WILSONWERKS ARCHIVES

◀ Globe Daisies

Macrophotograph, reproduction scale 1:1, photographed in its natural surroundings. Taken from above with Macrostat and 75 mm lens.

Close-up photograph Reproduction scale 8 : 1. Freshly picked flowers photographed indoors with Macrostat and 75 mm lens + Tuban. ▼

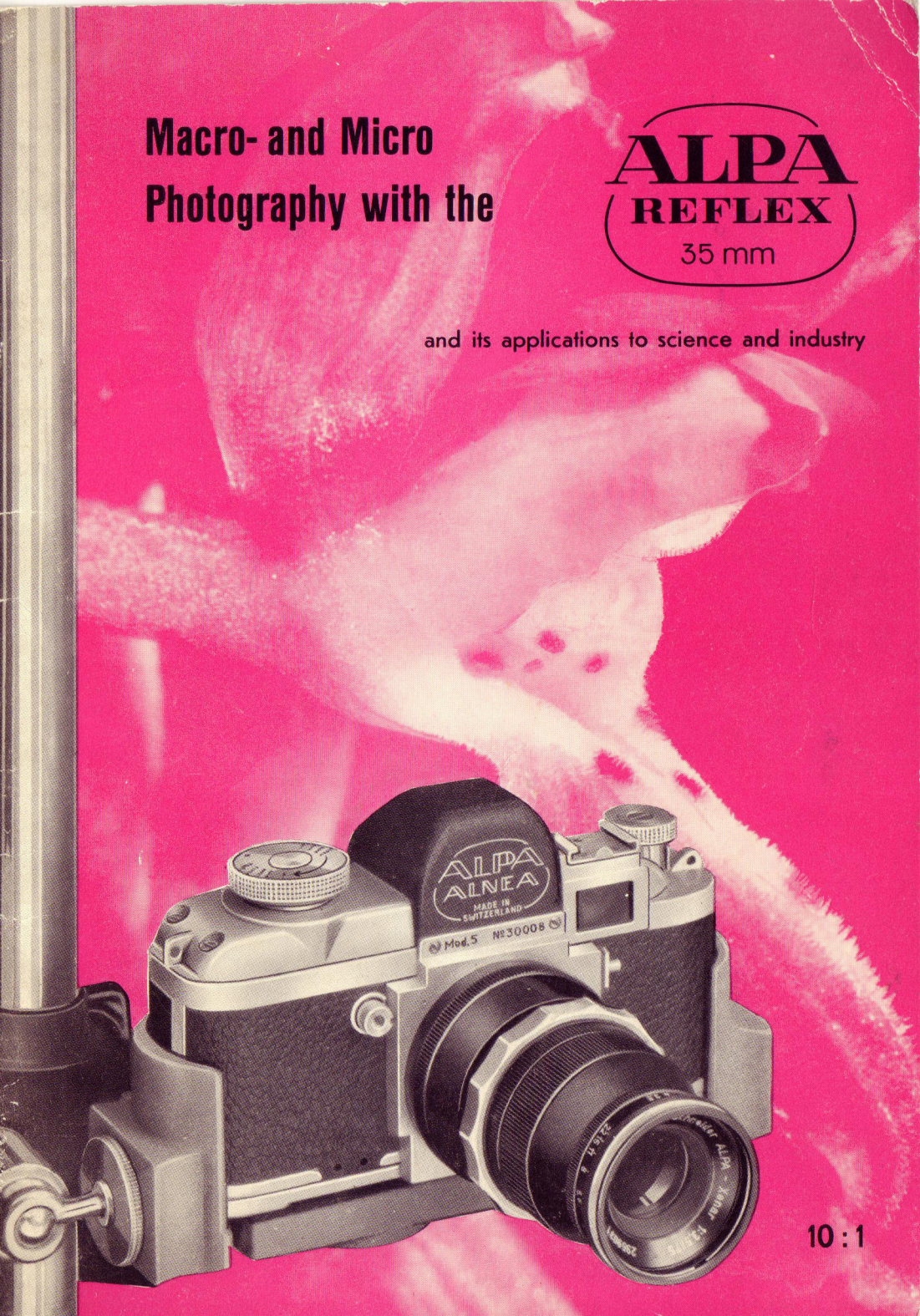
MACRO-STAT

Macrophotograph ▲
Reproduction scale 1.4 : 1.

Macro- and Micro Photography with the

ALPA
REFLEX
35 mm

and its applications to science and industry



10 : 1

The ALPA All-In-One 35 mm Camera Applied to Copywork, Macro (Close-up) Photography and Photomicrography

Introduction :

Parallax-free, "through-the-lens" focusing combined with a precision-ground prism and an extremely fine-grain groundglass make the ALPA the ideal camera not only for general photography, but also for any special application in science and industry. The ALPA single-lens reflex system with its exceptionally brilliant and sharp "lifesize" image provides utmost ease of direct focusing and composition, with any lens, at any distance, for any magnification—and **without** the addition of complicated and expensive reflex housings, sliding attachments and other "Extras".
The logical 45° viewing angle of the ALPA allows the most natural position of the head for absolutely comfortable work, especially if the camera is mounted on a close-up stand or a microscope. It is also the ideal focusing set-up for those who wear glasses.

ALPA Macrostat close-up stand in field use with double-sided Macrostat mirror used as reflector.

Globe Daisies
(Globulosia vulgaris)

The three comparative pictures of the same subject reproduced opposite are an excellent visual introduction to Macrophotography.

Above left : *Photographed with ALPA and ALPA Xenar 75 mm f/3.5, fully extended, without additional accessories, on Macrostat stand. Negative scale 1 : 4, reproduction scale 1 : 1 (for explanation of these terms see page 5).*

Below left : *As above, but with addition of Tuban 2 extension tube. Negative scale 1 : 2, reproduction scale 1.4 : 1.*

Below right : *Close-up of a single flower using the same set-up, but with addition of Tuban 4 + 3 + 2 + 1. Negative scale 1.5 : 1, reproduction scale 8 : 1.*

Cavalier-Savonette-Watch
made about 1820.

Macrophotograph taken with Macrostat stand, 2 reflectors and Macrostat mirror. The shadow (below left) has been purposely left, so as to indicate the shape of the object; lighting has been kept sufficiently soft in order to accentuate the design of the delicate ornamentation. Taken with ALPA and ALPA Xenar 75 mm lens. Negative scale 1 : 3, reproduction scale 3.2 : 1.

3,2:1

These unique features become especially apparent when using the Swiss precision-built camera for copy work, macro (close-up) photography and in photomicrography. The built-in prism of the ALPA reinverts the image on the groundglass and your subject in accurately framed, exactly as it appears on the film. Please note that the groundglass image of the ALPA **before** « lifesize » magnification by the optical system measures 23 x 35 mm—i. e. 1/2 mm less on all 4 sides than the actual negative area—which, of course, measures a full 24 x 36 mm frame. This corresponds exactly to the area masked off by color slide mounts and provides a useful safety margin.

Focusing with the single-lens reflex system is not limited to distances of 3 feet and more as is the rangefinder system. You have one continuous focusing range from infinity down to ultra close-ups. And while a rangefinder simply checks the correct distance to the object, the reflex groundglass shows you the exact depth of field as well—which means that you see exactly how far the zone of sharpness extends in front and behind the subject at any aperture.

Helpful Formulas :

Lens Formula : The **position** of the image formed by a photographic objective (lens) is determined by this formula :

$$\frac{1}{p} + \frac{1}{t} = \frac{1}{F}$$

p = distance between object and optical center of the lens
t = distance between image and optical center, or "extension"
F = focal length

Negative Scale : The size of the image on the negative is found by the following formula :

$$\frac{I}{0} = \frac{t}{p}$$

I = size of image
0 = size of object.

General Examples :

Object	Image
1) beyond twice the focal length $p > 2F$	between one and two focal lengths smaller than object $I < 0$
2) between 1 and 2 focal lengths $F < p < 2F$	beyond two focal lengths $t > 2F$ larger than object $I > 0$

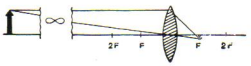

4
2:1

3) nearer than one focal length
$p < F$

Imaginary (works as magnifying glass only, not with camera)

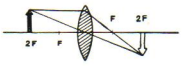
Special Examples

4) at infinity
$p = \infty$



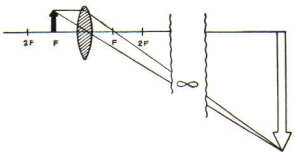
at focal point
$t = F$

5) at twice the focal length
$p = 2F$



at twice the focal length
$t = 2F$
(Object and image have the same size!)

6) at focal point
$p = F$



at infinity
$t = \infty$
(impossible to be focused)

While an object approaches all the way from infinity to a distance of twice the focal length of the lens, its image moves only from once to twice the focal length. For this reason a variable extension of the lens of one additional focal length is enough for focusing at such distances. If the extension is longer, it permits focusing at still closer distances (see example 2 above). The image also increases in size, when the object moves from infinity toward the focal point. For a "same-size" reproduction on the negative, both object and image must be at twice the focal length.

The scale of reproduction on the negative $\frac{I}{O}$, is calculated by the relation :

$$\frac{I}{O} = \frac{1}{p - 1}$$

p being expressed **in focal lengths.**

Negative Scale and Reproduction Scale

Throughout this booklet, "negative scale" means the scale to which the dimensions of the original object have been reduced or magnified, as they

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◀ **Tumbler :** *Macrophotograph with electronic flash. The bottom of the glass contained a granulated medicine (the label of which is reflected on the right side of the glass) which strongly effervesces in plain water. The jet of soda water has increased effervescence and turbulence even more. Note the large spherical drop which is hurled upwards. Taken with ALPA and Alefar 180 mm f/4.5 + Tuban 3, mounted on Macrostat. Negative scale 1 : 5, flash duration 1/5000 sec. Reproduction scale 2 : 1, i. e. twice natural size.*

appear on the film **before** it has been enlarged by printing, projection, etc. "Reproduction scale" means the scale to which the **original object** has been reduced or magnified as it appears on the print.

What is a Macrophotograph ?

Literally it means a photograph taken on a large scale, but in order to simplify matters we shall call all those pictures macrophotographs which are taken at a negative scale **larger** than 1 : 10. This is a reasonable limitation, as any good 35 mm picture may be enlarged at least 10 times, so that a print of the same size as the original object can be obtained. (Reproduction scale 1 : 1.) In addition, increases of exposure (page 7, column 5) have to be considered only for negative scales of 1 : 10 or more (see below).

What is a Microphotograph ?

This means a photograph taken with the aid of a microscope **without a camera lens,** the negative scale being more than 20 : 1 (see page 41).

Explanations regarding Table page 7 :

A comprehensive **Table** will help you solve almost any problem in figuring scales. The distances being expressed in focal lengths, this chart may be used for any camera lens. Please note that the effective focal length of the Standard ALPA lenses is 52 mm (not 50 mm), and that of the Macro-Kilar 42 mm (not 40 mm). For other ALPA lenses the focal length corresponds accurately with the engraved number.

1. For converting distance into focal lengths (F), simply divide the distance by the focal length of the lens being used. Example : distance from object to back of camera = 300 mm (12"), a 75 mm (3") lens is used, 300 : 75 = 4 F. The same distance would equal 6 F, if a 50 mm lens were used.

2. The fifth column indicates the exposure (increase) factors, by which the exposure speed is multiplied. A factor of "1" indicates no increase necessary, a factor of "2" indicates twice the normal exposure or the equivalent of opening the lens one more stop, a factor of "3" indicates three times the normal exposure or 1 1/2 more stops, etc.

3. Whenever calculations must be extremely precise the metric system of measuring is unquestionably easier and more accurate (each larger unit is exactly 10 times that of the next smaller one) than working with feet and inches. For this reason all the figures in this booklet are in millimeters, centimeters and meters, although we have included the corresponding inch-equivalents in some places to indicate the relative values involved. (The following table is universal, of course, and may be used interchangeably with millimeters or inches.) For most practical purposes the photographer can assume 1 inch = 25 mm—or he can purchase a ruler calibrated in both centimeters and inches.

General Table

Distances p, t and d are given in multiples of focal lengths (F)
so that values apply to any lens

1	2	3	4	5
Scale of reproduction (on negative)	Object distance (Object to lens) p	Image distance (Lens-to-image : extension) t	Total distance (between object and film plane, p + t) d	Exposure factor
1 : 100	101 F	1.01 F	102.01 F	1 (no increase necessary)
1 : 50	51 F	1.02 F	52.02 F	1 (no increase necessary)
1 : 10	11 F	1.1 F	12.1 F	1.21
1 : 5	6 F	1.2 F	7.2 F	1.44
1 : 4	5 F	1.25 F	6.25 F	1.56
1 : 3	4 F	1.33 F	5.33 F	1.77
1 : 2	3 F	1.5 F	4.5 F	2.25
1 : 1.8	2.8 F	1.56 F	4.36 F	2.4
1 : 1.6	2.6 F	1.62 F	4.22 F	2.55
1 : 1.4	2.4 F	1.71 F	4.11 F	2.9
1 : 1.2	2.2 F	1.83 F	4.03 F	3.25
1 : 1	2 F	2 F	4 F	4
1.2 : 1	1.83 F	2.2 F	4.03 F	4.8
1.4 : 1	1.71 F	2.4 F	4.11 F	5.7
1.6 : 1	1.62 F	2.6 F	4.22 F	6.7
1.8 : 1	1.56 F	2.8 F	4.36 F	7.8
2 : 1	1.5 F	3 F	4.5 F	9
3 : 1	1.33 F	4 F	5.33 F	16
4 : 1	1.25 F	5 F	6.25 F	25
5 : 1	1.2 F	6 F	7.2 F	36
10 : 1	1.10 F	11 F	12.1 F	121
20 : 1	1.05 F	21 F	22.05 F	440

The following practical examples illustrate the use of this table :

1. **Problem :**

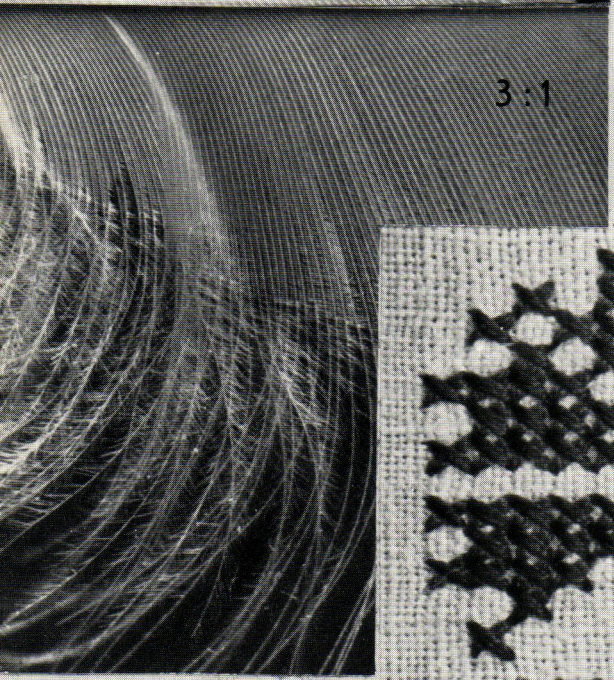
A group of flowers is photographed with the ALPA with a standard 50 mm lens. Distance is 1 meter (3 1/4 feet) according to the focusing scale.

Question : What is the negative scale ?

Solution according to the General Table above :

A. **Approximate calculation :**

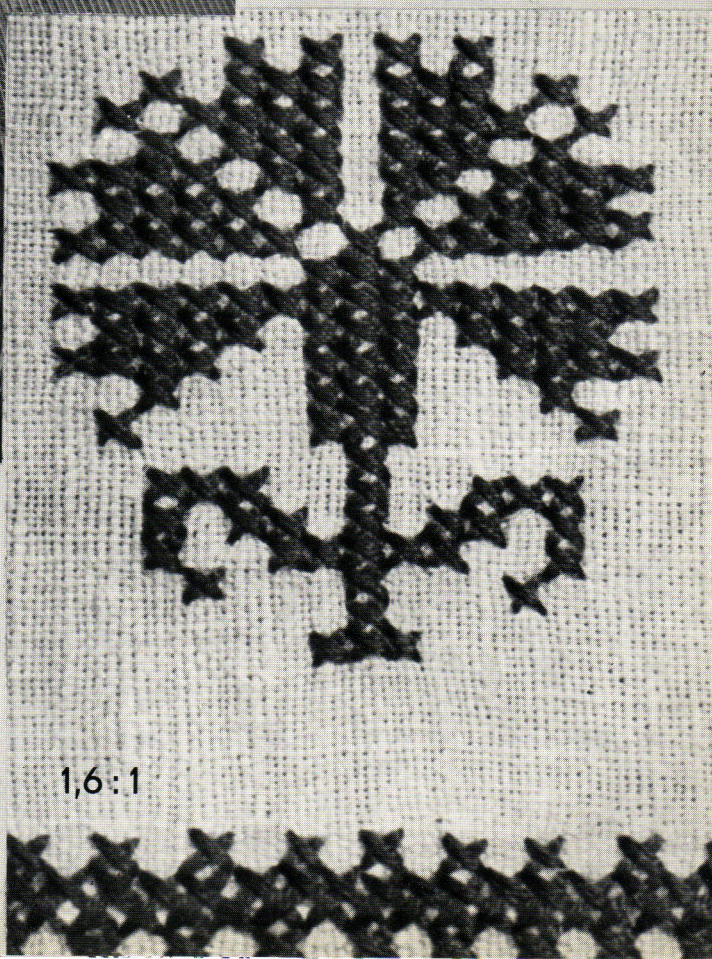
Focal length F = 50 mm (2"). Distance d = 1 m (40") $\frac{1000}{50}\frac{(40)}{2}$ = 20 F (focal length).



White Swan's Feathers, *plucked when the bird cleaned itself with its beak.*

Upper illustration : *Photograph taken with Macrostat lamp and mirror with ALPA Xenar 75 mm lens without additional accessories. Negative scale 1 : 4, i. e.* 1/4 *natural size, reproduction scale 1.6 : 1.*

Lower illustration : *In order to show the fine details, the picture was taken at a negative scale of almost 1 : 1, reproduction scale 3 : 1.*



Buendner Cross-Stitch Embroidery : *The stylized carnation was embroidered on linen over 150 years old. Photographed with ALPA Xenar 75 mm, negative scale 1 : 3, i. e. 1/3 natural size, reproduction scale 1.6 : 1.*

Check with column 4 of the table. The value of 20 F is not indicated, but we find that values given in this column are always greater by two units (+ a negligible fraction) than the equivalent negative scale shown in column 1. Accordingly the desired negative scale is 1 : 18, obtained by subtraction of 2 units from 20.

B. **Accurate calculation :**

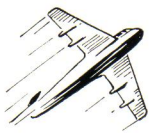
Use the effective focal length of the ALPA standard lens = 52 mm.
Distance = 1 m.
Subtract 4 mm (1/6") from the distance p, which is the difference between the back of the camera and the actual film plane (indicated by the shoulder running the length of the bottom of the camera back).
Therefore d = 996 mm (39 5/6").
Dividing $\frac{996}{52}$ we obtain 19.15.
Column 4 has no value corresponding to 19.15, but the desired negative scale is smaller by two units, i. e., 1 : 17.15.

Solution according to the Special Table II (supplement in the back of this booklet).
The negative scale is 1 : 17.
We purposely show three solutions to this first problem, in order to demonstrate the degree of error when using approximate values. The more rapid calculation may be preferred by many amateurs, professionals or even scientists and technicians, although it is slightly less accurate.

2. **Problem :** A church tower is photographed with an ALPA and a 90 mm lens. The height of the tower is known to be 36 m ; on the colour slide the tower measures 6 mm. What was the camera distance ?

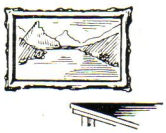
Solution : The reduction ratio of 36 m to 6 mm (in mm 36000 : 6) corresponds to a negative scale of 1 : 6000.
Column I of the table shows no value corresponding to 1 : 6000, but value d (in column 4) is always larger by two units (+ the small fraction) than the corresponding negative scale in column I, so that the distance can be determined as follows : 6000 F + 2 F, or 6002 x 90 mm = 540.18 m.

3. **Problem :** A photograph is required of an airplane of 18 meter wingspan at a height of 600 m which ought to produce an image of approximately 10 mm on the negative. What focal length lens should be used ?



Solution : The required negative scale is calculated by dividing 10 mm by 18000 mm 1 : 1800. The distance d expressed in focal length shown in column 4, which is always greater by two units than the negative scale, is therefore 1802. Assuming the height (distance) of the plane as 600 m, we divide 600 m (600000 mm) by 1802 and obtain the desired focal length value as 332.96. A telephoto lens of 360 mm focal length will meet the purpose.

4. **Problem :** A picture 160 x 245 cm (1600 x 2450 mm) in size, hanging on the wall is to be photographed indoors. The only position for taking the picture is at a distance of 3 m. What focal length is required, so as to get the entire image ?



Solution : Length of groundglass image = 35 mm.
Width of groundglass image = 23 mm.

Negative scale for the length : $\frac{35}{2450} = \frac{1}{70}$

Negative scale for the width : $\frac{23}{1600} = \frac{1}{69.6}$

Select the smaller scale of 1 : 70, in order to provide a slight margin on the negative, then proceed as in problem 3 above. The distance

Reproduction scale 8 : 1.

This means you see the detail of the hatching as through a strong magnifier.

being 2 units greater than the negative scale, we add 2 and get 72— as the distance **expressed in focal lengths.** Since we don't know what the focal length is, we divide 3 m (3000 mm) by 72 and obtain the value of the required focal length : 41.6 mm. The photograph can therefore be taken successfully with the ALPA Macro-Kilar 40 mm lens.

5. **Problem :** A full-frame reproduction is required of an international size postcard, 150 x 148 mm using the standard 50 mm lens. Can this be done without additional equipment ? If not, what accessories are required ?

A. **Solution** according to the Supplementary Tables I or II (depending on which standard lens is being used) : Find the nearest approximation of the dimensions of the object under the appropriate column (in this case, 100 x 150 mm) which corresponds to an extension of 12 mm.

B. **Solution** according to the General Table on page 7 :

Scale of reduction :

Length : 148 mm to 35 mm = 1 : 4.2 negative scale.
Width : 105 mm to 23 mm = 1 : 4.6 negative scale.

Select the smaller scale of 1 : 4.6. The table indicates 1 : 4.6 between 1 : 5 and 1 : 4 in the first column, and the corresponding distance t given in column 3 indicates an « extension » of a little less than 1 1/4 focal length, which again gives about 12 mm (one fourth of 50 mm). This can be achieved with Tuban A + B = 6 mm added to the 6.1 mm helical movement of the lens mount of the Switar and the preset Alfinon, or with Tuban A + 1 + B = 12 mm added to the movement of any 50 mm lens. The exposure factor is 1.5.

6. **Problem :** A portion of a stamp is to be reproduced 3 times the size of the original. What distance and how much extension are required ?

Solution : Simply choose the desired negative scale 3 : 1 from column 1 in the table on page 7. The total extension (t) for that scale equals 3 focal lengths. If we use a standard 50 mm lens this amounts to 150 mm (or 100 mm more than the lens itself). This is easily obtained by using the Kavo bellows attachment, which can be extended up to 137 mm (see page 38). The distance object-to-lens (p. column 2) is 1.5 F or 75 mm (78 mm) for the 50 mm (52 mm) lens being used. The exposure factor is 9.

7. **Problem :** A photographer wants to make a colour slide of the sun or the moon, so that their image on the film is approximately 2 mm in diameter. What focal length should be used ?

Solution : It has been determined that the diameter of the image of any heavenly body equals approximately 1/100th of the focal length used. In this case the desired diameter is 2 mm which—multiplied by this optical factor of 100—requires a focal length of 200 mm. The best suitable ALPA lens is the Alefar 180 mm which gives an image on the negative of about 1.8 mm diameter.

◀ **Stamps :** *Philatelic variations are not confined to earlier issues. The current Swiss 20 cts. stamp is an appropriate example. In the first printing the hatching between the figures 2 and 0 showed only horizontal lines. Subsequent issues had oblique lines added. Philatelic circles estimate the current value for unfranked stamps of this first edition at Swiss Fr. 75.—, for well preserved franked stamps at Swiss Fr. 3.— each.*

Technical Data : *Complete stamps : taken with ALPA, Macrostat, Macrotable and shadowless ring light. ALPA Xenar 75 mm lens + Tuban 4. Negative scale slightly less than 1 : 1, reproduction scale 3.8 : 1. Detail of hatching above denomination : Kern Switar 50 mm APOCHROMAT with Tuban A + 4 + 3 + B.*

Lenses for Macrophotography

In practice any lens may be used for macrophotography, if the focusing extension can be adapted to the object distance. Since lenses of longer focal length require increasingly longer extensions for the reproduction of larger scale images, it might appear desirable to use lenses of very short focal length for macrophotography, in order to avoid the necessity of additional extension devices. This solution will often give acceptable results, but it must be remembered that the distance to the object is greatly reduced.

For reproductions of equal scale the depth of field always remains the same, independent of the focal length. The required object distance will therefore be the deciding factor for selection of a lens. Dental photography, for instance, demands a relatively great working distance, so as to avoid the patient's breath clouding the lens. Photography of threedimensional objects is governed by the relation between camera distance and perspective. Both too close and too great a distance can be very disadvantageous. Short camera distances lead to perspective exaggeration as well as to illumination problems, since the lens position forces a lateral arrangement of the light sources. This does not apply however, if the ring light is used (see page 14).

The ALPA Xenar 75 mm f/3.5 fills the bill to perfection. This special highquality objective is intended for close-up (macro) photography as well as copy-work. Its own EXTENSAN mount alone focuses continuously from infinity down to 1 1/2 feet (46 cm), rendering a negative scale of 1 : 4 (1/4 natural size).

The ALPA Macro Kilar 40 mm f/2.8 is a typical lens of short focal length excellent for all those cases where the distance from camera to object can be rather short.

The ALPA Macro-Kilar is supplied in two different mounts :

Model E : with medium extension range, focusing from infinity down to 4" (10 cm) i. e. up to a negative scale of 1 : 2 (1/2 natural size).

Model D : with extreme extension range, focusing from infinity to 2" (5 cm) i. e. up to a negative scale of 1 : 1,1 (natural size). These distances are calculated from the front of the lens mount.

Standard 50 mm lenses :

Kern Switar * 50 mm f/1.8 Apochromat with fully automatic preset diaphragm. Direct focusing from infinity down to 22" rendering an image scale of 1 : 8,3.

Kern Macro Switar * 50 mm f/1.8 Apochromat with fully automatic preset diaphragm and automatic depth of field indicator. Direct focusing from infinity down to 7" rendering an image scale of 1 : 3 (1/3 nat. size).

The ALPA Macro-Kilar 90 mm f/2.8

with single preset diaphragm. Direct focusing from infinity down to 14 1/5" rendering an image scale of 1 : 1 (nat. size).

On the following page (13) we are giving the characteristics of all ALPA lenses. Those of them which are giving with direct focusing an image ratio of greater than 1 : 10 are specially destinated for Macrophotography.

See also Table V of supplement.

* The Kern Switar—the first and fastest true Apochromat in 35 mm photography—provides highest resolution even at full aperture f/1.8, sparkling contrast and unparalleled correction of all three primary colors which the closer tolerances of macro- and microphotography demand. To reproduce fine detail and subtile contrasts on the negative, and to provide a sharp plane of focus on the groundglass, there is no finer lens than the Kern Switar Apochromat!

Characteristics of ALPA lenses

ALPA lens :	Retrofocus	Retrofocus	Curtagon	Macro-Kilar	Switar	Macro-Switar	Xenar	Alfitar	Macro-Kilar	Apochromat	Tele-Xenar	Algular	Alitar	Tele-Xenar
Focal length in mm	24	28	35	40	50	50	75	90	90	100	135	135	180	360
Rel. aperture:	3.5	3.5	2.8	2.8	1.8	1.8	3.5	2.5	2.8	2	3.5	3.2	4.5	5.5
Smallest diaphragm setting	22	22	22	22	22	22	32	22	32	22	22	32	32	32
Angle of field	83°	75°	65°	55°	45°	45°	32°	27°	27°	24°	18°	18°	13°	7°
Ratio of image size at ∞ standard focal length 50 mm = 1	0.46	0.56	0.7	0.8	1	1	1.5	1.8	1.8	2	2.7	2.7	3.6	7.2
Direct focusing from m infinity down to: ft.	0.4 16″	0.5 20″	0.35 14″	E = 0.20 D = 0.17	0.5 22″	0.28 7″	0.46 18 1/8″	1 3 1/4″	0.36 14 1/5″	0.7 29″	1.5 5′	1.1 4′	2.5 8′	4.5 15′
Subject to image ratio on nearest direct focusing	1:11	1:14	1:7.8	E 1:2 D 1:1,1	1:9	1:3	1:3.8	1:9	1:1	1:5	1:9	1:6.8	1:11	1:10
Weight in ounces	12	11 1/2	7 1/2	5 1/2	6	9	5 1/2	19	21 1/2	20 3/4	20	9 1/2	19	47 1/4
Diameter for ALPA filter	D	D	B	E	A	B	A	B	A	C	B	B	B	Sp
Diameter for ALPA sunshade	—	—	B curtabe	—	A	B	A	B	—	C	B	B	B	Sp
Preset diaphragm	autom.	autom.	autom.	single	autom.	autom.	single	autom.	single	single	autom.	single	autom	single
Depth of field indicator			autom.			autom.					autom.			
Leather case	redark	redark	norm-dark	norm-dark	norm-dark	norm-dark	xetdark	redark	cendark	muldark	muldark	texdark	aldark	texdark

Distortion : Particularly when reproducing originals with geometrically straight lines, it must be remembered that—strictly speaking—each lens can only be entirely free from distortion for one given distance. With normal lenses the variations remain acceptable, but with true tele-objectives the situation is not quite as favourable. It is not recommended to use such lenses for reproductions of maps or similar work.

Extreme Close-up Photographs (image on the negative 2-8x larger than lifesize) require special lenses of very short focal length. These short lenses fill the gap between standard Macrophotographs (up to a negative scale of 4 : 1) and true Microphotographs (from about 20 : 1—up).

ALPA Macrostat Stand and Ring Light for Reproduction of Coins and Medals

Reproduction of well preserved or newly minted coins is relatively simple. It is sufficient to use a concentrated single light source, usually from top left, and the Macrostat mirror with its flat side as compensating reflector, in order to obtain good pictures.

Gold coins and medals may also be photographed with colour film in daylight, using the **concave** *side of the Macrostat mirror as main illumination and the diffused daylight as secondary fill-in light source.*

The reproduction of old and worn coins is much more difficult, and normal technique will not be adequate. In this case the coin is placed on a base (approximately 1" high) of a smaller diameter than the coin itself (an empty cotton reel or a film spool may be used). This base is then set on the Macrotable, the focusing stage for small objects, preferably covered by a black background (for instance, black velvet or velvet covered cardboard). The coin is now placed (by means of focusing the table) under the hood of the ring light, so that the lighting can be observed accurately from above. In one particular position the relief outline will be clearly picked out by the lighting. The camera should now be set so that the coin image almost fills the frame (approximately 22 mm diameter or 7/8"). It is suggested to use contrasty negative material (for example, Kodak Microfile or any fine grain film with contrast development).

Usually the negative is enlarged on contrast paper, which points up the design wherever it has not been worn away.

From the original negative either a contact positive can be produced on film and a negative enlargement made from it, or a negative print can be made directly on reversal paper. This will then show the design in black outline which may prove very useful for certain purposes.

Examples : See illustration on opposite page.

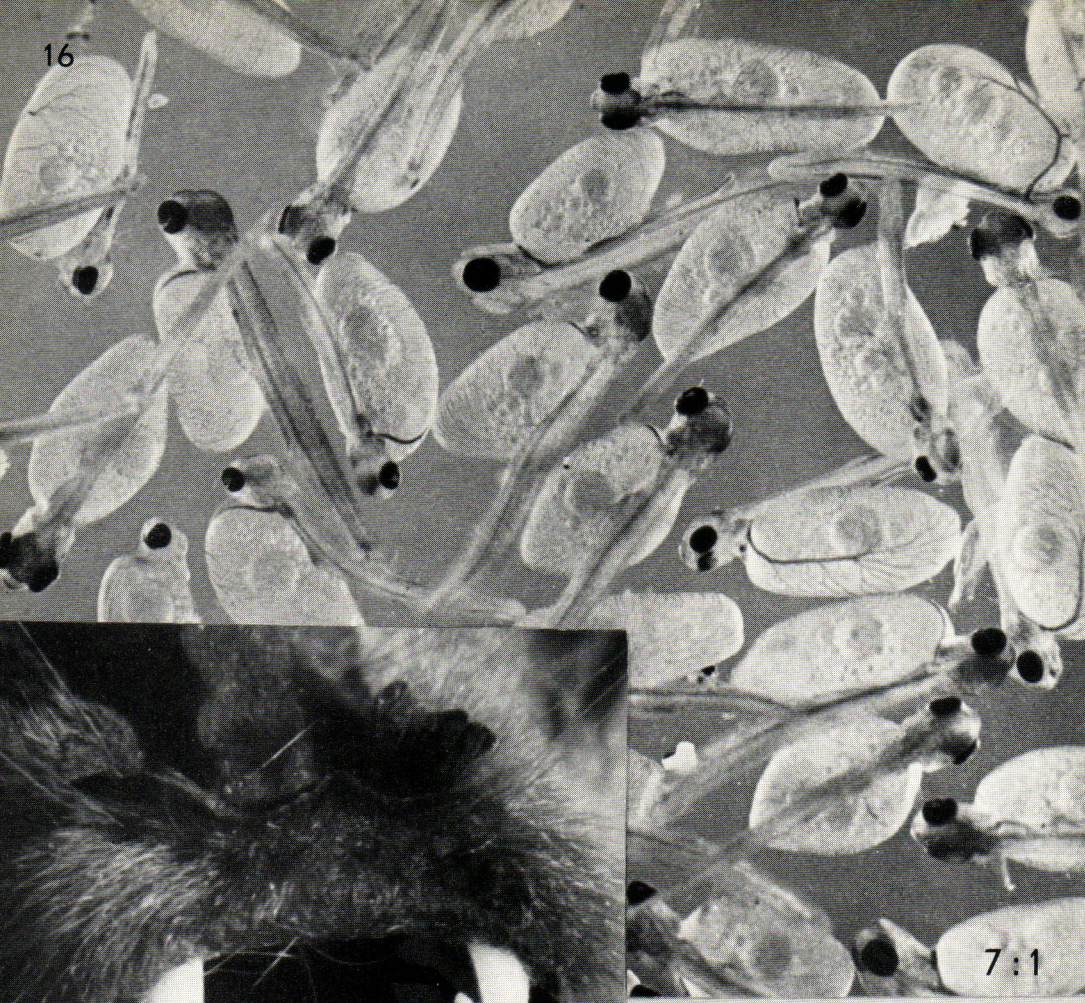
Left : *Badly worn 1625 silver coin with portrait of King Sigismund III of Poland. Above : positive ; below : negative reproduced from positive. Diameter of the coin : 29 mm, reproduction scale 3 : 1. Photographs were made according to the procedure described above, using the ALPA Kern Switar 50 mm f/1.8 APOCHROMAT with Tuban at aperture f/8.*

Right : *Flat relief in bronze (detail of a monument) of F. A. Forel (1841-1912) in Morges, Switzerland. Hand-held photograph taken in sunlight (side light from top left) with ALPA and Tele Xenar 90 mm f/3.5. Negative scale 1 : 25 reproduction scale 1 : 4.7. This example clearly demonstrates the versatility of the ALPA in taking close-ups* **without** *any special preparations or accessories.*

3 : 1

1 : 4,7

3 : 1



Trout Spawn (*Salmo iridens*)

Young trouts immediately after hatching from the egg. Prominent is the egg sack from which nourishment is drawn until development has advanced to the stage of direct food intake. Negative scale 1 : 1.4, 90 mm lens with Tuban 4, f/8, 1/50th sec., artificial light, reproduction scale 7 : 1.

Bat (*Plecotus auritus*)

Detail of teeth typical of an insectivorous animal. Negative scale 1.5 : 1, 50 mm lens with bellows extension, f/16, electronic flash, reproduction scale 6 : 1.

Both photographs by R. H. Noailles, Paris.

Water Spider *(Argyroneta Aquatica)*

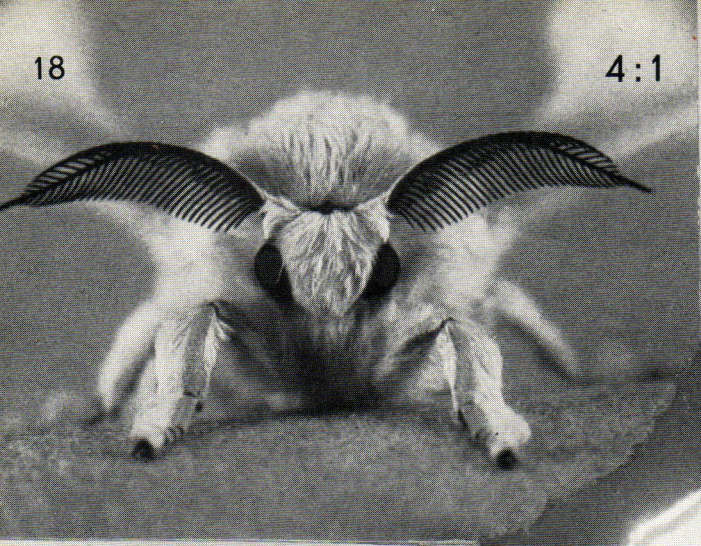
Lives under water, but needs air to breathe. The spider weaves a bell-shaped net in which it stores air. Negative scale 1 : 2, 90 mm lens with bellows extension, f/16, electronic flash, reproduction scale 4 : 1.

Black Water-Beetle *(Hydrophylus Piceus L)*

Large beetle which stores air under its body. These air bubbles cause the bright reflections in the picture. Negative scale 1 : 2, 90 mm lens with Tuban 2 + 3, f/8, 1/50 sec., artificial light, reproduction scale 2.5 : 1.

Photographs by R. H. Noailles, Paris.

4 : 1



Silk Moth *(Bombyx mori)*

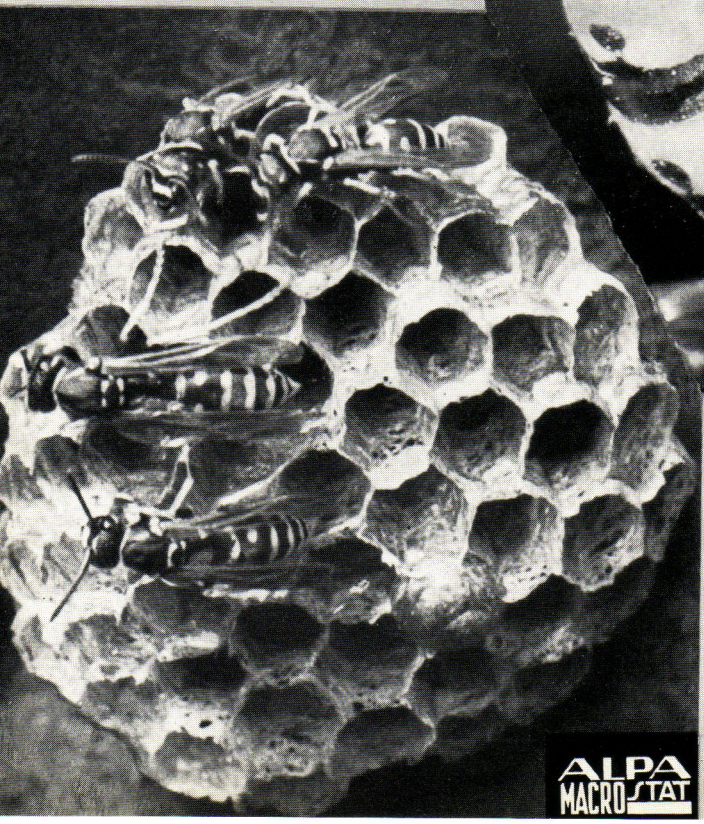
Head of male. The feelers are more developed than those of the female. Negative scale 1.3 : 1, 50 mm lens with Tuban A + 1 + 3 + B, f/8, 1/50 sec., artificial light, reproduction scale 4 : 1.

Photograph by R. H. Noailles, Paris, from the book "The Life of a Silkmoth".

9 : 1

Poison Sting of a Wasp *(Vespa sp.)* ▶

The sting is shown completely drawn out of its sheath. Negative scale 2 : 1, 50 mm lens with complete Tuban set, daylight and concave side of Macrostat mirror, f/16, 1/2 sec., reproduction scale 9 : 1.



2 : 1

Colony of Wasps
(Polistes gallicus L)

The nest is made of a paper like substance. Negative scale 1 : 4, 90 mm lens with Tuban 2, f/8, 1/100 sec., reproduction scale 2 : 1.

Photograph by R. H. Noailles, Paris.

ALPA MACROSTAT

General Comments on the macrophotographs of R. H. Noailles, Paris :

This author uses exclusively ALPA equipment for his comprehensive documentation over the entire field of natural history, which he does especially for the purpose of collecting visual material for all teaching levels.

His photographs are made available in transparency sets in black-and-white as well as in colour, in the form of lectures for educational purposes. They are accompanied by a short text, so as to give the lecturer all the necessary information.

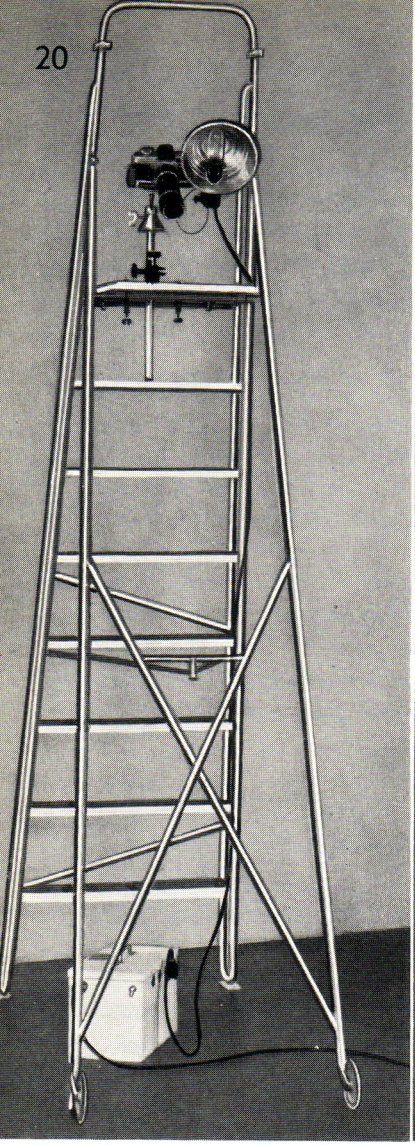
The few illustrations shown in this booklet merely indicate the innumerable possibilities offered by the ALPA in recording natural history and science. Noteworthy is the use of electronic flash synchronized with the ALPA. By this means large quantities of light can be released within the shortest time (according to the type of lamp from 1/500 to 1/5000 second). This permits the use of very small stops for combining great depth of field with critical definition of detail and high speeds, in order to "freeze" movement. These are particularly desirable features when using the customarily slow colour films.

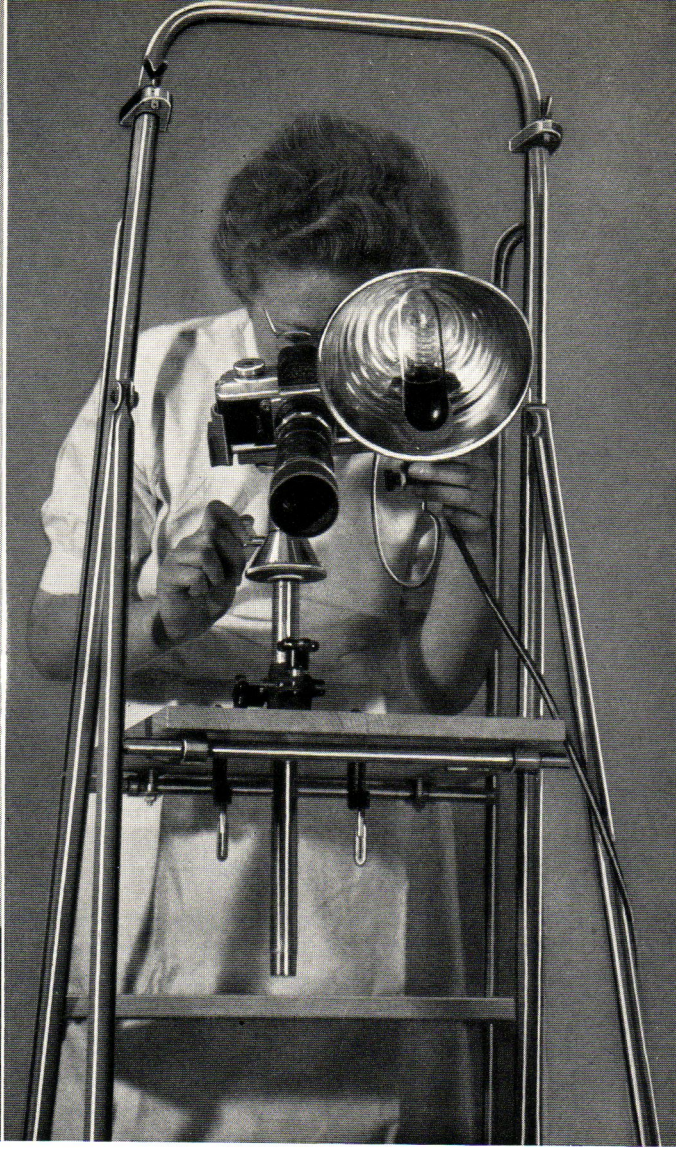
The use of strong tungsten light sources (photofloods, spots, etc.) does offer, however, the advantage of greater control over lighting arrangement, which in turn can ensure more effective lighting.

Problems of Medical Photography

The following pages show some examples of how ALPA cameras are used in the service of medical science. Lack of space does not permit a full discussion of the manifold photographic problems, but only allows touching upon some of the typical factors common to most kinds of medical photography.

Pictures of various types of operations must show all essential details clearly, on as large a scale as possible. Therefore, "general views" are of little value, since they give only the atmosphere of an operating room without supplying any factual evidence of the proceedings. The organs or portions of the body of which photographs are needed may be of varying size (the patient may be an adult or a child), so that similar operations may require different scales of reproduction. But a minimum working distance is essential and must be kept completely unobstructed, so that those concerned can move about freely. In order to achieve this, the use of long focal length lenses and additional extension tubes or bellows becomes indispensable. Depending on the dimensions of the operating area to be photographed, negative scales may vary from 1 : 10 (1/10 natural size) up to 2 : 1 (twice the size of the original).





Surgical photography requires extreme depth of field. The available operating light —however brilliant—will usually not be sufficient for photographic purposes. It will allow the camera operator to view and focus, but greater exposure flexibility can only be provided with electronic flash as a main light source.

The recent increase in speed of colour materials leads to the use of smaller stops, in order to achieve greater depth of field. Synchronization at 1/60 sec. will eliminate the operating light as a source of photographic illumination, which is absolutely necessary if a secondary, blurred image is to be avoided. The use of a haze filter (ALPA filter No. 40) is recommended, in order to avoid an undesirable blue cast. Furthermore, it is advisable to use coloured (preferably green) operating linen and coats. Not only are they more restful to the eyes of the surgeons and their staff, but they are also essential to good colour photographs. White aprons and linen should be avoided, because they lead to uncontrollable reflections, and make the proper exposure difficult to calculate. For this type of work the ALPA Macrostat can be combined with special stands.

Aortic Isthmus Stenosis *by Prof. P. Santy*

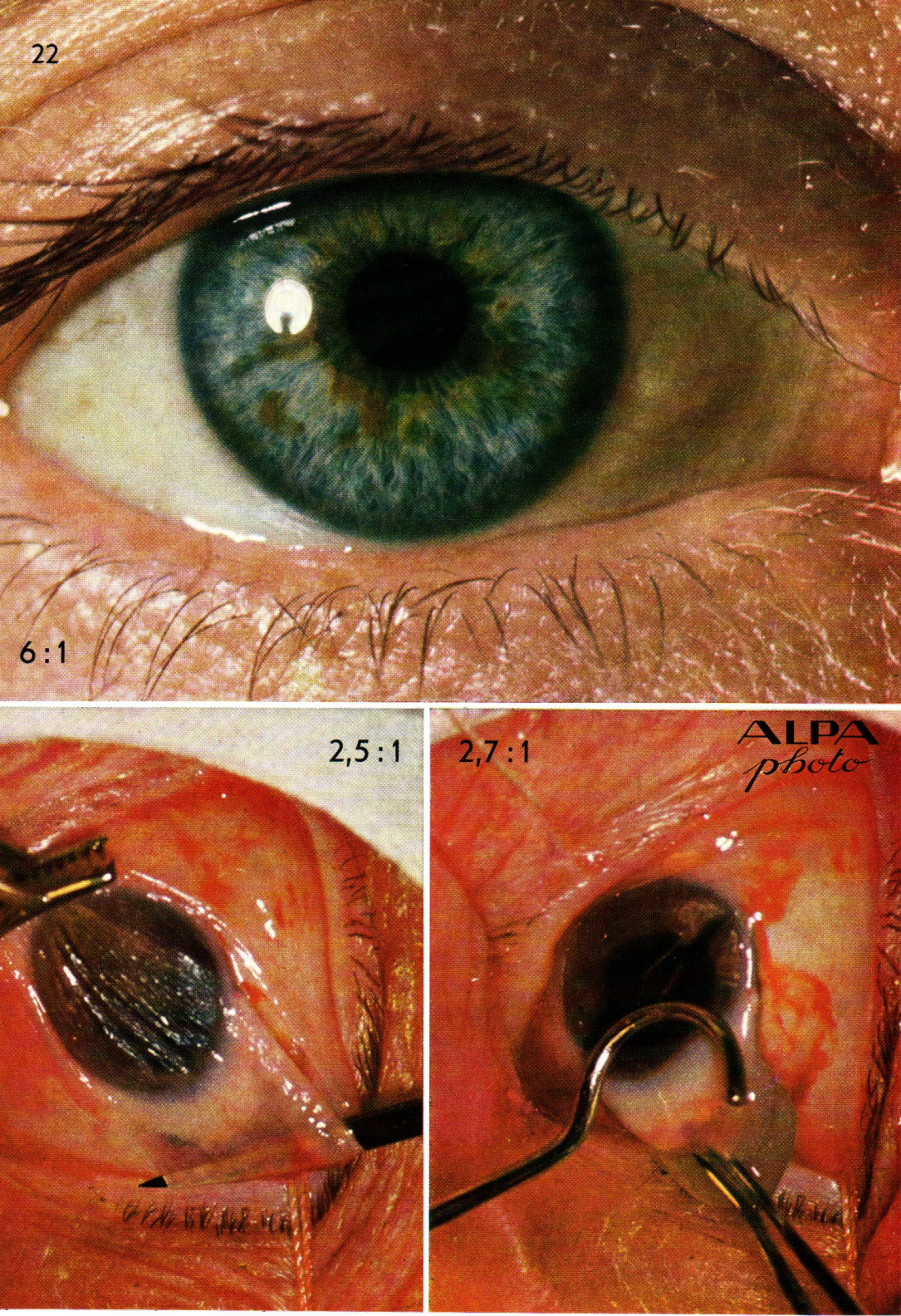
The ALPA Serves the Science of Surgery

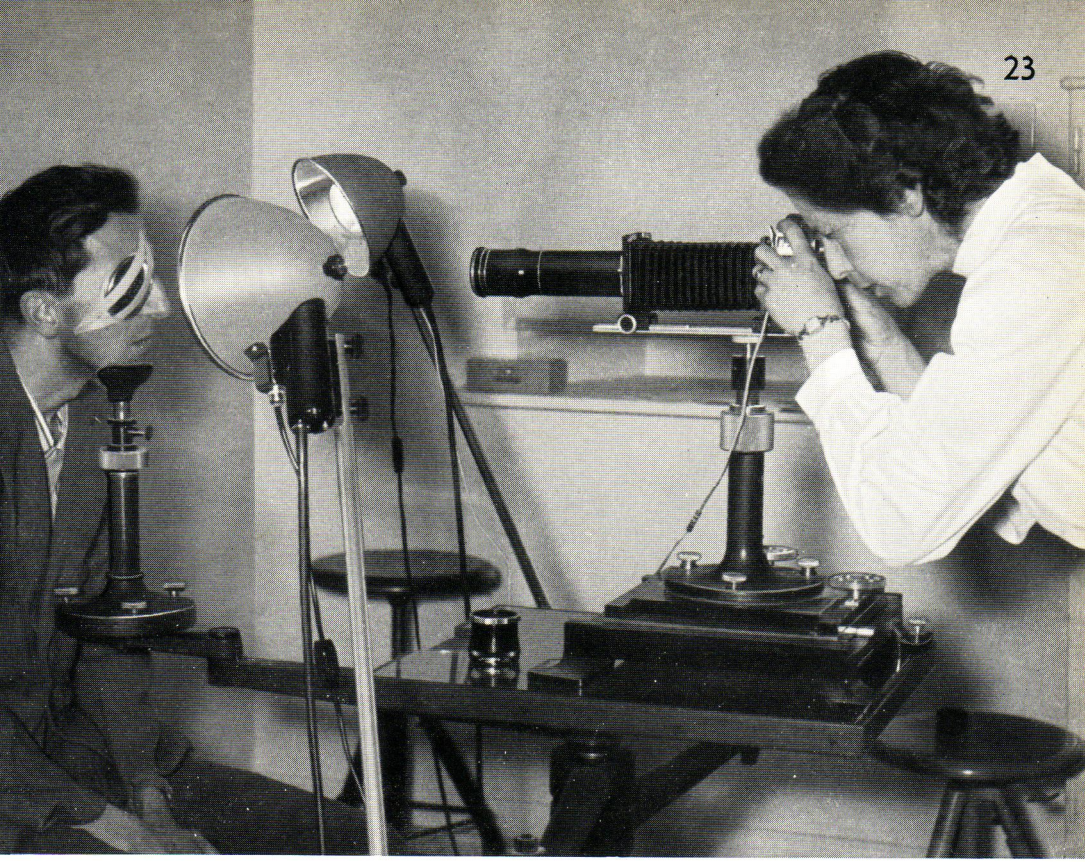
ALPA photo with Alefar 180 mm lens (at f/11) and electronic flash of 350 Watt sec. (at 1/50 sec.). This exceptional photograph, made available by Prof. P. Santy, Lyon, is one of a series picturing a complete operation. The size of the reproduction corresponds exactly to the original Kodachrome without any cropping being necessary.

Set-Up for Surgical Photographs :

The ALPA "Macrostat" close-up stand is mounted on the platform of a metal ladder. Both the ALPA 5 or 7 with camera tilt-cradle Usang and an electronic flash of 400 Watt sec. are mounted on a large ball-and-socket head. The Alefar lens f/4.5 180 mm is mounted with Tuban extension. The best suitable distance is between 4 and 6 feet according to the dimensions of the area of the operation to be photographed. This area will thus be reproduced in 1/9 to 1/5 of its actual size on the film, i. e. it can easily be increased to much more than its actual size when projecting or enlarging the slide.

The shutter of the ALPA is set at 1/50, while the duration of the electronic flash is about 1/1000 of a second. The influence of all other light sources in the room will be absolutely negligible.


22
6 : 1
2,5 : 1
2,7 : 1
ALPA
photo



The ALPA Serves the Science of Ophtalmology

The colour plate upper left illustrates a normal healthy eye. This photograph, used for comparison with unsound eyes, was taken with an ALPA Mod. 5 camera, Alefar lens f/4.5 - 180 mm, fitted with bellows attachment and Tuban tube extensions. Although the photograph was taken from some distance away, the size of the image on the film was 1.2 : 1, i. e. larger than lifesize.

The transparency overleaf is reproduced at a scale of 6 : 1. The lighting, consisting of a reflector containing a filament lamp and 200 Ws electronic tube, made it possible to transfer the image of the lamp, which is unavoidably reflected in the eye, from the pupil, where it would have hindered effective examination, to the cornea. (Two lamps are only used when it is necessary to photograph both the patient's eyes simultaneously.) Stop f/8. Reversal colour film.

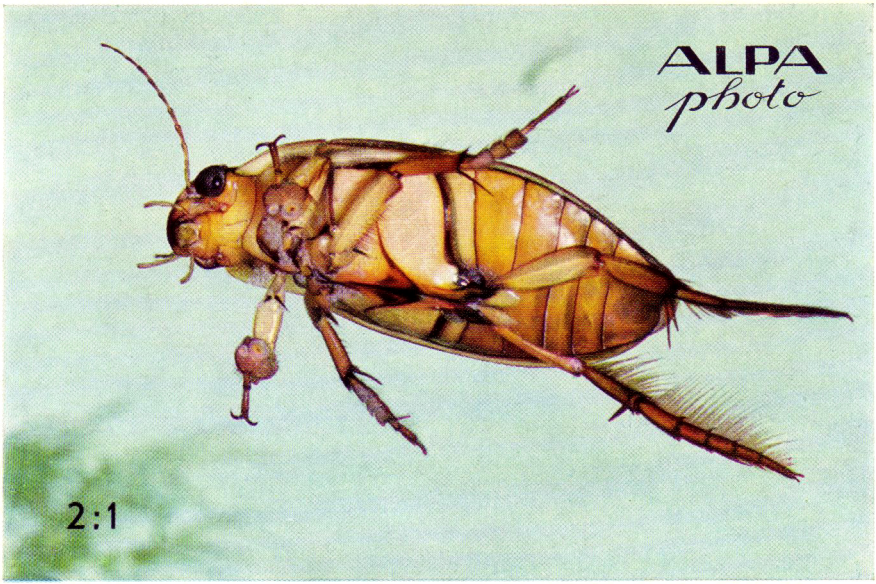
The illustration above shows in detail the apparatus used by the Lausanne Ophtalmic Clinic.

The two colour plates lower left are from a series taken during a cataract operation at the Pasteur Hospital at Colmar.

Left : **Cornea incision with Graeff knife** : Using forceps held in the left hand, the surgeon grips the eyeball and makes a horizontal incision with the knife in his right hand. This is the preliminary step which enables the removal of the crystalline lens.

Right : **Intra-capsular operation on the crystalline lens** : Cataract is an eye complaint causing opacity of the crystalline lens or membrane. The surgeon effects the ablation by holding the crystalline capsule with special forceps and pulling it steadily away from the eyeball as in our photo. The function of the crystalline lens will henceforth be filled either by a substitute lens made of organic glass or by spectacles fitted with special lenses.

Photographs taken with ALPA Mod. 7 Alefar lens f/4.5 — 180 mm and Tuban 4 + 1. 225 Ws electronic lamp. f/8. Distance 1 m. Scale on film 1 : 2. Scale of reproduction : lefthand photo 2.5 : 1, righthand photo 2.7 : 1. Photos A. Schmid, Colmar.



ALPA photograph by R. H. Noailles, Paris.

Dytiscus marginalis, male, swimming

Suction discs typical to the male beetle are clearly shown on the forelegs, as in the formation of the hind legs used for propulsion. Enlarged by rows of hair these form rudders. Negative scale 1 : 1.5, reproduction scale 2 : 1, i. e. twice natural size. ALPA Alefar 180 mm f/4.5, with bellows extension, f/11, electronic flash.

Note: For production reasons—to keep colour plates together—this illustration is included with the medical photographs, although it belongs to the illustrations on pages 16 - 17.

Three ALPA Photographs of Dental Work (Surgery)

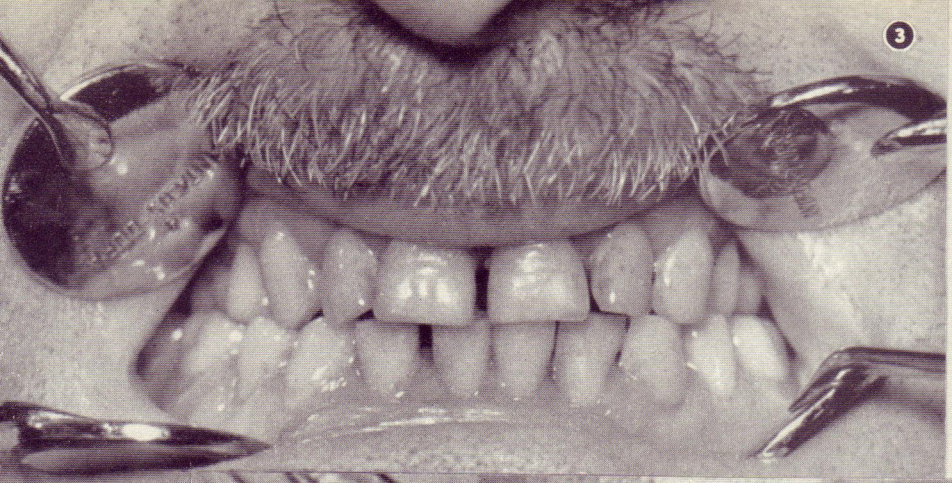
(Author : Dr. med. dent. Ch. R. Jaquier, Bussigny, Switzerland)

(1 and 2) Two photographs showing correction of the alveolar extension after extraction : upper prognathism and removal of the upper frenulum labii.

1) During the stitching.
2) After the operation.
3) The same mouth after fitting two dentures.

The upper firm bridge (denture) is fixed on two Richmond crowns with parallel pins.

Technical Data : ALPA with ALPA Algular 135 mm f/3.2 and Tuban. Distance between camera and mouth approximately 28" (70 cm), f/8, Kodachrome, electronic flash. The black and white negatives were made from Kodachrome colour transparencies and subsequently enlarged with the aid of the Macrostat equipment described on page 37.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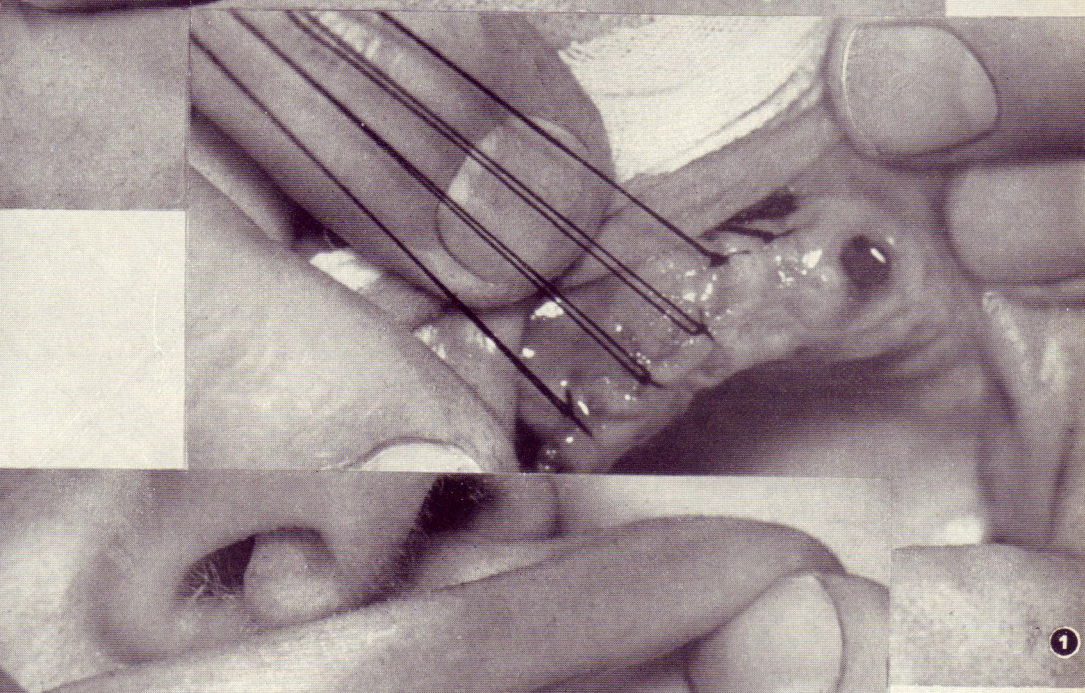
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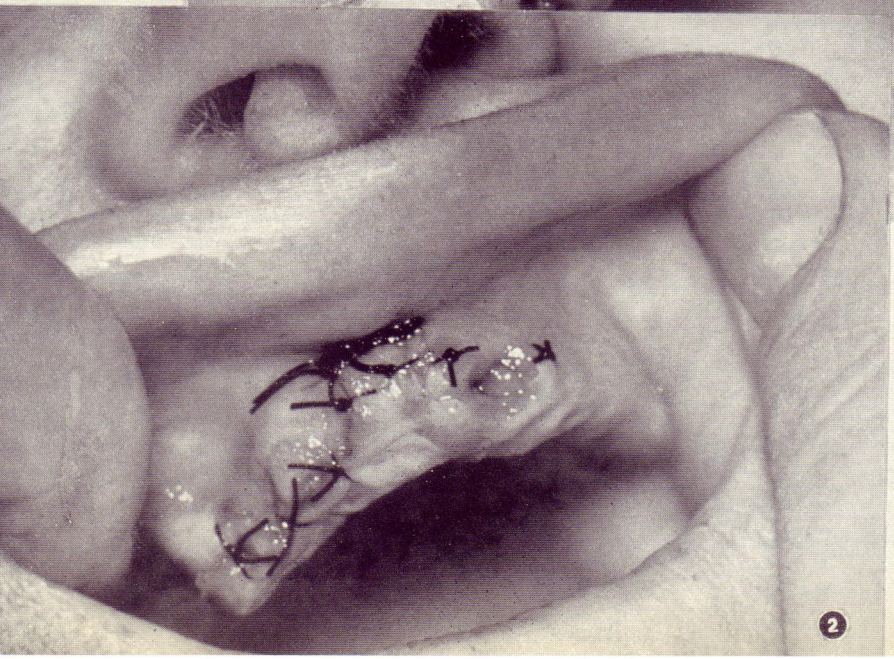
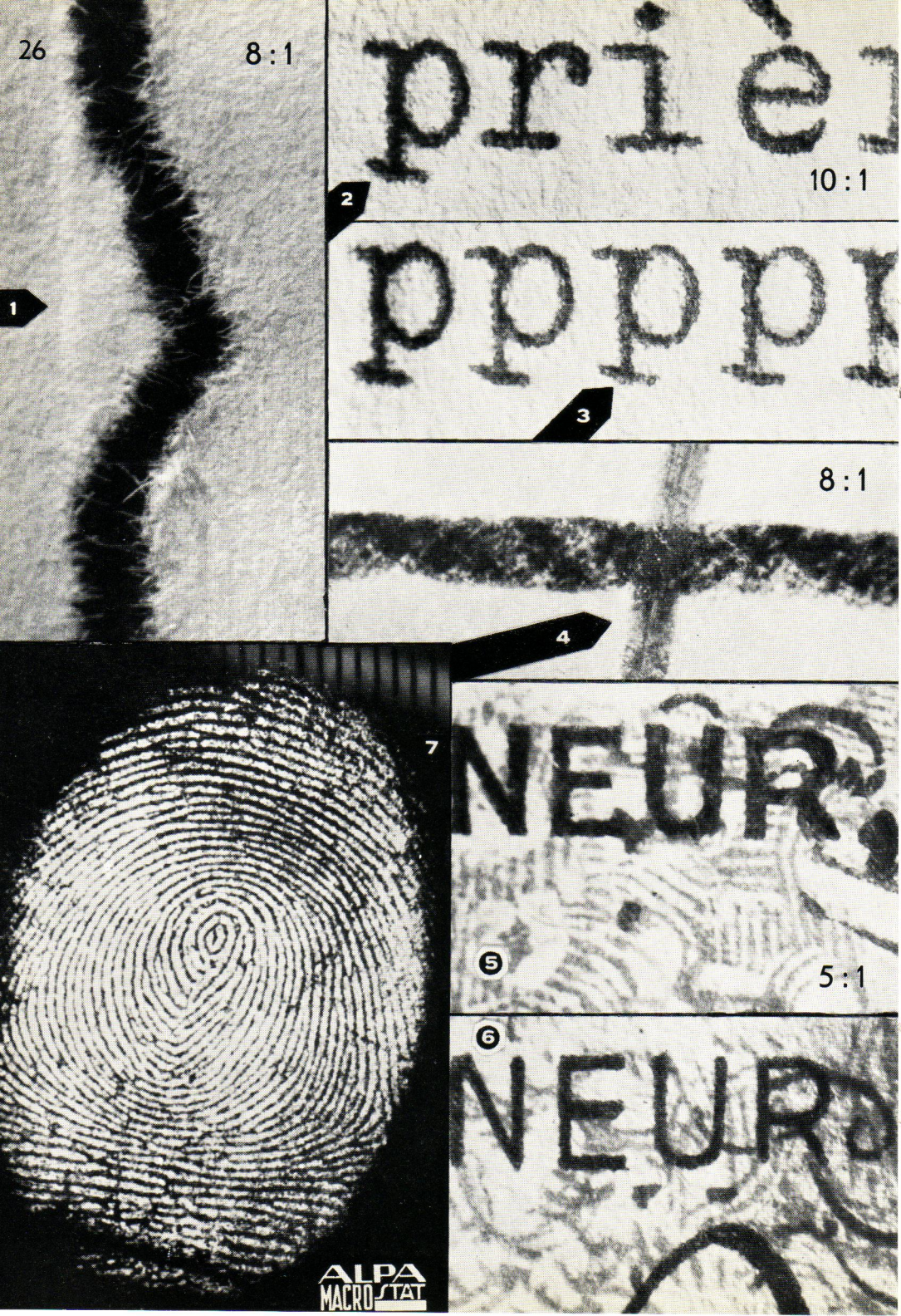

2


26
8 : 1
1
2
10 : 1
3
8 : 1
4
7
5
5 : 1
6
ALPA
MACROSTAT

Typical applications of the ALPA to scientific police work

① **Paper Tear Proof :** A piece of paper was folded and torn apart, the arrow showing the trace of the fold. The tearing did not entirely follow the fold. The photograph clearly shows that the two pieces join exactly together. The picture was taken with a strong sidelight*, 50 mm lens with Tuban extension tubes, negative scale 2 : 1, reproduction scale 8 : 1.

② **Evidence of Faulty Type on Typewriter :** The word "prière" was written in an anonymous letter. The defective line of the lower case "p" is a detail typical for the machine which was used.

③ A sequence of the letter "p" from the machine under examination proves the identity of the faulty type. Strong sidelight, 50 mm lens with Tuban extension tubes, negative scale 2 : 1, reproduction scale 10 : 1.

④ **Crossing of Lines, a Frequently Arising Problem :** Which of the two lines is the lower one, i.e. was drawn first? This photograph proves clearly that the almost vertical line was drawn **after** the horizontal one. The photograph was taken with strong sidelight, 50 mm lens with Tuban extension tubes, negative scale 2 : 1, reproduction scale 8 : 1.

⑤+⑥ **Forgery of Securities :**

5) Sectional photograph from genuine certificate. The ground pattern is printed in "broken" colours. The forgers, who used colour filters, did not succeed in matching it.

6) Corresponding section from the forged certificate which shows quite a different ground pattern.

Both photographs were taken with diffused light. 75 mm lens, negative scale 1 : 2, reproduction scale 5 : 1.

⑦ **Fingerprint :** Photograph on dark background. The millimeter markings above the figure 7, show a reproduction scale of 3 : 1.

All pictures were taken by a police expert of international fame who uses an ALPA camera.

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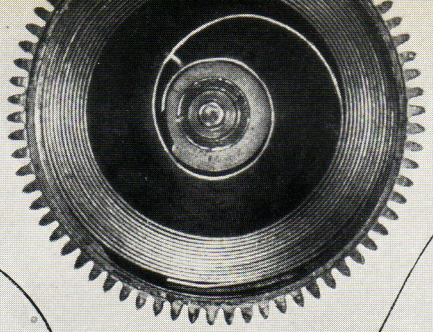
* Strong sidelighting may be easily obtained by the following method: The original is placed on the Macrotable, a slide projector placed on the side and the cone of light projected on to the object. The most effective illumination is then achieved by fine adjustment of the Macrotable. Instead of slides horizontal slit mask can be inserted into the projector which is focused just short of the object.



8 : 1

new

5 x

50 x

100 x

200 x

1 : 1

500 x

ALPA photo

◂ Watch Springs

(Captions to page 28)

A selection of ALPA photographs made available by the laboratory of the Swiss research organization for watch engineering in Neuchâtel, Switzerland.

Above : *Spring casing of ordinary watch with inserted spring, reproduction scale 8 : 1.*

Left : *6 reproductions of lesser quality springs.*

Right : *6 comparative pictures of good quality springs. The two new springs were never wound. The figures (5 x, 50 x etc.) indicate the number of times the two springs have been wound.*

This comparison demonstrates that springs of good quality maintain their shape, while one of poor quality becomes increasingly deformed in use.

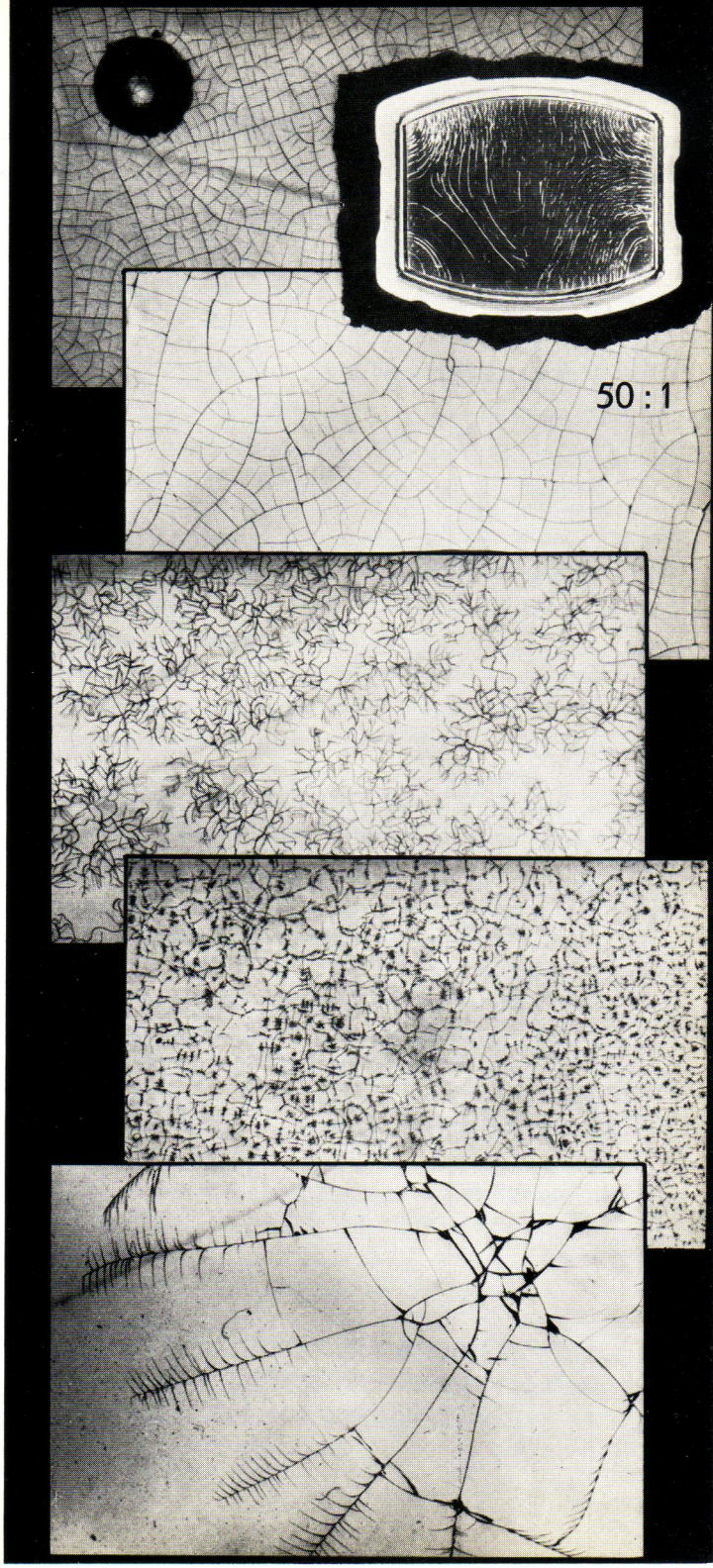
The pictures were taken with ALPA camera, 50 mm lens + Tuban, negative scale 1:3, reproduction scale 1:1, i. e. natural size.

Watch Crystals ▸

ALPA photographs showing organic (so-called unbreakable) watch glasses.

Above right: *Watch glass mounted on a wrist watch. Lateral illumination discloses coarse cracks. 50 mm lens +Tuban, negative scale 1:2, reproduction scale : more than natural size.*

5 Microphotographs taken with ALPA camera mounted on a laboratory microscope. These pictures show clearly the formation of minute cracks which gradually appear in this type of organic glass. Reproduction scale 50 : 1.



The ALPA Macrostat Close-up Stand

Macrostat is the registered trade name for a collapsible stand, designed especially for macrophotography and copywork with ALPA cameras. Though easily transportable in an ordinary briefcase, it offers firm support for various uses and emphasizes the extreme adaptability of the ALPA to macrophotography.

Macrostat applied to Copywork

A vertical set-up is most desirable for the purpose of reproducing from books or other flat copy, which can be arranged on a table and photographed from above. The Macrostat column (consisting of two pillars linked by a collar) is fixed into position with the aid of a table clamp ; it can easily be lowered or raised by means of a large tightening knob. The horizontal arm is mounted by a similar, easily controlled knob, while the camera is screwed to its end which places it into a "vertical" position.

If the full height is not required, either column or horizontal arm are lowered. Should the column not be high enough, the copy material may either be arranged on a chair or on the floor (see page 36).

The two reflectors supplied with the Macrostat are provided with gooseneck arms which fit into the table clamp, and make them extremely adaptable. For frequent reproduction of large originals the use of permanently installed fluorescent tubes may be preferable.

Recently electronic flash has become very popular for copying, particularly colour work. This type of light source is especially advantageous, because of its constant light output. We strongly recommend the use of two units for copywork, so as to balance light. If only one flash head is available, two exposures must be made, first from the left and then from the right side. Before making the second exposure, sufficient time must be allowed for recharging the lamp, in order to avoid uneven exposures. Equal distance and angle of the lamp must also be carefully observed, so as to eliminate surface reflections, especially if the original is shiny or covered by plateglass.

If the exposures are made without the exclusion of daylight, colour values may easily be falsified, should the shutter remain open during the flash re-charge period. Reflections from coloured wallpaper must not be overlooked, and in general it is safer to erect a plain white background of cloth or cardboard.

Macrostat applied to Macro (Close-up) Photography

Indoors : Macrophotographs are usually taken of 3-dimensional rather than flat objects. For this purpose it is suggested to mount the camera on a

ball-and-socket head, so as to allow complete freedom of camera movement. Frequently it will be convenient to dispense entirely with the horizontal arm and to mount the ball-and-socket head directly on the column, by means of the intermediate piece "intervis".

The Macrostat column can also be screwed on top of a tripod or studio stand. This arrangement is very useful for vertical shots, such as of mosaic floors, giving the camera the required clearance. A similar set-up in medical photography has already been shown on page 20.

For true macrophotography of small objects the use of the Macrostat is limited to a small area, and we strongly recommend using also the Macrotable focusing stage, the ring light and the Macrostat mirror.

For large reproduction scales with a short distance to the object it is difficult to obtain correct focus solely by the usual lens extension. The Macrotable is therefore fitted with a fine gear movement which enables critical focusing by changing its position, i. e. the distance of the object itself, without touching the camera lens.

Frequently, shadowless illumination will be essential, in which case the ring light becomes indispensable. For this purpose it is also suggested to place the object on a sheet of glass, thus leaving a space between base and background for better separation (see page 14).

Outdoors : The identical Macrostat equipment can be used outdoors for botanical, geological and other nature photography by planting the column firmly into the ground with the aid of the large spike. This gives the camera utmost flexibility and direct approach to objects in their natural surroundings. A small spike positions the Macrostat mirror to its best advantage for supplementary illumination. On an overcast day with even, diffused skylight the mirror can be used to reflect enough extra light on the object, in order to introduce a directional quality to the lighting—thus improving the rendering of the object by making it more "plastic". On extremely bright days very heavy shadows may be cast, and in this case it is wise to use the mirror for reflecting some light into the shadows, so as to open them up. The mirror has a flat side, for normal reflector work, and a concave, magnifying side for producing a concentrated "spotlight" illumination. (See illustration page 1.) Outdoor work can also be simplified by screwing the Macrostat column into an ordinary tripod which offers complete flexibility at a greater distance from the ground.

Low camera angles are particularly common in outdoor nature work, and here the 45° viewing angle of the ALPA prism is unbeatable for convenience, since the photographer can focus and compose in a comfortable position.

Description of Individual Components of the MACROSTAT:

❶ **Table fixture :** Made of light-metal casting, bottom is leather-covered so as to protect the table. Eccentric tightening grip for pillar tubes.
440 g
15 oz

❷ ❸ **Table-clamps :** Fitting into special grooves in the table fixture they permit fixing it on any table whose thickness does not exceed 45 mm (1 3/4").
220 g
7 oz

❹ ❺ **Pillar tubes :** Made of chromium plated steel, the two tubes can be firmly connected. Overall height : 68 cm (25"). One tube is provided with a standard 3/8" screw thread, for groundspike (12) or a special ball-and-socket head, for taking pictures of operations etc. (Camera in horizontal position).
650 g
23 oz

❻ **Joint :** Light-metal casting with eccentric tightening grip, holds horizontal arm.
180 g 6 oz

❼ **Arm for same :** maximum useful length : 26 cm 10 1/4.
90 g 3 oz

❽ **Disc :** Must be removed, if ball-and-socket head or camera tilt cradle Usang are used.

❾ ❿ **Pair of reflectors :** (furnished without bulbs). Screwed into the table fixture and equipped with flexible arms, the reflectors can be put into any desired position ; built-in switch assures ease of operation. It is recommended to use opal bulbs.
1500 g
53 oz

⓫ **Double sided mirror with flexible arm :** Flat on one side and concave on the other, this mirror is extremely useful for reducing shadows, introducing highlights, etc. The mirror can be screwed into the table fixture.
350 g
12 oz

⓬ **Large groundspike for main pillar :** Screwed in the main pillar it permits the stand to be firmly planted into the ground for outdoor close-up photography.
210 g
7 oz

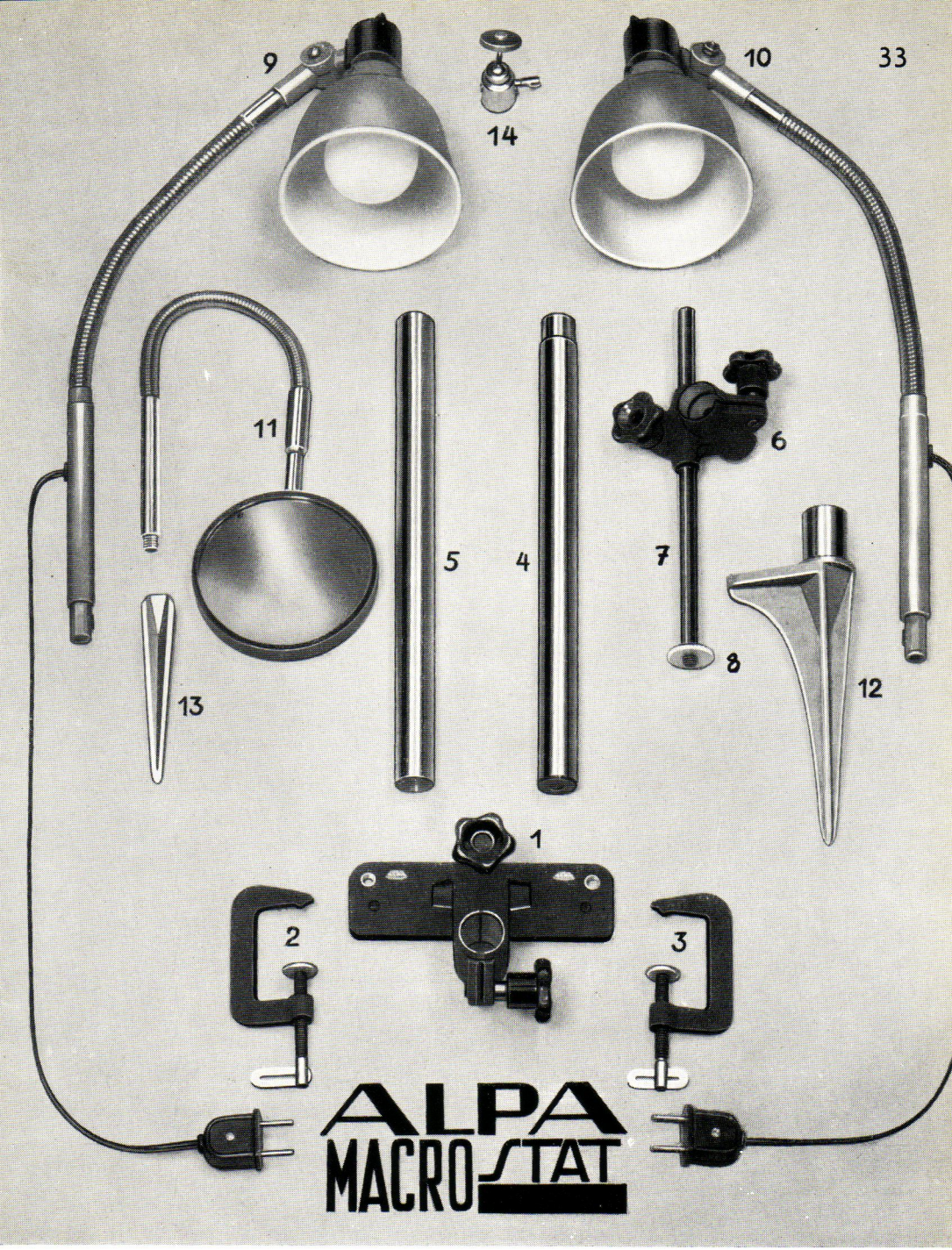
⓭ **Small ground spike for mirror :** Planted into the ground the mirror becomes an essential accessory for field work, reducing excessively dark shadows, reflecting sunlight into shady undergrowth, etc.
50 g
1 oz

⓮ **Ball-and-socket head :** Manufactured of brass, this is an indispensable accessory for angle shots.
120 g
4 oz

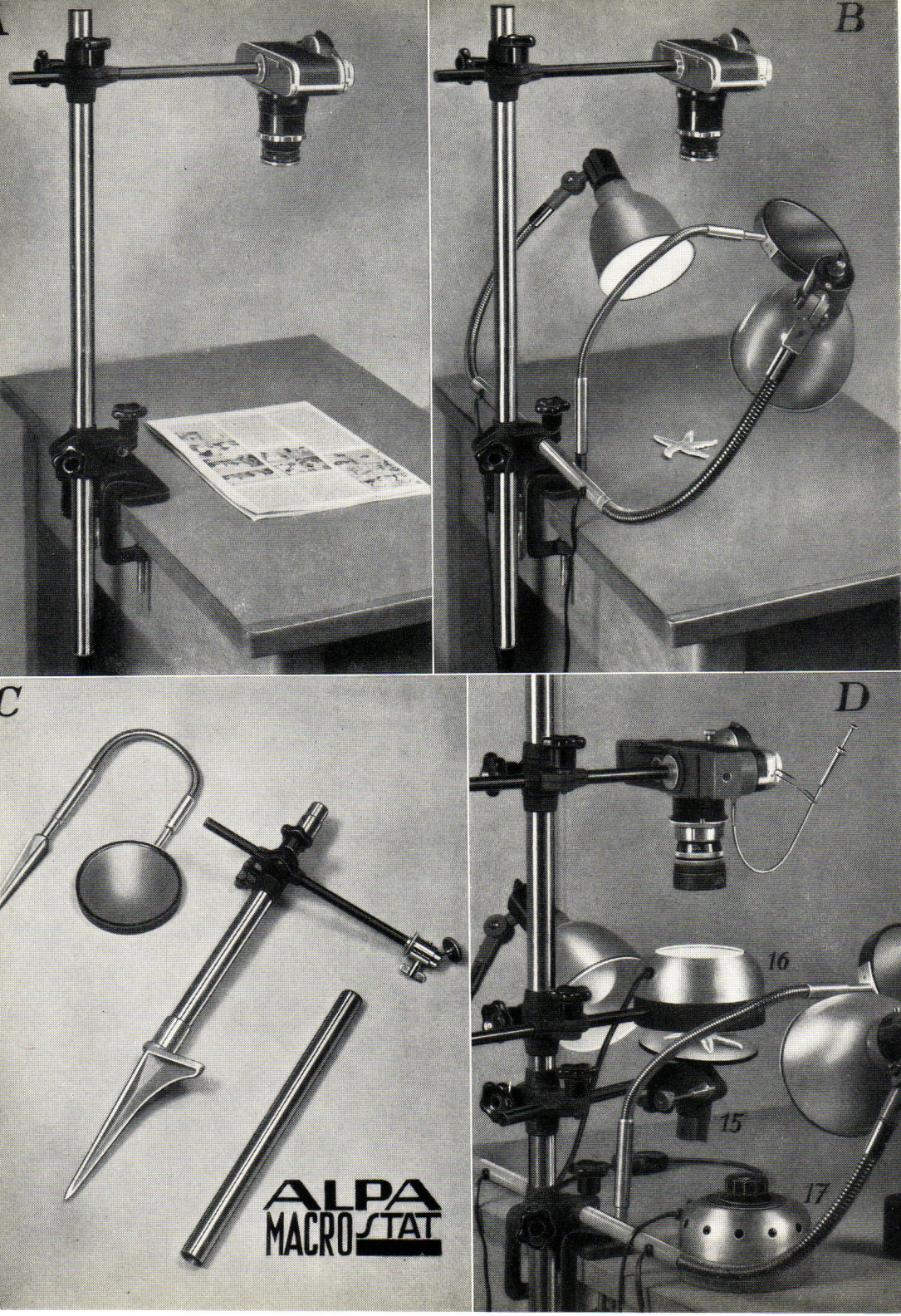
⓯ **Focusing stage for small objects :** This vertically adjustable table (diameter 4 1/2") allows small objects to be accurately focused without touching the camera lens (Fig. D).

⓰ ⓱ **Ring light system with rheostat :** A ring of 12 bulbs wired in series gives a shadowless illumination for small objects placed on the platform (15). The light can be dimmed between pictures by means of the rheostat. (Fig. D).

An opal glass plate permits the light system in conjunction with the mirror to be used as an object stage for transmitted light.

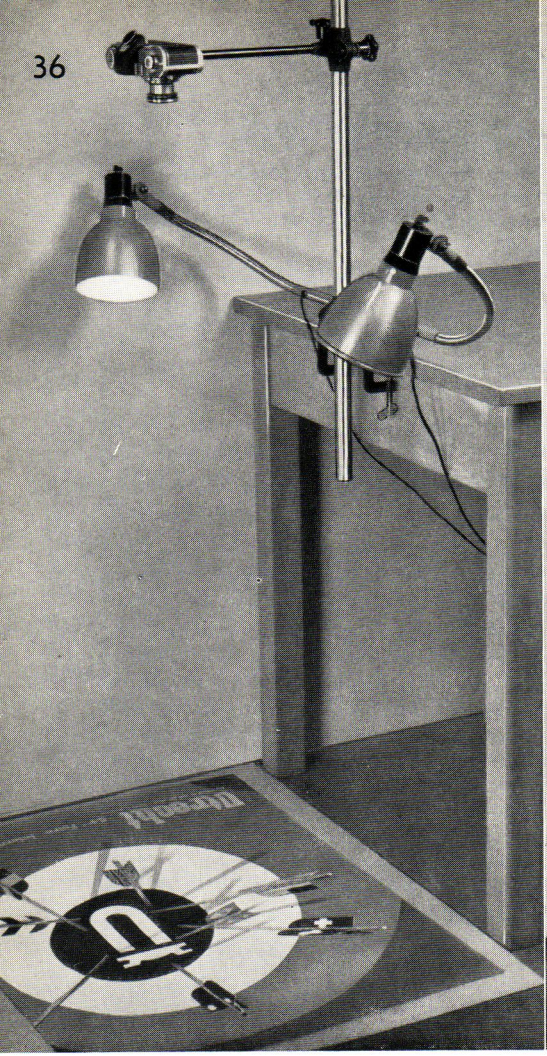


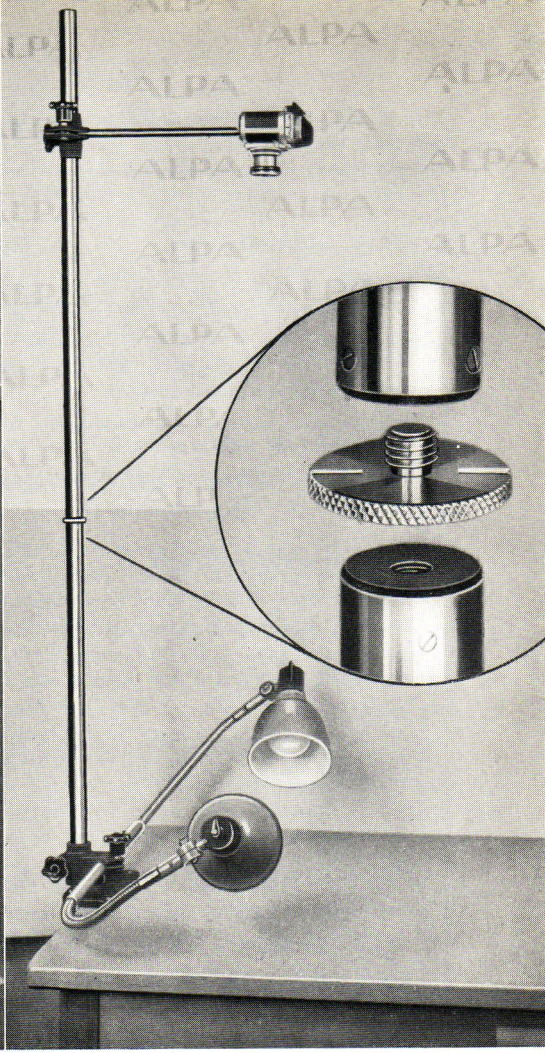
❶ Table fixture ❷-❸ Table clamps ❹-❺ Two pillar tubes ❻ Joint ❼ Arm for same ❽ Disc ❾-❿ Pair of reflectors ⓫ Double-sided mirror with flexible arm ⓬ Large groundspike for stand ⓭ Small groundspike for mirror ⓮ Ball-and-socket head


B
C
D
16
15
17
ALPA
MACRO STAT

MACROSTAT Copy and Close-Up Stand

	Weight		Code word
BASIC EQUIPMENT A **Fig. A**			
consists of parts		ounces	
1 + 2 - 3 + 4 - 5 + 6 + 7 + 8	1586 g	56	**MACROBASE**
This equipment is only sold as a unit; single parts are not available.			
Equipment for indoor work B **Fig. B** consists of basic equipment A plus pair of reflectors (**9 - 10**) and mirror (**11**)	3436 g	121	**MACROSAL**
Equipment for field work C **Fig. C** consists of basic equipment A plus mirror (**11**) and groundspikes (**12** and **13**)	2196 g	76	**MACROTERE**
Complete equipment for indoor and field work D consists of basic equipment A plus accessories (**9, 10, 11, 12** and **13**).	3696 g	129	**MACROCOMT**
Accessories :			
Pair of reflectors with flexible arms (**9 - 10**)	1500 g	53	MACROLAMP
Double sided mirror with flexible arm (**11**)	350 g	12	MACROMIR
Large groundspike (**12**) for stand	210 g	7	MACROPLANT
Small groundspike (**13**) for mirror	50 g	1	MIROPLANT
Ball-and-socket head (**14**)	120 g	4	BULET
Focusing stage for small objects (**15**) . .	650 g	23	MACTAB
Ring light system (**16**)	570 g 20	220 V	MACONORM
with rheostat (**17**) and translucent glass plate	460 g 16	110-125 V	MACILU
Spare bulbs for circular light system :			
8 V for 110 - 125 volt			MACLIT
16 V for 200 volt			MACLAF
Camera tilt cradle			USANG
Intermediate piece for pillar column, double-sided screw 3/8" and 3/8"			INTERVIS
Same, double-sided screw 3/8" and 1/4" .			INTERASA





Large copy, a poster for example, is most suitably reproduced with the Macrostat equipment as shown in the illustrations: Copy on floor, ALPA on horizontal arm swung out from table, lamps set wide apart.
The right illustration shows how to double the height of the Macrostat column from 25 to 50" by adding another column with the intermediate piece (Code-word Intervis). This practice is not too much recommended, since the great distance from the table makes the camera subject to vibrations.

Supplementary Equipment for Reproducing Black and White Negatives from Colour-Transparencies

Problem : The amateur using reversal colour material may wish to make black and white prints in addition to seeing his slides projected. First-rate negatives can be produced with the ALPA and some supplementary equipment for the ring light system. For best results the transparency must be illuminated evenly and the light intensity matched to the density of the transparency. The rheostat in connection with the ring light provides a wide range of control, so that the illumination can be increased for a dense trans-

parency or decreased for a relatively thin transparency. Slides which are too dark (dense) for projection can be turned into perfectly satisfactory black and white negatives, simply by greatly increasing the intensity of the light. The reverse can be done for thin, washed-out transparencies too, although generally not as satisfactorily as when the slides are sufficiently dense.

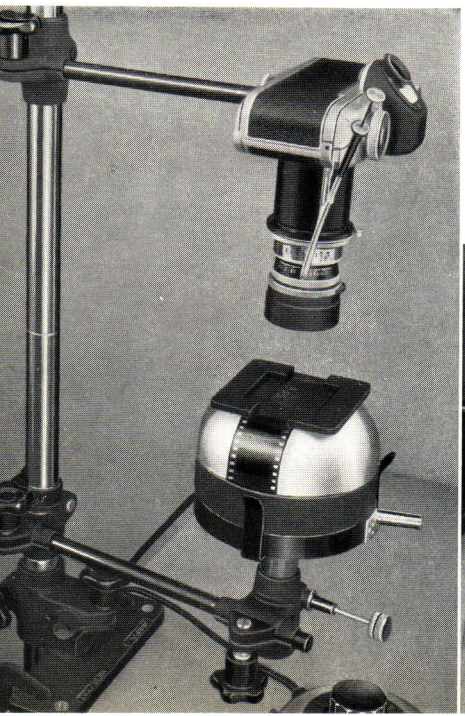
Solution : Macrotable focusing stage, ring light and Macrostat mirror are used in conjunction with some supplementary equipment, especially designed for this purpose. The set-up is mounted as follows : Three small clips on the side of the Macrotable hold the mirror (without gooseneck arm) firmly in place, concave side upwards. Above this comes the ring light, all components thus being built up on the focusing stage. A circular metal mask is placed on the light source and above that a ground glass ; the special filmholder "pasfilm" is inserted on top. This holder will take either uncut film or mounted 2 x 2" (5 cm x 5 cm) slides.

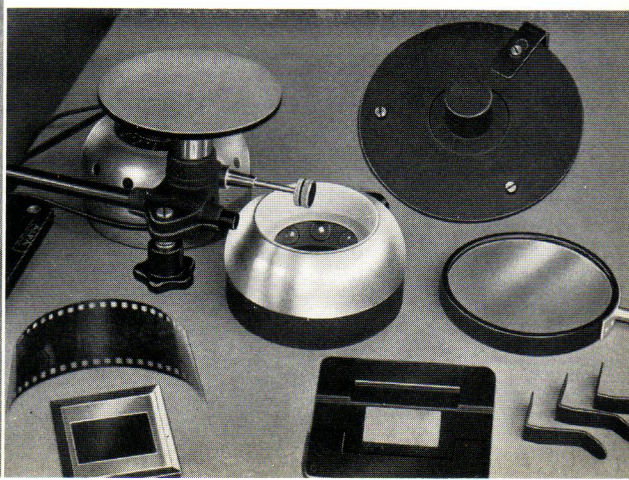
The complete set-up is attached to the Macrostat column so that the ALPA camera can be centered vertically above it. Either a 50 mm lens with Tuban A + 4 + B or the ALPA Xenar 75 mm f/3.5 with Tuban 4 + 2 or the Macro Kilar 40 mm f/3.5 Mod. D may be used. Moving of the horizontal arm allows coarse focusing, while the focusing stage offers fine adjustment up to a 1 : 1 reproduction ratio.

The use of fine grain medium or slow-speed black and white film and a fine grain developer are recommended. Illumination of the colour transparency is controlled by variable resistance of the light source in such a way that scale marking 4 on the rheostat corresponds to very thin transparencies, marking 7 to normal density and marking 10 to very dense originals. The most suitable stop is (according to the lens in use) between f/5,6 and f/8, the exposure time between 3 and 15 seconds. It is important that the surface of the transparency does not reflect too much scattered light, but it is not necessary to work in complete darkness. Very contrasty originals may even benefit from a certain amount of extraneous light which will tend to lower the contrast and avoid the production of too hard negatives.

The same procedure does not apply as such to copying on colour film. Not only does the colour temperature change with varying resistance, but colour work requires also the use of different correction filters.

The complete supplementary equipment is identified by the code word **"pasfilm".**





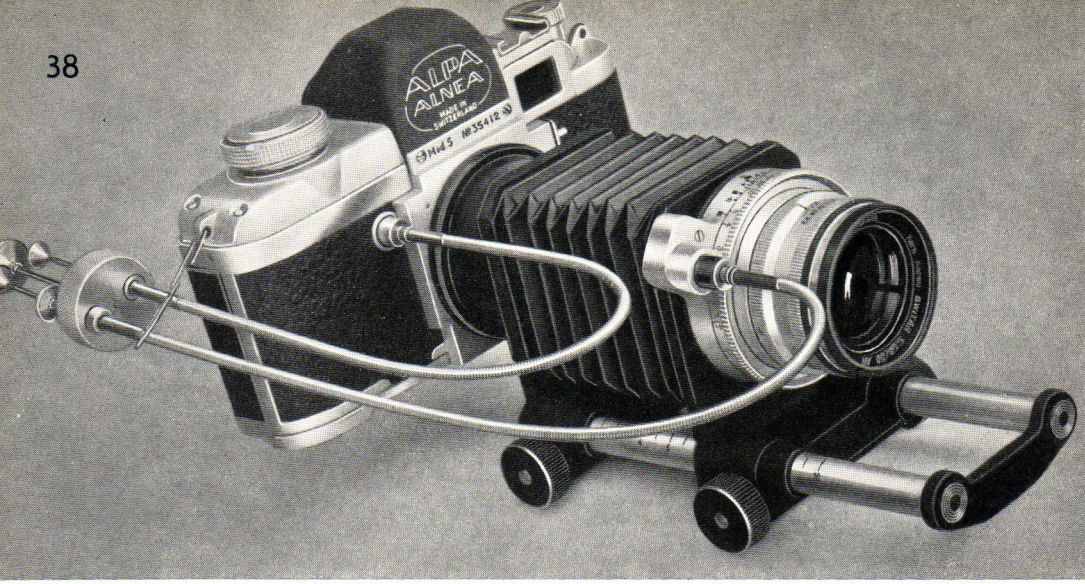
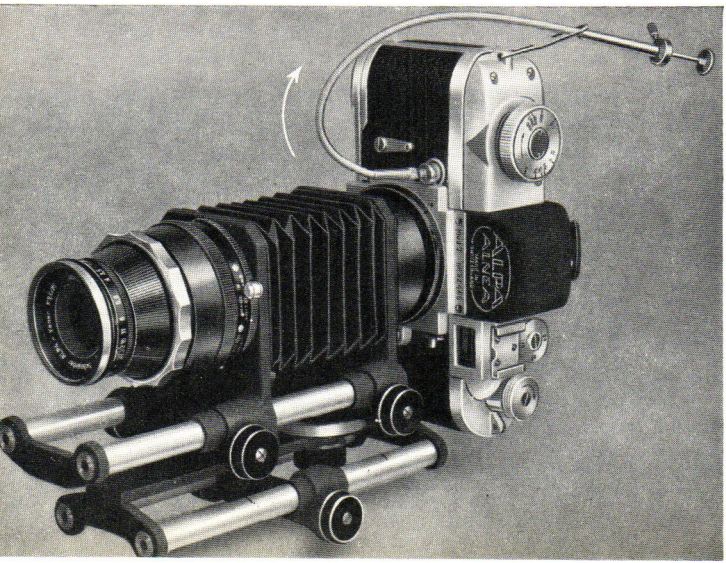


Illustration shows KAVO bellows with ALPA 5 and Kern Switar 50 mm f/1.8 Apochromat with automatic diaphragm and twin cable release.

New KAVO Bellows Attachment for ALPA Cameras

This practical accessory extends the unique versatility of the ALPA for close-up photography still further. With the KAVO bellows you can easily change from vertical to horizontal pictures without detaching the camera. Focusing is done by a smooth gear drive.

The front of the bellows accepts ALPA lenses with bayonet-mount. In conjunction with the Tuban A ring the long focal length lenses (75-180 mm) without their Extensan mount may be directly screwed into the frontplate



◀ *ALPA 6 with KAVO bellows and KAUT sliding support. The Xenar 75 mm f/3.5 lens is fixed with its Extensan mount. The camera can be turned either into horizontal or vertical position.*

of the bellows which provides a continuous focusing range fom infinity to ultra close-ups.

The minimum length of the KAVO bellows completely contracted is 29 mm., the maximum extension is 117 mm.

KAUT Sliding Support

This well designed supplement allows the ALPA with KAVO bellows extension to be moved back and forth until the desired reproduction scale is obtained. The gear drive permits a movement of up to 109 mm. The same accessory may also be used for stereo photography, by turning it 90° with reference to the camera. Two separate exposures are then made, with the camera moved between the two engraved markings (67 mm apart) on the sliding support, one exposure at each point. This is of course only possible with objects which do not move.

KAV bellows extension for ALPA cameras :

Weight : 11 ounces. Code word : KAVO.

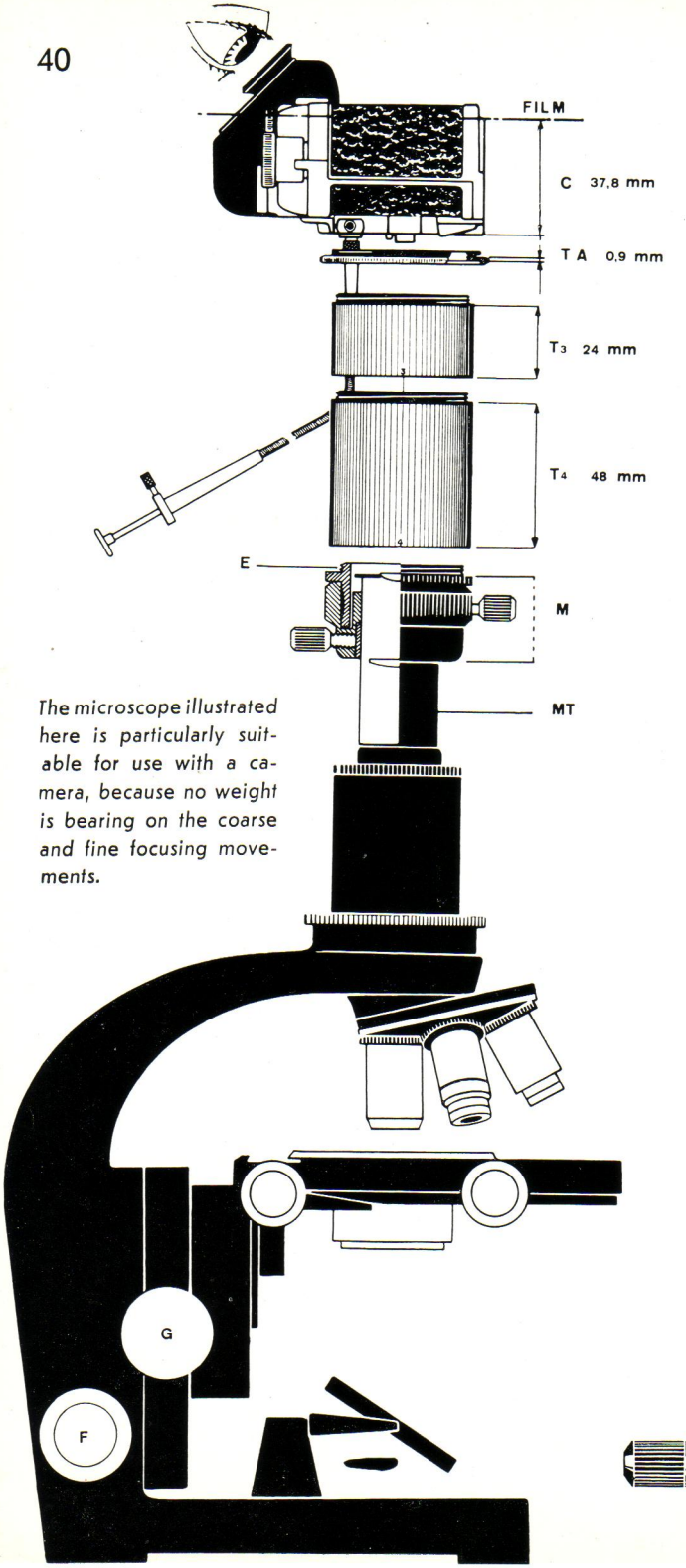
KAUT Sliding support. Weight 6.3 ounces. Code word : KAUT.

A twin cable release (Code word : BICLONG) permits the use of the automatic diaphragm when the lens is mounted on extension tubes or bellows.

Chart of Negative Scales Obtainable With ALPA Camera and KAVO Bellows Extension

ALPA lens f = mm	Lens without Extensan mount (+ Tuban A) from — to	Complete lens from — to	Comments
35 Curtagon	— —	1 : 1,3 ➤ 3,4 : 1 ➤	do not exceed 1 : 1
40 Macro-Kilar E	— —	1 : 1,5 ➤ 3,2 : 1	
40 Macro-Kilar D	— —	1 : 1,5 ➤ 3,7 : 1	——➤ Can only be used in exceptional circumstances with frontal lighting. Front of lens mount is only 1 cm (3/8") from copy.
50 all except Macro-Switar	— —	1 : 1,9 ➤ 2,3 : 1	
50 Macro-Switar	— —	1 : 1,9 ➤ 2,6 : 1	
75 Xenar	∞ ➤ 1,2 : 1	1 : 2,7 ➤ 1,8 : 1	
90 Altelar	∞ ➤ 1 : 1	1 : 3,1 ➤ 1,6 : 1	
90 Alfitar	— —	1 : 3,3 ➤ 1,4 : 1	
90 Macro-Kilar*	∞ ➤ 1,5 : 1	1 : 3,2 ➤ 2,3 : 1	
100 Apochromat	∞ ➤ 1 : 1,1	1 : 3,7 ➤ 1,4 : 1	
135 Algular	∞ ➤ 1 : 1,5	1 : 4,8 ➤ 1 : 1	
135 Tele-Xenar	— —	1 : 4,8 ➤ 1 : 1	
180 Alefar	∞ ➤ 1 : 2,1	1 : 6,4 ➤ 1 : 1,3	
180 Alitar	— —	1 : 6,8 ➤ 1 : 1,4	

*Without camera adapter. 1:3 = 1/3 natural size 3:1 = 3 × natural size



The microscope illustrated here is particularly suitable for use with a camera, because no weight is bearing on the coarse and fine focusing movements.

The ALPA Used as Microphotographic Camera

Schematic diagram:

C = camera distance (distance from film to front plate of camera.

TA = Tuban A

T3 = Tuban 3 (24 mm)

T4 = Tuban 4 (48 mm)

M = Adapter (either Microfix or Micrano).

MT = Microscope eye tube

E = Exit pupil

G = Coarse focusing (Knob)

F = Fine focusing (Knob)

Micrano adapter ring for eye tubes of abnormal diameter, is made to order (ask for questionaire).

Microfix adapter: for eye tubes of 25 mm standard diameter fitting all modern microscopes, consists of 2 parts. (See page 44).

Photomicrography with the ALPA Camera

It must be clearly understood that in photomicrography the picture quality is decisively controlled by the quality of the microscope and its objectives. The camera is used **without** camera lens and serves solely as a recording instrument which assures critical focus on the groundglass and on the film plane. The built-in prism guarantees uniform precision focusing, and its logical 45° viewing angle provides an exceptionally comfortable position of the head — essential for avoiding fatigue during long hours of research in the laboratory. The 45° angle is also particularly convenient for those who wear glasses.

Microscopes have been originally designed as a means of visual observation. However, their photographic application increased to such an extent that modern instruments, both in design and lens correction, are fully up to the standards demanded for photomicrography. Older models can only be used with care, as their optical performance is frequently inadequate, even for the most modest requirements. The weight of the camera may also affect the fine adjustment mechanically. Furthermore, the microscope eye-tube must have a sufficiently large diameter, and its inner surface must be entirely coated with a black paint, so as to eliminate all unwanted reflections.

The human eye is optically very imperfect, so that for purely visual purposes it matters little if a micro lens shows considerable curvature of field. In a photograph this shows however a rapid decline of definition from the centre to the edges of the image.

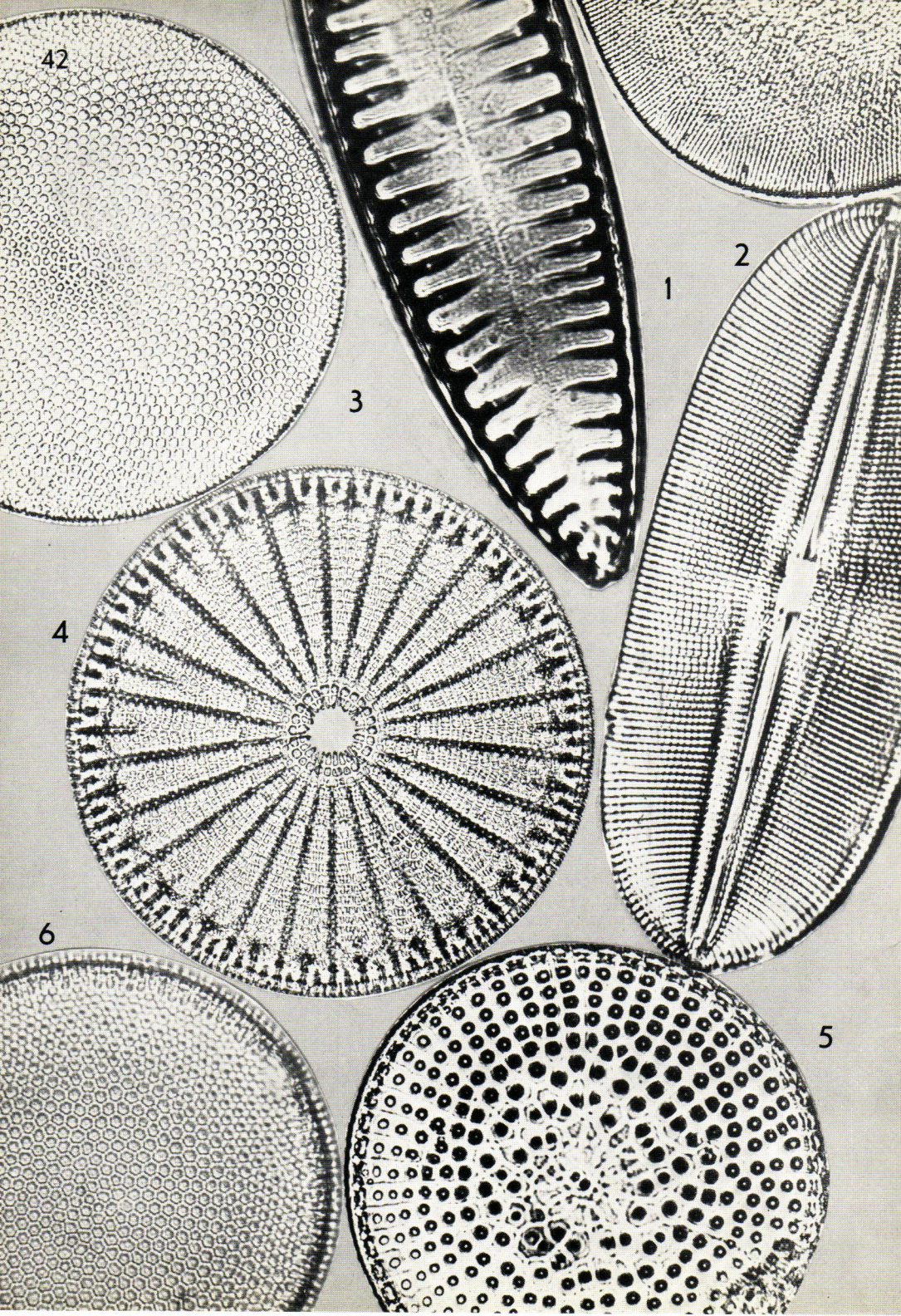
When using an older model it may be advisable to purchase at least a modern eyepiece.

Recent progress in the design of microscope objectives has improved the quality of the image considerably. There are three micro-lens categories :

Achromatic Lenses : These objectives are corrected for yellow-green and blue rays and are only suitable for black-and-white photography. They should always be used with filters restricting the effective light to a narrow portion of the spectrum. The more monochromatic the filter used, the sharper the image.

Semi-Apochromatic Fluorite Lenses : These are suitable for every type of work including colour photography.

Apochromats : These micro-objectives have the highest optical correction and are especially recommended for colour-work. The difference from the semi-apochromatic type becomes most noticeable with more powerful lenses, particularly those with oil-immersion.


42
3
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Microphotographs of Diatomacea

The structure of diatoms is one of the most interesting subjects for photomicrography and some species are even used as tests subjects for the resolving power of micro-lenses. The illustrations on the opposite page are evidence for the excellent application of the ALPA 35 mm camera to photomicrography, even at very high magnifications. All these photographs were taken with a homogenized oil immersion objective 84 x and a special photographic ocular 7.5 x. The total extension (i. e. distance from exit pupil to film plane) consisted of Tuban 4 + 3 + A in addition to the Microfix adapter, calculated to add up to 83 mm. The magnification on the negative is therefore $\frac{84 \times 7\,1/2}{3} = 210$ *times (see explanation of this calculation below).*

The individual enlargements were combined for the page lay-out. Reproduction scales for the various subjects on page 42 are as follows:

1)	**Surirella robusta Ehr.** *(Freshwater Plöner Lake, Holstein)*	*825 : 1*
2)	**Diploneis fusca Cl.** *(Marin, Gulf of Naples)*	*750 : 1*
3)	**Coscinodiscus oculus iridis Ehr.** *(Marin, Para, Brazil)*	*800 : 1*
4)	**Arachnoidiscus Ehrenbergi Bail.** *(Marin, North Sea)*	*475 : 1*
5)	**Stictodiscus californicus Grev.** *(Marin, fossil. Oamaru, New Zealand)*	*640 : 1*
6)	**Eupodiscus radiatus Bail** *(Marin, Tampa Bay, Florida, U. S. A.)*	*800 : 1*

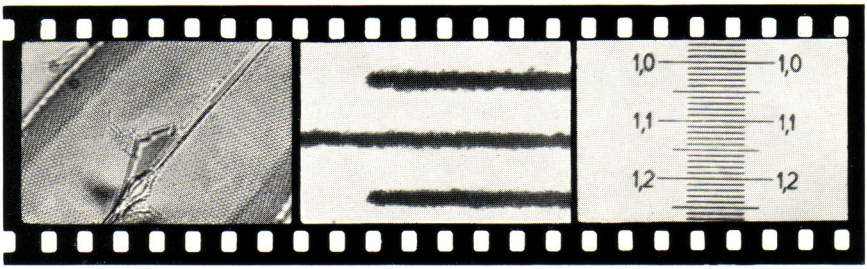
The most frequently used Huygenion oculars are not suitable for photomicrography. It is strongly recommended to use eye-pieces especially corrected for photographic work, supplied under various names by a number of manufacturers.

In photomicrography, the problem of illumination is nearly as important as the selection of lenses. It cannot be impressed strongly enough upon those who use the microscope merely for visual examination that most careful lighting of micro preparations is essential for photographic work. Koehler's principle of integral illumination should be rigidly applied. A general adjustment is insufficient and cannot lead to good results. For colour work, it is also indispensable to use achromatically corrected condensers.

The actual degree of enlargement on the negative can be easily determined. The so-called nominal magnification of a microscope for visual use is calculated by multiplying the primary enlargement of the micro-objective by the enlargement of the eyepiece. This calculation applies to normal sight, assuming the power of refraction + 4 diopters. In order to achieve this degree of magnification on the negative as well the distance between the exit pupil of the eyepiece and the film plane must be 250 mm (10"). With the camera mounted on the microscope such a distance is neither very practical nor necessary. Half the distance (125 mm) or a third (83 mm) are highly adequate. Accordingly the effective degree of enlargement obtained on the negative will be proportionally reduced. When using for instance a 20 x lens and a 10 x photographic eyepiece, the visual enlargement is 20 x 10 = 200. A distance of 125 mm between exit pupil and film plane renders an enlargement of 100 times on the negative, i. e. half the visual magnification. A distance of 83 mm only gives a magnification of 66 2/3 times on the negative, i. e. a third of the visual magnification. (See also example in 2nd paragraph above.)

Note : Formerly micro-lenses and eyepieces were marked only by numbers. With such optics the degree of enlargement can only be calculated from charts.

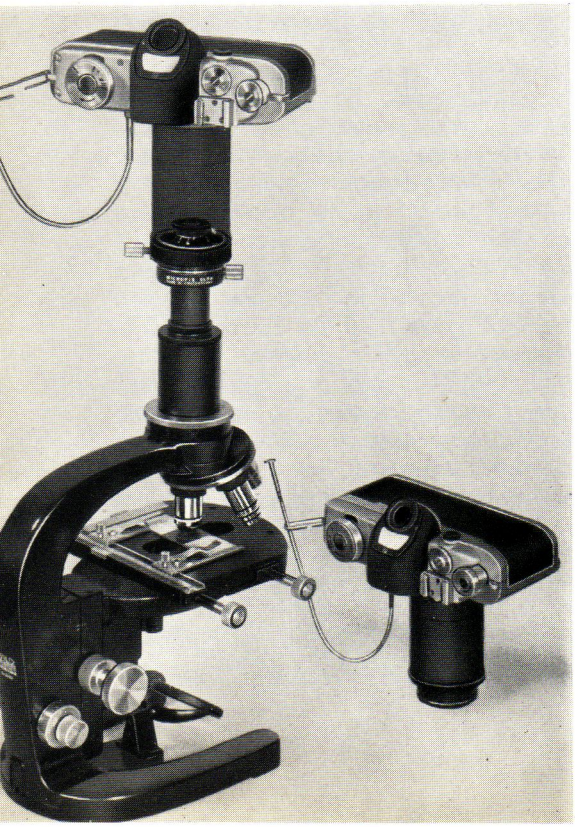
Should no charts be available the following test must be used :
The scale of enlargement on the negative is easily determined by using as object a millimeter rule, divided in 1/100 mm. Photographed in this manner it will show conclusively the degree of enlargement obtained. The strip of film pictured below clearly illustrates this method.



Left : *Test preparation : Pleurosigma angulatum Sm. Contact print of negative. Wild Fluotar 100 x, photographic eyepiece 15 x - nom. enlargement 100 x 15 = 1500. The distance between exit pupil and film plane was 125 mm., therefore an actual enlargement of half the value or 750 x was obtained on the negative.*

Center : *Photograph of millimeter rule. The section of the rule photographed with the identical microscope setting as above shows a distance of 7 ½ mm between the 1/100 mm markings, corresponding to a magnification of 750 x.*

Right : *Section of millimeter rule divided into 1/10 mm and 1/100 mm), but photographed at a magnification of 75 x only, i. e. 10 x less, which helps to explain the center frame of the illustration.*



◀ *The illustration shows a modern microscope and an ALPA 5 camera and Tuban extension tubes. The "Microfix" adapter which connects the camera with the instrument consists of two ring sections permitting the vibration-free removal of camera and extension tubes. This in turn frees the eyepiece of the microscope for visual examination of the preparations and simplifies lighting control and exposure readings. The mounting and removal of the ALPA camera may be done instantaneously without straining or moving the microscope. The camera is also freely accessible for loading and unloading of film. The "Microfix" is suitable for all instruments with eyetubes of 25 mm standard diameter.*

Practical Hints for Photomicrography

Black and white work : The use of fast, hypersensitive films is not recommended, because they are not sufficiently contrasty and lack adequate resolution. Medium fast and slow emulsions with a good contrast range and fine grain give best results. With achromatic lenses the use of filters is essential. They must always be mounted between light source and condenser, and focusing on the groundglass has to be done with the filter in position. The choice of the filters depends on the nature and colouring of the preparations. Complementary filter tints increase the contrast, similar tints reduce it. Microphotographs of low contrast preparations can be considerably improved by using suitable filters.

For preparations of insects with thick Chitin armor protection, orange or red filters render less opaque and therefore more detailed reproductions. If extreme resolution is required, a blue filter is essential. For long exposures, it is indispensable to have a vibration-free, sturdy table support. The use of the Declad cable-release is always necessary.

Colour Work : Only micro-objectives suitable for colour photography should be used. The colour temperature of the lights must be carefully balanced to the emulsion which excludes the use of any light source controlled by variable resistance. Daylight emulsions require the use of blue filters or of electronic flash, for which a haze filter is recommended. Certain combination microscope lamps now offer tungsten light for focusing and electronic flash for picture taking.

The greater the magnification, the more precaution must be applied to focusing, centering of lights, etc., for both black and white or colour work.

Ground glass with clear spot : Ground glass focusing becomes also more difficult with increased magnification. ALPA cameras with split image rangefinder in the ground glass (Mod. 6 and 8) offers two possibilities of focusing : either the use of the split image field in the centre, or if the beam of light is of not sufficient diameter to illuminate both prism elements, the clear zone around. Focusing in this zone is than done by means of the aerial image which requires coincidental focus both on the engraved line and the image.

In ALPA models without split image rangefinder (5 and 7) on special request a ground glass with clear spot in the centre can be installed in the factory, or by authorized agents. (Code word : ZON to be added to the code designation of the camerabody.)

Attaching the ALPA to the Microscope

The **Microfix** intermediate ring adapts the ALPA to all modern microscopes with an eyetube of standard 25 mm diameter. The adapter consists of two

parts : A lower ring of 25 mm aperture with a (lower) clamping screw and an upper ring threaded to match the Tuban extension tubes. An additional (upper) clamping screw keeps both parts together.

For mounting the Microfix to the microscope proceed as follows: Remove the eyepiece, loosen the upper clamping screw, place the lower ring on the eyetube, so that the ring is just even with the top of the eyetube and tighten the lower screw until the ring holds. Put the eyepiece back into the eyetube. The upper ring is screwed into the Tuban extension tubes which are fixed to the camera by means of the Tuban A ring. The camera can now be mounted without any vibration. Firm connection is secured by tightening the upper clamping screw. When using the microscope for visual observation between exposures the upper clamping screw is loosened, and the camera can be easily and quickly removed.

Micrano: This one-piece clamping ring is made available for microscope eyetubes of other than the standard 25 mm diameter. The upper part is threaded to join the Tuban extension tubes, while the lower part is slotted into clamping jaws which have a tightening ring. This ring should, however, never be tightened, if the Micrano is not mounted on the microscope. The inside diameter of the Micrano is made to order, so as to fit the diameter of the specific microscope eyetube. This must be an exact fit within tolerances of 1/10 mm, and we urgently request that the measurement is made with a micrometer (see questionnaire).

Tuban Extension Tubes: The degree of enlargement is determined by the selection of tubes (see page 43). If the distance from exit pupil to film plane is 250 mm, the photographic magnification corresponds exactly with the visual magnification, which requires 4 Tuban of 48 mm each + Tuban A and camera. For $^1/_3$ of this distance (i. e. 83 mm) or $^1/_3$ of the total magnification Tuban 4 + A and camera are sufficient. For $^1/_2$ distance (125 mm) corresponding to $^1/_2$ of the total magnification Tuban 2 + 3 + A and camera are required. (See also diagram of microscope and ALPA accessories on page 40.)

Special Photographic Fittings are supplied by some manufacturers, for microscopes of their own make (Wild, Heerbrugg ; Zeiss-Winkel, Goettingen). They allow lateral observation of preparations through a special eyepiece without removing the camera. This is achieved by means of a movable prism (Wild) or by a fixed prism conducting 1/10 of the light to the eye, the remaining 9/10 to the film (Zeiss). Such equipment is especially useful for non-stabilized preparations. Special adapters for ALPA cameras can be requested from these manufacturers or their agents.

Adapting of ALPA Cameras to Other Optical Instruments

Any real image produced by an optical instrument can be photographed. The important question always is, whether the image-producing lens is adequately corrected for photographic purposes. For purely visual use only limited correction is necessary, and considerable curvature of field is not disturbing to the human eye, since it has itself a strongly curved reception surface.

In binoculars and telescopes chromatic aberration is corrected to achieve visual image size coincidence in the yellow-green and blue bands of the spectrum but without ensuring identical planes of these two images for photographic purposes. Such instruments can only produce satisfactory photographs by using strong monochromatic filters.

As a single lens reflex camera the ALPA is particularly suitable for use with numerous optical instruments, by virtue of its absolute image control both for composition and focusing. The camera can be used in two different ways : *a)* with the normal lens on the camera ; *b)* without the lens, the camera body being attached directly to the instrument.

There is however no clear line of demarcation between these applications, as in some cases the camera may be used either with or without camera lens.

Describing the multiple applications of the ALPA in this very special field would exceed the scope of this publication and we merely cite some typical examples. Please note that the Macrostat stand is an excellent means of mounting the ALPA firmly in conjunction with almost any optical instrument.

The ALPA may be attached to the following instruments :

Laboratory Microscopes, as manufactured by Isoma and Hauser and others (see illustrations on page 29). An extremely flexible and versatile instrument is the Swiss Projectina, a **Macro and Microscopic Projector,** especially suitable for textile and metal surface research. The ALPA camera without lens is connected to the projector eyepiece with the "Microfix" adapter.

Colpograph : This instrument with ALPA fitting made by Kern, Switzerland, has a tele-objective which permits variable magnifications, i. e. renders negative scales between 1.1 : 1 and 3,5 : 1. It may be used for purely medical as well as for technical purposes.

Endoscope : An instrument for medical and technical photography, to which the ALPA can be attached with its lens.

Cathode Ray Oscillographs : The ALPA ought to be equipped with the fast Kern Switar 50 mm f/1.8 APOCHROMAT for photographing the screen image. The possibility of taking intentional double exposures is extremely valuable, because comparisons between known basic curves and actual transmission curves can be recorded on the same negative.

Radar Equipment : Photography of the radar screen image is easily made possible with the ALPA, preferably equipped with the Kern Switar 50 mm f/1.8 APOCHROMAT. According to the size of the screen this can often be done with the lens alone, as it focuses down to 17" without any other accessories.

The ALPA may be easily attached to telescopes and binoculars (as mentioned above) equipped with a 50 mm or a long focus lens. A special adapter ring for attaching Kern Swiss binoculars or telescopes is available.

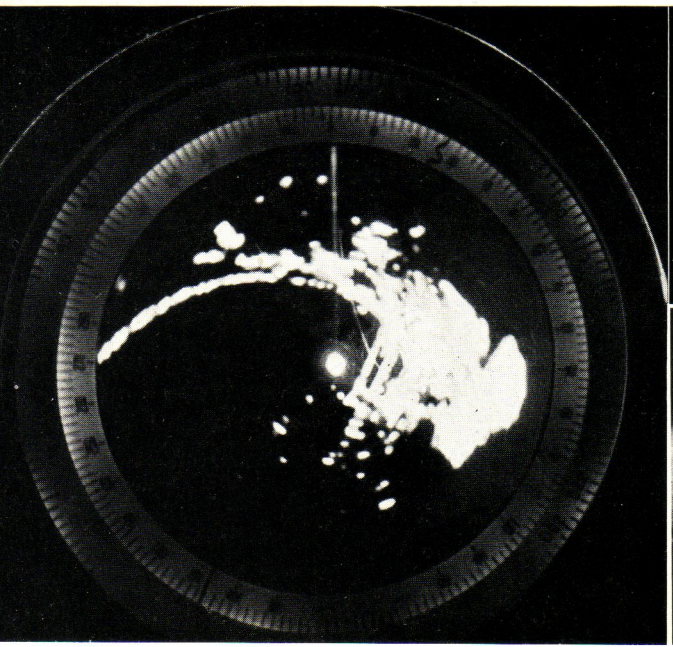
Conclusion :

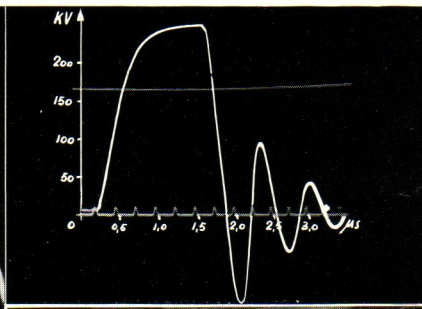
In the relatively brief space of this booklet, we have indicated but a few of the unlimited applications in technical photography which the ALPA handles both with extreme accuracy and utmost ease. Inimitable Swiss craftsmanship has developed a custom made, most flexible instrument of ultra modern design, equally effective for indoor and field use, synchronized flash exposures or available light work, fast sequence shooting, distant views as well as ultra close-ups or copywork, extreme wide angles and photomicrography. The very same camera which serves the amateur to perfection in pursuit of his hobby is also a precision recording tool in the hands of the scientist and research engineer. The ALPA is the most versatile, the most complete, the ALL-IN-ONE 35 mm camera, **ideal for industry and science as well as for your personal use.**

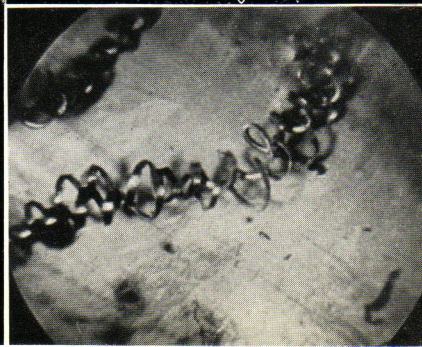
Left : Photograph or radar screen image. Cape Town Harbour.

Top : *Cathode ray oscillogram.*

Bottom : *Endoscope photograph taken with a technical endoscope and ALPA 5 by Messrs. Sass Wolf & Co., Berlin. Reproduction scale 6 : 1.*





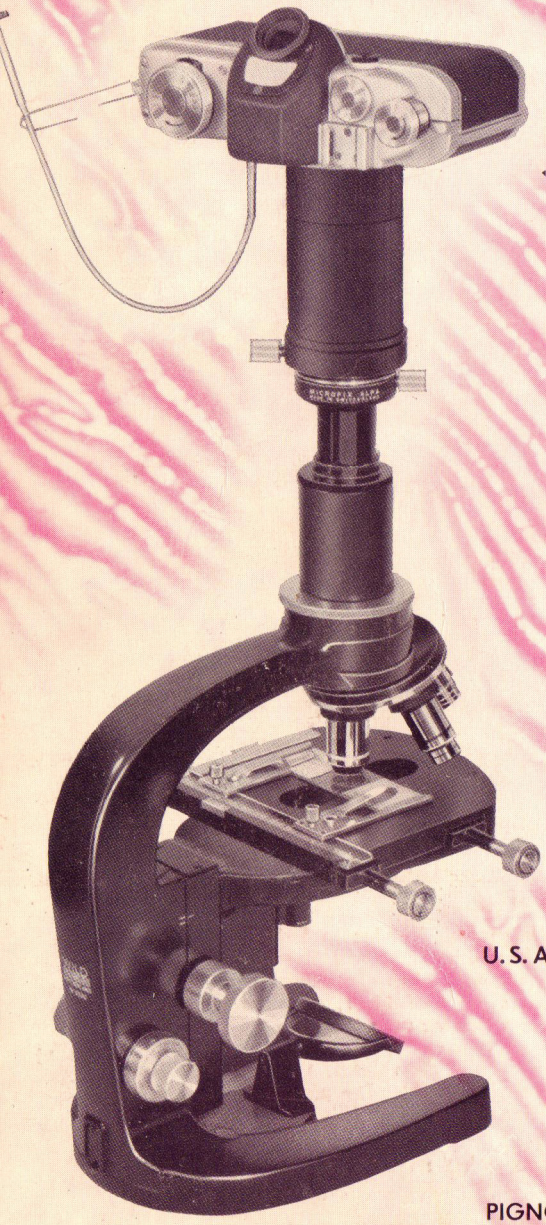


Cover page : *The flower shown is an orchid native to Switzerland (Orchis masculus). The photograph was taken with ALPA and Macrostat equipment with the ALPA Xenar 75 mm f/3.5 lens and Tuban extensions. The reproduction on the cover page represents a scale of 10 : 1, negative scale 2 : 1. Above : Macrophotograph of the same flower : negative scale 1.4 : 1.*

Back cover page : *The microphotograph of the veins of a pine seedwing on the back cover was taken with transmitted light. The pine seeds blown by the wind from their cone have a transparent wing which is illustrated here. Magnification 100 : 1.*

Illustration shows a Wild-microscope with the ALPA and Tuban 4 + 3 + A, attached with Microfix adapter.

100 : 1



INDEX

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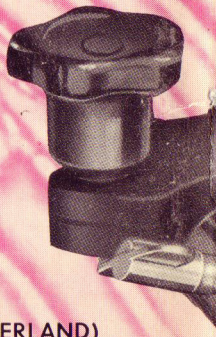

PIGNONS S.A. BALLAIGUES (SWITZERLAND)

Printed in Switzerland P.S.A. 1059 4 US