Schneider LENSES

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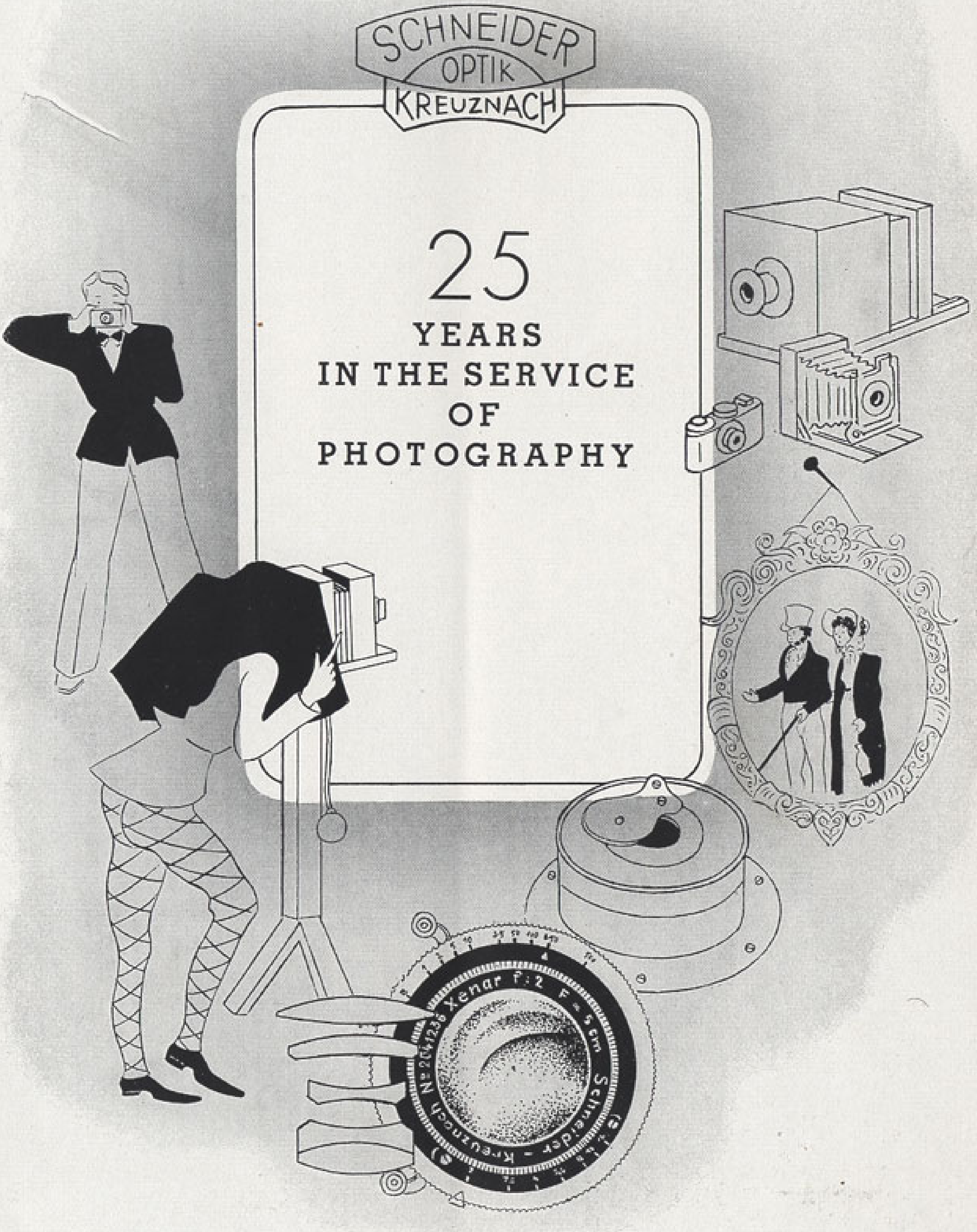
JOS. SCHNEIDER & CO. · OPTICAL WORKS · KREUZNACH / RHLD. · GERMANY

25 YEARS IN THE SERVICE OF PHOTOGRAPHY



Index

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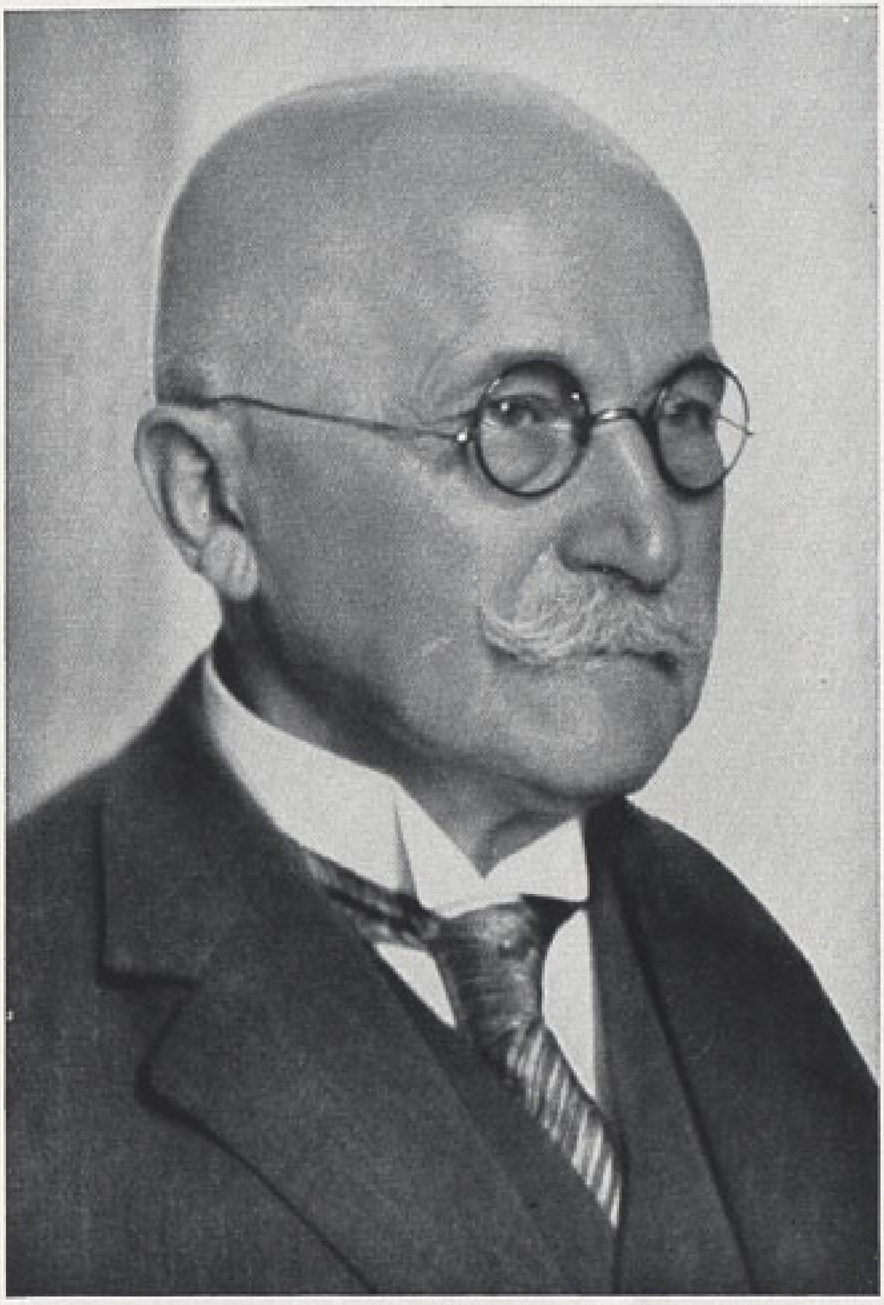

JOS. SCHNEIDER SEN.

OPTICAL WORKS JOS. SCHNEIDER & CO., KREUZNACH

"Schneider" Lenses are used all over the world!

When, in 1912, Mr. Jos. Schneider sen. and his son Mr. Jos. A. Schneider, the actual manager, founded the business they started manufacturing optical equipment with only 12 workmen.

In 1938 580 trained specialists were busy in up to date factories. The daily output at the Kreuznach and the affiliated Göttingen works exceeds 700 lenses.

In 1936 the 1,000,000th Schneider lens was sold, proving the great satisfaction these lenses enjoy everywhere.

The manufacturers evolve and manufacture only one speciality: lenses for photo and cinematograph apparatus.

The most famous Schneider lens, the "Xenar" was manufactured first in 1919 in large quantities, though its aperture size (f:4,5) was an extraordinary high one at that time.

Later on further types were developed: the "Radionar", "Tele-Xenar", the extra wide angle lens "Angulon", the Cine "Xenon" and the miniature camera lens "Xenon".

All Schneider lenses are of special design, patented in all countries and are the very best offered to the public for their specific purposes. They are the results of many years of practical workmanship and scientific investigation.

Schneider lens mounts are manufactured with a precision of 0,01 millimeter (0,0254 mm = $^1/_{1000}$ inch).

No lens leaves our works without having been previously submitted to manifold examinations by experts using most complicated special equipment for the purpose.

All these factors have contributed to making "Schneider" lenses a leading brand all over the world.

This general catalogue aims to give you information of the whole range of productions of the Jos. Schneider & Co. Optical works and the fields of application of Schneider lenses. To facilitate a ready understanding of technical descriptions many tables, formulas and data are given and an "Optical Introduction" for amateurs is added.

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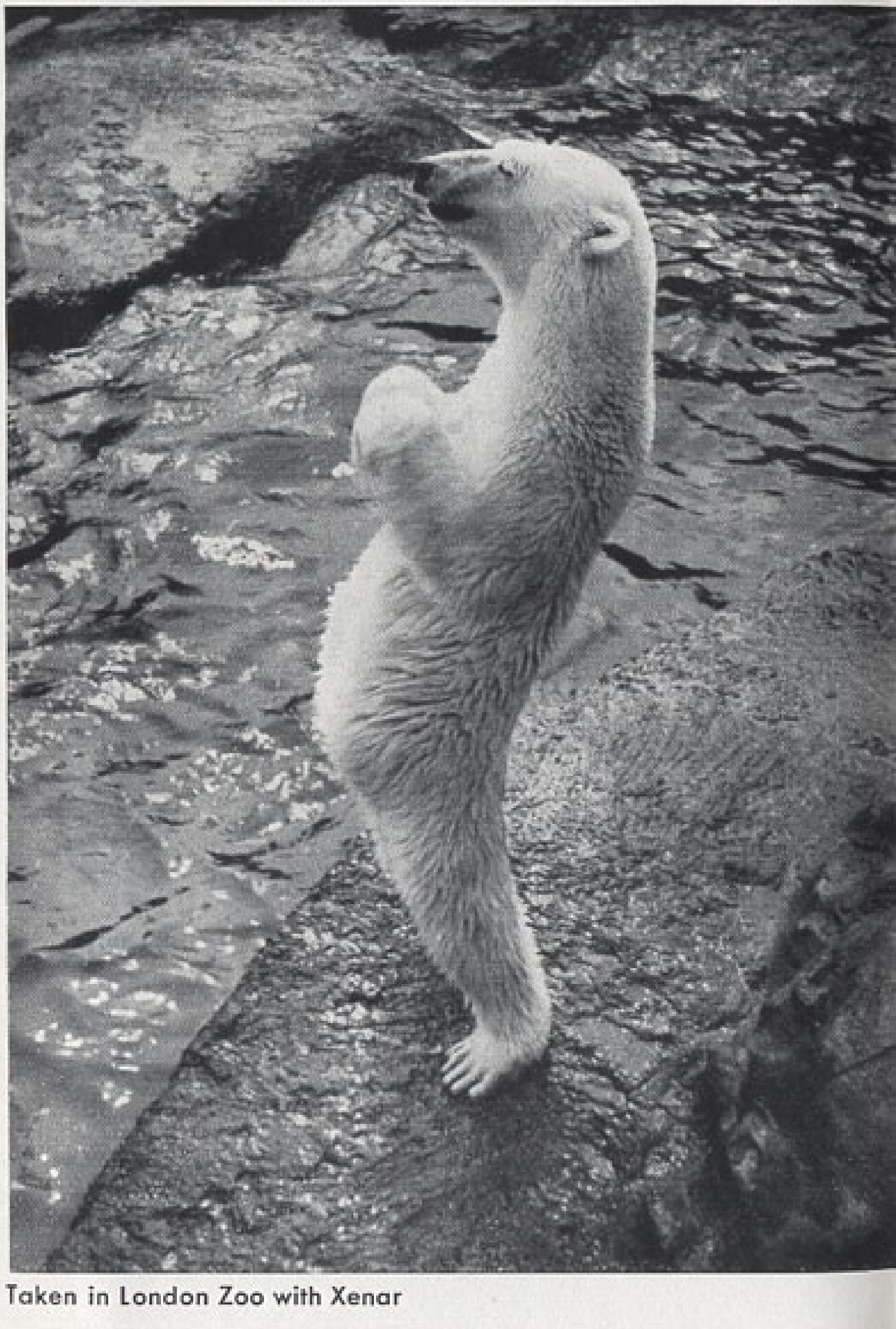
Miss M. Taylor, England · Taken with Xenar



Taken in London Zoo with Xenar

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Elementary photographic optics

Focal length and full aperture

In order to understand properly the technical points which arise in a description of various lens types, it is necessary to have some knowledge of optics. In the first place, every modern lens is distinguished by having the values for its focal length and full aperture engraved on the mount next to the factory number. Thus, a lens might be obtained which is marked "Xenar F:4,5 f = 75 mm". The first value — F:4,5, or sometimes 1:4,5 — is a measure of the full aperture*) or "speed" of the lens, while the second indicates the focal length in millimetres. The focal length is a measure ot the optical performance of a lens, since it decides the scale on which objects in front of the camera are reproduced. A lens of long focus will give a large image scale, and vice versa. In order to determine the focal length of a lens with high accuracy, it is normally necessary to use a large full aperture, but a sufficiently accurate value can be obtained by measuring the distance from the plane of the negative to the centre of the lens, assuming that objects at an infinite distance (usually ∞ on the focussing scale) are in focus.

Relative aperture and the iris diaphragm

On a ring surrounding the lens will be found a further scale of values, such as 2,8 — 4 — 5,6 — 8 — 11 and so on. These numbers indicate various relative apertures when the iris diaphragm is used to reduce the "speed" of the lens, and the scale is always arranged so that as one passes from any number to the next higher number, the lens is reduced to half its earlier "speed" by the fact that only half the earlier quantity of light is allowed to pass through it. As the numbers increase in value, therefore, the time of exposure also needs increasing. These facts can be seen quite clearly by opening the camera, setting the shutter at time and opening it, and then looking through the lens at light as the iris diaphragm ring or pointer is moved about. The effect of the diaphragm is to stop some proportion of light passing through the lens, so that reducing the aperture of the lens is frequently referred to as "stopping down". If the iris is fully opened, however, the full aperture value is produced, and all the light striking the front

*) The full aperture of a lens is the ratio between its focal length and its effective diameter. The effective diameter is the diameter of a parallel beam of light which can just enter and pass through the glasses of the lens. The actual diameter of the iris diaphragm is usually somewhat less in physical size than the effective diameter value.

glass of the lens can be transmitted. As the iris is gradually closed, more and more light is shut out, so that the exposure time must increase accordingly. Thus, as a general rule: Large aperture means small aperture number and short exposure — small aperture means large aperture number and long exposure.

Depth of focus

Apart from varying the time of exposure necessary, the iris diaphragm has another very important function — that of varying the depth of focus. Depth of focus is a quality which varies with both focal length and lens aperture: it becomes larger as the relative aperture of the lens decreases, and smaller as the focal length increases. Calculation shows that the really important point is the diameter of the beam of parallel rays entering the camera through the iris diaphragm, and since the aperture value of the lens varies both with this quantity and with the focal length, it is easy to see that for the same depth of focus value, a short-focus lens will have a larger aperture than a long-focus lens. Lenses such as used on miniature and ciné cameras thus have a larger depth of focus for the same effective "speed" of the lens. Depth of focus can be increased in a given lens only by stopping down: if foreground, middle distance, and horizon must all be sharp, it is necessary to adjust the focussing distance correctly and then to stop down to the necessary extent. From what has been said above, it will be necessary to stop down further on a long-focus lens than on one of short focus to get everything sharp.

The field circle

The field circle is the circular area covered sharply and fully illuminated by a lens set to focus on infinity, and it is usual to distinguish between the total field covered and the useful field circle. At full aperture, the latter is somewhat smaller than the former, though when the lens is stopped down the difference between the two decreases. In other words, the total field covered by the lens can only be completely utilised when the lens is very much stopped down. It is very important that in the useful field circle the image is fully sharp right up to the extreme edge, and it is consequently always essential to choose a lens which has a useful field circle larger than the diagonal of the negative size with which it is to be used. The Schneider series of anastigmat lenses have the useful quality of producing a particularly large effective field circle, which implies that even at full aperture the image given can be relied on to be absolutely sharp right up to the edges of the negative image.

← Taken with Xenar

Optical aberrations

However carefully a lens is produced and assembled from a number of component glasses, a certain number of residual "aberrations", or errors in performance, are bound to remain in it. To reduce these aberrations to a point where their effect on the image is negligible, lengthy and tedious calculations are required, and it is sometimes possible, by careful choice, curvature, and positioning of the glasses to play off one aberration against another so that both vanish. In all good-quality lenses the residual effect of the aberrations is so small that it can be entirely neglected in practical work.

Traces of the following aberrations can, however, be found in virtually every lens:

Chromatic aberration. This trouble is caused by the fact that the different colours of light passing through the lens are refracted differently, and do not come to a focus in exactly the same plane. At the same time, the images of the object formed by the red, green, and blue light rays may not be the same size, which results in an image with coloured fringes round it. Lenses with this particular aberration are quite useless for colour-film exposures. If both of these aberrations have been removed by careful design and construction, the lens is stated to be chromatically corrected.

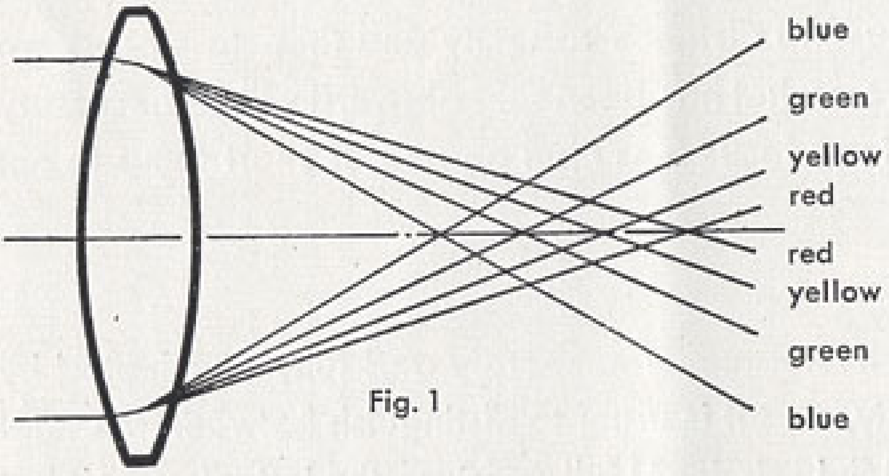

Fig. 1

Coma. This is a difficulty which may easily arise in a large-aperture lens. When it is present, a lack of sharpness appears at the edges of the image, each point of the image changing into a comet-like shape with a dot for a head and a fairly long "tail". (This fact gave rise to the name "coma".) A lens with coma can only be made to produce a good image by stopping it down considerably.

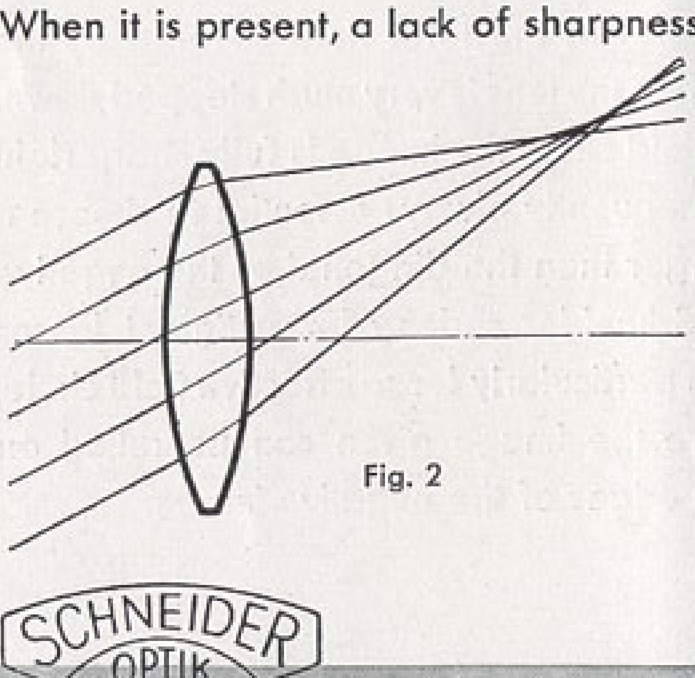
Fig. 2

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Spherical aberration. When it is impossible to focus a lens to give a sharp image in the centre of the field, it is probable that this form of aberration is present. It should not be forgotten that some degree of zonal spherical aberration is present to a minor extent in every lens, for the difficulty cannot be completely corrected.

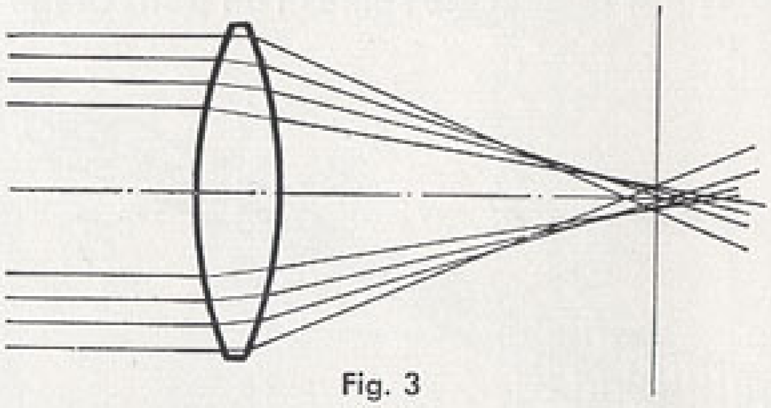

Fig. 3

Distortion is a further form of aberration, in which the straight lines of the object photographed are bent to some extent in the image given by the lens. It must be mentioned that this aberration has nothing to do with **perspective distortion,** for the latter is caused either by not having the camera level during exposure, or else (where the perpendiculars of the image are parallel, but the horizontals seem completely unnatural) by taking a photograph too close to some subject with a lens of too short focus. The latter type of perspective distortion is frequently seen in exposures with a wide-angle lens.

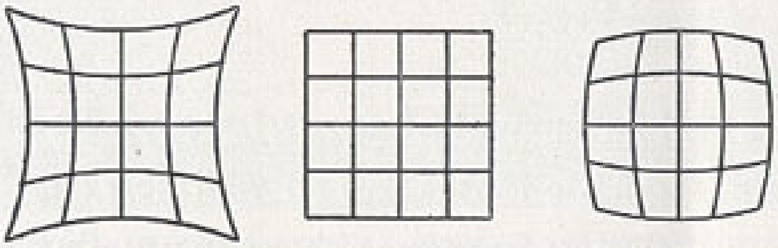

Fig. 4 negative corrected positive

Astigmatism is an aberration that is present only in the more simple types of lenses. A lens not corrected for it will resolve a point in the object as a pair of lines, lying at right angles to each other and in somewhat different

Taken with Radionar

focal planes, on the ground-glass screen. When focussing with such lenses, it is clearly necessary to focus sharp on one line or the other. Moreover, the plane in which one line appears does not remain the same in all parts of the

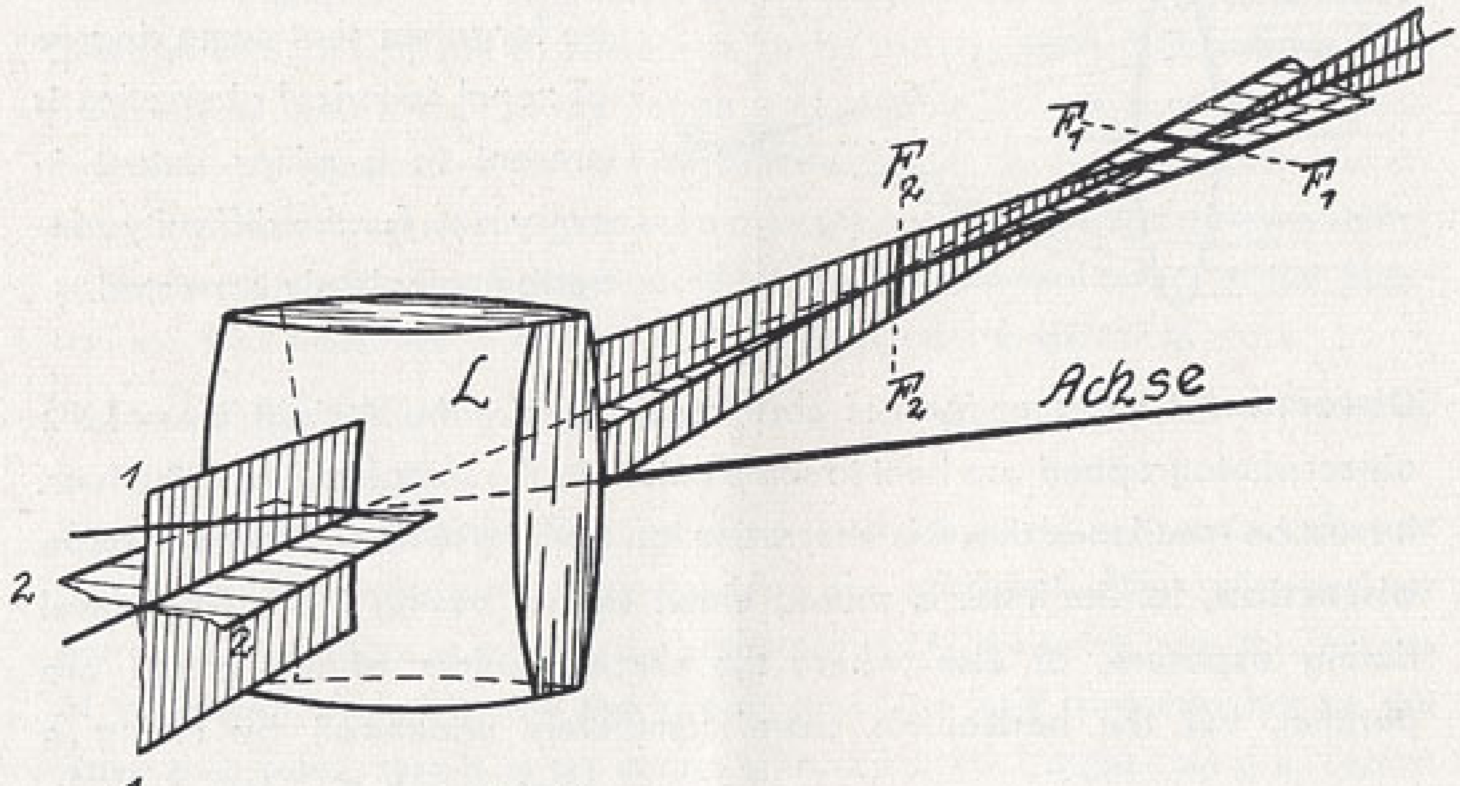

Fig. 5

field covered by the lens, so that a certain amount of **curvature of field** is present in the image. Modern anastigmatic lenses are so well corrected for both astigmatism and field curvature that no traces of either can usually be found in the image.

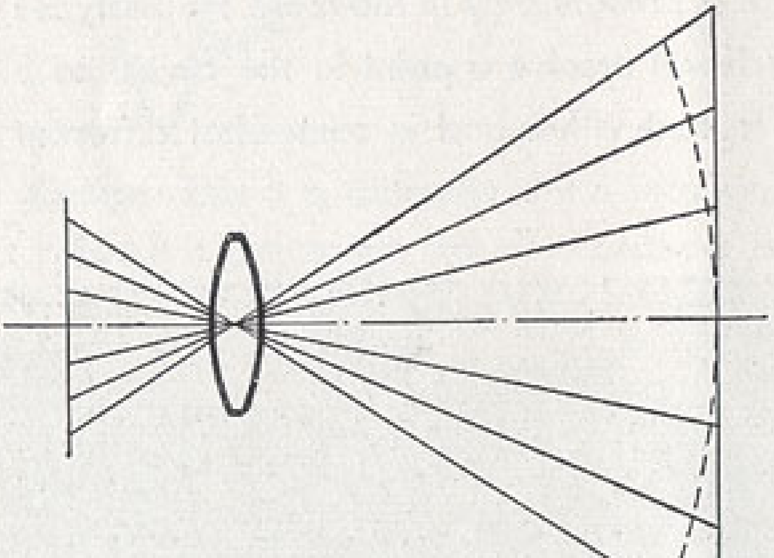

Fig. 6

It will be appreciated that it is very much less easy to remove residual traces of aberrations from a large-aperture lens than from one of only medium aperture, and that in any case each particular lens type requires the most careful design and computation. The time taken for computations alone will normally take a few weeks or a few months, while with a large-aperture lens it is sometimes necessary to devote one or two years to the work.

Taken with Xenar

Taken with Angulon

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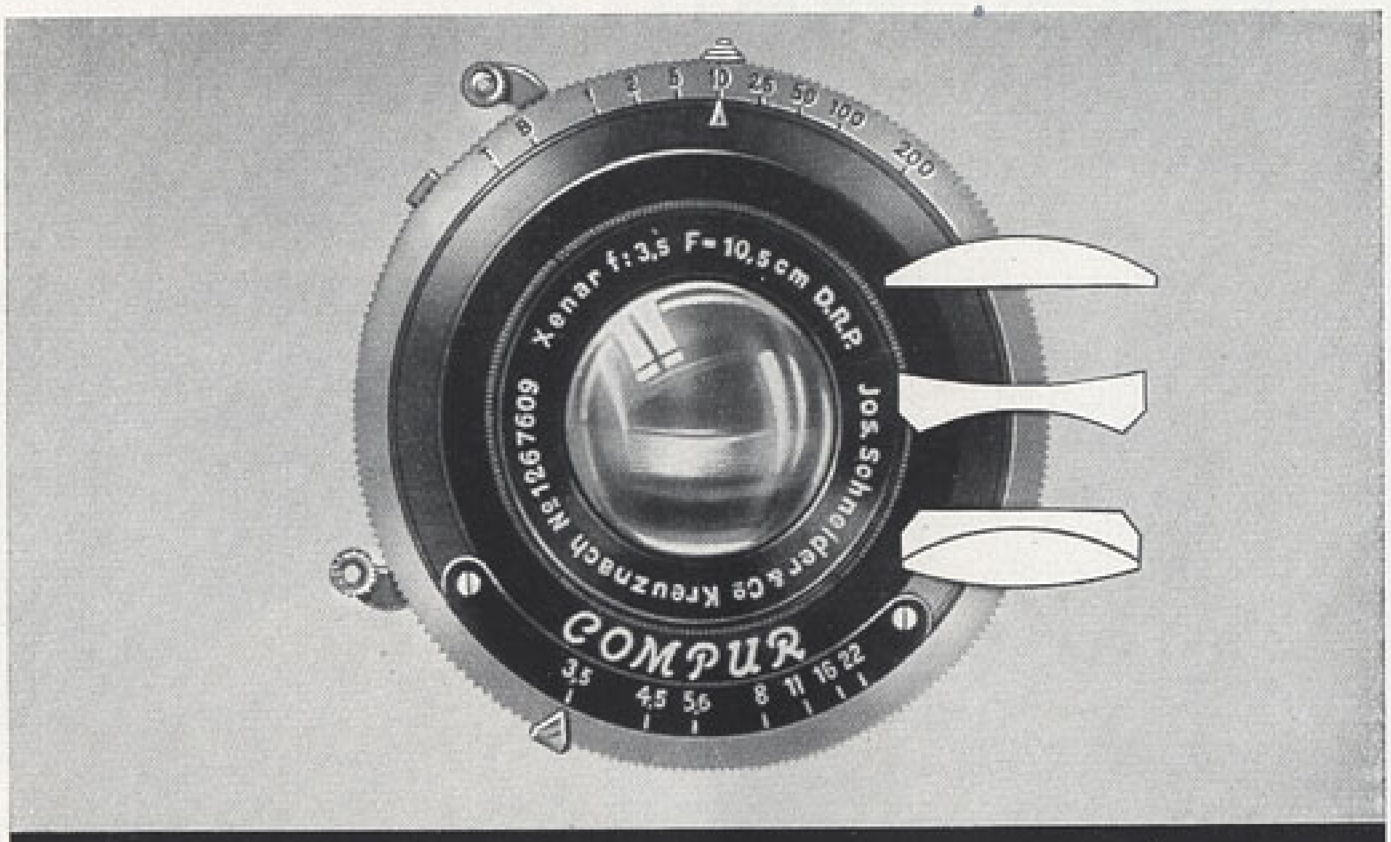


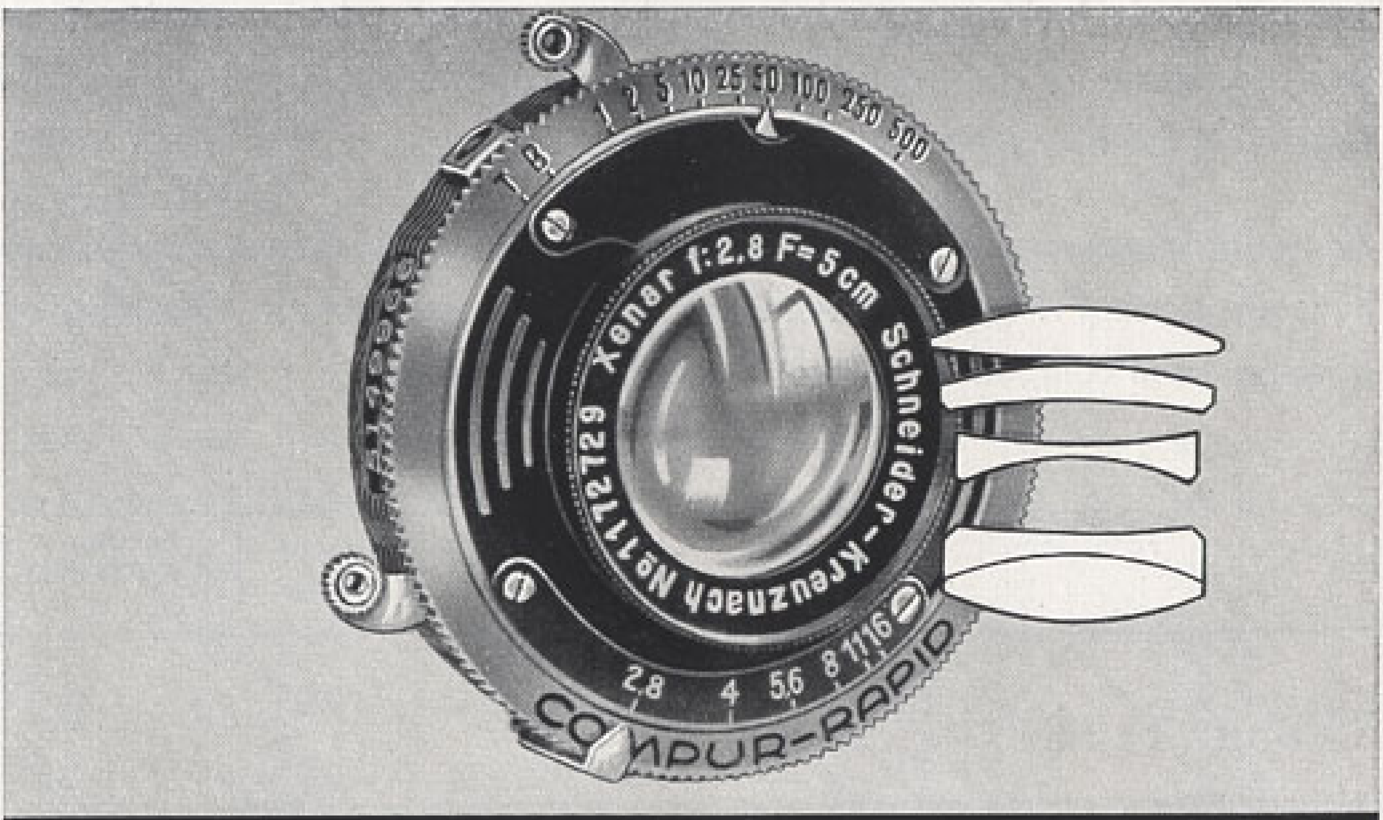
SCHNEIDER XENAR F:3,5 · 4,5 · 5,5

Schneider XENAR

The Xenar lens aroused considerable interest and praise almost as soon as it appeared on the market. It has proved of extreme service and value in all kinds of cameras from the miniature type through the large studio camera and the aerial instruments of modern type.

The lens is made in a number of different forms, all of which are fully protected by patents. Optically, the lens is unsymmetrical, and the design very different according to the use to which the lens is to be put. By thus adapting a single basic principle in different ways, the efficiency of the lens in its own particular field of work is materially increased.

The primary merits of the Xenar design are an exceedingly brilliant mage, complete sharpness up to the negative edges, and universal suitability for widely differing purposes. The design involves two uncemented components and two cemented components (in the F: 2,8 type three uncemented), and



SCHNEIDER XENAR F:2,8 · F = 5 and 7,5 cm

the correction of aberrations — particularly spherical and chromatic types, but also astigmatism and field curvature — is an improvement over other lens designs. Even when other aberrations have been corrected to the fullest extent, the design can deal with distortion and coma, so that even at large full apertures the lens gives a needle-sharp image of great brilliance. These remarkable qualities make the Xenar lens a valuable aid to the professional and amateur photographer, as well as to those who specialise in artistic, scientific, and technical photography. As with all unsymmetrical anastigmats, the back component cannot be used separately.

Apart from this, the mechanical build of the Xenar lens is very short, so that it can be recommended for use in all studio and hand cameras, as well as reflex instruments. With small negative sizes, the excellent correction for aberrations in focus are specially advantageous, in that they ensure a negative of full sharpness and great brilliance that enlarges to a brilliant print.

For special purposes, a new design of the Xenar has been introduced, and it is intended as a universal lens for roll-film cameras in medium small sizes such as the 2¹/₄ in. square negative. The full aperture is F: 2,8, and the design

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is unsymmetrical with five semicemented components. The image is excellently corrected for coma considering the large aperture, and a special leaflet regarding the new type will be sent on application.

All Xenar lenses can be delivered in normal, or sunk mount, mounted in helical focussing ring, or in a shutter. In many focal lengths focussing by rotating front component is also available.

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
Xenar F:2,8						
2,8	2	5	$\frac{15}{16} \times \frac{11}{16}$ in. $1\frac{7}{16} \times \frac{15}{16}$ in.	$2\frac{3}{16}$ in.	00	$1\frac{3}{4}$ in.
2,8	$2\frac{15}{16}$	7,5	$1\frac{7}{16} \times \frac{15}{16}$ in. $2\frac{3}{8} \times 2\frac{3}{8}$ in.	$3\frac{3}{8}$ in.	0S	$2\frac{1}{4}$ in.
Xenar F:3,5						
3,5	$1\frac{3}{8}$	3,5	$\frac{15}{16} \times \frac{11}{16}$ in.	$1\frac{9}{16}$ in.	00	$1\frac{3}{4}$ in.
3,5	2	5	$1\frac{9}{16} \times 1\frac{3}{16}$ in.	2 in.	00	$1\frac{3}{4}$ in.
3,5	$2\frac{15}{16}$	7,5	$2\frac{3}{8} \times 1\frac{3}{4}$ in.	$3\frac{1}{8}$ in.	0S	$2\frac{1}{4}$ in.
3,5	$3\frac{1}{8}$	8				
3,5	$4\frac{1}{8}$	10,5	$3\frac{9}{16} \times 2\frac{3}{8}$ in.	$4\frac{5}{16}$ in.	I S	$2\frac{11}{16}$ in.
3,5	$5\frac{5}{16}$	13,5	$3\frac{9}{16} \times 2\frac{3}{8}$ in.	$5\frac{1}{2}$ in.	II 4/2	$3\frac{1}{16}$ in.
3,5	$5\frac{7}{8}$	15	$4\frac{3}{4} \times 3\frac{9}{16}$ in.	$6\frac{5}{16}$ in.	II/5	$3\frac{1}{16}$ in.
3,5	$6\frac{1}{2}$	16,5	$4\frac{3}{4} \times 3\frac{9}{16}$ in.	$6\frac{11}{16}$ in.	III/7	$3\frac{7}{16}$ in.
3,5	$7\frac{1}{16}$	18	$5\frac{7}{8} \times 3\frac{15}{16}$ in.	$7\frac{1}{2}$ in.	III/7	$3\frac{7}{16}$ in.
3,5	$8\frac{1}{4}$	21	$7\frac{1}{16} \times 5\frac{1}{8}$ in.	$8\frac{11}{16}$ in.	IV 10/2	$4\frac{3}{16}$ in.
3,5	$9\frac{7}{16}$	24	$6\frac{5}{16} \times 6\frac{5}{16}$ in.	$9\frac{13}{16}$ in.	V/12	$4\frac{15}{16}$ in.
3,5	$11\frac{13}{16}$	30	$9\frac{7}{16} \times 7\frac{1}{16}$ in.	$12\frac{3}{8}$ in.	—	—

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
Xenar F:4,5						
4,5	2	5	$1\frac{9}{16}\times1\frac{3}{16}$ in.	2 in.	00	$1\frac{3}{4}$ in.
4,5	$2\frac{15}{16}$	7,5	$2\frac{9}{16}\times1\frac{9}{16}$ in.	$3\frac{1}{8}$ in.	00	$1\frac{3}{4}$ in.
4,5	$4\frac{1}{8}$	10,5	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$4\frac{5}{16}$ in.	0S	$2\frac{1}{4}$ in.
4,5	$4\frac{3}{4}$	12	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$5\frac{1}{8}$ in.	0S	$2\frac{1}{4}$ in.
4,5	$5\frac{5}{16}$	13,5	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$5\frac{11}{16}$ in.	IS	$2\frac{11}{16}$ in.
4,5	$5\frac{7}{8}$	15	$4\frac{3}{4}\times3\frac{9}{16}$ in.	$6\frac{5}{16}$ in.	IS	$2\frac{11}{16}$ in.
4,5	$6\frac{1}{2}$	16,5	$4\frac{3}{4}\times3\frac{9}{16}$ in.	$6\frac{7}{8}$ in.	II/5	$3\frac{1}{16}$ in.
4,5	$7\frac{1}{16}$	18	$5\frac{7}{8}\times3\frac{15}{16}$ in.	$7\frac{1}{2}$ in.	II 6/2	$3\frac{1}{16}$ in.
4,5	$8\frac{1}{4}$	21	$7\frac{1}{16}\times5\frac{1}{8}$ in.	$8\frac{11}{16}$ in.	III/7	$3\frac{7}{16}$ in.
4,5	$9\frac{7}{16}$	24	$8\frac{1}{4}\times5\frac{1}{8}$ in.	$9\frac{13}{16}$ in.	IV 10/2	$4\frac{3}{16}$ in.
4,5	$10\frac{5}{8}$	27	$8\frac{1}{4}\times6\frac{5}{16}$ in.	$11\frac{1}{4}$ in.	IV 10/2	$4\frac{3}{16}$ in.
4,5	$11\frac{13}{16}$	30	$9\frac{7}{16}\times7\frac{1}{16}$ in.	$12\frac{3}{8}$ in.	V/12	$4\frac{15}{16}$ in.
4,5	$14\frac{3}{16}$	36	$10\frac{1}{4}\times8\frac{1}{4}$ in.	$14\frac{15}{16}$ in.	—	—
4,5	$16\frac{9}{16}$	42	$11\frac{13}{16}\times9\frac{7}{16}$ in.	$17\frac{11}{16}$ in.	—	—
4,5	$18\frac{7}{8}$	48	$15\frac{3}{4}\times11\frac{13}{16}$ in.	$19\frac{11}{16}$ in.	—	—
Xenar F:5,5						
5,5	$4\frac{1}{8}$	10,5	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$4\frac{5}{16}$ in.	0S	$2\frac{1}{4}$ in.
5,5	$4\frac{3}{4}$	12	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$4\frac{15}{16}$ in.	0S	$2\frac{1}{4}$ in.
5,5	$5\frac{5}{16}$	13,5	$3\frac{15}{16}\times3\frac{3}{8}$ in.	$5\frac{11}{16}$ in.	0S	$2\frac{1}{4}$ in.
5,5	$5\frac{7}{8}$	15	$4\frac{3}{4}\times3\frac{9}{16}$ in.	$6\frac{5}{16}$ in.	IS	$2\frac{11}{16}$ in.
5,5	$6\frac{1}{2}$	16,5	$5\frac{1}{2}\times3\frac{9}{16}$ in.	$6\frac{7}{8}$ in.	IS	$2\frac{11}{16}$ in.
5,5	$7\frac{1}{16}$	18	$5\frac{7}{8}\times3\frac{15}{16}$ in.	$7\frac{1}{2}$ in.	IS	$2\frac{11}{16}$ in.
5,5	$8\frac{1}{4}$	21	$7\frac{1}{16}\times5\frac{1}{8}$ in.	$8\frac{11}{16}$ in.	II 6/2	$3\frac{1}{16}$ in.
5,5	$9\frac{7}{16}$	24	$8\frac{1}{4}\times5\frac{1}{8}$ in.	$9\frac{13}{16}$ in.	III/7	$3\frac{7}{16}$ in.
5,5	$10\frac{5}{8}$	27	$8\frac{1}{4}\times6\frac{5}{16}$ in.	11 in.	IV 10/2	$4\frac{3}{16}$ in.
5,5	$11\frac{13}{16}$	30	$9\frac{7}{16}\times7\frac{1}{16}$ in.	$12\frac{5}{8}$ in.	IV 10/2	$4\frac{3}{16}$ in.

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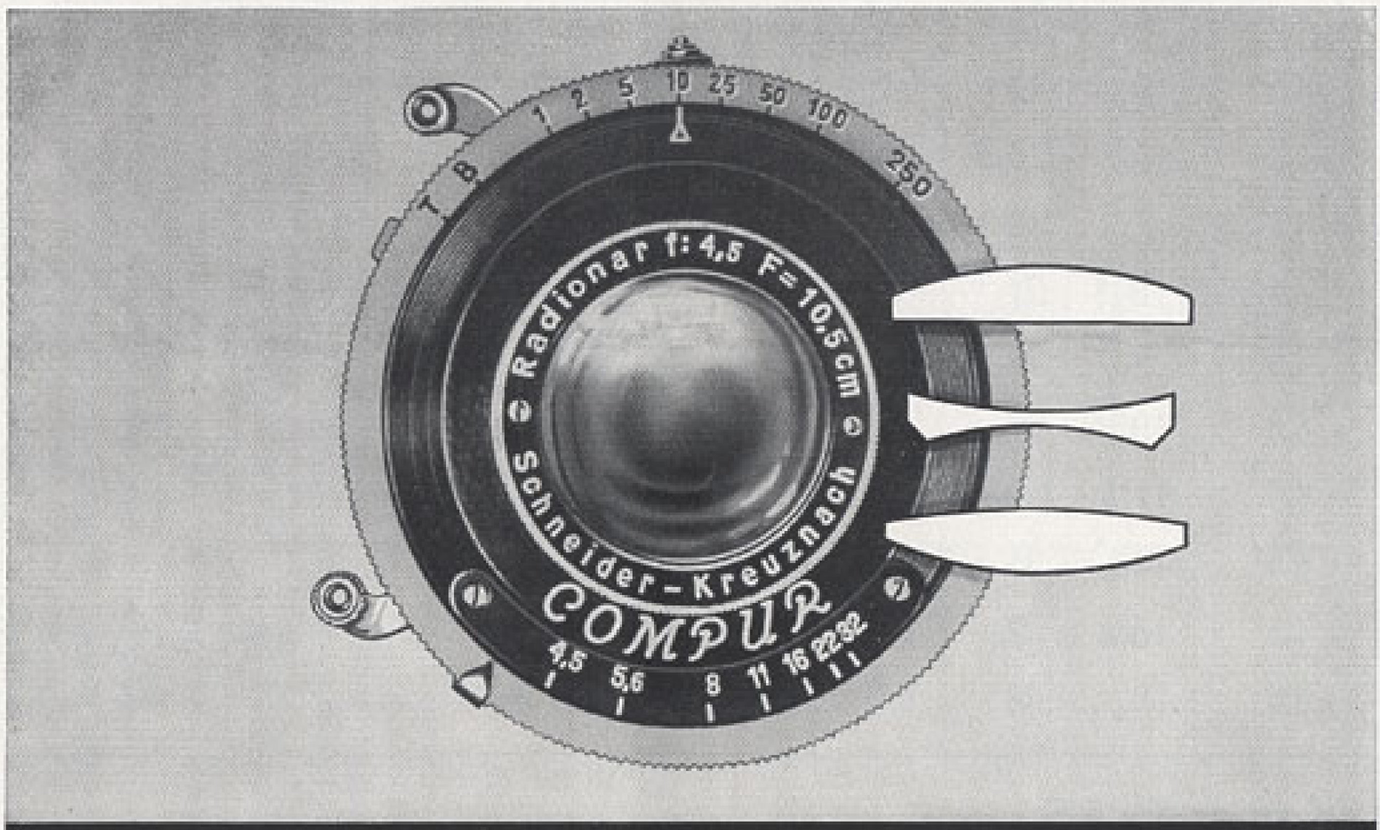
Schneider RADIONAR

This lens is a standard type, available in many full aperture values and focal lengths, and in spite of low price produces an image of extremely high quality.



SCHNEIDER RADIONAR F:2,9 · 3,5 · 4,5

In the aperture values F: 2,9 and F: 3,5 special care has been paid to the important question of high image quality when close-ups are taken: normally, some deterioration of image quality takes place with a large-aperture lens under these circumstances. The Radionar, however, has proved very tractable in this respect, and we can fairly claim that all such difficulties have been obviated. The F: 2,9 and F: 3,5 Radionar lenses are thus eminently suitable for any kind of miniature photography. In the F: 4,5 Radionar, care has been taken to make the lens as compact as possible, in order that it may be used in small cameras of folding type, and still not be too bulky.

Aberrations have been reduced to a minimum, and both the centre and edges of the field show excellent definition, while the removal of coma and the avoidance of internal reflection in the component glasses ensures a particularly sparking negative image. The image quality may be described as being similar to that of the many four-component anastigmats of normal design, but the patented Xenar design has a still better resolution of fine image detail.

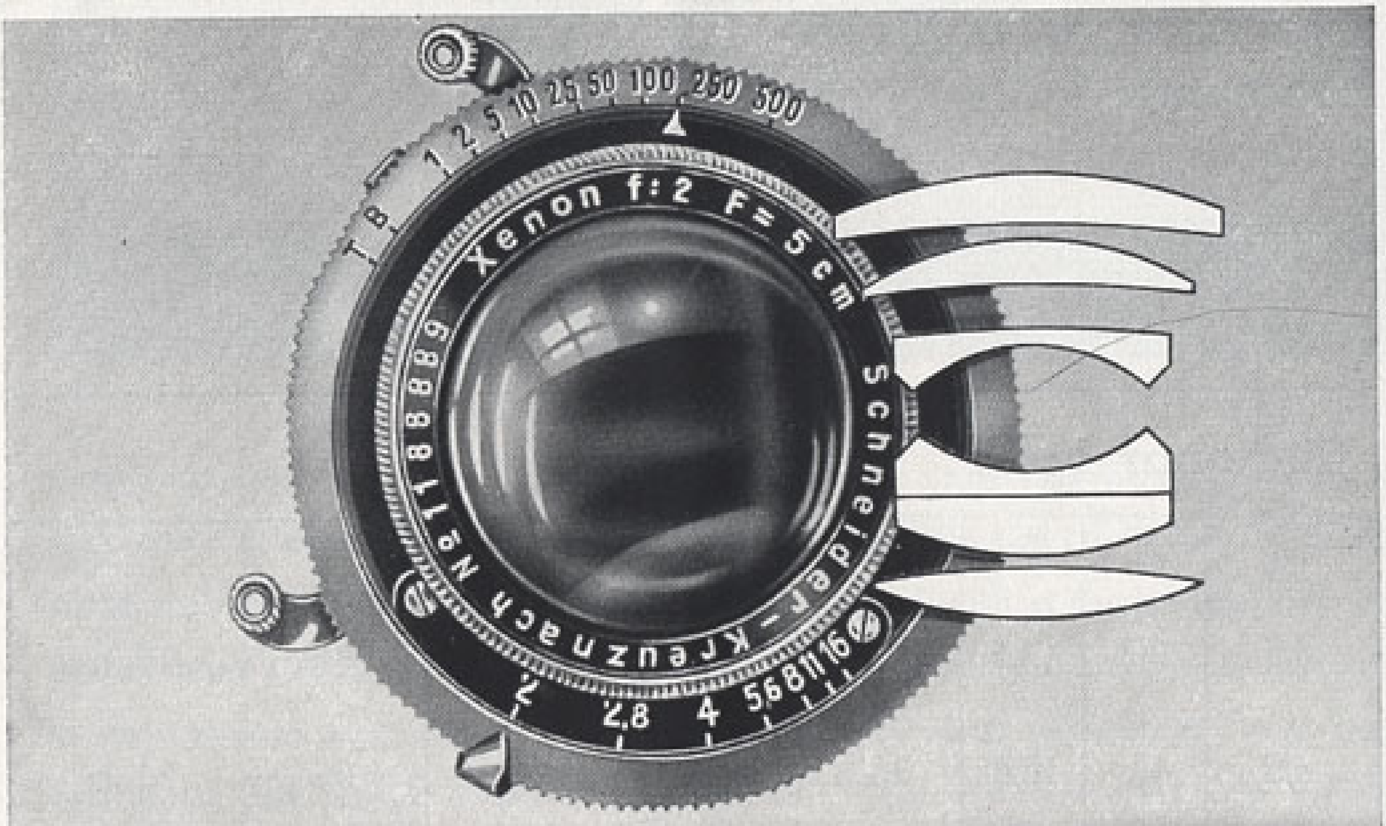
All Radionar types can be delivered in rigid mount or with focussing by rotating front component.

Aperture F:	Focal length		For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
	in.	cm				
Radionar 1:2,9						
2,9	2	5	$1\frac{9}{16}\times1\frac{3}{16}$ in.	$1\frac{3}{4}$ in.	00	$1\frac{3}{4}$ in.
2,9	$2\frac{15}{16}$	7,5	$2\frac{9}{16}\times1\frac{9}{16}$ and $2\frac{3}{8}\times2\frac{3}{8}$ in.	$2\frac{3}{4}$ in.	0S	$2\frac{1}{4}$ in.
Radionar 1:3,5						
3,5	2	5	$1\frac{9}{16}\times1\frac{3}{16}$ in.	$1\frac{3}{4}$ in.	00	$1\frac{3}{4}$ in.
3,5	$2\frac{15}{16}$	7,5	$2\frac{9}{16}\times1\frac{9}{16}$ and $2\frac{3}{8}\times2\frac{3}{8}$ in.	$2\frac{3}{4}$ in.	0S	$2\frac{1}{4}$ in.
Radionar 1:4,5						
4,5	2	5	$1\frac{9}{16}\times1\frac{3}{16}$ in.	$1\frac{3}{4}$ in.	00	$1\frac{3}{4}$ in.
4,5	$2\frac{15}{16}$	7,5	$2\frac{9}{16}\times1\frac{9}{16}$ and $2\frac{3}{8}\times2\frac{3}{8}$ in.	$2\frac{3}{4}$ in.	00	$1\frac{3}{4}$ in.
4,5	$4\frac{1}{8}$	10,5	$3\frac{9}{16}\times2\frac{9}{16}$ in.	$3\frac{3}{4}$ in.	0S	$2\frac{1}{4}$ in.
4,5	$4\frac{3}{4}$	12	$4\frac{3}{8}\times2\frac{9}{16}$ in.	$4\frac{5}{16}$ in.	0S	$2\frac{1}{4}$ in.
4,5	$5\frac{5}{16}$	13,5	$4\frac{3}{4}\times3\frac{9}{16}$ in.	$4\frac{15}{16}$ in.	IS	$2\frac{11}{16}$ in.

Schneider XENON
(FOR MINIATURE CAMERAS)

This lens was originally computed as a specially rapid lens for professional film cameras, but has been redesigned for use in many miniature cameras at the wish of many professional and amateur photographers.

The Xenon is designed as a large-aperture lens with the highest possible resolving power and its very large full aperture allows the miniature photographer a great reserve of speed. For night snapshots, exposures in theatres and circuses of all kinds, and for the variety stage, the Xenon is the lens par excellence. At the same time, we must insist that the Xenon F:2 — because of its remarkably fine image quality and large field angle — has both the qualities of a universal miniature lens as well as those of a specialised lens of extreme practical rapidity.



SCHNEIDER XENON F:2,0 (for miniature cameras)

SCHNEIDER OPTIK KREUZNACH

Schneider Xenon F:2,0 (for miniature cameras)

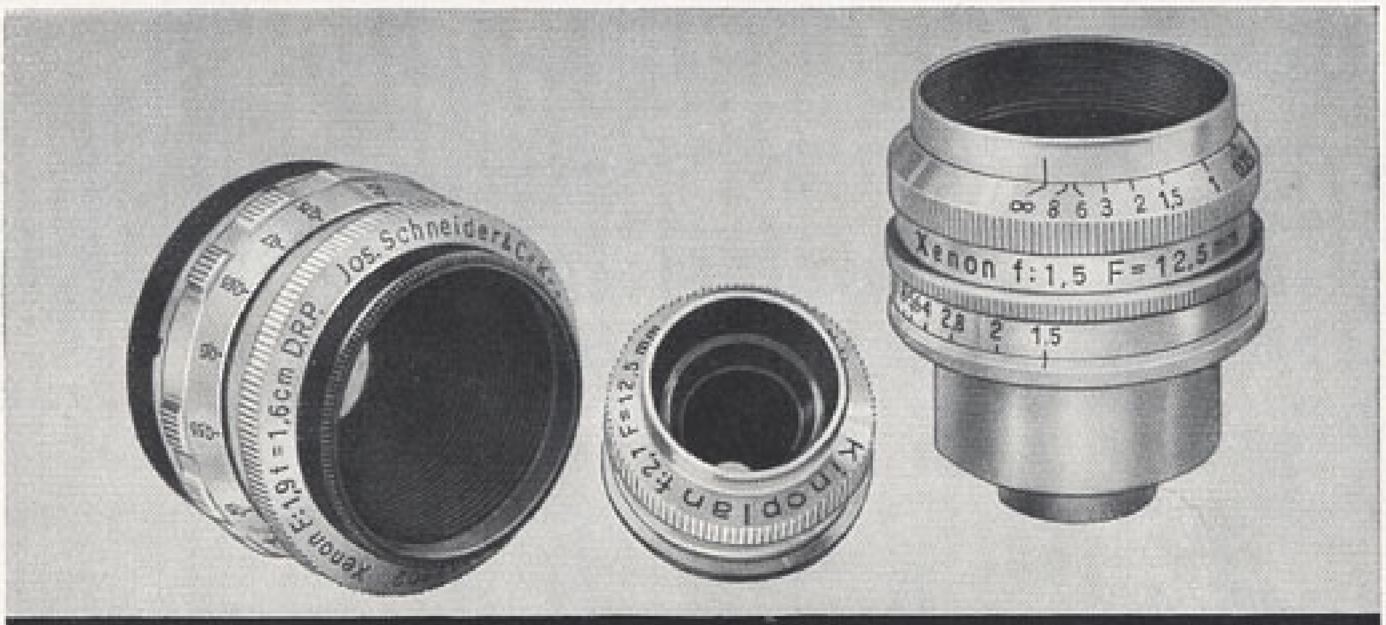
Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
2,0	2	5	$1\frac{7}{16} \times \frac{15}{16}$ in.	$1\frac{9}{16}$ in.	00	$1\frac{3}{4}$ in.
2,0	$3\frac{1}{8}$	8	$2\frac{9}{16} \times 1\frac{9}{16}$ in.	$2\frac{9}{16}$ in.	II 4/1	$3\frac{1}{16}$ in.

Schneider CINE-XENON

As was noted above, the Xenon is made in two forms — one for still photography (see page 20: Xenon F: 2) and the other for the professional cinematographer. In both cases a remarkable definition is shown in the image, and within the useful angle of field we claim that the resolving power is unsurpassed. In these lenses, spherical and chromatic aberration, astigmatism, field curvature, and coma have all been reduced to the very lowest level. For film cameras the Xenon is made in the following focal lengths and full apertures.

Aperture F:	Focal length in.	Focal length cm	For negative size
1,5	$\frac{9}{16}$	1,3	8 mm sub-standard film
1,5	1	2,5	8 and 16 mm sub-standard film
1,9	$\frac{5}{8}$	1,6	16 mm sub-standard film
2,3	2	5	16 mm sub-standard film and 35 mm standard film
1,5	2	5	35 mm standard film
2,3	2	5	35 mm standard film

SCHNEIDER OPTIK KREUZNACH



SCHNEIDER CINE-LENSES F:1,5 to 4,5

It may be mentioned here that one of the practical advantages of the Xenon series lies in the possibility of using either the miniature or cinema type interchangeably with the longer-focus Tele-Xenar lenses which have been developed for similar purposes. (See page "Cine-Tele-Xenar")

Schneider KINOPLAN

Apart from the large-aperture Xenon lenses for film work, a quite new lens has now been designed for use with 8-mm substandard film. This is the Kinoplan, with apertures of F: 2,7 and F: 3,5. In each case the image is brilliant and extremely sharp, so that even with considerable enlargement during projection the screen picture is of first-class quality.

Aperture F:	Focal length in.	Focal length mm	For negative size	Circle of sharp definition at small stop
2,7	$\frac{1}{2}$	12,5	8-mm substandard film	$\frac{9}{16}$ in.
3,5	$\frac{1}{2}$	12,5	8-mm substandard film	$\frac{9}{16}$ in.

Schneider

TELE-XENAR

The growth in favour of hand cameras, and the not unreasonable desire of the user to include as much in the picture as possible, has led to the point where all hand cameras and miniature cameras are fitted with relatively short-focus lenses. These have the one great drawback that they are liable, at times, to introduce perspective distortion, and this may make the print anything but pleasing to the eye. Every amateur will know that some of his prints — in particular those of landscapes and portraits — have turned out to be somewhat unnatural, and those who have photographed mountains while on holiday with a normal-focus lens will know that the print does not in any way give a suitable impression of the grandeur of the mountains, since they are always much smaller than they appeared in real life. The same may be said of photographs taken on cruises, of sporting snapshots, and, in general, of all kinds of subjects where it is a physical impossibility to get close to the main subject of the picture. The result is invariably that these important objects seem to be lost in the far distance in the print.

Although these subjects have been specifically mentioned on account of the value a telephoto lens is in dealing with them, the long-focus lens is equally useful in other kinds of photographic work. Where paintings or sculptures high up on walls must be recorded such a lens is a necessity, and it is also very valuable in photographing animals, plants, and flowers.

The perspective distortion mentioned previously is particularly unpleasant in the case of portrait work, for excessively large hands, feet, and even noses in a true "close-up", frequently surprise the beginner who has tried his prentice hand on portrait photography.

In the Tele-Xenar series the professional photographer — also the advanced and experienced amateur — will find a special lens type which has certain important advantages as compared with the normal lens of shorter focal length. The design of the whole series involves a considerably longer focal length than usual, coupled with large full apertures, and the resulting negatives have excellent definition as well as good contrast.

In spite of the long focal lengths of the Tele-Xenar lenses, by means of which it is possible to produce an image of larger scale than usual, it is frequently possible to mount these lenses in the cell threads of normal shutter types, and thus obtain large-scale images from cameras of normal small size.*)

The longer the focal length of the lens, however, the longer the bellows extension of the camera must be, but with the Tele-Xenar lenses matters have been arranged that with a reduced camera extension a very much greater focal length is available. The focal length of the telephoto lenses, moreover, may be varied by the use of supplementary lenses placed either on the front or the back component of the combination, though this implies that a change in camera extension must simultaneously be made. This last change is naturally not possible with most hand-camera designs that consist of a more or less rigid box. The special design of the Tele-Xenar is exceedingly advantageous, for not only do they give large-scale images with a reduced camera extension, but also their optical computation permits a very much larger aperture value to be used than would be possible in other lens systems. A normal lens of great focal length and large aperture has a very considerable weight, and on account of the large diameter of the glasses will demand a correspondingly large shutter. A correspondingly long camera extension is also required, and the final result is that the combination of camera and lens is of considerable dimensions and correspondingly large weight.

All these disadvantages are avoided by using the Tele-Xenar lenses, which have:

(1) a long focus, yet require small camera extension, and —
(2) can be exchanged against the ordinary camera lens, screwing into the normal threads of the standard shutter.
(3) They have a large enough aperture to allow rapid exposures and
(4) the print from the resulting negative has a much more natural appearance than that from the normal-focus lens.

These four very important points have not been achieved at the expense of image quality; Tele-Xenar negatives, on the contrary, frequently surprise the user by their brilliance and sharpness.

In the interchangeable Tele-Xenar lenses a special aperture scale, shown in the illustration, is provided, and the coloured aperture numbers are normally those used. We are prepared to mount the components of Tele-Xenar lenses in lens mounts made by other firms at low inclusive cost.

In the Tele-Xenar series the scale of aperture values is not normally taken beyond F:11, since smaller apertures than this are seldom required, and in any case may result in image deterioration. Apart from this normal type of mount, however, Tele-Xenar lenses can be obtained mounted in large shutters, in which case smaller aperture values can naturally be used.

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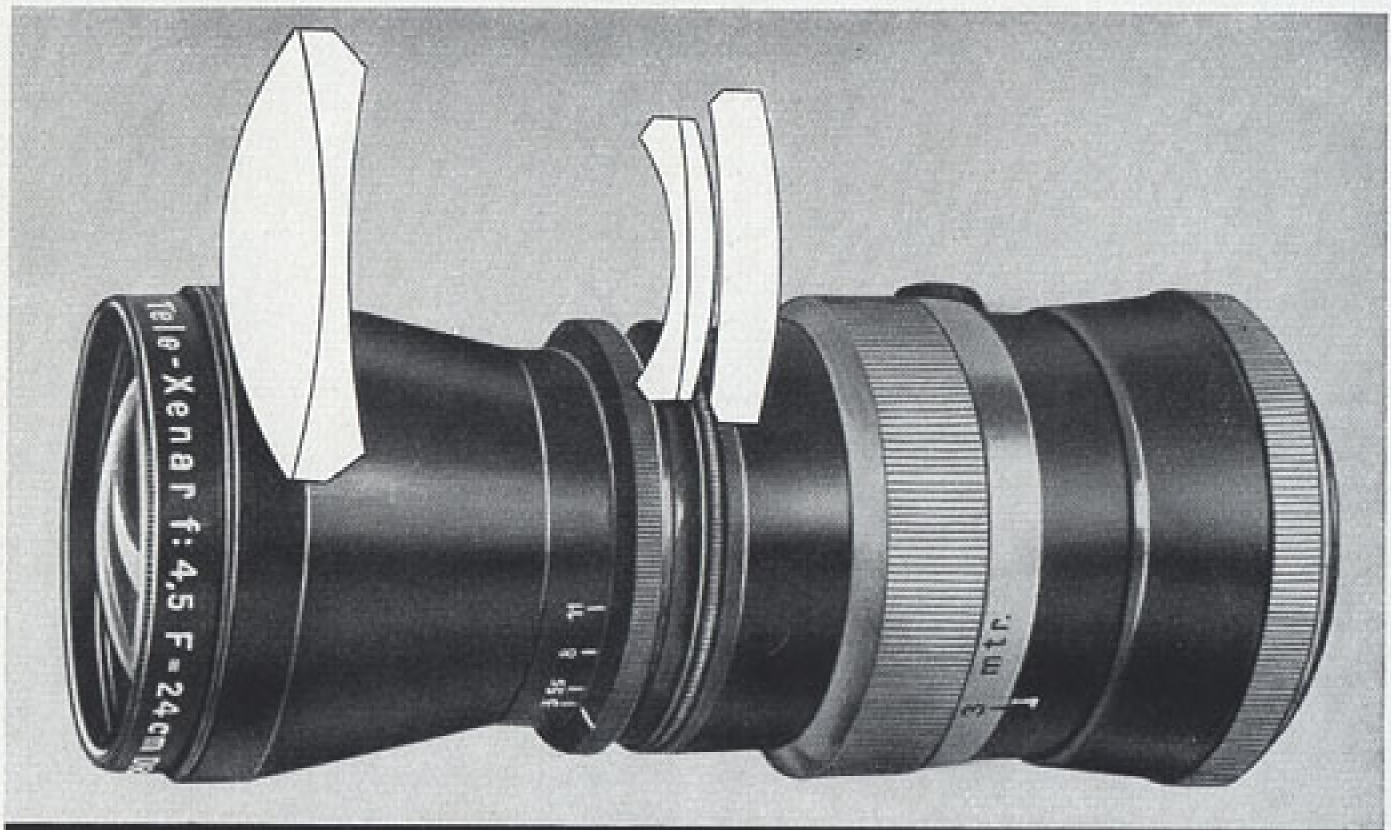
*) The table on pages 28/29 indicates which types of lenses may be used interchangeably.

SCHNEIDER OPTIK KREUZNACH

Taken with Tele-Xenar →

The F : 4,5 Tele-Xenar is a specially large-aperture telephoto-type lens with a fixed focal length. In design it is unsymmetrical, has five components, and is partially cemented. As with all true telephoto lenses, the back component is a negative, and cannot be used separately, though the front component — given a reduced aperture — can be used for special purposes such as reproducing a very small object on an enlarged scale.



SCHNEIDER TELE-XENAR F : 4,5

The F : 5,5 Tele-Xenar is also a fixed-focus telephoto-type lens in which the high quality of the Xenar lens has been retained. In spite of its low price, this lens has the great advantage of wide application on account of its simplicity in use. The design involves four components, divided into two cemented lenses in front and two cemented lenses behind. The considerable distortion introduced into some telephoto lenses has been reduced, by this particular design, to a level where it has no material importance.

To obtain a still greater focal length, both the F : 4,5 and F : 5,5 Tele-Xenar lenses may be modified by placing a supplementary lens over the rim of the back component lens. By stopping down to F : 9 or so, the result is a still larger-scale image with an image quality that is satisfactory for most purposes. (See further notes in the section "Supplementary lenses" on page 38 and 41.)

Taken with Tele-Xenar

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
4,5	$7\frac{1}{16}$	18	$2\frac{9}{16}\times1\frac{9}{16}$ to $3\frac{9}{16}\times2\frac{9}{16}$ in.	$4\frac{3}{4}$ in.	I S	$2\frac{11}{16}$ in.
4,5	$9\frac{7}{16}$	24	$2\frac{9}{16}\times1\frac{9}{16}$ to $4\frac{3}{4}\times3\frac{9}{16}$ in.	$6\frac{5}{16}$ in.	II/5	$3\frac{1}{16}$ in.
5,5	$7\frac{1}{16}$	18	$2\frac{9}{16}\times1\frac{9}{16}$ to $3\frac{9}{16}\times2\frac{9}{16}$ in.	$4\frac{3}{4}$ in.	0 S	$2\frac{1}{4}$ in.
5,5	$9\frac{7}{16}$	24	$2\frac{9}{16}\times1\frac{9}{16}$ to $4\frac{3}{4}\times3\frac{9}{16}$ in.	$5\frac{15}{16}$ in.	I S	$2\frac{11}{16}$ in.
5,5	$10\frac{5}{8}$	27	$2\frac{9}{16}\times1\frac{9}{16}$ to $4\frac{3}{4}\times3\frac{9}{16}$ in.	$7\frac{1}{16}$ in.	II 4/2 and II/5	$3\frac{1}{16}$ in.
5,5	$11\frac{13}{16}$	30	$2\frac{3}{8}\times2\frac{3}{8}$ to $5\frac{7}{8}\times3\frac{15}{16}$ in.	$7\frac{1}{2}$ in.	II 6/2	$3\frac{1}{16}$ in.
5,5	$14\frac{3}{16}$	36	$2\frac{3}{8}\times2\frac{3}{8}$ to $7\frac{1}{16}\times5\frac{1}{8}$ in.	$9\frac{7}{16}$ in.	III/7	$3\frac{7}{16}$ in.

SCHNEIDER OPTIK KREUZNACH

Exchange Table.

Tele-Xenar lenses F: 4,5 and 5,5 are exchangeable against the following Xenar and Radionar lenses provided that the shutter-size is the same:

Tele-Xenar			Is exchangeable	Xenar F: 3,5 Focal length	Xenar F: 4,5 Focal length	Radionar F: 4,5 Focal length	Size of shutter	Exterior diameter of shutter
Aperture F:	Focal length in.	cm						
4,5	$7\frac{1}{16}$	18	against	$4\frac{1}{8}$ in.	—	—	I S	$2\frac{11}{16}$ in.
5,5	$7\frac{1}{16}$	18	against	—	$4\frac{1}{8}$ in. $4\frac{3}{4}$ in.	$4\frac{1}{8}$ in. $4\frac{3}{4}$ in.	0 S	$2\frac{1}{4}$ in.
4,5	$9\frac{7}{16}$	24	against	$5\frac{7}{8}$ in.	—	—	II/5	$3\frac{1}{16}$ in.
5,5	$9\frac{7}{16}$	24	against	$4\frac{1}{8}$ in.	$5\frac{5}{16}$ in. $5\frac{7}{8}$ in.	$5\frac{5}{16}$ in.	I S	$2\frac{11}{16}$ in.
5,5	$10\frac{5}{8}$	27	against	$5\frac{5}{16}$ in.	—	—	II 4/2	$3\frac{1}{16}$ in.
				$5\frac{1}{8}$ in.	$6\frac{1}{2}$ in.	—	II/5	
5,5	$11\frac{13}{16}$	30	against	—	$7\frac{1}{16}$ in.	—	II 6/2	$3\frac{1}{16}$ in.
5,5	$14\frac{3}{16}$	36	against	$6\frac{1}{2}$ in. $7\frac{1}{16}$ in.	$8\frac{1}{4}$ in.	—	III/7	$3\frac{7}{16}$ in.

Taken with Xenar

Exchange Table.

The following Xenar and Radionar lenses are exchangeable against Tele-Xenar lenses provided that the shutters have the same size:

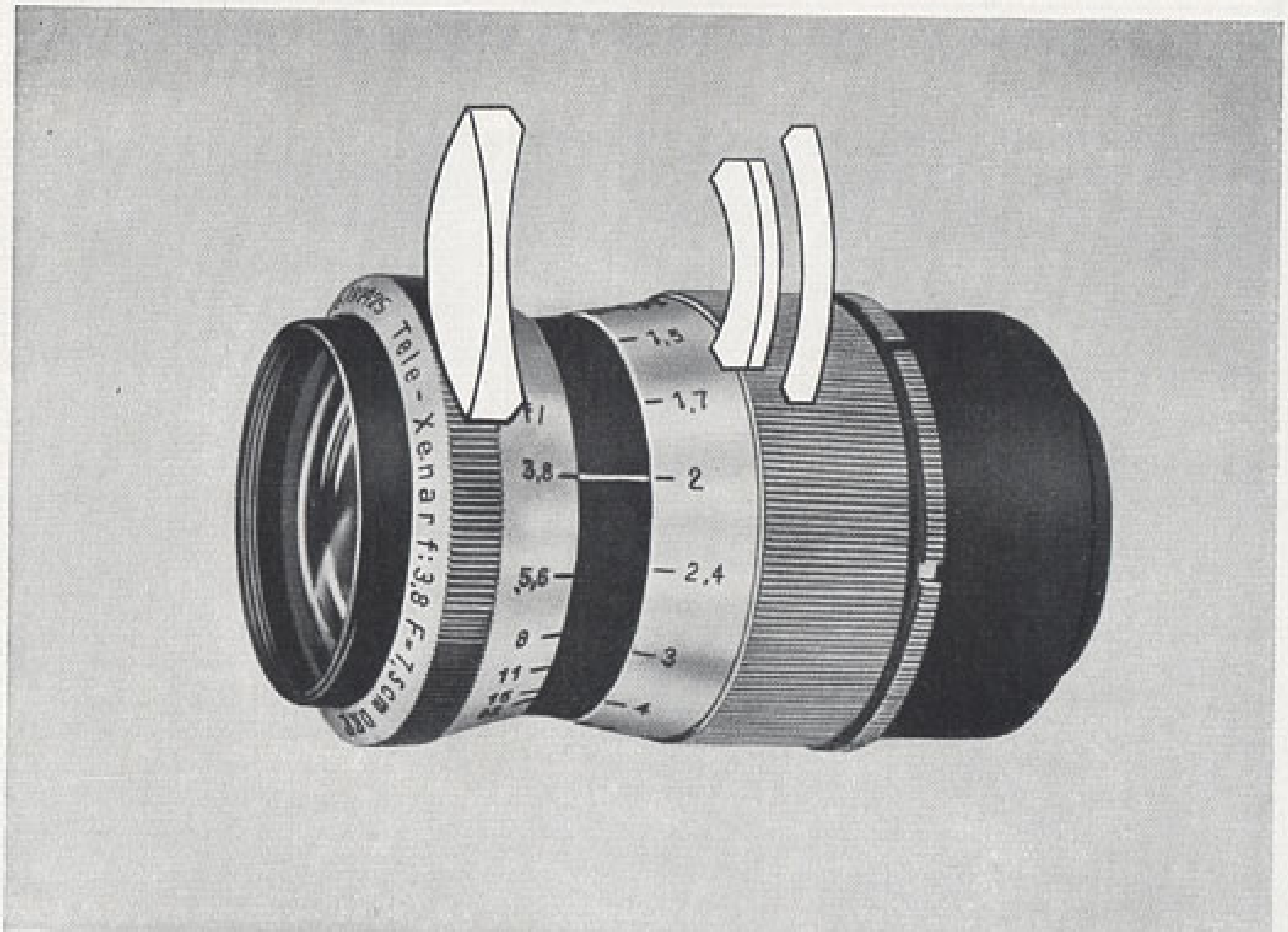
Lens	Aperture F:	Focal length in.	Focal length cm		Aperture F:	Focal length in.	Focal length cm	Size of shutter	Exterior diameter of shutter
Negative size $3\frac{1}{2} \times 2\frac{3}{8}$ in. (6×9 cm)									
Xenar	3,5	$4\frac{1}{8}$	10,5	Exchangeable against Tele-Xenar	4,5 and 5,5	$7\frac{1}{16}$ and $9\frac{7}{16}$	18 and 24	I S	$2\frac{11}{16}$ in.
Xenar	4,5	$4\frac{1}{8}$	10,5		5,5	$7\frac{1}{16}$	18	0 S	$2\frac{1}{4}$ in.
Radionar	4,5	$4\frac{1}{8}$	10,5						
Xenar	4,5	$4\frac{3}{4}$	12						
Radionar	4,5	$4\frac{3}{4}$	12						
Negative size $4\frac{3}{4} \times 3\frac{9}{16}$ in. (9×12 cm)									
Xenar	3,5	$5\frac{5}{16}$	13,5	Exchangeable against Tele-Xenar	5,5	$10\frac{5}{8}$	27	II 4/2	$3\frac{1}{16}$ in.
Xenar	3,5	$5\frac{7}{8}$	15		4,5 and 5,5	$9\frac{7}{16}$ and $10\frac{5}{8}$	24 and 27	II/5	$3\frac{1}{16}$ in.
Xenar	4,5	$5\frac{5}{16}$	13,5		5,5	$9\frac{7}{16}$	24	I S	$2\frac{11}{16}$ in.
Radionar	4,5	$5\frac{5}{16}$	13,5						
Xenar	4,5	$5\frac{7}{8}$	15						
Negative size $5\frac{7}{8} \times 3\frac{15}{16}$ in. (10×15 cm)									
Xenar	4,5	$6\frac{1}{2}$	16,5	Exchangeable against Tele-Xenar	5,5	$10\frac{5}{8}$	27	II/5	$3\frac{1}{16}$ in.
Xenar	4,5	$7\frac{1}{16}$	18		5,5	$11\frac{13}{16}$	30	II 6/2	$3\frac{1}{16}$ in.
Negative size $7\frac{1}{16} \times 5\frac{1}{8}$ in. (13×18 cm)									
Xenar	3,5	$6\frac{1}{2}$	16,5	Exchangeable against Tele-Xenar	5,5	$14\frac{3}{16}$	36	III/7	$3\frac{7}{16}$ in.
Xenar	3,5	$7\frac{1}{16}$	18						
Xenar	4,5	$8\frac{1}{4}$	21						

SCHNEIDER OPTIK KREUZNACH

Schneider

CINE TELE-XENAR

The Tele-Xenar design has also been adapted and computed for cinematography, and the range available covers both professional and substandard film work. To suit the short exposure needed in the film camera, a still greater full aperture has been provided. While care has been taken to ensure that the strain on the camera mount caused by the extra weight of a long-focus lens remains within reasonable limits, the definition, which approximates to that of the Xenon lenses, is of the highest class. This last point is important, since the Tele-Xenar must be used interchangeably with the normal focus Kine-Xenon lens. The table below gives data regarding the interchangeable feature of these lenses.



SCHNEIDER CINE-TELE-XENAR F:3,8

SCHNEIDER OPTIK KREUZNACH

Cine Tele-Xenar F:3,8 and 4,5

Aperture F:	Focal length in.	Focal length cm	For negative size
3,8	$1\frac{9}{16}$	3,8†	8 mm sub-standard film
3,8	3	7,5	16 mm sub-standard film and 35 mm standard film
3,8	4	10	
4,5	6	15	

† In preparation

Exchangeable lenses for 16 mm Cine Cameras

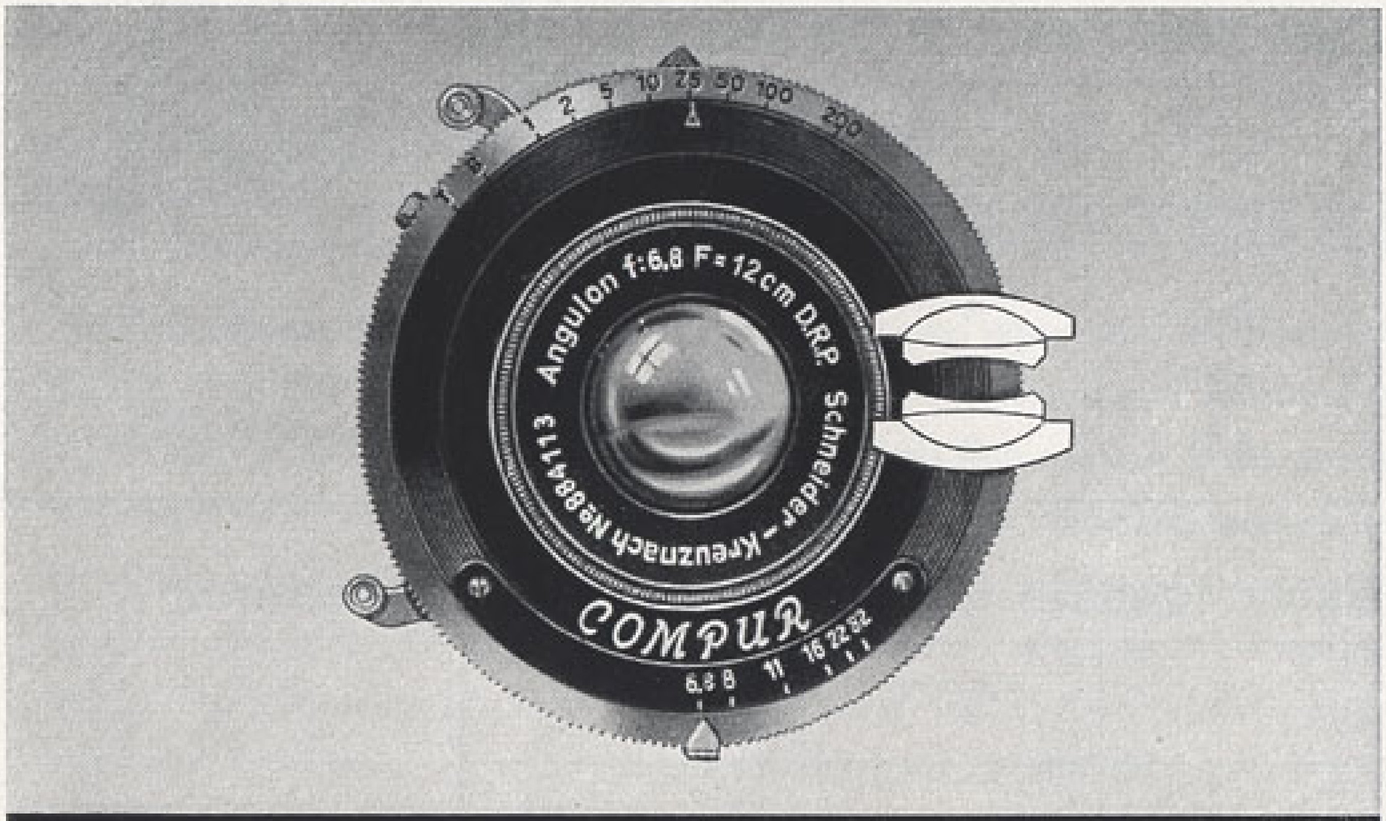
Lens	Aperture F:	Focal length in.	Focal length cm
Xenon *)	1,9	$\frac{5}{8}$	1,6
Xenon	1,5	1	2,5
Xenon	2,3	2	5
Tele-Xenar	3,8	$2\frac{15}{16}$	7,5
Tele-Xenar	3,8	$3\frac{15}{16}$	10
Tele-Xenar	4,5	$5\frac{7}{8}$	15

*) Xenon F:1,9 f: $\frac{5}{8}$ in. (1,6 cm) = wide-angle Xenon for Siemens Camera only.

Schneider ANGULON

The Angulon is a wide-angle lens, with a maximum field angle of 105°, and can be described as being "three lenses in one". At full aperture, it is perfectly corrected for spherical aberration, and highly corrected for chromatic and astigmatic aberrations. Wherever work must be done in narrow surroundings, such as small rooms indoors, between tall houses in narrow streets, and similar occassions, many photographers have deplored the fact that the normal-focus lens cannot be used satisfactorily, and the Angulon is intended to work under such circumstances in an efficient manner.

SCHNEIDER OPTIK KREUZNACH



SCHNEIDER ANGULON F:6,8

It is always possible to use a supplementary lens in conjunction with a normal-focus camera lens to obtain wide-angle effects, but it will be clear to anyone that such a procedure tends to introduce aberrations into the composite lens system which have carefully and laboriously been removed by the designer of the camera lens in the first place. The Angulon, specially designed for wide-angle work, is particularly carefully corrected for such aberrations, and gives no trouble from these sources.

The correction, in fact, extends a great distance from the optical axis of the lens, and the fact that coma has been reduced to a very low level ensures sharp and brilliant images over an extremely wide angle of field.

Apart from this, the Angulon F: 6,8 is the first wide-angle lens in which it has been possible to use the front and back components separately in order to obtain a variety of three different focal lengths from the lens — a fact which makes it possible to do away entirely with the use of supplementary lenses. The relative focal length of the complete lens to that of the two single components is in the ratio f : 1,5 and f : 2, so that three different focal lengths of reasonably wide range are provided. The Angulon is made in four different focal lengths, as shown in the table below, and the most suitable negative sizes for use with each are also indicated.

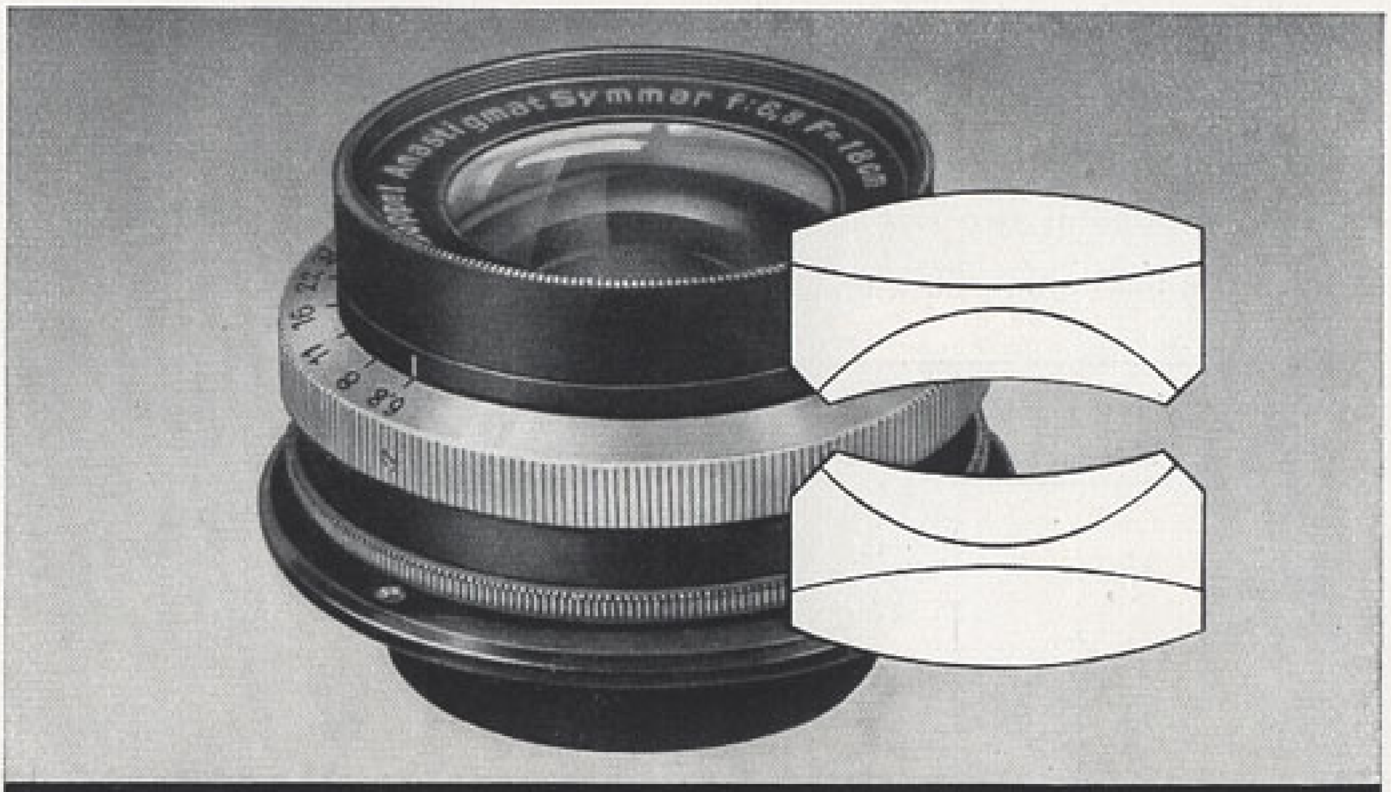
Further information regarding the practical use of the Angulon and its single components are available in a special leaflet, which will gladly be sent on application.

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
6,8	$3\frac{9}{16}$	9	$3\frac{9}{16} \times 2\frac{9}{16}$ to $5\frac{7}{8} \times 3\frac{15}{16}$ in.	$7\frac{1}{16}$ in.	0 S	$2\frac{1}{4}$ in.
6,8	$4\frac{3}{4}$	12	$3\frac{9}{16} \times 3\frac{9}{16}$ to $7\frac{1}{16} \times 5\frac{1}{8}$ in.	$9\frac{7}{16}$ in.	I S	$2\frac{11}{16}$ in.
6,8	$6\frac{1}{2}$	16,5	$4\frac{3}{4} \times 3\frac{9}{16}$ to $9\frac{7}{16} \times 7\frac{1}{16}$ in.	$13\frac{3}{16}$ in.	II/5	$3\frac{1}{16}$ in.
6,8	$8\frac{1}{4}$	21	$7\frac{1}{16} \times 5\frac{1}{8}$ to $11\frac{13}{16} \times 9\frac{7}{16}$ in.	$16\frac{9}{16}$ in.	III/7	$3\frac{7}{16}$ in.

Schneider SYMMAR

The Symmar is a universal anastigmat for all photographic purposes. The effective field circle at full aperture covers an angle of 65°, while by stopping down this value may be increased to 80°. In the latter case, the lens may be used as a wide-angle anastigmat.

The components of the Symmar may also be used singly, and each gives (alone) a focal length that is approximately double that of the complete lens. At full aperture, the single components give pleasingly soft image quality, such as is frequently demanded in portrait photography: when slightly stopped down they form excellent landscape lenses with excellent definition.



SCHNEIDER SYMMAR F:6,8

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop	Size of shutter	Exterior diameter of shutter
6,8	$2\frac{15}{16}$	7,5	$3\frac{1}{8} \times 2\frac{3}{4}$ in.	$4\frac{5}{16}$ in.	00	$1\frac{3}{4}$ in.
6,8	$3\frac{9}{16}$	9	$3\frac{9}{16} \times 2\frac{3}{4}$ in.	$5\frac{1}{8}$ in.	00	$1\frac{3}{4}$ in.
6,8	$4\frac{1}{8}$	10,5	$3\frac{15}{16} \times 3\frac{3}{8}$ in.	$5\frac{15}{16}$ in.	0S	$2\frac{1}{4}$ in.
6,8	$4\frac{3}{4}$	12	$4\frac{3}{4} \times 3\frac{9}{16}$ in.	$6\frac{11}{16}$ in.	0S	$2\frac{1}{4}$ in.
6,8	$5\frac{5}{16}$	13,5	$5\frac{1}{2} \times 3\frac{9}{16}$ in.	$7\frac{1}{2}$ in.	0S	$2\frac{1}{4}$ in.
6,8	$5\frac{7}{8}$	15	$5\frac{7}{8} \times 3\frac{15}{16}$ in.	$8\frac{7}{16}$ in.	0S	$2\frac{1}{4}$ in.
6,8	$6\frac{1}{2}$	16,5	$6\frac{5}{16} \times 4\frac{3}{4}$ in.	$9\frac{1}{4}$ in.	IS	$2\frac{11}{16}$ in.
6,8	$7\frac{1}{16}$	18	$7\frac{1}{16} \times 5\frac{1}{8}$ in.	$10\frac{1}{16}$ in.	IS	$2\frac{11}{16}$ in.
6,8	$8\frac{1}{4}$	21	$8\frac{1}{4} \times 6\frac{5}{16}$ in.	$11\frac{13}{16}$ in.	IS	$2\frac{11}{16}$ in.
6,8	$9\frac{7}{16}$	24	$9\frac{7}{16} \times 7\frac{1}{16}$ in.	$13\frac{3}{8}$ in.	II6/1	$3\frac{1}{16}$ in.
6,8	$10\frac{5}{8}$	27	$10\frac{5}{8} \times 8\frac{1}{4}$ in.	$14\frac{15}{16}$ in.	II6/1	$3\frac{1}{16}$ in.
6,8	$11\frac{13}{16}$	30	$11\frac{13}{16} \times 9\frac{7}{16}$ in.	$16\frac{15}{16}$ in.	III/8	$3\frac{7}{16}$ in.
6,8	$14\frac{3}{16}$	36	$14\frac{3}{16} \times 11$ in.	$20\frac{1}{16}$ in.	IV10/2	$4\frac{3}{16}$ in.

SCHNEIDER OPTIK KREUZNACH

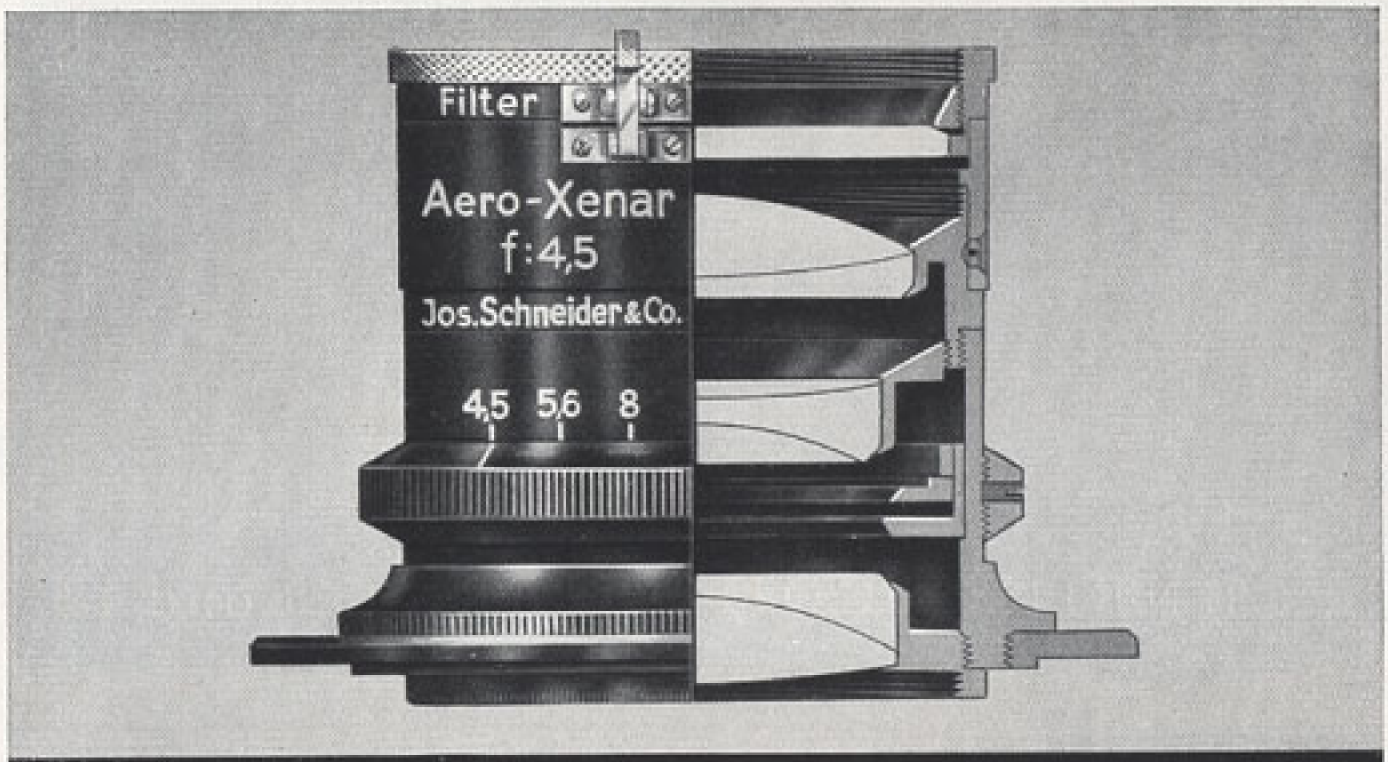
Schneider

AERO-XENAR

This lens was specially designed and computed for aerial photography, and its excellent qualities have already made it widely popular.

Spherical and chromatic aberration, as well as zonal aberrations of both kinds, have been reduced to negligibility, while careful correction for oblique rays has resulted in an astigmatically corrected field over a considerable angle. The Aero-Xenar is delivered either in full brass mount or in a mount of light alloy, as required. For filters, we ourselves use the mass-glass filters of Schott and Gen, in the grades Schott GG2 (Aero filter A), and Schott GG11 (Aero filter B), and have these glasses in stock. The filter surfaces are ground plane-parallel, and their polish is of the highest quality.

Aero-Xenar lenses are made in four different types, as noted in the table below.



SCHNEIDER AERO-XENAR F:3,5 and 4,5

Aperture F:	Focal length in.	Focal length cm	Negative size	Circle of sharp definition at small stop
3,5	10	25	7×5 in.	10 in.
4,5	10	25	7×5 in.	10 in.
4,5	12	30	8½×6½ in.	12 in.
4,5	20	50	12×5 in.	15 in.

SCHNEIDER OPTIK KREUZNACH

Schneider COMPONAR

The necessity of enlarging negatives taken with the popular miniature cameras of today has made it necessary that suitable enlarging lenses of high quality are available. A specialised lens for this work is the Componar, which has been specifically calculated for the purpose. In this lens, a very fine optical fitting for enlargers (with or without condensers) is available, and two lens

SCHNEIDER COMPONAR F:3,5 and 4,5

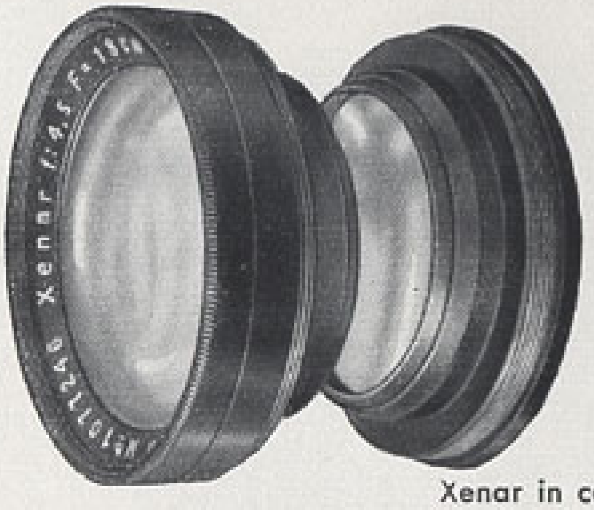
apertures of F: 3,5 and F: 4,5 are manufactured. On account of the variety of mounting methods found in commercial enlargers, the Componars are supplied in focussing mounts, with or without iris diaphragm, in the following focal lengths:

Aperture F:	Focal length in.	Focal length cm	For negative size	Circle of sharp definition at small stop
3,5	2	5	$1\frac{9}{16} \times 1\frac{9}{16}$ in.	$2\frac{3}{16}$ in.
3,5	$2\frac{15}{16}$	7,5	$2\frac{3}{8} \times 2\frac{3}{8}$ in.	$3\frac{1}{8}$ in.
4,5	2	5	$1\frac{9}{16} \times 1\frac{9}{16}$ in.	$2\frac{3}{16}$ in.
4,5	$2\frac{15}{16}$	7,5	$2\frac{3}{8} \times 2\frac{3}{8}$ in.	$3\frac{1}{8}$ in.
4,5	$4\frac{1}{8}$	10,5	$3\frac{9}{16} \times 2\frac{9}{16}$ in.	$4\frac{5}{16}$ in.
4,5	$5\frac{5}{16}$	13,5	$4\frac{3}{4} \times 3\frac{9}{16}$ in.	$5\frac{11}{16}$ in.

SCHNEIDER OPTIK KREUZNACH

Lens mounts

Schneider lenses may be obtained in the following types of mount:



Xenar in cells

Shutter cells,

screwed to fit all normal types of shutters.

Xenar in normal mount

Normal mounts,

for studio and other 'tripod" cameras. With this type of mount a roller-blind shutter is frequently used, and can be pushed over the front mount of the lens.

Xenar in focussing mount

Helical focussing mounts,

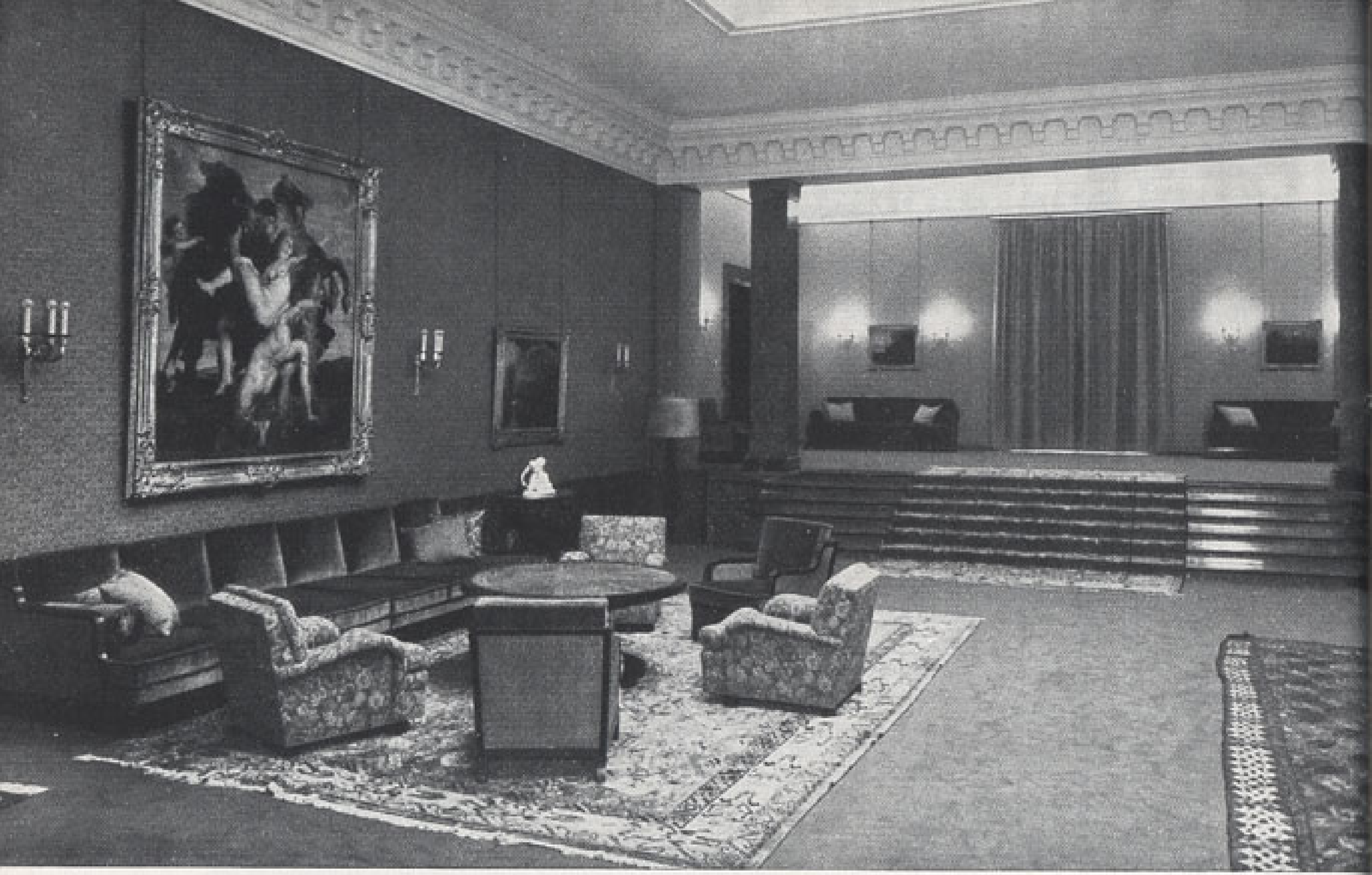
normally used for focussing on focal-plane cameras, self-erecting roll-film models, and cameras with a fixed bellows extension in general.

Xenar in sunk mount

Sunk mounts,

intended primarily for use in cameras that have focal plane shutters with rack and pinion or lazy-tongs focussing.

SCHNEIDER OPTIK KREUZNACH



Taken with Angulon

Schneider SUPPLEMENTARY LENSES

Supplementary lenses are frequently used as a simple means of varying the focal length of the camera lens, and where the design of the cameras makes such a change in focal length essential if a good focussing range is to be covered. A good supplementary lens should be suited to the design of the lens with which it is to be used, and should not introduce more aberration, optically, than can be avoided. It is important, in particular, that the mount should hold it centrally in front of or behind the camera lens. In mentioning these points it is as well to state that the Schneider supplementaries have been specially computed for use with the Xenar and Radionar types of lenses. They may certainly be used with lenses of other types, but preferably only with those of similar optical design.

SCHNEIDER OPTIK KREUZNACH

Schneider LONGAR (increases focal length)

This lens has the function of increasing the focal length of the camera lens, and three different grades are available. In order to remove minor aberrations introduced by the supplementary, it is recommended that the combination camera lens + supplementary, is slightly stopped down, the degree of stopping-down varying with the change that has been made in the focal length. It is important to note that the use of the Longar-lenses will increase the distance necessary between camera lens and focussing screen. (See table) Apart from this, exposure times are somewhat increased, since this increase in focal length reduces the effective aperture value of the combination.

To ascertain the required exposure time, the following calculation is used: The correct exposure at the aperture value given on the lens scale is first determined, and then the multiplication factor given in the tables below used to increase it for the particular Longar-lens in question.

Schneider CURTAR (reduces focal length)

The focal length of the camera lens can equally well be reduced by an appropriate supplementary, and the combination of the normal lens with a Curtar supplementary will increase the angle of field covered. Some distortion is introduced at the edges of the image, and the lens must be stopped down to some extent, but since the fact that the focal length is reduced will actually increase the effective aperture value of the lens this is seldom a disadvantage. Exposure times do not actually increase even when the lens is suitably stopped down. The table below should be used for the calculation of the appropriate exposure time from that normally required, as in the case of the Longar supplementaries.

Where considerable quantities of supplementary lenses are ordered, the table below may be used for convenience. All Schneider supplementary lenses are indicated by two numbers, as shown in the table. The first number is the dioptre value of the lens (the coloured figures on the left of the table) and the second the appropriate diameter of the lens mount in units of 1/10th millimetre (on the right-hand side of the table).

SCHNEIDER OPTIK KREUZNACH

Schneider Longar and Curtar supplementary lenses for Xenar and Radionar

Focal length without supplementary lens:	Longar supplementaries Resulting focal length: A	B	C	Curtar supplementaries Resulting focal length: D	E	Xenar F : 5,5	Xenar F : 4,5 / Radion. F : 4,5	Xenar F : 3,5	Xenar F : 2,8
	Dioptre value					Outer diam. of back lens mount in $^1/_{10}$th mm			
$2\frac{15}{16}$ in. = 7,5 cm	10,5 cm 400	12,5 cm 600	— —	6 cm 20	— —	240	240	320	—
$4\frac{1}{8}$ in. = 10,5 cm	13,5 cm 250	17 cm 400	20 cm 500	9 cm 20	— —	320	320	420	420
$4\frac{3}{4}$ in. = 12 cm	16,5 cm 250	20 cm 300	22 cm 450	10 cm 20	— —	320	420	425	—
$5\frac{5}{16}$ in. = 13,5 cm	18 cm 250	23 cm 300	26,5 cm 400	— —	11 cm 20	320	420	425	—
$5\frac{7}{8}$ in. = 15 cm	20,5 cm 200	26 cm 300	29 cm 350	— —	12 cm 20	420	420	475	—
$6\frac{1}{2}$ in. = 16,5 cm	23 cm 200	28 cm 250	32 cm 300	— —	13,5 cm 15	420	475	572	—
$7\frac{1}{16}$ in. = 18 cm	24 cm 150	30 cm 250	34 cm 300	— —	15 cm 15	420	515	572	—
$8\frac{1}{4}$ in. = 21 cm	26 cm 100	34 cm 200	41 cm 250	— —	18 cm 10	515	572	—	—
Exposure multiplier	2×	3×	3,5×	0,6×	0,5×	—	—	—	—

When ordering supplementary lenses and filters for a particular lens that was obtained earlier, the number of the lens should be quoted as well as the focal length and the full aperture value.

Schneider Longar supplementary Lenses for Tele-Xenar F: 4,5 and 5,5 lenses

Tele-Xenar	Resulting focal length:				Tele-Xenar for shutter size:					
	I	II	III	IV	0 S	I S	II 4/2	II 5/2	II 6/2	III/7
	Dioptre value				Outer diam. of back lens mount in $^1/_{10}$th mm					
4,5/7 $\frac{1}{16}$ in. = 18 cm	24 cm 300	27 cm 350	30 cm 450	34 cm 525	—	375	—	—	—	—
5,5/7 $\frac{1}{16}$ in. = 18 cm	24 cm 300	27 cm 350	30 cm 450	34 cm 525	285	—	—	—	—	—
4,5/9 $\frac{7}{16}$ in. = 24 cm	32 cm 200	36 cm 250	40 cm 350	45 cm 400	—	—	—	475	—	—
5,5/9 $\frac{7}{16}$ in. = 24 cm	32 cm 200	36 cm 250	40 cm 350	45 cm 400	—	375	—	—	—	—
5,5/10 $\frac{5}{8}$ in. = 27 cm	36 cm 200	40 cm 250	45 cm 300	51 cm 350	—	—	425	475	—	—
5,5/11 $\frac{13}{16}$ in. = 30 cm	40 cm 175	45 cm 225	51 cm 250	57 cm 300	—	—	—	—	515	—
5,5/14 $\frac{3}{16}$ in. = 36 cm	48 cm 150	54 cm 175	61 cm 225	68 cm 275	—	—	—	—	—	572
Exposure multiplier	2×	2,5×	3×	3,5×	—	—	—	—	—	—

When ordering supplementaries for Tele-Xenar lenses, it is essential that the diameter of the back lens cell of the camera lens is given, or else the normal lens against which the Tele-Xenar is interchangeable specified. In certain cases, it may be necessary to return the back component lens of the Tele-Xenar to us in order that the supplementary may be correctly fitted. In order to make the choice of a suitable supplementary more simple, the table below indicates the extension required in the camera with the normal Tele-Xenar, and with the various supplementaries. In the table, $a = \infty$ denotes the distance between the back flange of the shutter and the negative or groundglass screen when the lens is focussed on infinity, and shorter distances are indicated in the same manner. These values are only averages, since the type of shutter and mounting cell which are used may cause variations of plus or minus $^2/_5$ th of an inch. The extension values are given in millimetres.

Tele-Xenar	Without supplementary		With supplementary lenses							
			I		II		III		IV	
	a ∞	a 1,5 m	a ∞	a 3 m	a ∞	a 3 m	a ∞	a 3 m	a ∞	a 3 m
$7\frac{1}{16}$ in. = 18 cm	100	125	130	151	140	167	155	190	175	220
$9\frac{1}{16}$ in. = 24 cm	138	183	175	213	190	240	215	280	235	315
$10\frac{5}{8}$ in. = 27 cm	155	215	200	250	220	285	240	320	270	375
$11\frac{13}{16}$ in. = 30 cm	170	245	225	290	250	330	270	375	300	425
$14\frac{3}{16}$ in. = 36 cm	200	315	255	345	285	405	310	465	355	555

Taken with Xenon

Taken with Xenar and Isco Focussing-lens

Schneider FOCUSSING-LENSES "ISCO"
(Close-up lenses)

Many types of cameras cannot be made normally to focus more closely than a certain distance, particularly those of simple design. With such cameras all objects within the focussing range can be photographed sharply, but it is frequently necessary to make exposures on objects at very close ranges. Since the focussing movement of the camera cannot deal with these ranges, close-up lenses of the "Isco" variety are essential.

The "Isco" lenses are convex in nature, and can be obtained in various grades. Their effect is to form a virtual image of the object concerned at a greater distance than the actual from the camera, and the camera lens then is enabled to focus this image sharply. In actual use, the virtual image is naturally not noticed, for the lenses are placed on the front mount of the camera lens and focussing carried out as usual. It is normally desirable to stop the camera lens down to F: 5, 6 or F: 8, though the exposure time is virtually unchanged by the presence of the focussing lens.

The range of use of the various grades of focussing lenses of this type are given in the table below.

SCHNEIDER OPTIK KREUZNACH

"Isco" close-up lens focussing table for lenses of 2 in. (5 cm), 3 in. (7,5 cm) and $4\frac{1}{8}$ in. (10,5 cm) focus.

Focussing scale set to:	Focal length 2 in. (5 cm)			Focal length 3 in. (7,5 cm)			Focal length $4^1/_8$ in. (10,5 cm)		
	Distance at which objects are sharp with grade:								
	I	II	III	I	II	III	I	II	III
∞	107 cm	66,5 cm	40,5 cm	100 cm	65 cm	39,5 cm	100 cm	65 cm	39,5 cm
20 m	102 cm	65 cm	39,5 cm	97 cm	63 cm	38,5 cm	96 cm	63,5 cm	39 cm
15 m	99,5 cm	64 cm	39 cm	96 cm	62 cm	38,5 cm	95 cm	63 cm	38,5 cm
12 m	98 cm	63,5 cm	39 cm	95 cm	61,5 cm	38 cm	94 cm	62,5 cm	38 cm
10 m	96 cm	63 cm	38,5 cm	94 cm	61 cm	38 cm	93 cm	61,5 cm	37,5 cm
8 m	94 cm	62 cm	38,5 cm	92 cm	60 cm	37,5 cm	91 cm	61 cm	37,5 cm
7 m	92,5 cm	61 cm	38 cm	90,5 cm	59,5 cm	37 cm	90 cm	60 cm	37 cm
6 m	91 cm	60,5 cm	38 cm	89 cm	59 cm	37 cm	88,5 cm	59 cm	37 cm
5 m	89 cm	69,5 cm	37,5 cm	86,5 cm	57,5 cm	36 cm	86,5 cm	58 cm	36,5 cm
4 m	85 cm	57,5 cm	37 cm	83,5 cm	55,5 cm	35,5 cm	83,5 cm	56,5 cm	36 cm
3 m	79 cm	55 cm	36 cm	78,5 cm	53 cm	35 cm	78,5 cm	53 cm	36 cm
2,50 m	75,5 cm	53 cm	35 cm	74,5 cm	50,5 cm	34 cm	74,5 cm	51,5 cm	34,5 cm
2,40 m	74 cm	53 cm	34,5 cm	73,5 cm	50 cm	34 cm	73,5 cm	51,5 cm	34,5 cm
2 m	69 cm	50,5 cm	33,5 cm	69 cm	48 cm	33,5 cm	69 cm	48,5 cm	33,5 cm
1,70 m	66 cm	48,5 cm	32,5 cm	64,5 cm	45 cm	32,5 cm	64,5 cm	46 cm	32 cm
1,50 m	62,5 cm	465, cm	32 cm	61 cm	43 cm	31,5 cm	61,5 cm	44,5 cm	31 cm
1,35 m	60 cm	45 cm	31 cm	58,5 cm	41,5 cm	31 cm	58,5 cm	44 cm	30,5 cm
1,25 m	58 cm	44 cm	30,5 cm	56,5 cm	41 cm	30,5 cm	57 cm	43 cm	30 cm
1,20 m	56,5 cm	43 cm	39,5 cm	55,5 cm	40,5 cm	30 cm	56 cm	42,5 cm	29,5 cm
1,10 m	54,5 cm	42 cm	30 cm	53 cm	40 cm	29 cm	53,5 cm	41,5 cm	29 cm
1 m	52 cm	40,5 cm	29 cm	51 cm	40 cm	28,5 cm	51 cm	40 cm	28,5 cm
0,90 m	50 cm	39 cm	28,5 cm	48,5 cm	38,5 cm	27,5 cm	48 cm	38,5 cm	27,5 cm
0,85 m	48 cm	38 cm	28 cm	47,5 cm	37,5 cm	27,5 cm	46,5 cm	37,5 cm	27 cm
0,80 m	46,5 cm	37 cm	27 cm	46 cm	36 cm	27 cm	44,5 cm	36,5 cm	26,5 cm
0,75 m	45 cm	35,5 cm	26,5 cm	44 cm	35 cm	26 cm	43 cm	35,5 cm	26 cm
0,70 m	42 cm	34 cm	25,5 cm	42 cm	34 cm	25,5 cm	42 cm	34 cm	25,5 cm

The focussing distance is measured from the front of the "Isco" lens mount to the subject. It is useful to stop down to F: 5,6 or F: 8.

The table above shows that the effect of the "Isco" focussing lenses is independent (at least in the first approximation) of the focal length of the camera lens.

"Isco" close-up lenses are delivered in mounts to fit all focal lengths between 2 in. (5 cm) and $4\frac{1}{8}$ in. (10,5 cm) in the Xenar and Radionar series, and also for the F: 2, 2 in. (5 cm) Xenon lens.

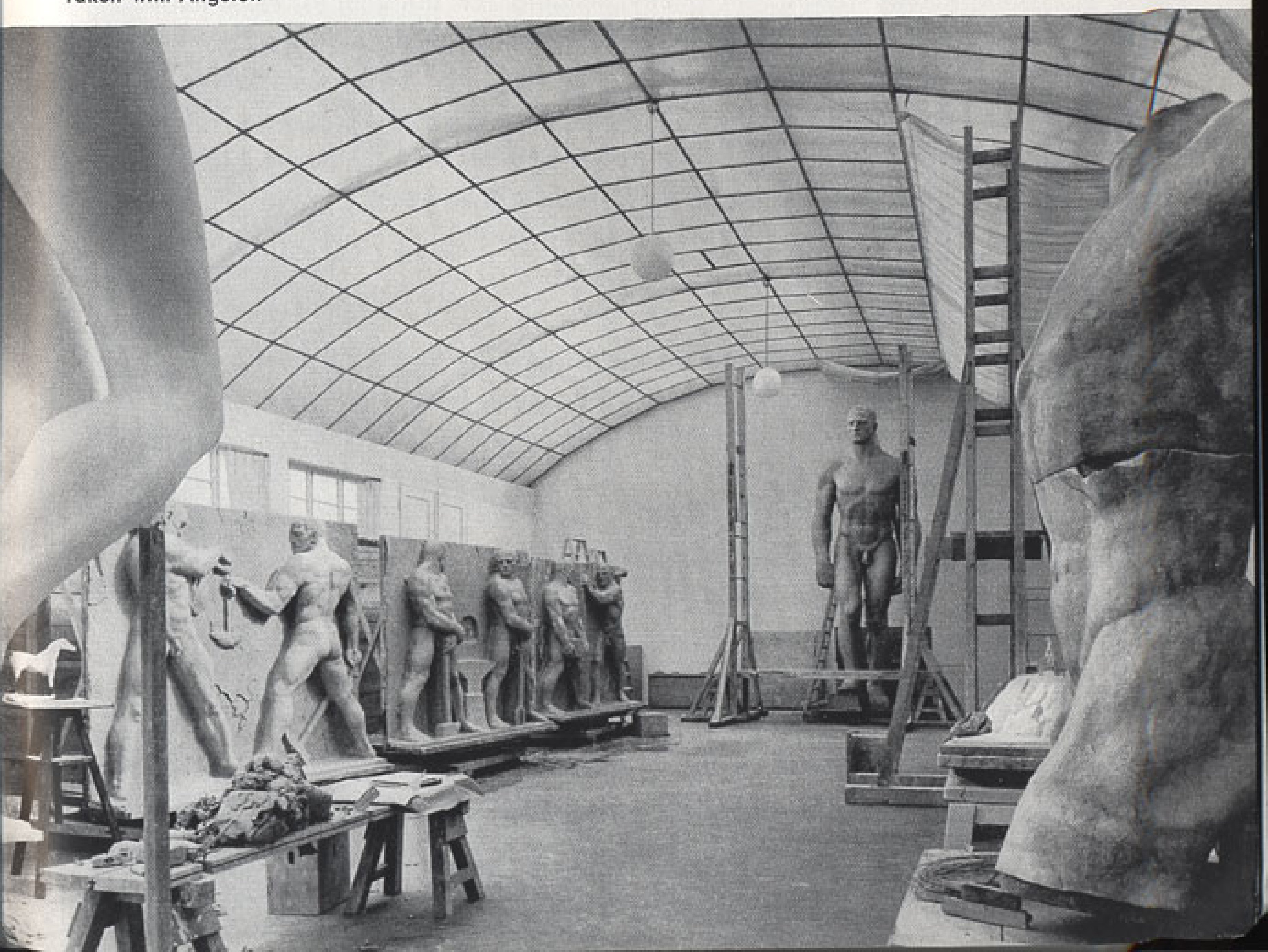
Schneider SCHOTT COLOUR FILTERS

In modern photography, the manufacture of good quality colour filters comes second only to the computation and manufacture of highgrade lenses, because a good colour filter increases the effectiveness of the image by colour correction, one of poor quality merely upsets the image quality that is produced by the lens itself. Filters must thus be made with the same care and accuracy as the best camera lenses.

All the colour filters we deliver are made of glass coloured in the mass by the firm of Schott and Gen. Jena, and this material assures that degradation of colour, changes in absorption, and other unpleasant qualities are obviated as far as possible. Each filter is very accurately ground plane-parallel, and is delivered in a push-on type mount which ensures that the filter assumes an optical unity with the lens.

The purpose and uses of colour filters is a subject that cannot be dealt with in detail in the present catalogue particularly since the effect of a filter can

Taken with Angulon



be greatly altered by a considerable number of purely practical factors involved. Reference is thus merely made to the various types of emulsions with the most varied kinds of spectral sensitivity, to the changing spectral quality of light through the course of the day and year, and to the varied spectral quality of artificial light-sources, as well as to the importance of the colour of the actual subject photographed.

Though the choice of a suitable filter must naturally be made with these points in view, a brief review is given below of the various grades manufactured, and their average effect.

1. Light yellow filter

Corrects for colour when using orthochromatic and panchromatic materials by absorbing blue light. Universally suitable as a "normal filter" for general use. Exposure factor $1\frac{1}{2}$ x to 2 x.

2. Medium yellow filter

Higher absorption of blue light, and thus suitable for landscape and mountain photography, the latter to medium heights, as well as for work on flowers, paintings, and costumes on orthochromatic and panchromatic material. Exposure factor 3 x to 4 x.

3. Deep yellow filter

Strong blue absorption chiefly suitable for landscapes, telephoto exposures, and aerial photography. Exposure factor 4 x to 6 x.

4. Green filter

Primarily absorbs red, and thus improves colour reproduction with panchromatic material of high red sensitivity. Universally suitable for use with all panchromatic emulsions. Exposure factor 3 x to 4 x.

5. Orange filter

6. Orange-yellow filter

7. Orange-red filter

These three filters primarily absorb the blue and green. They are useful for photographing coloured originals in copying work, as well as in landscape and aerial photography for general colour correction.

8. Light red filter

9. Medium red filter

10. Deep red filter

11. Opaque filter

For use in landscape and telephoto work on panchromatic emulsions to penetrate haze. The deep red and opaque grades are specially suitable for infra-red photography.

12. Light blue filter

13. Deep blue filter

Special filters for use with panchromatic material in half-watt (not over-run) light, and for photo-micrographic work.

14. Ultra-violet absorption filter

For the absorption of invisible ultra-violet rays. Useful for work at high altitudes on orthochromatic or panchromatic material:

When ordering filters and supplementary lenses, to be used on a lens already purchased, quote the number of the lens, together with the focal length and full aperture value.

Taken with Xenar

Schneider Accessories

In order to reduce the more technical aspects of photography to greater simplicity, depth of focus tables and exposure tables, are available, and both amateur and professional will find them of extreme value.

Schneider Magnifiers

These magnifiers are intended for accurate focussing on the ground-glass screen, and for the examination of negatives. A glass of this kind is particularly indispensible for the miniature photographer, and with it he may examine the smallest section of a negative for quality. Schneider magnifiers are made of three single glasses, cemented together, and are aplanatic in design. Four different powers are made, all being delivered in neat black-finished brass mounts. The upper portion of the mount may be screwed in or out in order to give accurate focus for every type of eye.

Printed tables for depth of focus on a lens of any focal length made by Schneider are available.

Isco Exposure tables

These supply accurate data for correct exposure times, and are specially valuable to the beginner as a practical help to good results.

Taken with Xenar