25) located on camera holder and lens holder respectively must be loosened by turning them counterclockwise up to the stop. Camera holder and lens holder have to be pushed together so that the bellows are protected. First the lens holder (22) and then the camera holder of the bellows top attachment (20) are pushed on to the tail-end of the slide (recognizable by the largest values on the scale). The locking screw (3) must be set in such a way that the cut-off section of the screw lies on a level with the upper surface of the slide rail (2). Having pushed the holders on, tighten locking screw (3) causing the round part of the screw head to project from the

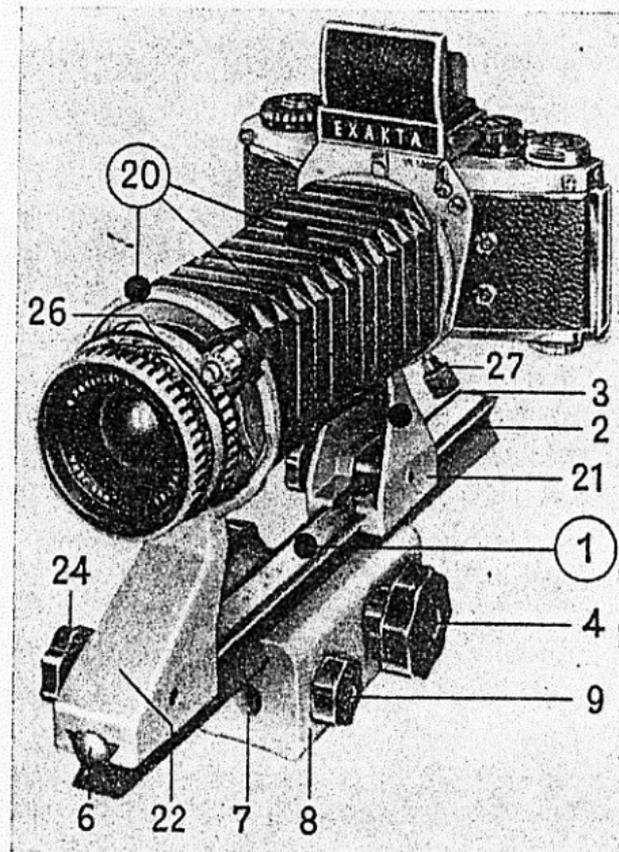


Fig. 3

surface of the slide rail (2), thus preventing an accidental slipping off of the bellows top attachment. It is advisable to place the bellows top attachment (20) towards the opposite end of the slide rail (2) and to lock the lens holder (22) in this position by turning knob (24) to the right. It will be possible to move the camera holder (22) to and fro on the slide rail (2), as required for focusing. The camera holder can be locked in position by turning knob (25) to the right. Of course, the lens holder (22) can also be moved.

For fastening the camera to the camera holder (21) its bayonet ring must be turned so that the red dot will be above. If required, loosen the locking knob (27). Before placing the camera do not forget to retighten this knob by turning it to the right. When fastening the camera to the camera holder (21) make sure that the red dots on

the two bayonet rings are exactly opposite each other. Then turn the camera clockwise (in viewing direction) until the locking lever clicks into the bayonet fitting. The camera can be turned into any desired position (vertical, horizontal or oblique) upon loosening the locking knob (27). After that the locking knob (27) must be retightened.

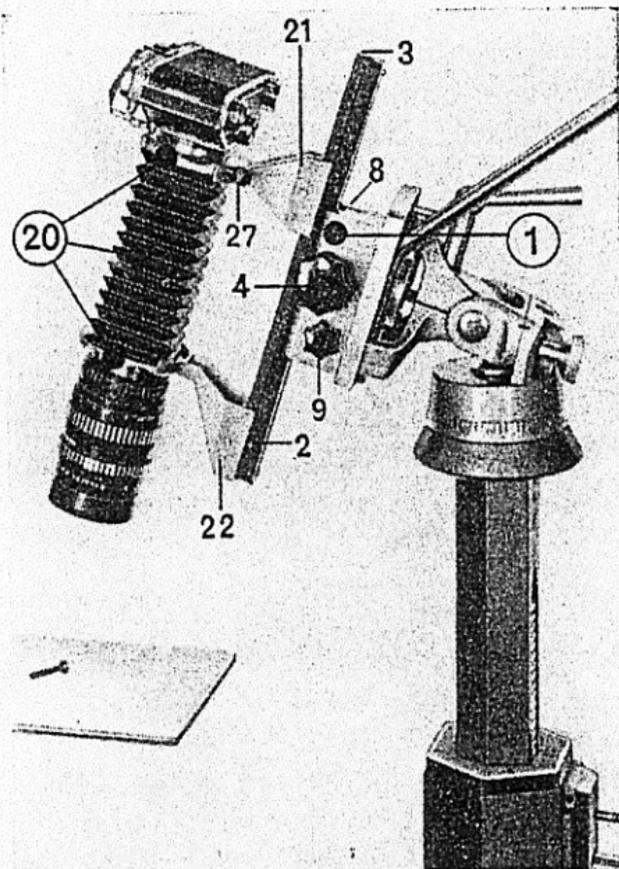
You are at liberty to use any standard or special supplementary lens to fit the EXAKTA and EXA single lens reflex cameras, with the exception of extreme wide-angle lenses with a focal length of less than 30 mm (for optical reasons). Also lenses featuring very long focal distances are not very practicable on the bellows attachment because of their heavy weight. When fixing the lens into the lens holder (22) the red dots on the bayonet fittings must meet. Insert the lens into the bayonet mount and turn clockwise until locking lever (26) clicks in.

The smallest increase in extension obtainable with the aid of the bellows attachment is 35 mm, the greatest approximately 220 mm. The 35 mm extension increase, when using 50 mm standard lenses, shows an image scale of reproduction of 0.7 and subjects measuring 34 mm  $\times$  51 mm are reproduced in full. The well-known special lens T f 2.8/50 mm from Jena is available with sunk mount, for taking larger subjects with the aid of the bellows attachment. It will also allow focusing at longer distances (up to infinity). The black figures on the scale of the focusing slide (1) signify the increase in extension in mm for the usual standard, short-or long-focus lenses of the cameras, whereas the red figures refer to the increase in extension when using the special lens T f 2.8/50 mm from Jena with sunk mount. This lens can, therefore, cope with extension increases ranging from 0 up

to 185 mm. The scale values hold good only with lens holder (22) in position against the front stop of the slide rail (2). It is the measurement visible against the upright rear surface of the camera holder that counts.

If the bellows top attachment (20) is to be removed from the focusing slide (1), it is in all cases advisable, for the sake of preserving the bellows after loosening the locking knobs (24 and 25), to push lens holder (22) and camera holder (21) together, and then to draw them together from the slide rail (2). It will be necessary to set the locking screw (3) so that its lateral cut-off section lies on a level with the upper surface of the slide rail (2).

For horizontal working, the bellows attachment fastened to the camera can be set on a table. The bellows attachment can be



fixed on a sturdy tripod either in horizontal position or, with the aid of a pan and tilt tripod head, in a vertical position. An English and a Continental tripod socket will be found at the bottom of the sliding block (8). Moreover, the bellows attachment is one of the essential component parts of the repro unit (see page 20). By adding the bellows attachment to the copying stand, you will obtain the repro unit. The increase in extension necessary for the desired image scale of reproduction is obtained by drawing out the bellows: Loosen the locking knob (25) located on the camera holder (21) and slide the camera holder up to the desired scale value. Critical focusing is accomplished by actuating the cog-wheel mechanism of the focusing slide and by moving to and fro the slide rail (2) with the bellows top attachment and camera moun-

Fig. 4

ted. Shifting the tripod will hardly be necessary, for the bellows attachment's wide focusing range allows ample play for varying the lens to subject distance. However, in case the lens to subject distance is unchangeable, critical focusing can be accomplished by moving the camera holder (21) to and fro on the slide rail (2). This mode of operation is a particular advantage of the bellows attachment. Of course, sharp focusing is controlled on the reflex image of the camera. Moving the slide rail (2) to and fro is accomplished by actuating the rack-and-pinion knobs (4 and 5). When working in vertical position the rack-and-pinion knob (5) can serve for fixing the slide rail (2), thus preventing it from being pulled down by the weight of the camera. In this case the rack-and-pinion knob (5) is screwed clockwise tight against the sliding

block (8), whilst the opposed knob (4) is held tight. If the rack-and-pinion knob (5) is wanted again for focusing, turn it away from the sliding block (8) and tighten it in its end position. Rack-and-pinion knob (4) must be held tight. Locking screw (6) prevents the bellows top attachment from slipping off the slide rail (2), while working with the apparatus in vertical position. (The hole (7) and the locking knob (9) serve to receive the transparency copying equipment, please see also page 12).

#### Nos. for ordering

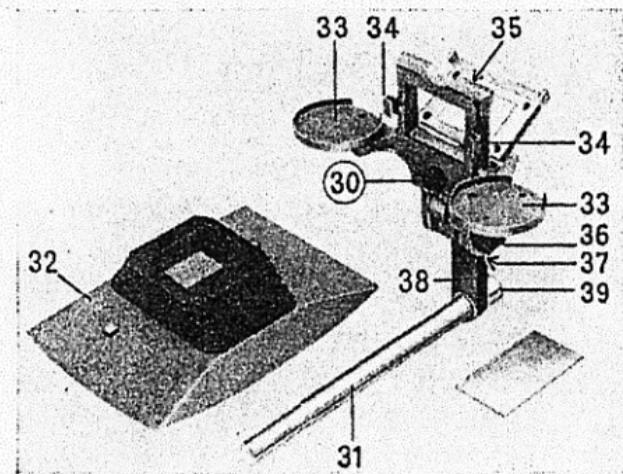
Focusing slide (1)	715.521
Bellows top attachment (20)	715.522
Bellows attachment (1 + 20)	715.510
Special lens T f 2.8/50 mm with sunk mount from Jena	712.800

## The Transparency Copying Equipment

(Figs. 5 and 6)

The desire to make transparencies from 35 mm black-and-white and colour negatives, and 35 mm duplicate negatives from reversible transparencies, led to the designing of the transparency copying equipment

Fig. 5



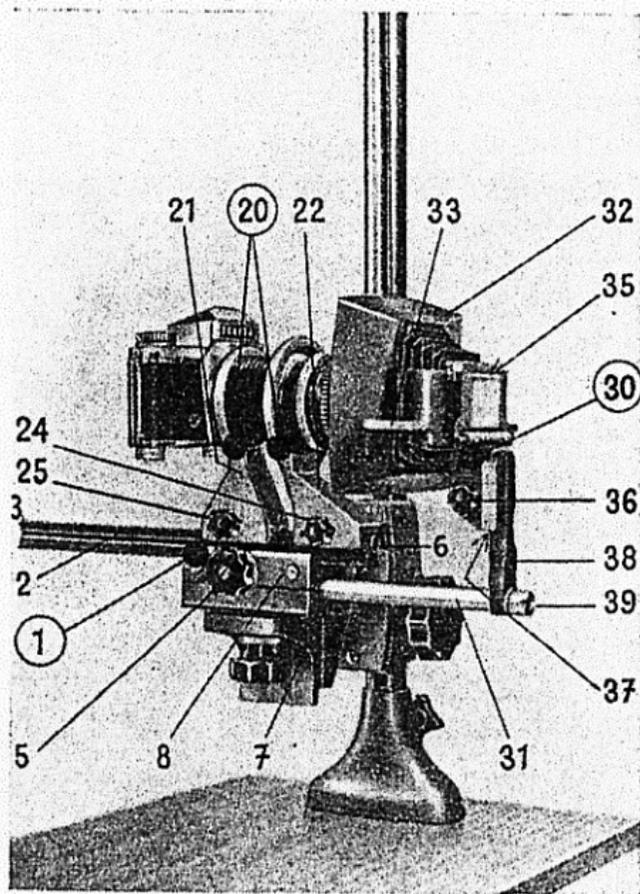
(30) being a supplement to the bellows attachment. Copying is an optical performance based on close-up photography, necessitating the use of the bellows attachment. For exposures at a ratio of 1:1 the extension increase must be equal to the focal length of the lens in use. The scale of the bellows attachment has to be set to an extension increase equal to the focal length of the lens.

The transparency copying equipment (30) has to be fixed to the focusing slide (1) by means of the coupling rod (31). For this purpose the sliding block (8) is provided with a circular opening (7). After loosening the small locking knob (9), see fig. 3, located on the sliding block (8), you can move the coupling rod (31) a little into the circular opening (7). Tighten the little knob (9), (see Fig. 3), and the transparency copying equipment is fastened securely to

the focusing slide. The transparency copying equipment (with bellows attachment) is generally chosen for 35 mm objects in the horizontal position in connection with the repro unit (see Fig. 6). You will find it most convenient to do this kind of work sitting down and looking straight into the Penta Prism (or into the built-in Prism View-finder of the camera). Of course, the Finder Hood, too, can be used for focusing with the EXAKTA.

Before the first use, the transparency copying equipment (30) has to be adjusted so that the aperture of the picture gate (35) will always fit precisely into the film window of the camera in the horizontal position. After the transparency copying equipment (30) has been fixed to the focusing slide (1), you place any negative strip into the folding picture gate (35), making sure that one of the negatives lies exactly in the aperture of the picture gate. You illuminate your

object either with normal bulbs (preferably not less than 60 watts), with opal lamps or with photolamps. Depending on the amount of heat radiating from the light source, the lamp is placed about 30 cm to 50 cm behind the picture gate (35), the opal glass of which yields an even distribution of light. Open the back of the camera, which has been fixed as shown in Fig. 6, place the little ground glass on the film window of the camera and with your camera prepared — as described before — for a reproduction ratio of 1:1, you focus, by means of the rack and pinion knobs (4 and 5), on the image visible in the ground glass. (Set the shutter to T and open it, in case of the EXAKTA VX 500 set the shutter to B and hold it open by means of the time exposure lock of the cable release.) Loosen the nut (39) with the aid of a strong screw driver. The holder (38) can now either be turned around the axis of the coupling rod



(31) or moved slightly in a horizontal direction until the image in the ground glass comes to lie exactly between the short margins of the film window in the camera. The nut (39) can now be screwed tight, as it will not be loosened again. Focusing in vertical position is performed by rise or fall movement of the picture gate (35) on the holder (38), for which purpose the locking knob (36) has to be loosened. Having been thus adjusted, the image in the ground glass must lie precisely between the long edges of the film window in the camera. After final adjustment, the locking knob (36) must be tightened again. To mark the correct adjustment we advise making a pencil stroke on the holder (38) at the point (37) designated by the arrow in Figs. 5 and 6. This adjustment always has to be observed when making duplicate ne-

Fig. 6

gatives and transparencies on a reproduction scale of 1:1. The object needs only to be placed accurately into the picture gate (35) and upon focusing either in the Finder Hood, in the Penta Prism or in the Prism Viewfinder of the camera with the aid of the rack-and-pinion knobs (4 and 5) you have exactly the 1:1 image. After this adjustment it is no longer necessary to watch the reflex image as long as your exposures are being made on the 1:1 ratio. It is advisable to stop down the diaphragm to f 8.

To avoid penetration of outside light, a transparency copying screen (32) has to be fixed at the projections (34) on the picture gate. It is secured to the two film trays (33) by means of the hooks. It will shield the camera against the light beam of the light source so that you are not dazzled when focusing. To avoid outside light especially

from the picture gate, it is profitable to work with the transparency copying equipment in a slightly darkened room.

As already mentioned, the single negatives, or negative strips, are inserted into the opened picture gate (35). Film trays (33) on both sides hold the ends of the strips. It is advisable to use the folded paper masks, two of which are delivered along with the equipment to push in the single negatives. The mask projects from the sides of the picture gate and can be moved sideways in both directions for critical adjustment of the picture outline in the 1:1 ratio and also when reproducing smaller singled-out parts of films. (See next section.) To make negative copies of 5 cm X 5 cm ready mounted transparencies, the latter are inserted into the frame behind the projections (34). When copying alternately film negatives and

ready mounted transparencies it will in each case be necessary to refocus.

Exposure takes place by means of the camera shutter.

As a rule, the scale of reproduction will be 1:1. It is also possible, however, to select smaller parts of a negative for the copy. This, of course, requires a somewhat longer camera extension, attainable, e. g. in the distance between camera holder and lens holder (21 and 22) in the bellows attachment. The negative is laterally adjustable in the picture gate (35), and the whole picture gate itself is arranged for vertical adjustment. The latter is achieved as before mentioned by loosening the locking knob (36) and moving the picture gate slightly up or down. The picture gate is fastened in posi-

tion by tightening the locking knob. Focusing is accomplished optically, based on the reflex image of the camera, and mechanically by actuating the rack-and-pinion mechanism of the focusing slide (1).

For the optical production of 35 mm transparencies from larger negatives, it is best to work with the apparatus in the vertical position, using the repro unit or the copying stand and some kind of lightbox. See also note on page 23.

#### No. for ordering

Transparency copying equipment (30) with ground-glass screen and 2 paper masks for single negatives (the transparency copying equipment is for use with bellows attachment only)

715.524

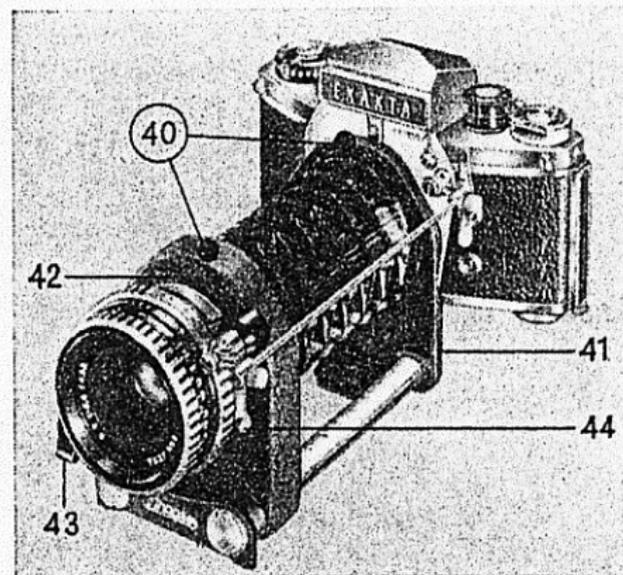
## The Miniature Bellows Attachment (Fig. 7)

The miniature bellows attachment (40), which is easily carried, is particularly intended for taking close-ups by hand, but, of course, it can also be employed on any tripod or on any copying stand.

It is possible to fasten the camera to the camera holder (41) either in vertical or horizontal position. In case of horizontal positioning make sure that the red dot on the camera is exactly opposite the single red dot, and in case of vertical positioning it must be opposite the double red dots on the camera holder (41). Seen in viewing direction, swing the camera to the right until the locking lever on the camera bayonet clicks in. To secure the lens on the lens holder (42): Make sure that the red dots are opposite each other, give the lens

a short turn to the right until the locking lever (44) on the lens holder clicks in. Loosen the locking knob (43) on the lens holder (42) and set the desired extension increase, between 35 mm and 125 mm: push

Fig. 7



the lens holder (42) forward and secure it by means of locking knob (43). The graduation lines on the right guide shaft are spaced 10 mm. The extension increase is read in front of the guide stud on the lens holder. During transportation, or when storing away, do make sure, for the sake of preserving the bellows, that camera holder and lens holder (41 and 42) are pushed together and that the lens holder is fixed!

When photographing by hand, the entire apparatus is easily pointed at the subject. When employing a tripod, we recommend the use of a sturdy ball-and-socket joint. Camera and lens holder have English tripod sockets ( $\frac{1}{4}$ ""). When using tripods or ball-and-socket joints with  $\frac{3}{8}$ " sockets an adapter must be employed. Either the tripod socket in the camera or in the lens holder may be used, depending on the centre of gravity of the entire apparatus. The tripod

socket in the lens holder (42) is recommended for heavy lenses featuring long focal lengths.

In order to employ the fully automatic pressure or spring diaphragms of modern lenses, the autocouple extension release (with long coupling rod) is inserted between lens and camera (Fig. 7).

When photographing by hand, fine focusing is done by moving the entire apparatus to and fro, the desired scale of reproduction having been preset. The same focusing method is possible with the copying stand by means of its rack-and-pinion knob. If a tripod is used only, focusing can be accomplished by moving the lens holder (42) to and fro; in such a case, however, the scale of reproduction will change with the varying object distance.

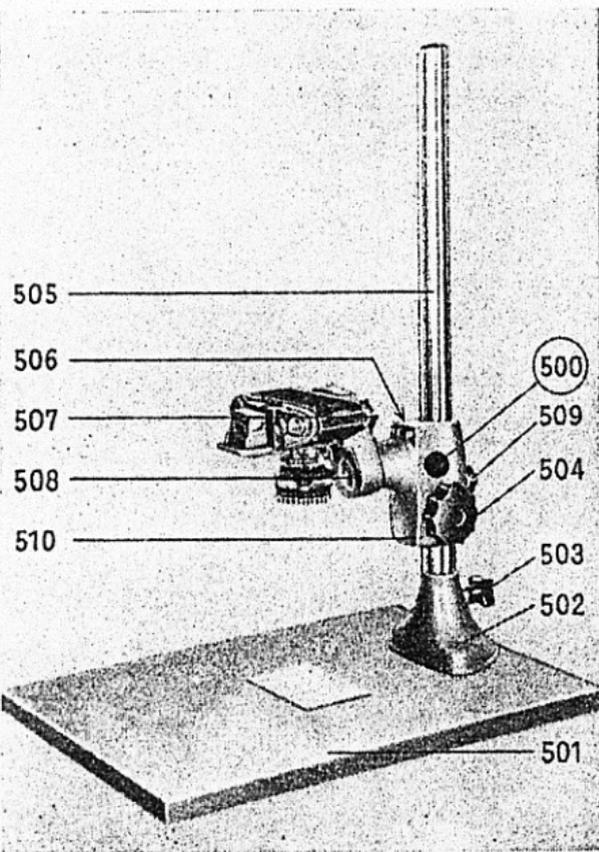
With a standard 50 mm lens any reproduction scale from 0.7 (extension increase

35 mm) to 2.5 (extension increase 125 mm) can be obtained, and subjects measuring from 34 mm  $\times$  51 mm down to 10 mm  $\times$  14 mm are fully shown on the negative. The special lens T 2.8/50 mm with sunk mount from Jena will assist you with the miniature bellows attachment (40) to reproduce larger subjects in full size and permit focusing to infinity. With this special lens the indicated extension increase must be reduced by 35 mm, so that extension increases from 0 to 90 mm can be reached.

The miniature bellows attachment is not practicable for wide angle lenses of shorter than 30 mm focal length; however, any long-focus lens can be used, if its weight permits.

#### Nos. for ordering

Miniature bellows attachment (40)	717.600
Special lens T f 2.8/50 mm with sunk mount from Jena	712.800



## Copying Stand and Repro Unit

(Figs. 8 . . . 15)

These designations do not fully show the versatile applicability of the copying stand and the repro unit. Fundamentally they are intended as equipment to assist in efficient reproduction work; however, they are equally useful as practical aids in many combinations as table stands, both for horizontal or vertical work. The copying stand (500) will receive the camera directly, extension increase being obtained by inserting bayonet adapter rings and tubes or the miniature bellows attachment (40). The repro unit is used in connection with the bellows attachment (see page 7).

Packing facilities require repro stand and repro unit to be shipped in the disassembled state. They are reassembled in the following manner; fasten column base (502) to the wooden baseboard (501) by screwing

Fig. 8 Copying Stand

the bolts with mounted washers through the baseboard from below into the column base (the washers must be placed between the bolt head and the baseboard). Thereafter insert the metal column (505) with the column head (510) into the column base (502) and secure it by means of locking the screw (503). Loosening this screw will permit rotating the column. In this way it will be possible to turn the entire photographic apparatus 180° backwards, if rather large objects at a large distance must be photographed (for instance from the edge of the table down to the floor). In this case the baseboard (501) must be weighted, if necessary. The locking screw (509) must be screwed into the socket on the column head (510).

The large hand-wheel (504) serves to move the column head (510) rapidly and effortlessly to any required height, where it is fixed by means of locking screw (509). When

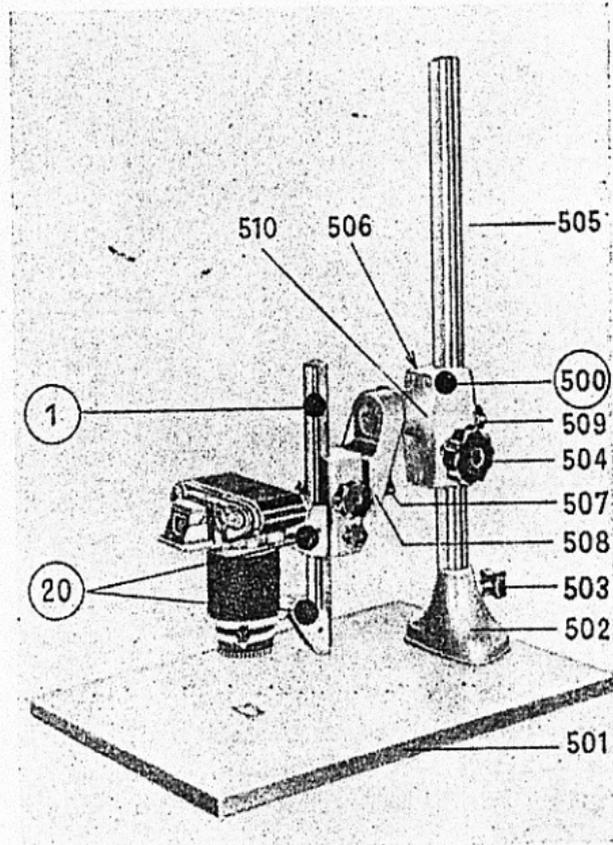


Fig. 9 Repro Unit

loosening the locking screw (506) located on the other side of the column head, then the front part (508) of the column head (510) can be turned into the desired position where it will stay after the locking screw has been retightened.

The copying stand (500) will accept the camera with bayonet adapter rings and tubes directly by means of the rotatable front part (508) of the column head on to which it is screwed. For the repro unit, the bellows attachment together with camera and lens is fixed on the front part (508) of the column head. For this purpose, the attachment is equipped with two fixing screws (507 and 512) (one with  $\frac{3}{8}$ " thread, the other with  $\frac{1}{4}$ "). The front part (508) of the column head is turned upwards or downwards (see Figs. 8 and 9), the oblong hole pointing in a vertical direction. The camera or the sliding block (8) of the bellows attachment are screwed on the black protection strips by means of fixing screw (507) which has been pushed through the

oblong hole. The locking nut of the fixing screw (507) must be drawn tight against the black knob, and its bore must point towards the screwhead. Finally, the locking nut is screwed tight by turning it in the direction of the camera. For the above-described setup, the small angular piece (511) which has possibly been screwed onto the front part (508) of the column head before shipment — see Figs. 10 and 11 — must be removed.

The desired scale of reproduction is obtained by the length of the extension increase (bayonet adapter rings and tubes, or bellows attachment, detailed information on which will be found on page 8). Fine focusing is done by moving the column head (510) up or down and by control of the reflex image in the camera. It goes without saying that focusing with the repro unit can also be done with the rack-and-pinion drive of the focusing slide (1) after the column head (510) has been given the necessary distance from the baseboard

(501). The baseboard (501) is suited for subjects measuring up to DIN A 4 (21 cm  $\times$  29.7 cm).

When photographing transparent objects any illuminating box placed on the baseboard (501) will do. Such a box will render it possible to make either transmitted-light photographs from below, or incident-light photographs or photographs by a combination of these illuminations. The illuminating box will also serve for making miniature transparencies (35 mm) from larger negatives: For this purpose place the negative upon the opal glass of the illuminating box which is illuminated from below, and proceed in the usual manner (using the camera as in case of any usual reproduction).

If copying stand or repro unit shall serve for working in horizontal direction (i. e. for pictures at a far distance, for reproductions of larger subjects fastened to a wall or for

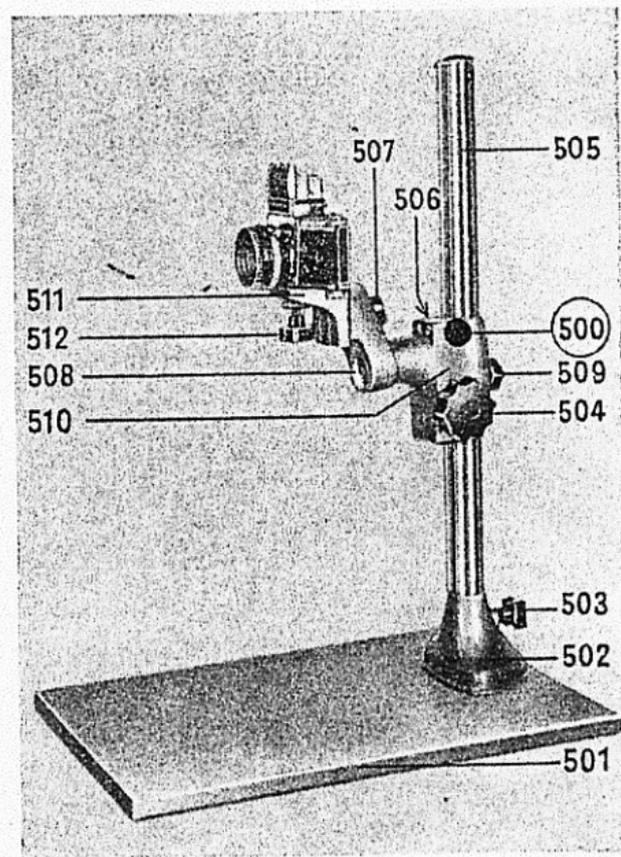
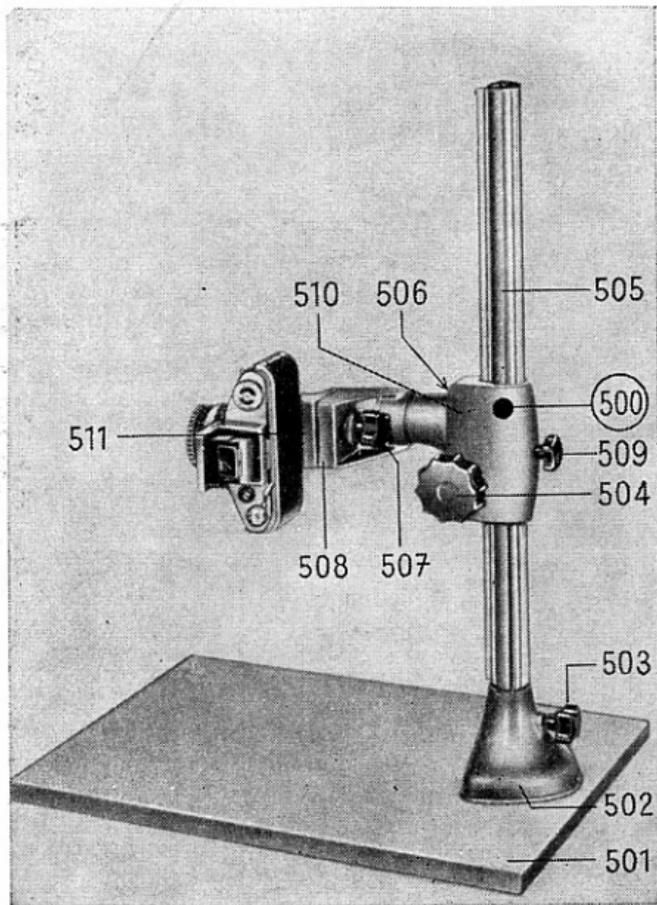


Fig. 10 Copying Stand



close-ups), the angular piece (511) is screwed on to the rotatable front part (508) of the column head and turned in such a way that its black protection strips will lie horizontally upwards. (See fig. 10.) The angular piece (511) is fixed with the locking screw (507). The camera or bellows attachment are put on the black protection strips of the angular piece, the second locking screw (512) is passed through the oblong aperture in the angular piece and then camera or bellows attachment are screwed on in the already described manner. The camera can be set to any required position by simply turning column (505) and front part (508) of the column head (Figs. 10 and 11). When taking horizontal pictures with the aid of the Penta Prism of the camera being directly fixed on the angular piece (511), set the column head (510) high enough so that the column (505) does not stand in the way when looking into the viewfinder.

Fig. 11 Copying Stand

## Lighting Equipment, an accessory to Copying Stand and Repro Unit

(Fig. 12)

For the uniform lighting of reproduction objects or other close-ups the lighting equipment (600) can be applied by fixing it on repro unit or copying stand (Fig. 12).

Lighting equipment (600) is slipped on to the metal column (505) from its bottom end. Fixing screw (503) is loosened and column (505) is taken out of its base (502), the lower end of the column is passed through clamping ring (602) and the column is replaced into its base and fixing screw (503) is pulled tight.

The working position of the lighting equipment (600) is adjusted to the subject to be reproduced and to the desired scale of reproduction. For enlargements of small

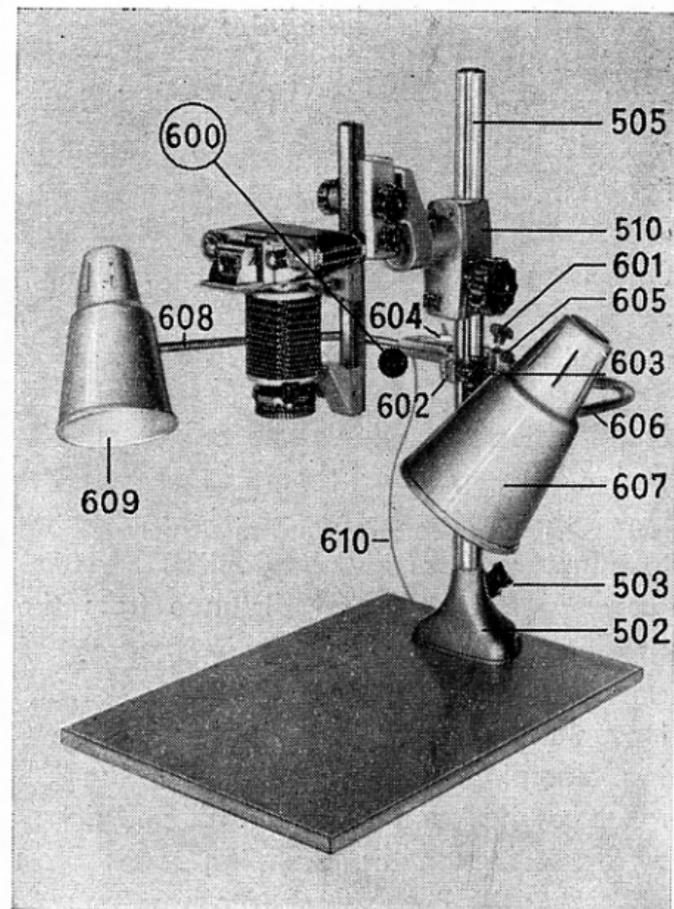


Fig. 12 Repro Unit

objects, fasten the lighting equipment to the lower part of column (505) by means of clamping screw (603). For scaled down reproductions of large objects, place the lighting equipment in the middle or at the upper end of column (505) and fasten by tightening screw (603). The possibility of adjusting the column head (510), however, must always be ensured.

Small objects can have the reflectors (607 and 609) very near them; large objects, however, require the spacing large enough to permit uniform illumination. Both reflectors must be at equal distance from the centre of the object to be reproduced. When adjusting the position of the reflectors just loosen the holding device (605) by loosening clamping screw (601) and swing the reflectors (607 and 609) upwards and downwards. Retighten the clamping screw (601) and bring the light source into position with

the aid of the flexible arms (606 and 608). We recommend illumination at an angle of  $45^\circ$  in order to prevent flare. Cable (610) and switch (604) will connect the lighting equipment to the mains. The reflectors (607 and 608) are designed for bulbs of up to 60 W.

### Photomicrography with Repro Unit (Figs. 13 and 14)

With the aid of a microscope attachment the EXAKTA and EXA cameras can be placed upon any commercially known microscope. Quite a few photographers do not like bringing the camera into direct touch with the microscope. The EXAKTA „Vielzweck“ offers the possibility to join camera and microscope without rigid fastening of repro unit is used as shown in Figs. 13 and 14. Lens holder (22), into which no lens has

been set receives the light baffle (513) which must be screwed into the socket on the lens holder (22). It is taken for granted that the microscope is equipped with a light-terminal sleeve (514) otherwise it is also available as part of the accessories of the EXAKTA „Vielzweck“. Said terminal sleeve is slipped on the ocular fitting of the microscope. Both light protection devices must fit into each other without coming into contact in a way leaving no possible opening for penetrating secondary light. The vertical arrangement will be found most suitable. The bellows attachment, which influences the scale of reproduction on the film will help to obtain the required extension increase. More detailed information will be learnt after reading the special publications on photomicrography.

Column head (510) attached to column

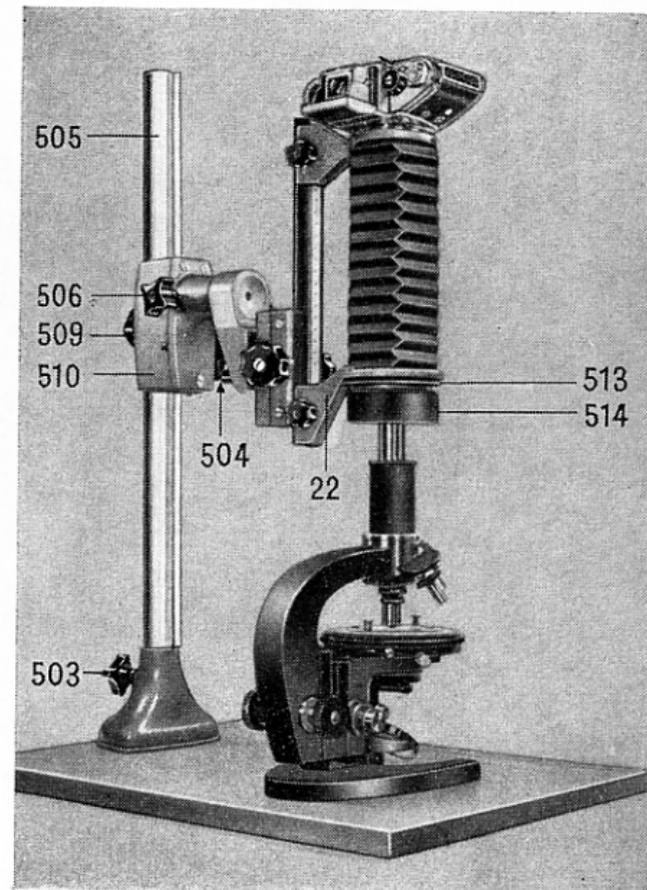
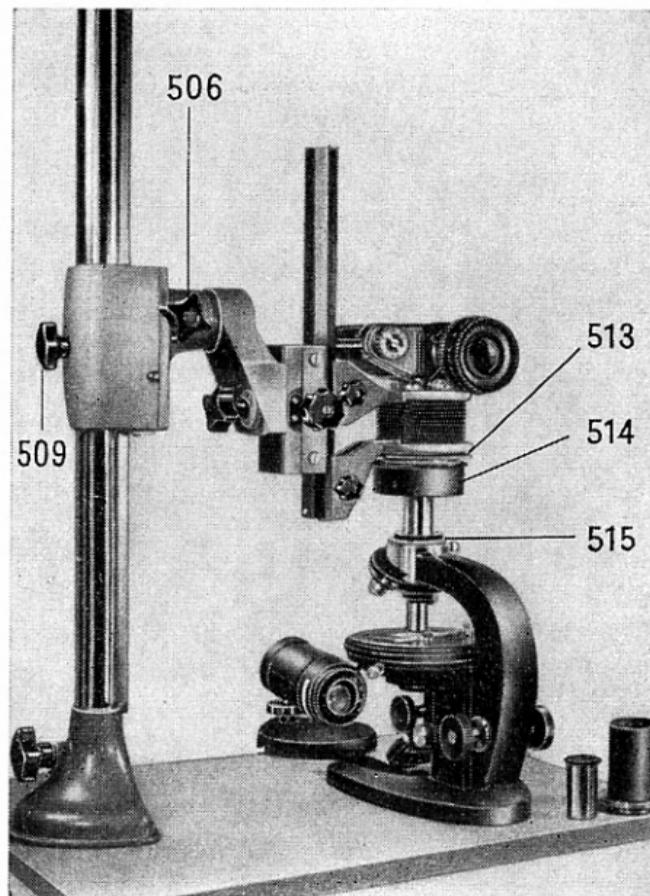


Fig. 13



(505) can be set to the height of the microscope. The photographic equipment is centered over the microscope so that the camera, in this case without its lens, is exactly above the optical axis of the microscope, meaning that the image produced by the lens and ocular of the microscope is projected into the camera. For swinging column head (510) with camera attached just slacken clamping screw (503) and re-tighten after centering. Turn hand-wheel (504) and move the column head (510) downwards until the light protection devices (513 and 514) fit into each other, but do not contact. When interrupting your photographic work on the microscope, just move the column head a little upwards, loosen the fixing screw (503), and swing the whole apparatus to one side. When resuming the photographic work, just swing

Fig. 14

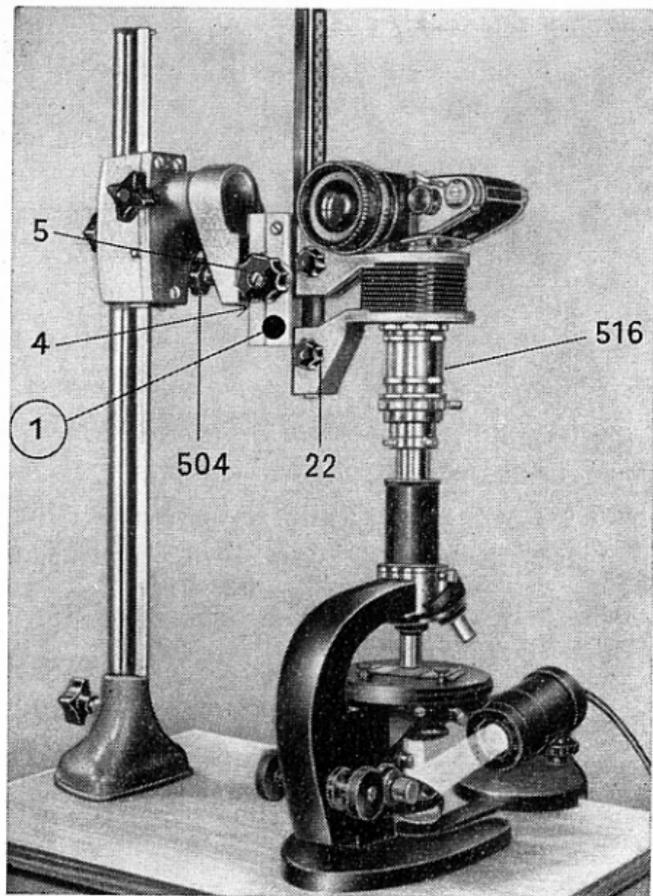
the apparatus back into its old position and proceed as described above.

With the aid of the Micro-Stands L and N from Jena you will find it possible to make extreme close-ups (lower magnification than micro-exposures). You choose a suitable lens, for example the special lenses „M“ from Jena and work without the ocular of the microscope. Remove the black tube of the microscope and replace it with the special microscope protective ring II (515) – Fig. 14 – which is set into the quick-change mount on the tube carrier of the Micro-Stands L and N from Jena. At the top of this special microscope protective ring II is the thread for receiving the ocular mount of the microscope. This mount must be screwed out of the black microscope tube and screwed into the mount of microscope protective ring II (515). As a result the space between lens and film plane has

become narrower, in correspondence to the lower magnification, but the method of working remains the same as described before.

### Photomicrography with Repro Unit and Microscope Attachment (Fig. 15)

In photomicrography lenses yielding up to tenfold enlargements sometimes reveal optical under-corrections, which can be decreased by simply lifting the ocular for focusing the reflex image in the camera. The equipment required consists of the repro unit and the microscope attachment (516) – see Fig. 15 –. The microscope is placed in the usual way on the baseboard of the repro unit. Remove the ocular of the microscope, separate the lower part of the microscope attachment from its upper part by loosening the milled screw and fix the



lower part on the ocular mount; replace the ocular and fasten the lower part by turning the notched ring to the left, during which performance the knurled edge is held tight. Now, rejoin upper and lower part of the microscope attachment, but do not tighten the milled screw. The microscope is placed underneath the bellows attachment with camera on top so that the axis of microscope and microscope attachment are in line. Turning the rack-and-pinion knobs (4 and 5) of the focusing slide (1), or turning hand-wheel (504) will lower the whole apparatus until the bayonet ring located at the top of the microscope attachment engages with the bayonet mount of the lens holder (22). The red dots on bayonet ring and lens holder must be precisely on top of each other. The bayonet ring having slipped into the mount, the upper part of the

Fig. 15

microscope attachment must be turned until it snaps in. Thereafter you tighten the milled screw located on the quick-change mount of the microscope attachment and loosen its clamp ring, which, when working without the repro unit, normally holds the microscope attachment to the microscope. On turning the pinion knob on the focusing slide or the handwheel at the column, the whole apparatus, microscope attachment included, will move and you will be able for coarse focusing to lift the ocular separately without the microscope lens.

Critical focusing is done as usual with the micrometer screw of the microscope.

#### Nos. for ordering: Copying Stand, Repro Unit and Accessories

Copying stand (500)	715.516
Repro unit with bellows attachment (500 + 1 + 20)	715.520
Lighting equipment (600) for the two before-mentioned units	721.312
Bellows attachment (1 + 20)	715.510
Special lens T f 2.8/50 mm with sunk mount from Jena	712.800
Transparency copying equipment (30)	715.524
Light baffle tube (513)	715.600
Light-terminal sleeve (514)	716.600
Microscope protective ring II (515)	715.700
Microscope attachment (516)	715.300

### Tripod plate with swing angle top (Fig. 16)

An extra simple supplementary part, the tripod plate (70), equipped with Continental and English thread, has been designed for

Fig. 16

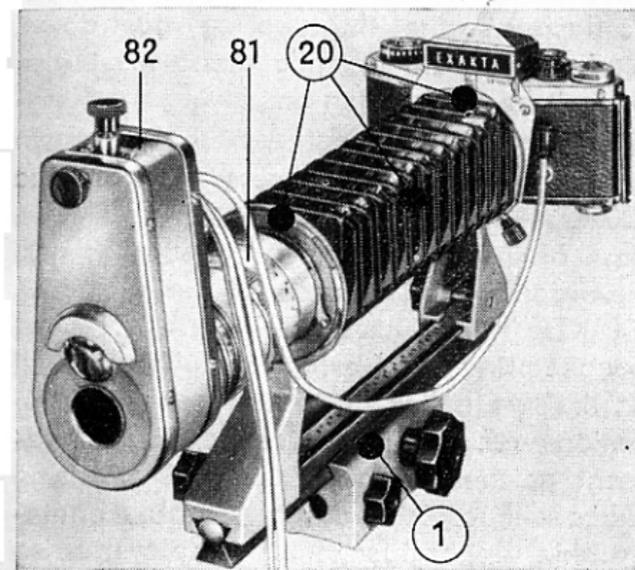


special work with the swing angle top (10). It can be screwed to any tripod. On the tripod plate (70) is a short slide rail (71) to accept the swing angle top (10), on which particulars have been given on page 3. The tripod plate will be found most convenient, where the camera is being used with long-focus or very heavy lenses (without a tripod socket of their own) perhaps, too, with an extra extension increase by means of bayonet adapter rings and tubes – see Fig. 16. In order to balance out the weight in such cases and to ensure tripod steadiness and vibrationless working of the camera, the swing angle top (10) with the camera on the slide rail (71) has to be pushed away from the vertical axis of the tripod until the whole apparatus is equally balanced. Also, the movements of the swing angle top (10) on the slide rail (71) of the tripod plate prove very practical in close-up work. Tripod with camera can be set up firmly in front of the subject, nevertheless there is still sufficient play for focusing, due

to the fact that the swing angle top (10) can be moved to and fro on the slide rail (71).

### Nos. for ordering

Tripod plate (70)	155.13
Swing angle top (10)	155.03



When ordering the swing angle top, we request you to state whether your camera has an English or Continental tripod socket.

### The EXAKTA Ring-Flash Unit RB 1 (Fig. 17)

The Ring-Flash Unit RB 1 (82) can be used for practically every kind of close-up photography and provides one of the most convenient methods of taking close-up pictures by flash. The flash tube surrounding the lens in an annular arrangement provides a constantly uniform frontal illumination which will always be necessary if very short lens-subject distances exclude the use of lateral illumination, if a virtually shadowless illu-

Fig. 17

mination is required or if the interiors of cavities shall be photographed. Apart from these particular tasks the ring-flash unit RB 1 will always be in place whenever an efficient and effortless illumination for close-ups is desired. This modern light source is nearly indispensable in the whole technical, scientific and general documentary photography, for owing to the brief flash duration of the shutter-synchronized electronic flash tube the highest possible definition is ensured even in case of photographing moving subjects, such as the balance of a watch, mechanical operations, insects and other small animals etc. During focusing a proper illumination is ensured in all cases by the pilot light (6 V) which can be adjusted in all three planes.

The EXAKTA Ring-Flash Unit RB 1 is fitted with its own triggering equipment and can be connected to all electronic flash units up to 125 joules power output, with operating voltages up to about 500 V. Working with a lower voltage than appr. 400 V will

do no damage to the tube, however, in that case no exact ignition can be guaranteed. In order to avoid overloading the tube, only a specified number of flashes per minute may be ignited: at 125 joules 6 flashes, at 100 joules 8 flashes, at 65 joules 12 flashes, at 50 joules 15 flashes. In case of photographs taken in series an interval of 10 minutes will be necessary after each 15 flashes so that the tube may cool down. During this time the pilot lamp must also be switched off. When employing the Ring-Flash Unit RB 1 you can use the well-known extension-increasing accessories of the EXAKTA and EXA reflex cameras, i. e. in case of the EXA Ia the bayonet rings and extension tubes, in case of the EXA 500, EXAKTA VX 1000 and EXAKTA VX 500 the bayonet rings and extension tubes as well as the two bellows attachments. Its combination with the miniature bellows attachment or the bayonet rings and extension tubes will result in a very movable photographic apparatus to be employed also

without a tripod. The Ring-Flash Unit RB 1 can be used even with miniature cameras produced by other manufacturers so long as these are employed with extension-increasing accessories and with special lenses having focal lengths between 100 and 135 mm. It can be screwed directly on to lenses with an M 49  $\times$  0.75 mm front filter thread, and can be mounted on other lenses with the aid of adapter rings. The light-baffle tube of the Ring-Flash Unit is provided with an M 24  $\times$  0.5 mm screw-in thread for filters, photomicrography lenses (e. g. the lens M from Jena), etc., for this purpose appropriate adapter rings must be employed.

The Ring-Flash Unit RB 1 when supplied with the bellows attachment and the special lens S 4/135 mm from Jena (which stops down to f 45) is known as the „EXAKTA Kolpofot“ (Fig. 17). This combination has proved itself to be of excellent value in many fields, but especially in medical photography. Highly successful close-up

pictures of the eyes, skin, teeth and ears, etc., can be taken with ease and convenience. The Kolpofot is primarily employed, however, for photographing body cavities (vagina, mouth and pharynx, etc.). Despite its simple operation, it is possible to obtain intravaginal pictures revealing even the finest structures with such clarity of detail that they can reliably be employed as a basis for diagnosis. In this way series of examinations, as in treatment of cervical cancer, can be prepared without difficulty. The long-focus lens (81) ensures that a favourable lens-subject distance of about 20 cm (8 inches) can be obtained, whilst in conjunction with the long bellows extension it provides a 1.6 times magnified image of the subject on the final negative. The Penta Prism of the EXAKTA, which in this case is fitted with a clear screen with hairlined cross, gives an image of 7 times magnification, so that in the most critical instances the finest structural details are easily recognizable.

## Nos. for ordering

EXAKTA Ring-Flash Unit RB 1 (82) with pilot-light and cable only	719.600
Complete EXAKTA Kolpofot including bellows attachment (1 + 20), lens S 4/135 mm from Jena (81) with aperture closing to f 45, Ring-Flash Unit RB 1 (82) with pilot-light and cable	715.511
Lens S 4/135 mm from Jena (81) with aperture closing to f 45	704.371

It is necessary, when working with the EXAKTA Ring-Flash Unit RB 1, to use an electronic flash unit with a power output of up to 125 joules and a nominal operating voltage of appr. 500 V as well as a transformer with a nominal operating voltage of 6 V for the pilot light. When working with the complete EXAKTA Kolpofot, it is necessary to use a sturdy tripod with pan and tilt head.

At the customer's request, the EXAKTA Kolpofot is also available with the lens

S 4/135 mm from Jena (with fully automatic spring diaphragm and aperture closing to f 22). For the fully automatic diaphragm of this lens a twin cable-release is required.

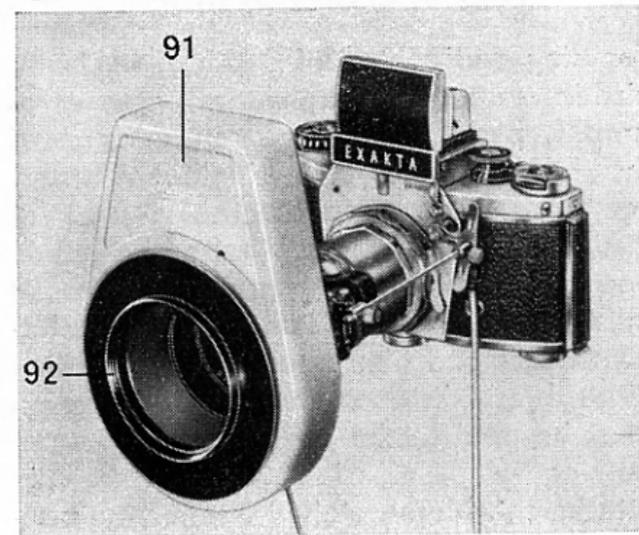
Complete EXAKTA Kolpofot equipped as mentioned above, but with the lens S 4/135 mm from Jena (with fully automatic spring diaphragm and aperture closing to f 22)	715.511 VSB
Lens S 4/135 mm with fully automatic diaphragm and aperture closing to f 22	706.371
Adapter rings for the light-baffle tube for screwing in photomicro- graphy lenses with thread W 0,8" $\times$ 1/36"	701.961
with thread M 26.5 $\times$ 0.5	701.962
Adapter ring for the transition from the RB 1 thread (M 49 $\times$ 0.75) to the thread of the EXAKTA extension tubes (M 40 $\times$ 0.75) (this adapter ring will be required when working with-photomicro- graphy lenses)	701.963

## The EXAKTA Ring-Flash Unit RB 2 (Fig. 18)

The EXAKTA Ring-Flash Unit RB 2 (91), too, shows the principal advantages of the model RB 1, it is provided with its own triggering equipment and can be connected to any electronic flash units (power output of up to 250 joules, nominal operating voltage appr. 500 V). Working with a lower voltage than appr. 400 V will do no damage to the tube, however, in that case no exact ignition can be guaranteed. In order to avoid overloading the tube, only a specified number of flashes per minute may be ignited: at 250 joules 3 flashes, at 200 joules 4 flashes, at 150 joules 5 flashes, at 125 joules 6 flashes, at 100 joules 8 flashes, at 65 joules 12 flashes, at 50 joules 15 flashes. When series of photographs are taken, an interval of 10 minutes will be necessary after each 15 flashes so that the tube may cool down. The unit RB 2 is equipped with a flash tube having a greater ring diameter

so that you can work not only with special lenses of medium focal length, but also with the standard lens 50 mm of the miniature camera. The following extension-increasing accessories of the EXAKTA system can be employed: bayonet rings and extension tubes as well as the large bellows attachment. Screwed-on supplementary len-

Fig. 18



ses can also be used. The Ring-Flash Unit RB 2 is of a somewhat simpler construction (e. g. no pilot light). A filter holder (92) is supplied permitting to adapt illumination to the subject width desired. In that way users are enabled to insert light-absorbing commercial filters into the light path (screw-in thread M 58 × 0.75) or to reduce the light

intensity of the flash tube by means of ring-shaped grey-filter foils.

#### Nos. for ordering

EXAKTA Ring Flash Unit RB 2 (91)	
with cable and filter holder (92)	
with two grey-filter foils (E 0.6)	719.700
Ring-shaped grey-filter foil (E 0.6)	701.974

### Some hints concerning Macrophotography and Photomicrography

Focusing and control of depth of field are, also in macrophotography and photomicrography, performed on the reflex image of the EXAKTA and EXA single-lens reflex cameras. In macrophotography, as the distance between the subject and the lens becomes shorter, the image will increase in size. The image distance (distance between lens and film plane) increases when the subject distance decreases. Attention must be paid to the exposure factor, when working with extension tubes or bellows attachment. More detailed information con-

cerning scales of reproduction, subject distance and image distance, etc. will be found in the instructions on „Macrophotography and Photomicrography“ and „Tables for Close-ups“ which you will obtain free of charge as well as in the special literature mentioned at the end of this booklet.

To facilitate determining the exact exposure time in photomicrography, stationary macrophotography, and for optical copying of slides we recommend the EXAKTA Macro-Micro Photometer. A selenium top layer element is moved into the path of the

light beam, thus allowing accurate measurement of the effective image-producing light inside the camera, evaluating also any eventual extension increase factor. For the use of the EXAKTA Macro-Micro Photometer a conventional micro-ammeter or galvanometer with light measurement scales is required.

As a useful accessory and focusing aid in macrophotography and photomicrography we recommend the Lens Magnifier to be inserted into the EXAKTA instead of the Finder Hood or the Penta Prisma. The lens magnifier makes it possible to focus and examine the reflected image with one of the highly corrected standard or special lenses making visible a largely distortion-free, evenly sharp and extremely enlarged reflex image. Should there be no lens available for this purpose, then we recommend the well-corrected top lens, designed especially for the Lens Magnifier.

With a long camera extension and perhaps with a small lens opening, a darkening of

the reflex image becomes unavoidable, so that it will seem desirable to focus through a clear spot in the ground glass straight on the bright aerial image. Close-ups from a 1:1 ratio upwards and photomicrographs can be made in this way with one of the special focusing magnifiers in the viewfinder systems of EXAKTA and EXA Ia. The magnifiers have a hairline cross in the clear spot. They are available also of completely clear glass with hairline cross. Upon request there are available individual types of magnifiers, with etched lines, squares, millimetre or centimetre division, etc.

Finally a few remarks have to be made regarding optical conditions in magnified photography with camera lenses. These lenses are highly corrected for ordinary exposures based on long subject distance and short image distance. But, whenever the negative picture already appears enlarged – and this is the case with magnified exposures – the image distance is greater than the subject distance. Therefore, in order

to maintain the full working capacity of the lens, it is advisable, for magnifier exposures (especially those with more than 1.5 fold enlargement), to reverse the lens, turning the rear element in the direction of the subject. This is possible with the aid of special „lens reversal rings“. On one side, these rings have the thread for the tubes or for the rear bayonet ring, and on the other side is the thread to accept the front section of the lens. In ordering a lens reversal ring please mention exactly the thread of the lens front mount. To fasten the „lens reversal ring“ to the lens carrier of the bellows attachment, the rear ring of the pair of bayonet rings must first be screwed into the mount of the lens carrier. If the lens is mounted reversed on the bellows attachment, the scales on the focusing slide become invalid. Scale of reproduction, exposure factor, image distance, subject distance are best evaluated with the aid of a focusing magnifier featuring

a millimetre division. Any type of millimetre rule is held in the focal plane, and the size to which the subject has been enlarged can easily be read on the magnifier scale of the camera viewfinder.

For over 5 times magnification, it is not advisable to use the camera lens, even in its reversed position. Instead, the photomicrographic lenses specially constructed for extreme close-ups, e. g. the lenses „M“ from Jena should be used. For this purpose there are available adapter rings with screw threads for these lenses. Having in their centre the thread for the desired lens „M“ from Jena, they can be screwed into the rear ring of the pair of bayonet rings. This bayonet ring (with the adapter ring and the lens „M“ from Jena) is then placed into the lens holder of one of the bellows attachments. In ordering the adapter ring, please do not forget to mention the focal length of the lens „M“ from Jena.

## **EXA Models and the EXAKTA „Vielzweck“**

The EXAKTA „Vielzweck“ is an essential part of the fully developed EXAKTA system, and is therefore mainly used with this high performance camera. But, in addition, the equipment may also be used with the EXA 500, the only reservation being that this model does not feature an interchangeable viewfinder system and, accordingly, interchangeable focusing magnifiers. The EXA Ia, however, in conjunction with the Vielzweck is limited, in so far as when using the bellows attachment, the negative will suffer cut-off on its longitudinal sides (vignetting). This is unimportant when using the normal

lens with an extension of between 20 mm and 50 mm approximately, as a sufficiently large image will remain. A larger extension should be avoided. The EXA Ia should not be used in conjunction with the transparency copying equipment or the Kolpofot.

The contents of this booklet require, to a certain extent, some knowledge regarding the applicability of the cameras and their accessories, as well as general skill in the photographic field. We call your attention to some leaflets, instruction manuals, and special literature. If available, prospectuses and instruction manuals are to be had free of charge. Please apply to your photographic dealer.

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