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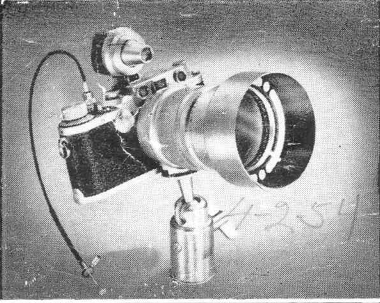
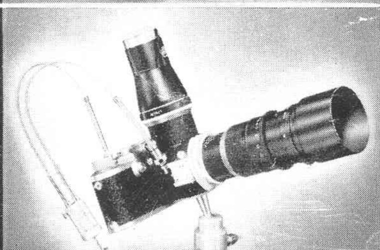
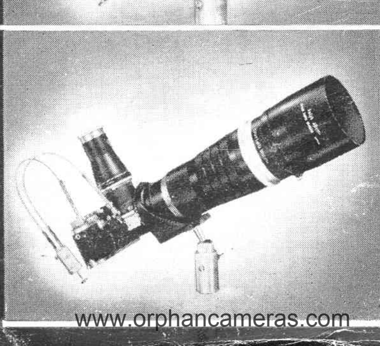


Leica Lenses





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28mm.

35mm.

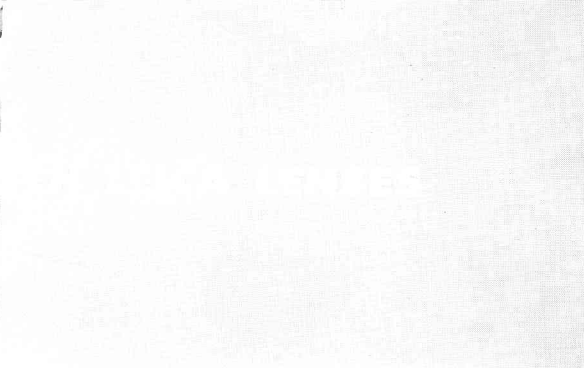
SPECIFICATIONS OF T

Name	Focal Length	Type	Mount	Maximum Aperture	Minimum Aperture
*Hektor	28 mm.	Wide Angle	Rigid Chrome	f/6.3	f/25
Summaron	35 mm.	Wide Angle	Rigid Chrome	f/3.5	f/22
Elmar	50 mm.	Standard	Collapsible-Chrome	f/3.5	f/16
Summicron	50 mm.	Standard	Collapsible-Chrome	f/2	f/16
Summarit	50 mm.	Standard	Rigid Chrome	f/1.5	f/16
Summarex	85 mm.	Long Focus	Rigid Chrome	f/1.5	f/16
Elmar	90 mm.	Long Focus	Rigid Chrome	f/4	f/36
Hektor	135 mm.	Long Focus	Rigid Chrome	f/4.5	f/36
Telyt	200 mm.	True Telephoto	Rigid Black	f/4.5	f/32
Telyt	400 mm.	True Telephoto	Rigid Black	f/5	f/32

*When available.

85mm.

50mm.

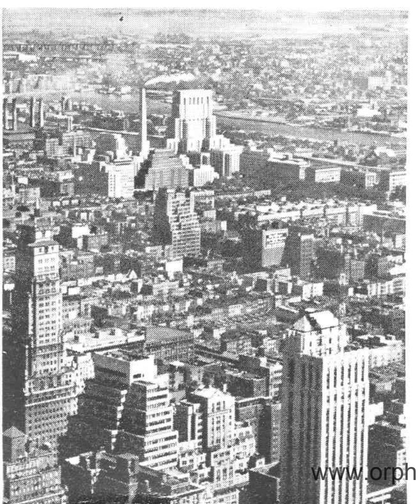


400mm.

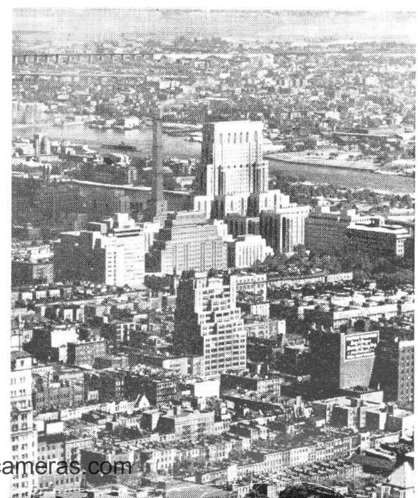
Angle Covered Diagonal 43.3mm.	Scale of Reproduction Compared with Standard Lens	Weight	Angle for Long Side Horizontal Pictures 36mm.	Image Angle for Short Side Vertical Pictures 24mm.
76°	× 0.56	3.5 ounces	65°	46°
64°	× 0.7	6 ounces	54°	38°
45°	× 1.00	4 ounces	~~54°~~ 40°	~~38°~~ 27°
45°	× 1.00	8 ounces	~~54°~~ 40°	~~38°~~ 27°
45°	× 1.00	10.5 ounces	38°	26°
28.5°	× 1.75	21 ounces	24°	16°
27°	× 1.8	7 ounces	23°	15°
18°	× 2.7	13.5 ounces	15°	10°
12°	× 4.00	14.5 ounces	10°	7°
6°	× 8.00	83 ounces	5°	3°

200mm.

90mm.



135mm.



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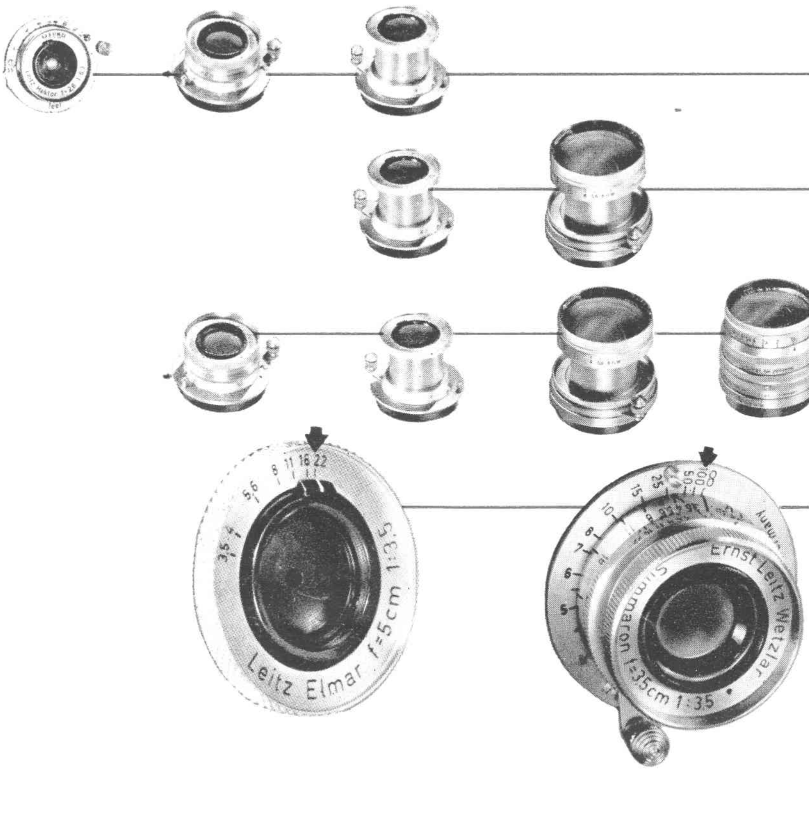
INTERCHANGEABLE LEICA



LENSES

The fact that the Leica camera may be fitted with a complete series of interchangeable, coated lenses which couple to the rangefinder of all Leica cameras is one of the most important characteristics of the Leica system of photography.

The principle of interchangeability is not new, but as developed and applied to the Leica camera, it has been made available to a far greater number of photographers than was previously possible.

The Helical Mount. Each lens is provided with its own focusing mount. On all lenses except Summarit 50mm. and long focus lenses, focusing is effected by means of a lever. On the other lenses a milled ring is provided. The distance is read off by an index mark.

Collapsible Lens Mounts. The Leitz Elmar and Leitz Summicron of 50mm., focal length are provided with collapsible mounts, and must be pulled out before using the camera. When the lens is fully drawn out, it is turned slightly to the right, where it locks in position. To push back the lens, it must first be turned a little to the left, then pushed straight back into the body of the camera.

The Infinity Catch. When the focusing mounts of the Hektor 28mm., Summaron 35mm., and Elmar, Summicron and Summarit 50mm., lenses reach the "infinity" mark, they lock in position by means of a catch. By pressing the knob on the end of the focusing lever, the catch is released and can then be rotated for focusing. This device is only found on lenses of 28, 35 and 50mm., focal length.

The Aperture is set on the Leitz Elmar 50mm. and Hektor 28mm., by a small lever engraved with an index to the front ring of the lens mount. On the other lenses, a narrow ring bearing the index mark, actuates the diaphragm. The figures indicate the relative aperture of the lens.

In the following pages we state that a lens is of Gauss-type construction. What does that mean? Gauss-type construction is based on a formula which was devised by Gauss in the 1880's. Originally, he simply took two identical Aplanatic lenses and mounted them end to end with an iris-diaphragm in between. In other words, he combined two identical lens systems, each one independently well-corrected. When he took these two lenses and combined them into one lens, and placed the iris-diaphragm in between, he was able to still further improve chromatic aberrations.

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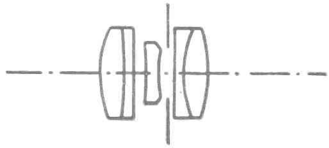
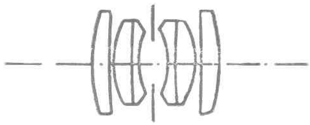
HEKTOR 28mm., f/6.3

(When Available)



Leitz extreme wide angle (76 deg.) lens, is the Hektor 28mm., f/6.3, designed as a triplet with two cemented surfaces, which has been widely used for correction. Even at full aperture (f/6.3), which in a system of such a large angle of view must be regarded as high, it gives remarkable sharpness to the Leica format without distortion—a novel feature in view of the very short focal length. In this objective, too, the requirement of extensive reduction of vignetting has been taken into consideration by making the lens larger than the dimension corresponding to the relative aperture. Proper reduction of the aperture, which is always advisable for wide-angle objectives if conditions permit, results in a further increase of the quality of the image (optimum approximately at f/11), and an improved distribution of light over the entire image area.

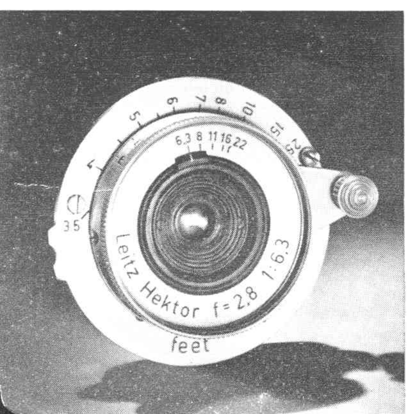
A 28mm. adapter fits into the Imarect Finder to show the proper field of view for the 28mm. Hektor.



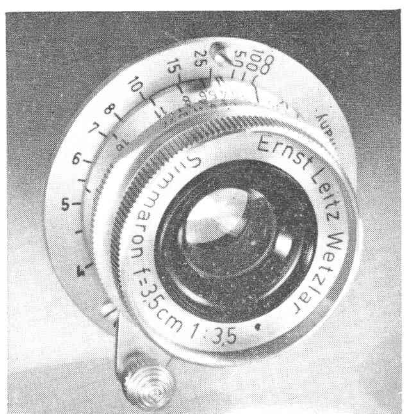
SUMMARON 35mm., f/3.5

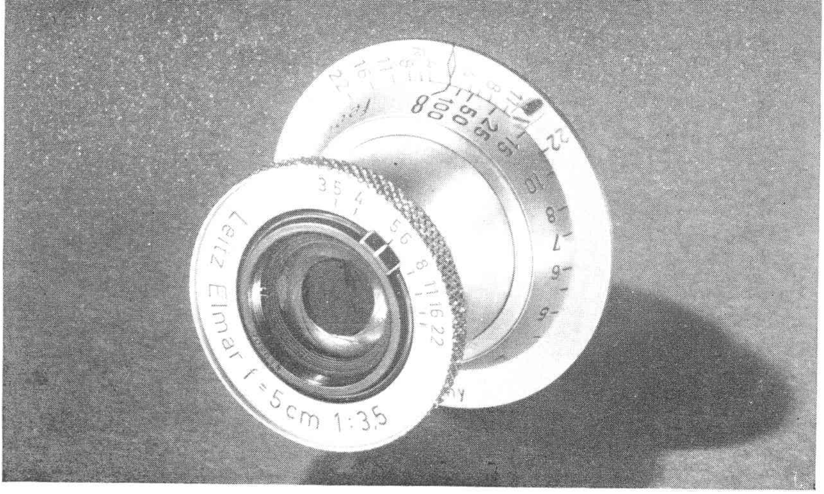
In the group of wide-angle objectives we have the Summaron 35mm., f/3.5 (1⅜″) with an angle of 64 degrees, which is close to the normal observation angle of the human eye. This objective belongs to the Gauss type group and consists of six lenses, two of which are independent; the remaining four are cemented together to form two members. Particularly in the case of wide-angle objectives, care must be taken that vignetting, which has an increasingly disturbing effect with increasing angle of view, is reduced to a tolerable measure. For this reason, the front lens of this objective is also made considerably larger than would correspond to the relative aperture of the system. Moreover, the rear lens of the system is given such dimensions that it additionally enlarges the cross section of the oblique pencils of rays.

HEKTOR 28mm.



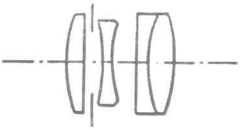
SUMMARON 35mm.





ELMAR 50mm.

The effect of both these design features is that the corners of the image receive much more light, so that vignetting no longer appears. The color correction of this objective is excellent, and other defects are eliminated to a large extent. The performance is, therefore, exceptional even at full aperture. Reduced aperture produces increased resolution and contrast, and between f/5.6 and f/8, a sharpness extending over the entire image area is reached. The depth of field at f/5.6 is so great that the rangefinder need hardly be used.



ELMAR 50mm., f/3.5

In its assembly, the Elmar 50mm., f/3.5 (2″) angle of view 45 deg., constitutes a known triplet variant consisting of three members. The last member contains a converging cemented surface, and, under favorable correction conditions has a relatively simple construction. The correction possibilities of this type of system have been widely utilized, and all residual defects, chromatic as well as spherical, are adjusted to each other so that an especially favorable general correction adapted to the Leica format is obtained. The sharpness increases rapidly as the aperture is reduced, and at f/8 it is at its maximum.

We wish to insert a statement here which applies quite generally, not only to the Elmar:

If, in order to obtain maximum depth of focus, the aperture is reduced beyond the so-called critical aperture of an objective, a decrease in the resolution capacity is theoretically to be expected because of the phenomena of diffraction. If standard emulsions with a resolution capacity of as much as about 100 lines per millimeter are used, however, practically no loss of resolution is generally observable, even at f/16.

The reproduction of periodic structures and test films of an especially high resolution capacity must remain outside our present considerations.

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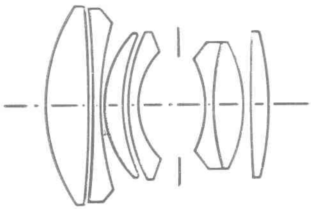
SUMMICRON 50mm., f/2



The Summicron 50mm., f/2 is a new addition to the Leica line of lenses. It has a new type of glass, new optical design and excellent correction, especially for color, flatness of field and vignetting.

The Summicron is more compact than the Summitar and the diaphragm adjusting ring has click stops. All glass-to-air surfaces are coated.

There are seven elements, only one pair of which is cemented. Utilization is made of "air lenses" to achieve an exceedingly high degree of correction. The basic design is a variation of the Gauss-type lens. (The Gauss-type is characterized by two converging lenses, one at each extremity of the system, enclosing two diverging meniscus lens components, located adjacent to the diaphragm.) This provides a favorable basis for color correction.

The Summicron has been further corrected to reduce the extra axial spherical aberration and loss of contrast at the edges to the absolute minimum, while at the same time obtaining a perfect correction of the astigmatic curvature of field, and reaching an optimum performance chromatically. Important in achieving this high degree of correction is a new optical glass of high refractive index used for the two positive elements of the system.

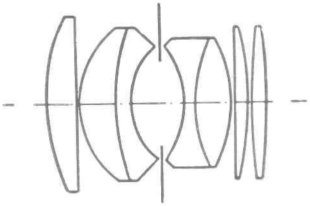
The Summicron performs excellently at full aperture, producing an exceedingly brilliant and even image over the entire field. Optimum image quality, which normally cannot be attained until the lens is stopped down considerably, is reached in the Summicron at the relatively large opening of f/4. An extremely high degree of contrast and resolution is obtained.

Correction of vignetting in a large aperture lens is of great importance. Unless special attention is paid to this, the edges of the negative will receive much less light than other areas, resulting in a darkening of the edges of the picture, or in the case of color photography, a false rendition of color at the edges of the transparency. The front element of the Summicron is larger in diameter than required for a relative aperture of f/2. This design increases the transverse section of the bundle of oblique rays, permitting more light to reach the edges, thereby reducing vignetting to a minimum.

Increasing the width of the oblique bundle of rays to eliminate vignetting increases the difficulty of correcting other aberrations. The reduction of vignetting in the Summicron, coupled with its over-all high correction, can be regarded as an outstanding achievement of optical design. The Summicron is a lens of highest performance leaving nothing to be desired for either color or black-and-white photography.

SUMMARIT 50mm., f/1.5

The high speed Summarit 50mm., f/1.5 (2"), angle 45 deg., is a seven-lens objective belonging to the group of Gauss types, which affords especially favorable correction possibilities for the present purpose. Color correction and contrast is excellent, so that considerable sharpness is obtained over the entire image area even at full aperture. The general sharpness is further increased with moderate closing of the aperture, and at about f/4 it reaches an unusually high degree of contrast and resolution. Also, the uniform distribution of light over the entire image area, and the elimination of distortion, are excellent for an objective of such a large initial aperture. We have here an especially successful construction of excellent performance, such as is probably seldom found in objectives of this kind.



SUMMITAR 50mm.

SUMMARIT 50mm.

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SUMMAREX
85mm.

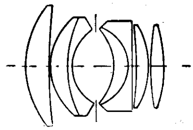
ELMAR
90mm.

SUMMITAR 50mm., f/2

(Illustration on Page 9)

The faster objective, Summitar 50mm., f/2 (2″), angle 45 deg., is based on the so-called Gauss type, which affords excellent correction possibilities for higher relative aperture and for greater angles of view. At variance with the normal Gauss type, the front member is composed of two lenses, so that additional means of correction are obtained. The excellent color correction deserves special mention, whereby color defects of a higher order are made unnoticeable.

The other defects, too, are limited in their extent. With reduced aperture the sharpness of the image increases rapidly and reaches its maximum at about f/5.6. Special importance was attached to the extensive elimination of vignetting which is of fundamental importance, especially in color photography.



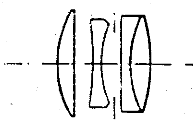
SUMMAREX 85mm., f/1.5

The series of objectives of long focal length begins with the high-speed Summarex 85mm., f/1.5 (3¼″), angle 28.5 deg. This is a seven-lens system, which may be regarded as a variant of the Gauss type, and which offers extremely fine correction conditions. As a result of the special position of the axial and extra-axial spherical aberration, the objective shows a slightly diminished sharpness at full aperture, which, however, does not go so far as to make the objective "soft."

The Summarex is excellent for news photography as well as an ideal objective for portrait photography. It is particularly highly esteemed in these fields.

It is highly corrected for critical sharpness and it is specially coated for reduction of flare and scatter, for increased light transmission and image contrast.

With slight reduction of the aperture, perfect sharpness is obtained over the entire image area (maximum—approximately at f/4), so that the objective is also suitable for photographs requiring an especially high resolution capacity.



ELMAR 90mm., f/4

Elmar 90mm., f/4 (3½″), angle 27 deg., belongs to the same type of objective as Elmar 50mm., f/3.5. What was stated there with respect to the correction conditions and optimum sharpness applies here. The very slight effect of vignetting in this objective is worth mentioning. It is particularly suited for portrait photography, but can be used very successfully for scenery and for all purposes where a relatively long focal length is needed.

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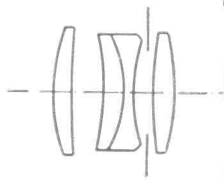
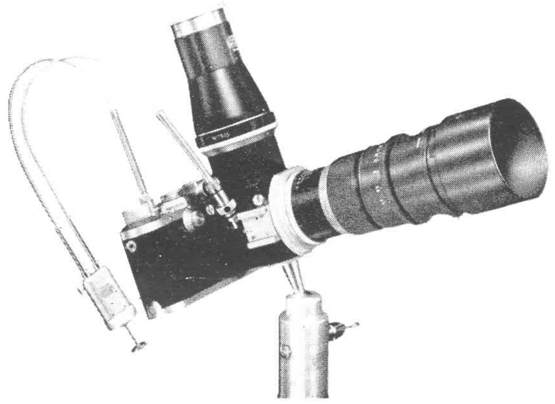
HEKTOR 135mm., f/4.5

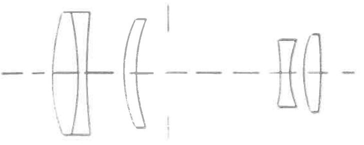
Hektor 135mm., f/4.5 (5⅜"), angle 18 deg., constitutes a triplet variant with a converging cemented surface inserted in the central member. This cement surface is an additional source of important correction possibilities which have been extensively used in this objective. The general correction is therefore excellent and the performance outstanding.

Maximum resolution capacity combined with perfect contrast are the qualities which make this objective particularly suitable for photographs requiring sharp rendition of finest structural details. For the rest, it meets all the requirements demanded of a good distance objective. The performance of the system is excellent at full aperture, so that reduction of the aperture is necessary only when increased depth of focus seems desirable. In a special short mount, it can be used with the Mirror Reflex Housing.



HEKTOR
135mm.



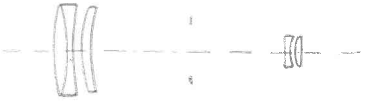


TELYT 200mm.

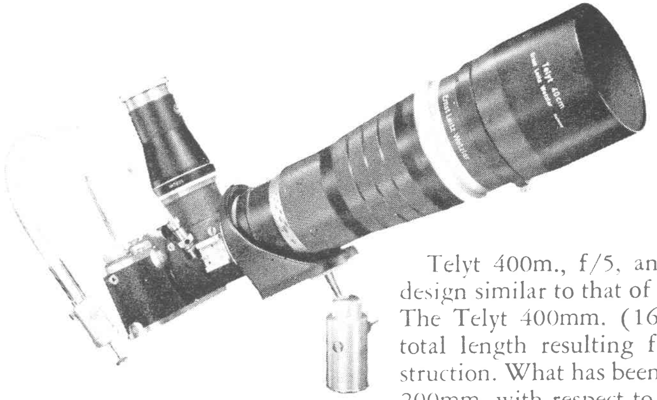
TELYT 200mm., f/4.5

Telyt 200mm., f 4.5 (8"), angle 12 deg. is designed as a tele-system, used in conjunction with the Mirror Reflex Housing, and consists of a front group of lenses having a converging effect and a rear group of lenses having a diverging effect; the two groups are separated by a relatively large air space.

The result is, that for a relatively long focal length, the total length of the objective from the front lens to lens flange of the camera remains comparatively short and easy to handle. The general correction is very favorable in this objective, and the extensive elimination of color defects and the complete elimination of distortion is outstanding.



TELYT 400mm., f/5



TELYT 400mm.

Telyt 400m., f/5, angle 6 deg., has a design similar to that of the Telyt 200mm. The Telyt 400mm. (16"), has a shorter total length resulting from the tele-construction. What has been said for the Telyt 200mm. with respect to correction applies also to the Telyt 400mm.

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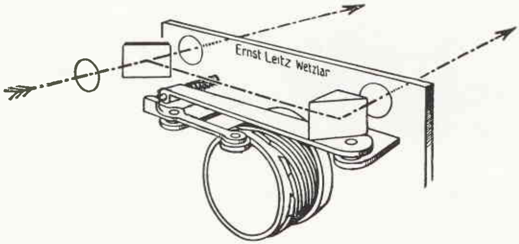

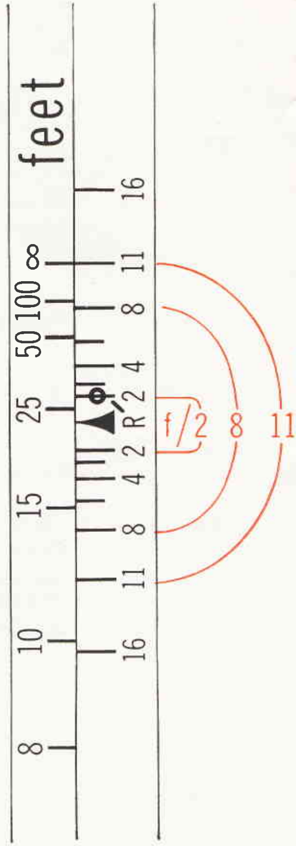

The Depth of Field Scale. In order that the range of depth of field at any lens aperture may be read off direct from the camera, a special scale is fitted engraved with the aperture figures, which shows the distances in front of and behind the actual focusing distance at which sharp focus is obtained, for all lens apertures. The accuracy of this scale is quite sufficient for most practical purposes, though for very accurate work special depth of field tables can be obtained from us (price 15 cents), in which the figures are calculated for a circle of least confusion of 1/30th of a millimeter.

Lens Changing. The interchangeability of the various Leica lenses is made possible by having a standardized screw thread on both the camera and the lens mount. The camera flange into which the lenses are screwed, and the lens thread, are made with the greatest accuracy possible. The lenses are simply screwed into the flange and are then in correct register. A quick-thread mount or a bayonet fitting has not been used, since these are liable to wear with use, and become inaccurate. When changing the lens, the opening in the camera body should not be exposed to strong light and it is best to hold the front of the camera against the body while the other lens is taken from the camera case. If the camera is carried for some time without a lens, a screw cover should be used to keep out dust and damp.

The Coupled Rangefinder. In the current Leica models a special patented device connects the helical focusing mount of the lens with the actuating lever of the rangefinder. The coupling is automatically effected merely by screwing the lens into the camera. This coupling makes the Leica extremely convenient and quick to manipulate. It should be especially mentioned that Leica lenses which are adapted for this coupling are suitable for immediate use on the Models Standard, Ic, and If Leicas, which are not equipped for coupling the lens with the rangefinder, though they can be provided with this coupling by subsequent adaptation.

Versatility of Lenses. Since the number of lenses available for use with the Leica is so large, it might not be an easy matter for all photographers to decide which lens would best suit their requirements. The following list, arranged in order of the various types of photography, clearly shows the special purposes to which the different lenses are suited.

Type of Work	*Lens of Short Focal Length*	*Lens of Standard Focal Length*	*Lens of Long Focal Length*	*Remarks*
Candid and Snapshots	Summaron 35 mm	Elmar or Summicron 50 mm	Elmar 90 mm	
Technical	Summaron 35 mm Hektor 28 mm	Elmar or Summicron 50 mm	Elmar 90 mm	
Advertising	Summaron 35 mm Hektor 28 mm	Elmar or Summicron 50 mm	Elmar 90 mm	
Landscape	Summaron 35 mm Hektor 28 mm	Elmar or Summicron 50 mm	Elmar 90 mm	
Travel Pictures	Summaron 35 mm Hektor 28 mm	Elmar or Summicron 50 mm	Elmar 90 mm	
Reproductions	Summaron 35 mm	Elmar 50 mm	Hektor 135 mm	With fine-grain film
Sports	Summaron 35 mm	Summicron or Summarit 50 mm	Summarex 85 mm	In special cases also Hektor 135 mm Telyt 200 mm or Telyt 400 mm
Press Photography	Summaron 35 mm	Summicron or Summarit 50 mm	Summarex 85 mm	
Portraiture		Summicron or Summarit 50 mm	Elmar 90 mm or Summarex 85 mm	
Still Life		Elmar 50 mm	Elmar 90 mm or Summarex 85 mm	
Instantaneous Exposures in Artificial Light		Summicron or Summarit 50 mm	Summarex 85 mm	With high-speed films
Stage Photos	–	Summicron or Summarit 50 mm	Summarex 85 mm	
Interior	Summaron 35 mm Hektor 28 mm	Elmar, Summicron or Summarit 50 mm	Summarex 85 mm	
Architecture	Summaron 35 mm Hektor 28 mm	Elmar 50 mm	Elmar 90 mm Hektor 135 mm Telyt 200 mm	
Nature Photography			Hektor 135 mm Telyt 200 mm Telyt 400 mm	

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