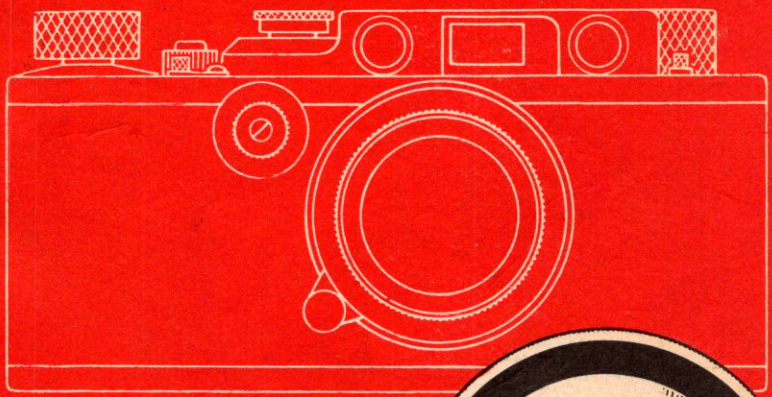
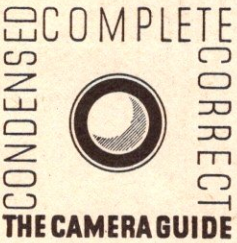
LEICA GUIDE



THE CAMERA GUIDE



This is a *Camera Guide*. It deals with one make of camera, but it is not boosting it. The *Camera Guide* is a Focal Press publication. It is not sponsored or censored by manufacturers, or dependent on them in any way. The *Camera Guide* is as scrupulous in fully describing the camera and advising on its use as the very best type of manufacturer's booklet of directions. It is, however, more critical than they could be. No *Camera Guide* will attempt to camouflage the limitations of a camera or make efforts to sell an endless chain of accessories. It is straightforward, practical and devoted to the questions of how to take the best photographs with a particular camera, rather than to the praise of that camera itself. Every *Camera Guide* is compiled by an author who has had long experience in handling the camera in question. It represents at the same time the gist of all available literature collected by the *Focal Press Circle of Photographers* and filtered through their considered judgment. Both authors and publishers have one aim only: to be fair to every camera and candid to the reader.

Any information regarding cameras additional to or correcting that published in this book will be gratefully received by the publishers, whose experts are also willing to answer individual enquiries without charge.

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LEICA GUIDE

HOW TO WORK THE LEICA AND HOW TO WORK WITH THE LEICA

By W. D. EMANUEL

A Focal Press Book

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by

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Third American Edition, 1946

Thousands of Leica cameras have changed hands during the last few years. Hundreds of them are at present used for essential work. Instructional literature for the Leica, however, is scarce—almost non-existent. In fact, this is one of the rare instances in which it can be said without exaggeration, that there is considerable need of a book like this.

Although a book on a certain "brand of merchandise" this is an unbiased publication. No manufacturer was in the position to exercise his influence on the author. Nowhere was he compelled to skirt delicate points. All advice given is direct, outspoken and, when necessary, blunt.

We are not going to pretend that the Leica is "the universal camera." No camera has ever been one, neither is it likely to be invented in the future. Few experts, however, would quarrel with the claim that the Leica—thanks to the unparalleled range of its accessories—is the most versatile photographic instrument of the day.

The Leica has many advantages and few limitations, but to make use of all its advantages and to overcome the limitations requires a specialised technique. This technique is more than a matter of correct handling. It is essentially a question of purposeful application of the Leica principle and the Leica equipment to photographic subjects of various types.

Beyond explaining "how to work" the Leica we shall give due attention to these problems of "how to work with" the Leica.

Critical use has been made of all available literature, the extensive practical experience of the Focal Press Circle of Photographers *and the generous advice of* Mr. H. S. Newcombe, F.R.P.S.

All aspects of taking Leica pictures were covered, but the intricate problems of processing Leica films—identical with those of processing 35 *mm. films in general—had to be left to other publications. Neither did space allow us to discuss scientific photography with the Leica.*

It goes without saying that a publication of this type cannot replace general text-books on photography or on special photographic subjects within such small a space. Still, every effort has been made to present a readable book, useful even to the uninitiated.

THE LEICA CAMERA

The Leica body is $5\frac{1}{4} \times 2\frac{1}{4} \times 1\frac{1}{4}$ in. (13.2 × 6.5 × 3 cm.). The standard lens (collapsed) projects $\frac{1}{2}$ in. (12 mm.) forward from the body. The Leica weighs 17 oz. (470 g.), a loaded film chamber 2 oz. (55 g.). It is thus the smallest and lightest camera of its type. Its body is of drawn ductile material of highest durability, and is covered with hard, vulcanized rubber.

As negative material, the 35 mm. standard ciné-film is employed for anything up to 36 exposures (or even more with a special model) on a single load of film.

All models have a self-capping focal plane shutter; the rubber cloth of which is made by a special process, and is proof against adverse climatic conditions.

Film transport and shutter-winding mechanism are automatically coupled, with the result that double exposures are impossible.

An optical direct vision view-finder indicates the accurate image.

The range finder is (from Model II on) built in. Focusing of the lens and measuring the distances between camera and object form one single operation.

A depth of focus indicator is provided on each lens, giving immediately the depth of focus with every setting of the lens at any given distance.

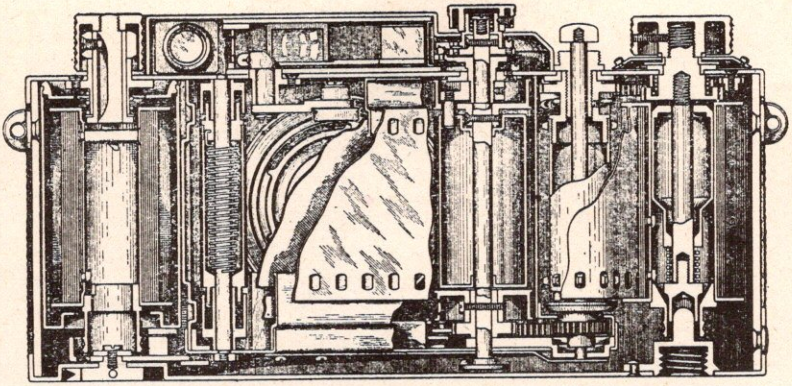
The Leica lenses are interchangeable (apart from those of the very first model) and fourteen special lenses are available, affording the widest variation in focal length, aperture and scope.

The Anatomy of the Leica (p. 7):

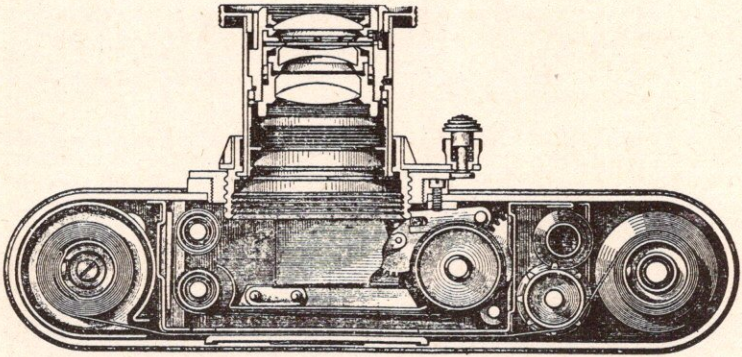
Top, opposite: *Back cross section of the camera displaying* (from left to right) *cassette chamber, shutter mechanism, film plane, view-finder, range-finder and its coupling to the lens* (in the upper part of the drawing), *release, shutter speed setter, film-winder and taking-up spool.*

Centre, opposite: *Top cross section showing the construction of the Elmar f 3.5 5 cm. lens, focal plane shutter* (in the centre of the drawing) *and the way followed by the film in the camera.*

Bottom, opposite: *Cross section of view- and range-finders showing the prism and the bar which contacts the lens mount flange.*

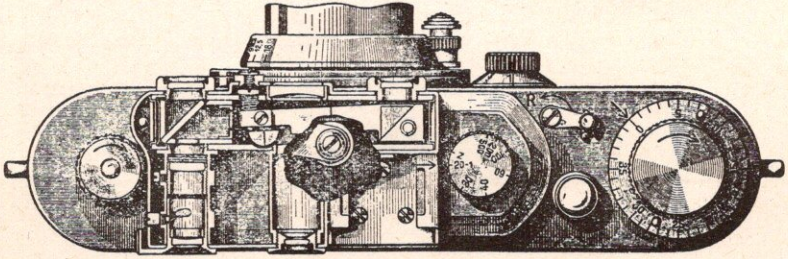


Back cross section of the Leica (see p. 6).



Top cross section of the Leica (see p. 6).

Cross section of view- and range-finders (see p. 6).



LEICA MODEL I (1925) answers the general description given in the previous paragraphs. The shutter is speeded 1/20, 1/30, 1/40, 1/60, 1/100, 1/200, 1/500th sec. and "Z" for time exposures. Two variations of the Leica I are available. In one the lens is interchangeable, whereas in the other it is not. Unlike the models described later, built-in range-finder, coupled range-finding and focusing, slow speeds (1 sec. to $\frac{1}{8}$ inclusive) are missing. A separate range-finder can be used with this model (see p. 107). All metal parts are black enamelled or nickel-plated.

LEICA STANDARD (1933). Similar to *Leica I*, but mechanically improved and with interchangeable lens; the metal parts are black enamelled and satin-chrome finished or fully satin-chrome finished.

LEICA MODEL II (1932) has a built-in range-finder which is coupled with the lens, but in other respects is similar to Leica Standard. All metal parts are either black enamelled and nickel-plated, or satin-chrome finished.

LEICA MODEL III (1933) possesses the built-in range-finder, coupled with the lens, slow shutter speeds: 1 sec., $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, besides the normal speeds (from 1/20th to 1/500th), "T" for very long time exposures. A magnifying system is built into the range-finder, giving 1.5 × magnification. All metal parts are either black enamelled and nickel-plated, or satin-chrome finished.

LEICA MODEL IIIa (1935). Similar to Model III, but shutter speeded up to 1/1,000th (instead of 1/500th as in *Leica III*) and fitted with carrying eyelets on either side of the camera-body. All metal parts are satin-chrome finished.

LEICA MODEL IIIb (1938). This is similar in all other respects to *Leica IIIa*, but has its range-finder and view-finder eye-pieces in *one* twin-sight opening.

LEICA IIIc (1940). Similar to *Leica IIIb*, but body is $\frac{1}{8}$ in. longer (standard attachments to be fitted to the body such as the Rapid Winder or the Leica Motor do *not* fit this model). Slow speed range $\frac{1}{10}$, $\frac{1}{15}$, $\frac{1}{15}$, $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 sec. Instantaneous range begins with $\frac{1}{30}$ sec. The camera plus range-finder housing is of one piece. The film counter moves on by one indication line only, instead of making a full revolution when winding on the film.

LEICA 250 (1934). For special purposes of the professional photographer, more than 36 exposures in one loading are desirable. To meet these requirements a Leica is supplied with a film chamber which may be loaded with 33 ft. (10 m.) of film, permitting 250 exposures to be made with a single loading. This model is fitted with two spool chambers, one of which serves as taking-up spool. For the rest the Leica 250 is similar to the Leica IIIa.

HANDLING THE LEICA

To start with, we take it for granted that our Leica film is in daylight packing (either cartridge or cassette). Our first task is to load the camera with film. This should be done *in subdued daylight* (p. 13).

Loading the Leica

1. **Set reversing lever to "A".**
2. **Remove bottom cover.**
3. **Pull taking-up spool out.**
4. **Fix film-end on taking-up spool.**
5. **Introduce film into camera.**
6. **Replace bottom-cover.**
7. **Wind film transport twice.**
8. **Set counting disc to "0".**

1. See that the reversing lever points to "A". Wind film transport knob once and press release button down.

2. Turn camera upside down, lift bottom-cover by raising swivel and turning it as far as it will go from "closed" to "open" (sometimes cameras are marked "zu" = closed, and "auf" = open). Lift cover and unhook at pin (p. 24; 8).

3 and 4. Pull out taking-up spool, hold it with left hand, take the film container in the right hand, insert beginning of the film under the spring of the taking-up spool so that the perforated edge of the film is right against the flange with knob. About $\frac{3}{8}$ in. (1 cm.) of film should clamp under the spring. (Knob of taking-up spool, as well as of film container, pointing downwards). P. 24; 9.

5. Place the opened camera in front of you with the lens facing you. Hold film container in the left hand, taking-up spool in the right hand. Pull about $4\frac{1}{2}$ in. (11 cm.) of film out of the cassettes. (Note: with commercially packed films not more than *two* perforations should be visible outside the cartridge at the lower edge of the film.) Introduce the film into the slit along the camera-back and press cassette and taking-up spool simultaneously into the camera. (Should the film container not drop right down, give a short turn to back winding knob.) P. 25; 10.

6. Replace bottom-cover by hooking cover over pin, close cover, turn swivel to "closed" (or "zu").

7 and 8. Wind film transport knob a second time, then turn counting disc by means of the two lugs until 0 is opposite the "counting arrow", now press release button. The two "windings" dispose of the useless tapered beginning of the film. The setting of the counting disc *before* finally pressing the release button enables one to

turn it either way, whereas if set *after* the release of button, the counting disc would need to be turned to the left (anti-clockwise).

Holding the Leica

It is obvious that the camera should be held as steady as possible, as the slighest shake, even if not seen in the original negative, will become visible in the enlargement. Always stand with your legs apart (p. 11).

A particularly steady hold of the camera is necessary when working with long focus lenses (p. 37). The Leica should be pressed against the nose for horizontal pictures and against forehead and nose for vertical ones, while the tube of the lens should be held in the left hand with a firm grip.

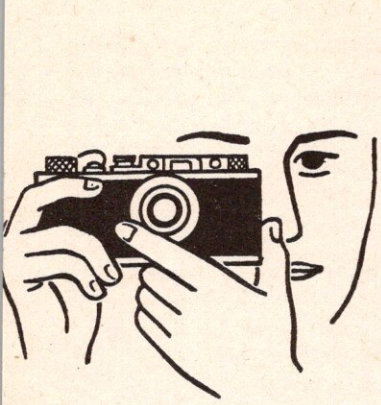
FOR HORIZONTAL PHOTOGRAPHS: rest camera against cheek, keeping both elbows close to the body, the right hand clasping the camera, the right index-finger ready on the shutter release button, the left index-finger on the focusing lever, the left thumb supporting the camera on one side.

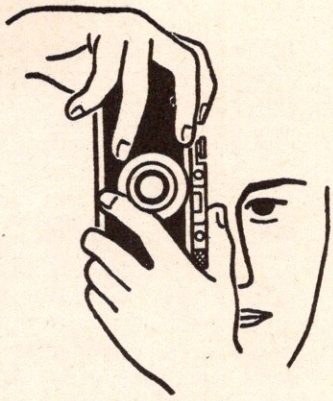
FOR VERTICAL PHOTOGRAPHS: Hold camera in left hand from underneath, left index finger stretched over winding knob and resting on focusing lever, left elbow against body. Operate focusing lever with index finger of the left hand, while at the same time the thumb steadies camera against forehead. Right hand holds camera from above, right index finger on the release button.

To release the shutter (p. 19), the shutter release button should be pressed with the index finger of the right hand, or with the right thumb (for vertical pictures). Use finger pressure only, keep the hand and its grip on the camera steady. The actual pressing down will have to be done slowly and smoothly. The slower the exposure time the smoother must be the release.

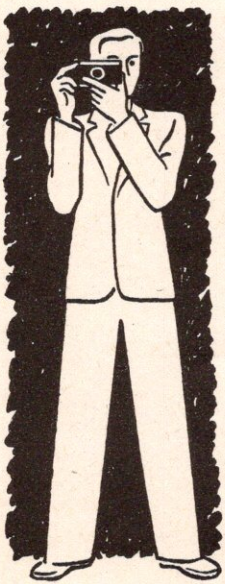
For slow exposures in the hand it is advisable to rest the elbows or at least to lean the body against some support in order to avoid shake. In this way $\frac{1}{4}$ sec. and with a very steady hand $\frac{1}{2}$ sec. can be exposed without noticeable camera-shake.

Use of a tripod is necessary when taking time-exposures, and is recommended for speeds from $\frac{1}{8}$ to 1 sec. and instantaneous exposures of 1/40 or slower with the long focus lenses of 13.5 cm. or more. A rigid tripod with a ball-and-socket head should be employed to allow the changing





Left: **Holding the camera for taking horizontal pictures.**
Right: **Holding the camera when taking vertical pictures.**
Bottom: **Rest elbow against the body and stand firm with the legs apart** (*see p. 10*).



from horizontal to vertical position of the Leica. While the tripod or the ball-and-socket head should be screwed into the tripod bush on the bottom plate of the Leica, they will have to be screwed into the bush of the lens and reflex-housing respectively when using 13.5 cm. or longer focal length lenses.

Carrying the Leica

However elegant it may be to carry the camera on a long strap hanging from the shoulder, this position is quite unsuitable for quick action. Many a good shot has been lost in this way. A better method is to carry the Leica on a short strap round the neck, so that it lies on one's chest. Opening the case and lifting the camera up to the eye is then a matter of a split second.

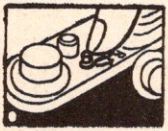
There are a number of different types of cases for the Leica available: *The Ever-Ready case* carries the camera ready for use; there is a holding screw which prevents the Leica from falling out of the opened case. *A leather purse* with zip-fastener may be used when the camera is carried in the pocket or hand-bag. *Outfit cases* in many variations are available to take a complete Leica outfit with auxiliary lenses, finders, filters, cassettes, etc. Separate cases and purses for one lens or for any of the many Leica accessories are also on the market.

Shooting with the Leica

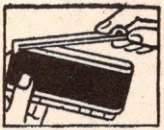
1. **Load the camera with film.**
2. **Pull out lens and fix it.**
3. **Wind film transport wheel.**
4. **Determine picture in view-finder.**
5. **Set shutter.**
6. **Set stop.**
7. **Focus with rangefinder.**
8. **Release, while checking through view-finder.**
9. **Push lens back.**

The manipulations here described should be practised so that in time they will become practically automatic (p. 13).

2. Pull out lens and turn it to the right as far as it will go, so as to secure it in the bayonet catch.
3. Wind film transport knob in direction of arrow as far as it will go.

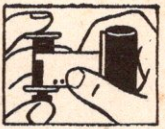


Reversing lever to A.



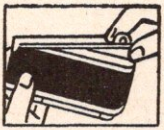
Remove bottom cover.

Pull out taking-up spool.



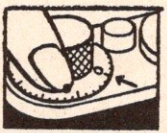
Fix film end to spool.

Put film into camera.

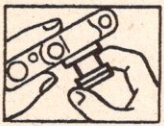


Replace bottom cover.

Wind film transport twice.



Counting disc to 0.

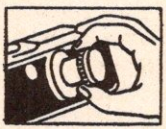


Pull out lens.

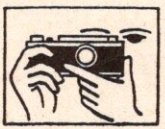
Wind film transport wheel.

Get subject in view-finder.

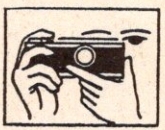
Set shutter-speed.



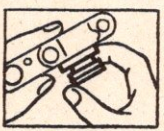
Set stop.



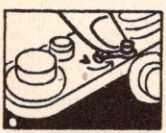
Focus.



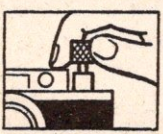
Release.



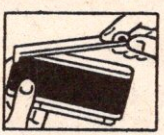
Push lens back.



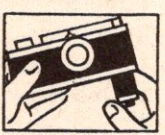
Reversing lever to R.



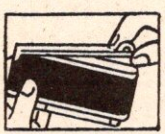
Rewind film.



Remove bottom cover.



Pull out film container.



Replace bottom cover.

Top sequence: **Loading** (see p. 9).
Centre sequence: **Taking** (see p. 19).
Bottom sequence: **Unloading** (see p. 19.)

By winding the film transport knob right round to the stop, the film is wound on to the next exposure. At the same time the shutter has been wound on and the counting disc shows the next number automatically. Evidence that the film is advancing properly is the rotation of the back-winding knob *against* the direction of the arrow engraved on it. To this, particular attention should be given before proceeding to take pictures after having put a new film into the camera.

If the film container has been loaded with a short length of film (p. 22) it may be necessary to "take up the slack" by winding the back-winding knob until some resistance is felt in order to observe this evidence of proper winding.

As film transport and shutter winding are coupled, double exposures are automatically prevented. Should it be desired to get two or more exposures on one film—for instance, in trick or commercial photography, or when by accident the shutter was released with the lens-cap on the lens, and one does not want to leave the frame in question unused, then the following procedure may be adopted: In case of *Leica I, II or III*, press release-button while turning the shutter speed dial (without lifting it up) *anti-clockwise* as far as it will go, then let go the release button. The shutter is now set, and shutter-speeds can be readjusted in the usual way. There is no danger of damaging the shutter by adopting this procedure. In case of a *Leica IIIa* or *IIIb*, the shutter speed dial must be set to 1/1,000th without winding film transport by the method described under "Shutter". Then proceed as for *Leica I, II* and *III*.

4. The View-finder is of the direct vision type and should be held close to the eye.

One must not attempt to turn the camera to the right or the left, away from the eye, nor must the eye be moved from the centre of the eye-piece to find the limitation of the field of view. This spying "round the corner" is deceptive, as only that section seen in the finder, which is visible when holding the eye close to and in the centre of opening while looking straight ahead, will appear on the negative.

The field of view given is exact for photographs taken at 9 to 12 ft. distance. At infinity a trifle more appears on the negative than is seen through the finder, and at 3 to 6 ft. a shade less. This normal finder is for 5 cm. focal length lenses (Elmar 5 cm. *f* 3.5, Hektor 5 cm. *f* 2.5, Summar 5 cm. *f* 2, Summitar 5 cm. *f* 2, Xenon 5 cm. *f* 1.5). There are also special finders (see pp. 40 and 43).

5. See that shutter speed is correct, or set it by lifting the shutter speed dial, turning it at the same time so that the required figure lies against the speed index arrow. (Note: The correct speed can only be set if the shutter is fully wound first.) Let go knob which will then settle in position.

At "Z" the shutter remains open as long as the release button is pressed down. *Leica III, IIIa and IIIb* are fitted with the slow speed dial on the camera front. If the slow speed dial is set to 20 (1/20th)—or anywhere between 20 (1/20th) and 1, but not between 1 and T or at T—the speeds from 1/20 to 1/500 (or the 1/1,000th on *Leica IIIa* and *IIIb*) may be set as explained above. If the slow speeds: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 sec. are to be used, the shutter speed dial remains set at 20 (engraved "20 — 1" while the slow speed dial on the camera front is set to the speed required.

The "T" of the slow-speed dial of the *Leica III, IIIa* and *IIIb*, allows long time exposures: the shutter remains open after release button has been pressed and can only be closed by *the slow speed dial being turned anti-clockwise.* (N.B.—*Not* by pressing the release button a second time.)

All intermediate speeds between 1 sec. and 1/20 of the slow speed dial can be set, these values being proportionate to those marked on the scale, i.e. $\frac{3}{4}$ sec., being half-way between $\frac{1}{2}$ and 1 sec.

When setting the 1/1,000 sec. of the *Leica IIIa* and *IIIb*, one will observe that the speed dial does not slip in quite as much as with the other speeds.

The setting of the shutter speeds by means of lifting and turning the dial opposite the speed arrow has to be done after winding film transport knob, which sets the shutter at the same time. On the other hand, the necessity might arise of setting the shutter speed *before* winding. In this case: wind film-transport knob, set speed dial to 1/30 sec., press release button. Now either remember exact position of the 1/30 or mark the camera body opposite 1/30. If it is desired to set the shutter speed before winding on, it is only

necessary to place the speed wanted opposite the mark or to the memorized position. By this means one can also read off the exposure time used after taking a picture. The slow-speed dial of *Leica III, IIIa, IIIb,* can be set either before or after winding on.

The blinds of the Leica focal plane shutter are made from rubberized cloth, and have proved their perfect durability, not only under normal conditions but equally in tropical heat and arctic cold. Even the shutters of the very first Leica models—built more than 16 years ago—still work faultlessly. The author may be allowed to mention that his first Leica, No. 273, has done 15 years of excellent and dependable service, not only on the European Continent, but in Africa and the coldest parts of America as well.

The Leica IIIa and IIIb are provided with a braking spring which damps down the impact of the blind of the focal plane shutter. When the Leica is in constant use the lubrication of the spring is exhausted after 4,000–5,000 exposures. The winding knob becomes somewhat harder to turn; the action of the shutter is, however, NOT affected. A trace of oil on the spring (which is visible when the bottom lid of the camera is opened) will immediately eliminate this drag in the winding mechanism.

6. Adjust iris diaphragm by turning stop-ring until the stop required is opposite indicator.

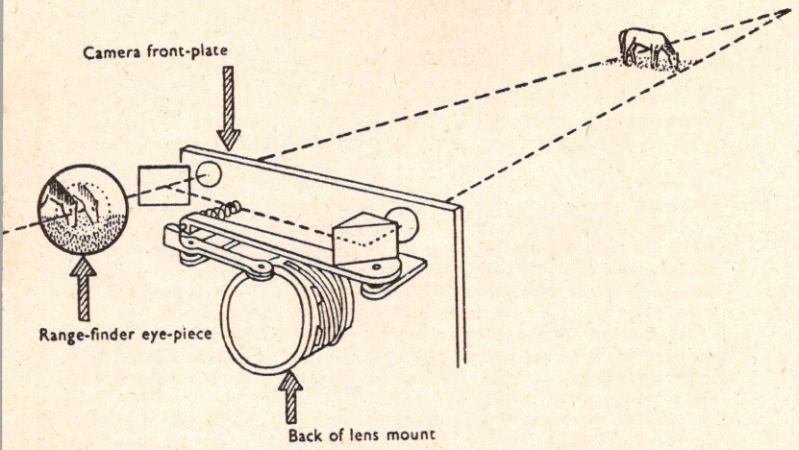
The aim of the diaphragm is to adjust the effective opening of the lens. The smaller this opening (i.e. when the lens is "stopped down") the greater the depth of focus. At the same time, as less light can pass through the lens in any given time, the exposure time must be longer (p. 62).

7. The Range-finder of *Leicas II, III, IIIa, IIIb,* which is placed horizontally between shutter speed dial and back winding knob, is automatically coupled with the helical focusing mount of the lens, so that the adjustment of the range-finder and focusing of the lens are simultaneous.

The focusing of the Leica is effected by a lever movement of 180° to cover all distances from ∞ to 3½ ft. while the focusing with other miniature cameras is accomplished by a wheel which needs 8 to 11 turns to cover the same range of distances—a necessarily slower procedure.

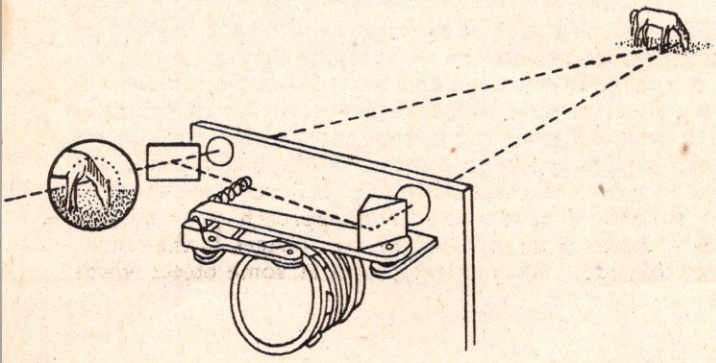
Correct focus is obtained when the two images appearing in the range-finder (which never disappear from the field of view) fuse into one (coincidence principle).

In order to increase the ease of measuring still further, the viewing aperture of the range-finder on the *Leica* model *III, IIIa* and *IIIb,* is fitted with a magnifying telescope system with a magnification of about 1.5. The subjective field of view is therefore increased by about ½, and this considerably facilitates exact and rapid focusing. The eye-piece is adjustable by turning the milled mount, in case of *Leica III* and *IIIa*; with *Leica IIIb* by the lever on the bottom of the



How the Range-finder Works (see p. 16):

One sees two pictures through the eye-piece of the range-finder: there is a direct view of the subject as well as a second one projected on to the eye-piece by a prism. Thus two pictures are visible in the middle of the eye-piece with their outlines more or less apart. By moving the focusing lever of the lens (not visible in the drawing as it is on the other side of the front plate of the camera) a lever is made to slide along the back of the lens mount which in turn is connected with the prism of the range-finder. The two pictures in the range-finder eye-piece will fuse and the double contours disappear as soon as the right distance is found, and the lens automatically focused at it.



back winding knob. Swung up it is used for distances up to 3½ ft., swung down for infinity, and set midway for distances from about 4 ft. to 15 ft., and can be adjusted according to individual eyesight peculiarities.

It is a fact that the accuracy of a range-finder is the greater the wider its base. While the old separate Leica range-finder had an 8½ cm. base, the newer built-in and coupled distance meter uses one of 4 cm. Leitz had good reasons to reduce the length of the range-finder base, especially in view of the fact that its accuracy remains more than sufficient, while the double image remains under all circumstances in the field of view. Long base range-finders, on the other hand, often necessitate movement of the instrument in either direction in order to find the double image. This, of course, means an appreciable loss of time.

An orange filter fitting over one of the range-finder objective glasses may be used in artificial light, and for the *Leica IIIb* for daylight and artificial light for easier differentiation of the second image when range-finding.

For the correction of defective eyesight (astigmatism, etc.), correction lenses may be screwed into the eye-pieces of view-finder and range-finder.

To focus the *Leicas II, III, IIIa, IIIb,* sight the object through range-finder eye-piece, press infinity catch of lens with index finger of left hand, turning focusing lever of the lenses of 2.8, 3.5 or 5 cm. focal length, or by using index-finger and thumb for the lens mount of the longer focal length lenses until the two images in the range-finder coincide (exactly cover each other). The distance setting of *Leica I* and *Leica Standard* has to be done by turning the focusing lever until the distance indicator points to the distance required on the focusing scale. The actual distance between camera and object will have to be measured separately (see p. 107) or guessed.

The orthodox way of focusing by looking through the range-finder eye-piece while turning the lens focusing mount until the two images which are visible in the eye-piece coincide may be adopted for taking photographs of subjects that are fairly stationary. A different method of focusing has to be adopted when taking subjects in motion. Set the range-finder at a distance at which the subject will be in a given moment, or focus at some spot which it actually has to pass, and press the release button when the subject is reaching the pre-focused point. With subjects who are liable to react self-consciously (e.g. children), set the lens at a suitable distance, and then approach your subject quickly, exposing as soon as the two images in the range-finder coincide. Alternatively, focus at some object which

is at the same distance from your camera as your real subject, but in a different direction, and when the range is found swing round to press the release button as soon as your victim slips into the finder's field of view.

Also see p. 49 about quick shooting with zone focusing methods.

8. The release is effected by pressing the release button gently. To do this, rest the middle joint of the index finger on the edge of the camera, using the first joint as a lever to press the button. At the same time the thumb should be placed under the bottom plate of the camera as support. Speeds from 1/20 to 1/1,000 sec. are "instantaneous" and can be taken from the hand.

It is advisable to use the slower range, 1/20, 1/30 and 1/40, as sparingly as possible, as there is some danger of jerking the camera, and even a slight jerk, six or eight diameters enlarged, results in unsatisfactory definition. On the other hand, if one has a steady hand and a chance of leaning against a wall, etc., or—even better—supporting the camera on something solid, not only the 1/30, 1/20, but $\frac{1}{8}$ and even $\frac{1}{4}$ sec. exposure can, with care, often be released without shaking.

Time exposures should be made with the *wire release*, which screws over the release button after unscrewing its protective (milled) ring. The unscrewing of the wire release should be done after film transport winding, or else the shutter speed dial should be held so as to prevent the shutter from being set accidentally (p. 103).

After having taken all the thirty-six exposures (the number of exposures taken is automatically counted on the film counter) the film has to be rewound into its cassette in order to remove it from the camera and replace it by a new film, both of which operations should be done *in subdued daylight* (p. 13).

Unloading the Leica

1. **Turn reversing lever to "R".**
2. **Rewind film into film container.**
3. **Remove bottom cover.**
4. **Pull out film container.**
5. **Replace bottom cover.**

2. Pull out back-winding knob (not with Leica I). Turn (all models) in direction of arrow until a slight resistance is felt; wind over this resistance a l give two or three more turns. The film end now comes off the spring of the taking-up spool and is wound back into the film container.
3. Turn swivel of bottom cover from "closed" to "open" ("zu" to "auf") and remove bottom cover, pull out film container.
4. Put film container in an aluminium box or wrap it up ready for processing.

Cutting off Exposed Film Parts

in the darkroom or in complete darkness. If a film which is only partly exposed has to be processed, it can be cut off most conveniently with the Leica cutting knife. After removing the bottom lid in the darkroom, introduce the end of the knife between film and the rear wall of the camera. In this way the film is pushed slightly back, far enough to bring the cutting edge of the knife over the film strip again, it is then turned through 90° so that the edge lies vertically over the film. The film can then easily be cut off, preferably very close to the mouth of the cassette (or cartridge).

A simple method, if no cutting knife is available, is to wind for the next exposure; remove lens; set shutter to "Z", press release-button, keep it pressed down while scratching with a knife or nail-file, etc., a cross (X) on the emulsion of the visible film; release pressure on button and rewind film into cassette in the usual way. Take cassette into the darkroom. There pull the film out, and with a clean and perfectly dry thumb gently touch the emulsion until the X scratch is felt. Cut film *behind* cross. Re-insert cassette with film rest into camera. Turn film counter four exposures. Make two blind exposures.

The back of the Leica is part of the one-piece camera body and therefore not removable. It will have to be admitted that the removable back of other miniature cameras has its advantages for an experienced photographer. At the same time, it must be emphasized that this possibility may expose certain highly delicate parts, such as the film-pressure plate and shutter to the risk of damage in the hands of less skilled users. The cutting off exposed film parts, the loading, unloading, and cleaning the camera is neither much simplified nor rendered more complicated by either system. It is rather a question of the requisite skill in handling the camera. The removable back bears, however, one definite advantage: the use of a plate-adaptor with focusing screen for specialized scientific and technical purposes. In similar cases the Leica-user will have to resort to the specially constructed "single exposure housing" with ground-glass screen, as described on p. 104.

LEICA FILMS, CASSETTES, CARTRIDGES

The Leica film is the standard ciné-film of 35 mm. width and perforated. It may be obtained as:—

BULK LENGTH (of 18 ft. to 200 ft.), in which case a suitable length will have to be cut off to be loaded in the darkroom into a cassette or cartridge (p. 26).

DARKROOM REFILLS are lengths cut and trimmed for thirty-six exposures and will have to be filled in the darkroom into a cassette or cartridge (p. 28).

DAYLIGHT REFILLS are ready cut and trimmed films for thirty-six exposures which are wound on to a centre spool (as used in cassettes and cartridges) and covered with a black paper strip to allow the loading of a cassette or cartridge in daylight (pp. 27 and 29).

DAYLIGHT LEICA CARTRIDGES are the simplest solution of Leica film packings. The ready cut and trimmed films are supplied in special Leica cartridges (also called "patrones") to replace the Leica cassette in the camera. They are loaded in daylight into the camera (p. 9).

Safelight

The loading of cassettes with film from bulk lengths or with darkroom refills has to be carried out in the darkroom.

In case of *panchromatic films* (p. 29) only the dark green "panchro" safelight may be used, but it is always safer to work in complete darkness. This is not difficult. It is, however, advisable to practise filling with a dummy film first in daylight before starting the darkroom work.

If *orthochromatic films* (p. 29) are used, the red "ortho" safelight may be used.

In the case of *positive films* (p. 30) amber light will do.

Handling, Winding and Trimming the Film

When handling the actual film, particular care must be taken not to touch its emulsion (matt) side. It should only be handled and spooled on to the centre spool of the

cassette by holding the film on either side of its edge, preferably between thumb and index finger (p. 24; 5). At the same time, it is of no less importance that the spot on which the loading is done should be perfectly dry, clean and dust free. Only a spotless, clean negative will produce the desired result!

When using bulk film in loading cassettes and cartridges, the edge of the work-bench can be marked with notches or drawing-pins to indicate various distances, let us say for 12, 24, 36 exposures of film. This considerably simplifies the measuring of film lengths in the darkroom.

The trimming of the film-ends is performed most correctly and simply by the templet. At the beginning of the roll of film make the wedge-shaped cut for the centre spool and measure off the required length of film (p. 24; 1). At the end of this make the curved cut for the taking-up spool (p. 24; 2). The curved cut should start between the twenty-first and twenty-second bottom perforation—when emulsion is towards you—and must not go through a perforation hole. When doing this with the Leica trimming templet there is at the same time the correct cut for the taking-up spool on the remaining film on the roll, so that about 4 in. of film are saved on every strip.

The ready-cut film is now spooled on to the centre spool of the cassette or cartridge, as described on page 26. One will have to make sure, while winding on, to hold the film only by its edges (p. 24; 5). This task is simplified by the use of a special hand winder, a milled metal rod with a slit on one end to fit into the cross-pin fitting of the spool. A mechanical winder may be obtained to serve the same purpose. It can be attached to the edge of the work table, and its working can be seen on p. 24; 6. 12 full turns with this winder wind film sufficient for about 12 exposures, 18 turns = 19 exposures, 32 turns = full length of 36 exposures.

When winding the film on and off, care must be taken that no great pressure is put on the film, and that the film-ends are not squeezed when drawing through the hand. Failure to take the first precaution may result in fogging, while

neglect of the latter precaution may give rise to peculiar kinds of exposure effects known as "lightning flashes". These are due to electrical discharges, and appear as dark, zigzag lines running from the edge of the film towards the centre of the picture.

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

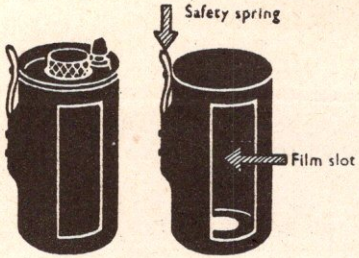
Number of Exposures	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*	
	in.	cm.		in.	cm.		in.	cm.
1	11¾	30	14	31¾	80	27	51	130
2	13⅓	34	15	33	84	28	52½	133
3	15	38	16	34½	88	29	54	137
4	16¼	41	17	36¼	92	30	55½	141
5	17¾	45	18	37¾	95	31	57	145
6	19¼	49	19	39¼	100	32	58½	148
7	20¾	53	20	40½	103	33	60	152
8	22	56	21	42	107	34	61½	156
9	23¾	60	22	43¾	111	35	63	160
10	25¼	64	23	45	114	36	64½	164
11	26¾	68	24	46½	118	37	66	167
12	28¾	73	25	48	122	38	67½	171
13	30	76	26	49½	126	Including trimming		

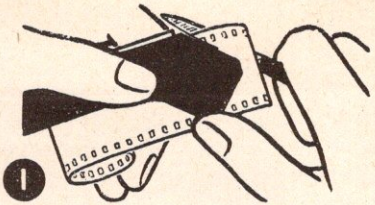
Using Leica Cassette "B"

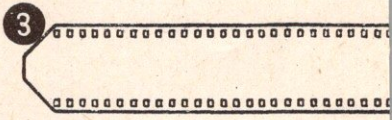
The Leica Casette "B" consists of three components:—(*A*) The outer shell with a safety spring fixed on one side, and its film-slot (*B*). The inner shell with cassette-knob on top and its film-slot (*C*). The centre spool with film-catch and a milled top. A guide groove on the inner shell and a pin opposite the safety spring of the outer shell make the opening and closing of the cassette mechanical. (See p. 24; 4).

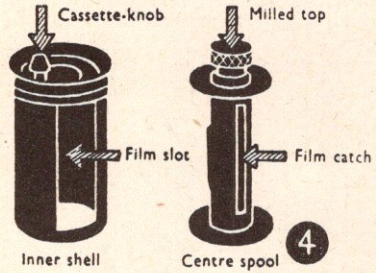
The cassette is opened by slightly lifting the safety spring and turning the inner shell by its cassette-knob clockwise. Remove the centre spool from the inner shell and the three components of the cassette are separated.

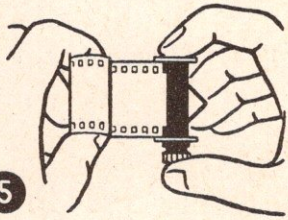
The cassette is closed by inserting the centre spool into the inner shell so that its milled knob comes through the

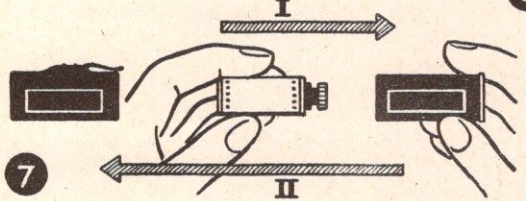






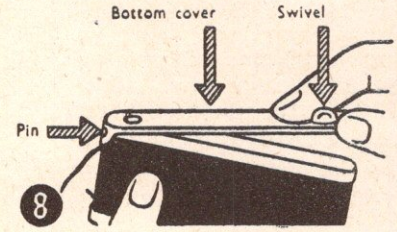


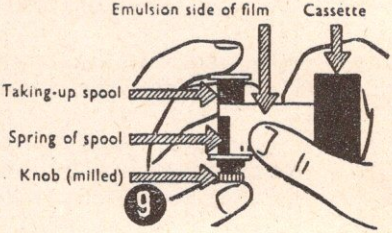


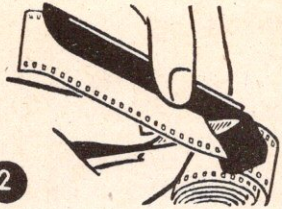


Trimming the Film and I

1 and 2: Trimming the film with correctly trimmed film (p. 22).
4a: Cartridge and its parts (p. 27 spool of cassette (p. 26). 5a: Ho cartridge (p. 28). 6: Winding the 7: Assembling the cassette (p. 26) 8: Opening the camera (p. 9). 9: 10: Introducing film, cassette and







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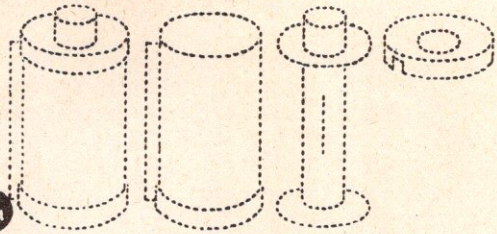

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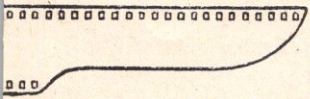

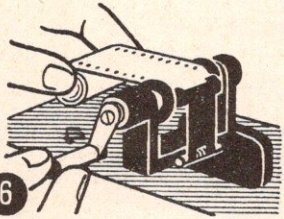

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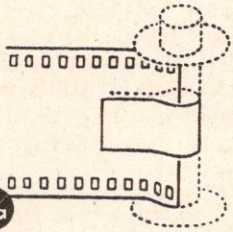

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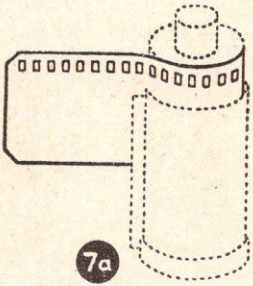
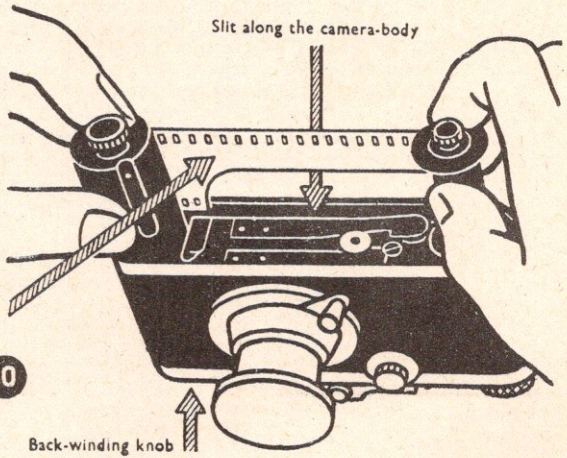


7a

g the Camera :

t (p. 22). 3: End and start of cassette and its parts (p. 23). low to fix the film on to centre k the film on to centre spool of n mechanical film-winder (p. 22). ssembling the cartridge (p. 28). e film on taking-up spool (p. 9). p spool into the camera (p. 9).



10

opening beside the cassette knob of the inner shell. Introduce the inner shell with spool into the outer shell until its rim does not go any further, the film-slot openings being then coincident. Turn the inner shell by its cassette knob anti-clockwise up to the limit stop, when the safety spring will then engage and prevent the cassette opening by accident.

Loading Cassette "B" with Darkroom Film

1. **Work in the appropriate darkroom safelight**
2. **Prepare the film.**
3. **Open Leica cassette.**
4. **Fix film on centre spool.**
5. **Wind film on centre spool.**
6. **Introduce centre spool into inner shell.**
7. **Put both into outer shell.**
8. **Pull 2 in. of film out through open slot.**
9. **Close cassette.**

2. In case of bulk film prepare the piece to be used as described on p. 22. In case of darkroom refills remove its wrappings. It is useful to fold the first $\frac{1}{2}$ in. (1 cm.) of the beginning of the film slightly backwards. It avoids its slipping away during the following manipulations.

4. Thread the short tapered end of the film into the film catch of the centre spool in the direction of the arrow, i.e. from left to right of milled knob, points upwards, emulsion side inside, touching the spool. *Emulsion side is matt, while back is glossy.* In the earlier types of centre spools there is no film catch, but instead a spring under which the short, tapered end of the film is pushed; it is then sharply folded back so as to secure it well.

5. Wind film on centre spool moderately tight. Care must be taken to see that the fingers do not come into contact with the emulsion, only the back and sides of the film being touched.

6. Introduce centre spool with film into inner shell, milled knob first, the beginning of the film lying in the slot.

7. Put both together into the outer shell, superimposing the two slots.

9. Close cassette by turning the cassette knob to the left until the safety spring engages (at "Z"). Incidentally, the backward fold of the beginning of the film, as advised under **2**, will prevent the film from slipping back in to the cassette when not immediately inserted into the camera; but if film is not to be used at once, wrap up filled cassette carefully, preferably in black paper, or place it in an aluminium container.

Loading Cassette "B" with Daylight Refill

1. **No darkroom is necessary.**
2. **Remove wrapping and label of daylight refill.**
3. **Open cassette.**
4. **Introduce refill into inner shell.**
5. **Put both together into outer shell.**
6. **Pull 2 in. of paper-leader out through open slot.**
7. **Close cassette.**
8. **Pull out paper-leader and 2 in. film.**
9. **Cut paper leader off.**

4. Introduce it into inner shell, milled knob first, the paper end lying in the slot. (The actual centre spool, replaced by the daylight refill spool, should be carefully kept, as it will be needed again when using darkroom loading film.)

5. Put both together into the outer shell, superimposing the two slots.

7. Close cassette by turning the cassette knob to the left until the safety spring engages (at "Z").

8 and 9. Pull the paper strip out; fixed to its end is the actual film. Pull about 1 in. (25 mm.) of the actual film out and cut paper off; fold the first ½ in. of the film backwards (see p. 26, note **9**).

Using Leica Cassette "A" or Cartridges

The construction of the Leica Cassette "A" and cartridges such as *Kodak*, *Agfa*, *Ilford*, etc., is so similar that we can deal with every type together (p. 24; 4a).

The majority of cartridges, as well as the Leica "A" cassette, consist of a centre spool, like the one of a Leica Cassette "B", which is in a one-piece shell. The films leave the shell by a light-trapped slot. The centre spool can be removed from the shell by removing either top or bottom of the cartridge, according to construction of the particular make of container.

While the Leica cassettes are actually designed to be reloaded, most of the containers of the daylight-loading films are intended by their makers to be used once only. This refers particularly to *Kodak* and *Agfa* cartridges. A number of cartridges made from plastic materials—for example, *Ilford*, *Gevaert*, *Mimosa* and others—are designed to be reloaded. Up to a short time ago the question of reloading of cartridges

has rarely arisen, as proper cassettes as well as Daylight films were plentiful. But under present conditions we have to face the fact that metal, labour, and production for non-essentials is reduced to an absolute minimum, and the photographer, too, has to economize to the limit in order to be able to carry on. When we suggest reloading cartridges, even if they are marked "not reloadable", it is for two reasons: (1) To overcome the present difficulties of supply, and (2) It is now an established fact that these cartridges *can* be reloaded many times, and will give perfectly satisfactory results—*if handled carefully*. The following table shows which daylight refills will fit the various cartridges.

RELOADABLE CARTRIDGES AND DAYLIGHT REFILLS

Make of Daylight Refills:	*Ilford Plastic Cartridge*	*Ilford Metal (Old) Cartridge*	*Kodak Metal Cartridge*	*Leitz Model "A" Cassette*	*Gevaert Plastic Cartridge*	*Mimosa Plastic Cartridge*	*Agfa Metal Cartridge*
Kodak	No	Yes	Yes	Yes	No	No	Yes
Ilford	Yes	Yes	No	Yes	Yes	Yes	Yes
Agfa	Yes	Yes	No	Yes	Yes	Yes	Yes

Cartridges or Cassette "A" with Darkroom Refills

1. **Work in the darkroom in appropriate safelight.**
2. **Prepare film.**
3. **Open cartridge.**
4. **Fix film on centre spool.**
5. **Wind film on centre spool.**
6. **Insert centre spool into shell; the first 2 in. of film has to look out of the light-trap.**
7. **Close cartridge.**

4. If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, it has been proved best to wind a 1½ in. (4 cm.) piece of Cellophane tape (for example, *Kodak* Cellophane Lantern Slide Binding Tape) round the centre spool, so that on *either* side about ½ in. tape is used to secure the film. (See p. 25; 5a, 7a.)

Cartridges or Cassette "A" with Daylight Refills

1. **No darkroom is necessary.**
2. **Remove film wrappings and label of refill.**
3. **Open cartridge.**
4. **Introduce refill into shell of cartridge; the first 2 in. of paper-leader has to look out of light-trap.**
5. **Close cartridge.**
6. **Pull out paper-leader and 2 in. of film.**
7. **Cut off paper-leader.**

4. The actual centre spool of the cartridge is not needed and may be kept separately.
7. When using *Agfa* cartridges (but *not* for *Kodak, Ilford, Gevaert, Mimosa,* etc.) it is essential to fix top or bottom cover to the shell preferably with a length of Cellophane tape.

The Choice of Material

There is no such thing as a "best" film for any or every kind of picture. Each type of film has certain characteristics, especially with regard to colour sensitivity, speed, gradation, latitude, and, more particularly, grain.

ORTHOCHROMATISM AND PANCHROMATISM. The ordinary "silver bromide" emulsion is only sensitive to violet and blue light, and therefore bound to give an untrue black and white rendering when taking photographs of subjects containing yellow, green and/or red (as practically all objects do). An improvement has been made in the orthochromatic emulsion which is sensitive also to yellow and green, while the panchromatic film has been made sensitive not only to violet, blue, yellow and green, but also to red. Some particularly fast panchromatic films are oversensitive to red and will render this colour too light. The advantages of having a negative material sensitive to all colours—violet, blue, yellow, green and red—are so striking that it was evident that the genuine panchromatic film should displace the other film types for general purposes. Still, for subjects not containing red (green landscapes) or when lighting conditions tend to blot out reds too much

(lips of portraits taken in incandescent light), orthochromatic materials come in very usefully.

INFRA-RED FILM. Infra-red film is a negative material which, unlike the orthochromatic and panchromatic films, is made sensitive to infra-red rays, which are not visible to the human eye. Special applications of this material: black-out photography, long-distance shots, fog or mist penetration, scientific copying and research work.

ORDINARY FILM. For copying black and white objects (books, ledgers, etc.), a "positive film" of 3 to 10° Scheiner can be recommended. Besides its qualities of fine grain and high brilliancy, it possesses the further advantage that it can be handled in an amber darkroom light.

SPEED. The sensitivity of film materials to light in general is measured in *Scheiner, Hurter and Driffield, Weston* or *Din* degrees. Scientists and manufacturers all agree that none of the methods employed to determine the speed of films is entirely satisfactory, and continue giving preference to one or the other of them. In any case, although speed is a very obvious asset, it is also a quality which must be paid for by possible disadvantages of the material in some other respect. To call the fastest film the best would be just as foolish as to select a racing car for daily motoring.

While a scientifically correct conversion of one speed rating system to another cannot be made owing to their different principles, the following list gives some guidance as to their practical relationship.

CONVERSION TABLE OF DIFFERENT SPEED DEGREES

Scheiner	*American Scheiner*	*Weston Scheiner*	*Weston*	*H. & D.*	*Din*
12	8	11	1.5	38	1/10
15	11	14	3	75	4/10
18	14	17	6	150	7/10
21	17	20	12	300	10/10
24	20	23	24	600	13/10
27	23	26	50	1,250	16/10
30	26	29	100	2,500	19/10
33	29	32	200	5,000	22/10

Slow films of less than about 23° Sch. can be usefully employed for scientific photography, copying, architectural details. Their main advantage is in their extremely fine grain making special development unnecessary. Their disadvantage is in their inability to cope

with live subjects in other than exceptionally favourable lighting conditions, lack of latitude and mostly hard gradation.

Medium films of 26°–29° Sch. are the right material for the beginner, and can be well employed for any of the average subjects. Their advantages are: reasonably fine grain without the use of too complicated methods of development, correct tone rendering, good resolving power. Disadvantage: further loss of speed if fine grain development has to be employed for the sake of big enlargements and sometimes steep gradation.

Fast films of 31° Sch. and over for high-speed sport shots, interiors, stage pictures and night photography. Advantages: increased sensitivity for red (artificial light), use of smaller apertures (depth of focus) which in their turn facilitate focusing under adverse conditions of lighting (focusing without range-finder). Disadvantages: graininess which, however, can be improved by special methods of developing, at some cost of speed and somewhat uneven tone rendering (reds too light).

GRAIN. Silver grains themselves form the picture in the emulsion. To the naked eye they form a compact, dark mass, but under the magnifying glass or microscope the separate clumps of grains are visible. Obviously, if the grain of our Leica film is coarse, it will soon become visible by moderate enlarging, and the finer the structure of grain, the more enlarging will it allow without showing any unpleasant granular effect in the print. As a rule, it can be said that the grain size is in direct relation to the speed of the film (p. 30). The faster the film, the coarser the grain and vice-versa. It may be pointed out at the same time that the grain can to a certain extent be influenced by development (hence fine-grain development), correct exposure, choice of paper, etc.

GRADATION. Each film has an ability of its own to reproduce various degrees of brightness on its emulsion. If the ability of a film is confined to only a small number of black-grey-white tones, we speak of a "high contrast" or hard negative material. If it is able to reproduce many delicate shades of grey between black and white, it is known as a "low contrast", or "soft" film. Generally speaking, low speed films of fine grain possess a higher contrast than fast films, which are softer.

LATITUDE. Latitude is the ability of the film to yield usable negatives, even with a certain amount of under-

or (more often) over-exposure. Films praised for particularly wide latitude may facilitate exposure, but are likely to have less "resolving power", causing loss of definition which in big enlargements is just as unpleasant as graininess.

Our negative material has a number of additional properties which help towards good results. There is a special "protective coating", a hardened gelatine layer on top of the actual sensitive layer which protects against scratches. The base has been coloured, as a rule grey, in order to avoid reflection of the light coming through the emulsion on the film-back and thus causing halation.

CHARACTERISTICS OF SOME LEICA FILMS

Make	*Type*	*Speed in Scheiner °*	*Grain*	*Gradation*
Agfa Ansco—				
Minipan	P.	21°	ef.	v.
F. G. Plenachrome ...	O.	27°	ef.	v.
Finopan	P.	27°	ef.	n.
Superpan Supreme ...	Pr.	30°	fg.	n/s.
U. S. Panchromatic ...	Pr.	33°	mg.	s.
Du Pont—				
Microcopy	P.	19°	ef.	v.
Superior I	P.	27°	ef.	n.
Superior II	P.	30°	fg.	n/s.
Superior III	P.	33°	mg.	s
Ilford—				
Micro-Neg.	P.	21°	ef.	v.
F.P. 2	P.	27°	ef.	n.
H.P. 2...	Pr.	31°	fg.	n/s
H.P. 3...	Pr.	32°	mg.	n/s
Kodak—				
Microfile	P.	19°	ef.	v.
Panatomic X	P.	27°	ef.	n
Plus X	P.	29°	fg.	n
Super XX	Pr.	32°	mg.	n/s

TYPE: P=panchromatic; Pr.=panchromatic with increased red sensitivity; O=orthochromatic.
GRAIN: ef.=extra fine grain; fg.=fine grain; mg.=medium fine grain.
GRADATION: n.=normal; n/s.=normal tending to soft; s.=soft; v.=vigorous.

COLOUR FILM. Besides the films mentioned which reproduce the world around us in black and white, in recent years colour films have been introduced, which enable us to photograph in natural colours. There are two types of colour films suitable for our Leica. One is represented by *Kodachrome*, a film with three emulsion layers, between each pair of which is an extremely fine membrane. The top layer records the blue part of the image, the middle one the green, and the lowest layer the red. It is the combination of the three images that reproduces the picture in natural colour. (A new variation of the Kodachrome film is the *Kodacolor* giving a colour negative, that is to say, a film showing complementary colours to the actual ones. From this colour-negative colour-transparencies as well as colour or black-and-white enlargements can be made. For the time being this Kodacolor material is not available in Great Britain.) The second type, *Dufaycolor*, uses instead of the three separate layers one single panchromatic emulsion layer with a greasy ink resin printed on a dyed base, which produces in the finished diapositive a geometrical mosaic of blue and green squares separated by red lines. The single spots of colour are so extremely small that they appear to our eye to form an even-coloured surface. In either case, the exposed material, after processing, produces not the usual negative, but a positive film in its natural colours, which can be projected on to a screen, viewed in a colour-transparency-viewer, or used to make colour-enlargements on paper. This latter process is at present still somewhat complicated, and therefore costly.

LEICA LENSES AND VIEW-FINDERS

The first Leica cameras were fitted with an *f* 3.5 5 cm. lens called *Leitz Anastigmat* 5 cm. *f* 3.5, shortly afterwards improved and christened *Elmax*, and finally replaced by the still more efficient *Elmar*. In the course of fifteen years of development, fourteen more lenses for the Leica have been introduced.

Leica lenses are fitted with the coupling to the range-finder of the Leica. There are, however, exceptions (1) The two Telyts (of 20 and 40 cm. focal length) for which a visual focusing Reflex housing (p. 42) is supplied, and (2) the very early specimens of Elmar 5 cm. *f* 3.5, Hektor *f* 2.5, 5 cm., Elmar *f* 3.5 3.5 cm., and Elmar *f* 4.5 13.5 cm. The view-finder of the Leica shows the correct image for all 5 cm. focal length lenses. For shorter and longer focal length lenses special finders are available (p. 43).

The standard lens of 5 cm. as well as those of shorter focal lengths are in a helical mount for focusing. On the mount there is an index showing (in feet or metres) the distances set when focusing.

In addition to the main distance index line the newer Leica lenses have a second index marked with "R', which serves for focusing when taking infra-red photographs (p. 30). When using the coupled range-finder the distance measured will have to be set by hand opposite the corresponding "R" figure. For lenses without "R" indicator, the following table may be used;—

FOCUSING WITH INFRA-RED FILM

Lens	*Set index line opposite to the following depth of focus indication line towards* ∞
Elmar	5 cm. 6.3
Hektor	5 cm. 6.3
Summar	5 cm. 2
Hektor	7.3 cm. 4.5
Elmar	9 cm. 6.3
Elmar	10.5 cm. 9
Elmar	13.5 cm. 6.3
Hektor	13.5 cm. 6.3
Elmar	3.5 cm. ... ... 1½ mm.
Hektor	2.8 cm. ... ... to be neglected

If the helical mount has reached the infinity position (∞) it is automatically engaged and locked. By pressure on the button of the focusing lever, it may be released for focusing closer distances (with 5 cm. and shorter focal length lenses). The mechanism of the built-in range-finder is interconnected with the helical focusing mount. By screwing the lens into the camera, the connection is automatically ensured. (There are a few older lenses on the market without the range-finder coupling and without infinity catch).

The diaphragm of the Leica lenses is adjusted by means of a small lever gliding along an index line in the case of 5 cm. Elmar and shorter focal length lenses. All other lenses have a milled ring for adjusting the diaphragm.

Each of the Leica lenses, with the exception of the very first ones, is fitted with a depth of focus calculator. On either side of the distance indicator a scale is provided on the lens mount bearing the aperture figures. Once the distance has been set the depth of focus is automatically given and the distance figures can be read off opposite the aperture-mark on the depth of focus scale. One figure gives the beginning, the other the end of the depth of focus. (See p. 52).

The Choice of Lenses

The Elmar *f* 3.5 5 cm. or Summar *f* 2 5 cm. can be regarded as the standard lenses of the Leica and the most suitable for general use. When other lenses are used in their place it should be borne in mind that in order to exploit all the possibilities of a whole range of lenses a certain amount of experience in photography is indispensable.

It is wrong to assume that the high correction of the Leitz large aperture lenses enables one to use them invariably at their full opening. It will be appreciated that the depth of focus (p. 46) of these high-power lenses can only be comparatively small at the original aperture, so that, for instance, more often than not, stopping down becomes necessary. It appears to be wise, therefore, to consider the larger stops of the ultra-fast lenses mainly as a reserve, to be made use of under adverse lighting conditions.

LEICA LENSES COMPARED

Len	Focal length in cm.	Focal length in in.	Full aperture f	Lens speed values compared with f 3.5	Angle of view (diagonal)	Scale of magnification compared with 5 c.m. lens	Shortest distance ft.	Shortest distance m.	Scale of reproducion at shortest distance	Small aperture† f	Mount	Special view-finder
Hektor ...	2.8	1 1/8	6.3	0.3	76°	0.6 ×	2	0.75	1 : 20	18	rigid	yes
Elmar ...	3.5	1 3/8	3.5	1	64°	0.7 ×	3.5	1	1 : 26.5	18	rigid	yes
Elmar ...	5	2	3.5	1	47°	1.0 ×	3.5	1	1 : 18	18	collapsible	no
Hektor ...	5	2	2.5	2	47°	1.0 ×	3.5	1	1 : 18	18	collapsible	no
Summar ...	5	2	2	3	47°	1.0 ×	3.5	1	1 : 18	12.5	collapsible	no
Summitar ...	5	2	2	3	47°	1.0 ×	3.5	1	1 : 18	12.5	collapsible	no
Xenon ...	5	2	1.5	5	47°	1.0 ×	3.5	1	1 : 18	12.5	rigid	no
Hektor ...	7.3	3	1.9	3.4	34°	1.5 ×	3.5	1	1 : 12	25	rigid	yes
Elmar ...	9	3 1/2	4	0.8	27°	1.8 ×	3.5	1	1 : 9	36	rigid	yes
Thambar ...	9	3 1/2	2.2	2.3	27°	1.8 ×	3.5	1	1 : 9	32	rigid	yes
Elmar ...	10.5	4 1/8	6.3	0.3	24°	2.1 ×	7	2	1 : 8	36	rigid	yes
Elmar ...	13.5	5 3/8	4.5	0.6	19°	2.7 ×	5	1.5	1 : 9	36	rigid	yes
Hektor ...	13.5	5 3/8	4.5	0.6	19°	2.7 ×	5	1.5	1 : 9	36	rigid	yes
Telyt ...	20	8	4.5	0.6	12°	4 ×	12	3.5	1 : 15*	36	rigid	yes
Telyt ...	40	16	5.0	0.5	6°	8 ×	25	7.5	1 : 17*	32	rigid	yes

* Without intermediate ring. † There are a number of older lenses on the market with different "smallest" apertures.

The possession of one or more of the longer focal length lenses may tempt the owner to use them more frequently than necessary. It must be remembered that focusing a lens of long focal length has to be done more accurately, as, again, the depth of focus is considerably more limited than with lenses of shorter focal length. At the same time, owing to the longer axis, slow exposure speeds of 1/30, 1/20 tend more easily to camera-shake—if not used on a rigid tripod—than lenses of normal focal length.

The interchanging of the Leica lenses is easily done, as the cameras as well as the lenses are all standardized. The lenses are simply screwed moderately tight into the changing flange of the Leica body ; $2\frac{1}{2}$ turns bring the lens into its proper position. When changing lenses the open camera body should not be exposed to bright light, but held with the aperture towards one's body until the lens is screwed in.

The treatment and care of the lenses is a matter of importance. On account of its chemical composition, *optical glass of high quality is susceptible to the influences of moisture, and for this reason touching the glass with the fingers should be avoided.* When not in use the lens should be protected by putting on the lens cover. Since complete protection is impossible, the lens surface should be cleaned occasionally with a clean, soft chamois leather.

ELMAR *f* 3.5 5 cm. is one of the standard lenses of the Leica, famous for its excellent definition. It is a universal lens for all types of photographs, except in conditions of very poor light. It is suitable for general views, technical and scientific photography—and enlarging work.

HEKTOR *f* 2.5 5 cm. was the first in the series of fast lenses for the Leica. Its field of application is similar to that of the Elmar. Regarding definition, more particularly at the widest apertures, it is not quite up to the standard of the 5 cm. Elmar, but stopped down to at least 6.3 it improves considerably.

SUMMAR *f* 2 5 cm. is the fast universal lens for the Leica. The definition is excellent, even at full aperture, although it can be slightly and progressively improved as the aperture is reduced, reaching its optimum at 6.3. The particularly good correction is of importance in conjunction with the use of panchromatic material, while the construction of the Summar produces pictures with what some people call a "plastic" effect. This lens can be regarded as being equally suitable for general outdoor, artificial light and press work.

SUMMITAR *f* 2 5 cm. This recent addition has the same general features as the Summar lens, but embodies improvements which result in the exceptionally even light distribution over the entire negative field, while a high degree of colour correction makes this lens valuable to colour photography. It is also—next to the 5 cm. Elmar—the most suitable lens for use in the enlarger.

XENON *f* 1.5 5 cm. fulfils the demand for a lens of extremely high aperture and full correction. It will be preferred by photographers who have to use fast shutter speeds in artificial light, e.g. for night and theatre work. The definition, even at full aperture, is satisfactory, and the sharpness rapidly increases as it is stopped down. The illumination over the entire field is remarkably even, the correction for distortion and aberrations is better than for any other lens of such high aperture. It can be used for all general photographic purposes.

ELMAR *f* 3.5 3.5 cm. The shorter focal length takes in an angle of nearly 65° compared with the 47° of the 5 cm. lens. The lens gives definite advantages in cases where the practicable distance between camera and subject is limited and not sufficient for lenses of "normal" focal length to show the subject in its entirety upon the negative. The 3.5 cm. Elmar is, therefore, primarily used for architectural photographs and interiors. Corresponding with its short focal length the depth of focus covers a particularly wide field, even at comparatively large apertures. For instance, with an aperture of *f* 6.3 and focused at 23 ft., a field from 10 ft. to ∞ is covered. Using this setting as an "ever ready" focusing, the 3.5 Elmar can be employed with advantage as a "quick shooting" lens for all general purposes when accurate focusing or distance setting would be inconvenient. With full aperture the lens tends slightly to "vignette" the corners (a little less illumination in the corners than in the middle of the film). But from *f* 4.5 on, it is, for all practical purposes, equal to the 5 cm. Elmar, and its definition over the whole picture is very good indeed.

HEKTOR *f* 6.3 2.8 cm. This extreme wide-angle lens covers nearly twice the field of the 5 cm. lenses. Its chief application is in architectural and interior photography. Used out of doors it will help to produce emphatic perspective effects with dominating foregrounds. It gives absolutely sharp definition at full aperture and is reasonably free from distortion.

ELMAR *f* 4 9 cm. is used particularly for photographing distant views excluding the near foreground, portraits and architectural details. The image angle of 27° gives nearly a 2× magnification compared with the 5 cm. standard lenses. Owing to the increased working distance it is frequently used in portraiture to avoid distortion and throw the background out of focus. The Elmar 9 cm. is light (10 oz.), only 3 in. long and therefore easy to carry about. The definition is good, even at full aperture, and if slightly stopped down will satisfy even the most exacting demands.

ELMAR *f* 6.3 10.5 cm. The focal length is slightly increased in comparison with that of 9 cm. and gives a full 2× magnification over the 5 cm. standard lens. The smaller aperture of *f* 6.3 is sufficient for practically all outdoor work in fair light, like mountaineering, where foregrounds to be included are often somewhat farther away and distant objects should be shown as if viewed through binoculars, for which it has been specially designed. It is particularly light (7 oz.).

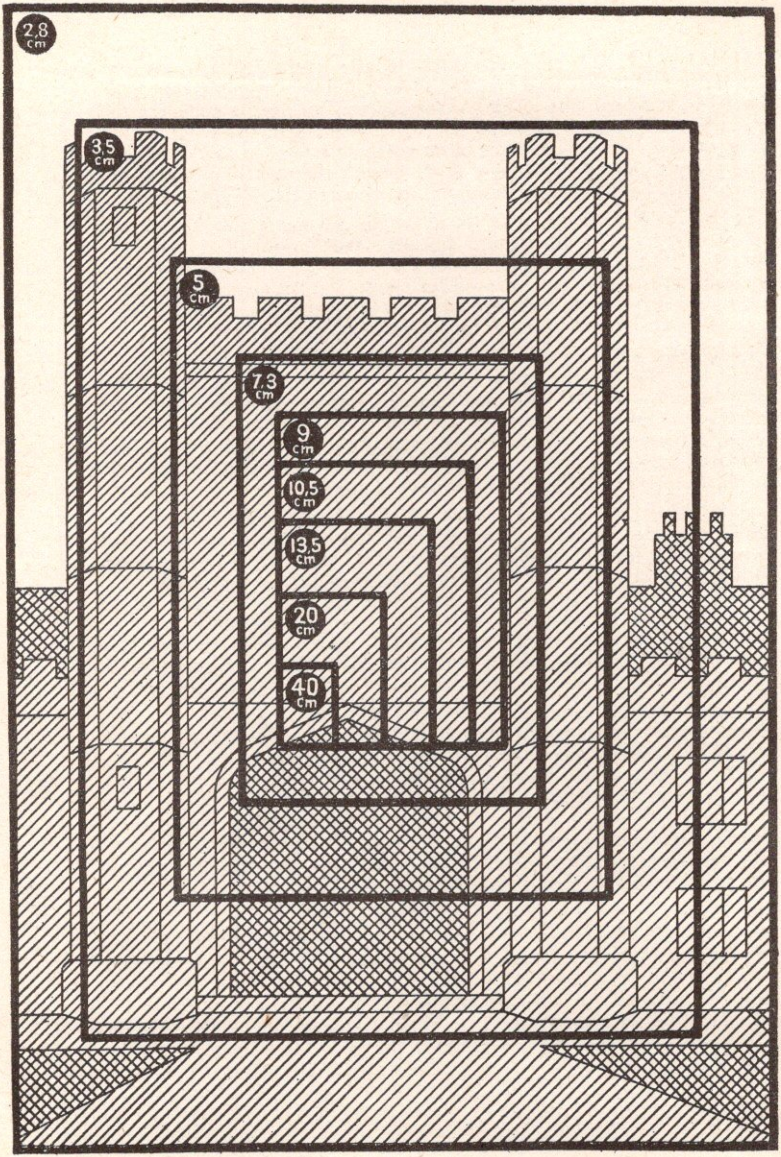
ELMAR *f* 4.5 13.5 cm., with its 19° angle of view, yields 2.7× magnification compared with the 5 cm. standard lenses. It is useful for distant landscape sections, for detail studies of architecture, and large portrait heads. May also be used for sport pictures at great distance, animal photography in zoos and nature work generally. Its definition is good, and can be still further improved by stopping down.

HEKTOR *f* 4.5 13.5 cm. This lens is of the same focal length as the Elmar 13.5 and has the same aperture. It has an appreciably better resolving power than the Elmar 13.5 cm. and an increased chromatic correction. While it serves for the same type of photographs it will be preferred to the 13.5 cm. Elmar for serious work, on account of its improved optical qualities. It is particularly suited (thanks to the high chromatic correction) to infra-red photography.

HEKTOR *f* 1.9 7.3 cm. is above all suitable for theatre work and similar subjects. Here the increased focal length is a definite advantage, as these pictures will have to be taken at a considerable distance, and with a 5 cm. standard lens the main object would be reproduced on a fairly small scale. Furthermore, the Hektor 7.3 cm. has proved its quality for indoor portraits. With full aperture it shows a very slight (intentional) softness, which makes it particularly suitable for portraits of a "pictorial" type. As the lens is stopped down the image gains rapidly in sharpness, so that it becomes quite useful for all general work.

THAMBAR *f* 2.2 9 cm. is a "soft focus" lens, if used at wide aperture; when stopped down the degree of softness is reduced, and may be regained by using a special central diaphragm (between *f* 3.2 and *f* 6.3), which eliminates the sharp definition of the lens centre. After *f* 6.3 the central diaphragm is of no further use and after *f* 9 the lens will become one of hard drawing. This lens has been specially designed to cater for the requirements of certain portrait photographers. Considerable experience is required to master this lens, but it yields effects almost impossible to secure by other means.

The Effect of the Focal Length (p. 40):
The longer the focal length of a lens the more limited its field of view. Worked from the same distance, a lens of very short focus may be able to cover the whole of a subject, while a lens of very long focus will fill the same film space with the picture of only a small part of the same subject, but, of course, showing at the same time a correspondingly larger amount of detail. The comparative coverage of the Leica set of lenses is shown on p. 40.


2,8 cm
3,5 cm
5 cm
7,3 cm
9 cm
10,5 cm
13,5 cm
20 cm
40 cm

5 cm.

2.8 cm.

3.5 cm.

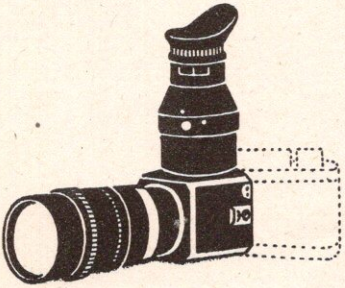
9 cm.

7.3 cm.

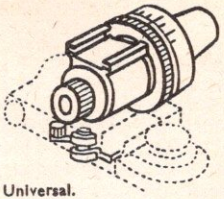
13.5 cm.

20 cm. Telyt with reflex housing.

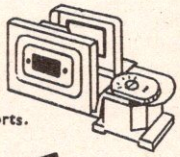
10.5 cm.



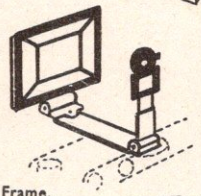
Lenses (p. 37)



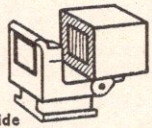
Universal.



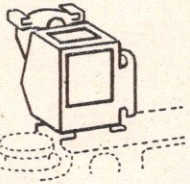
Sports.



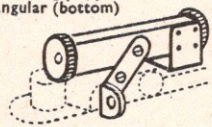
Frame.



Wide Angle.

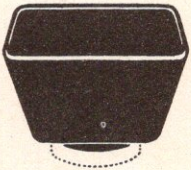


Reflecting (top) and Angular (bottom)

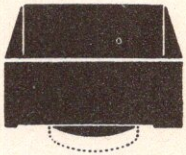


Finders (p. 43)

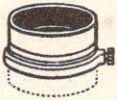
Hector 2.8.



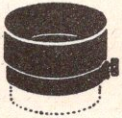
Summar.



Collapsible.



Elmar 5.



Elmar 3.5.
(Extensible (bottom).

Lenshoods (p. 45).

TELYT *f* 4.5 20 cm. and TELYT *f* 5 40 cm. These are the only lenses made by Leitz for the Leica which are "Tele"-constructions: that is to say, a negative lens combination behind the positive lens part, which magnifies the picture and allows a shorter extension (tube) of the complete lens than is indicated by its focal length. The narrow angle of view—12° and 6° respectively—affords very good correction. The magnification compared with the 5 cm. standard lenses is 4× and 8× respectively. These lenses are therefore particularly suited for long-distance work, animal photography, and (mainly the 20 cm. Telyt) portrait heads with ciné " close-up " effect.

The Telyt lenses are not coupled with the range-finder. For focusing, as well as viewing, a Reflex Housing is used. A mirror projects the Telyt image on a ground-glass screen, where the focusing may be accomplished by a 5× or 30× magnifying glass (built-in). The mirror housing can be turned for horizontal and upright pictures and at the same time the metal mask defining the actual image area rotates so that the correct image is always shown. A special cable release synchronises the Reflex Housing with the camera shutter. While the Telyts can be focused as near as 9 ft. and 25 ft. respectively, special intermediate rings make it possible to focus down between 9 and 5 ft. When two rings are used a further reduction of the working distance down to 4 ft. can be obtained. At this distance the Leica covers a field of view 6 in.× 4 in. with the 20 cm. lens and a 3 in.× 2 in. with the 40 cm. lens.

REFLEX HOUSINGS FOR OTHER LENSES. The Reflex Housing can also be used for lenses other than the Telyts. By setting the lens to infinity the following object sizes can be taken:—

CLOSE UP WORK WITH REFLEX HOUSING

Lens		*Reduction on the Negative*	*Object Size in cm.*
13.5 *cm.*	Hektor, Elmar	1 : 2.2	4.3× 7.9
10.5 *cm.*	Elmar	1 : 1.7	4.1× 6.4
9 *cm.*	Elmar, Thambar	1 : 1.5	3.6× 5.4
7.3 *cm.*	Hektor	1 : 1.2	2.9× 4.3
		Magnification on the Negative	
5 *cm.*	Elmar	1, 2 : 1	1.9× 2.9
	Hektor		
	Summar		
	Xenon		
3.5 *cm.*	Elmar	1, 8 : 1	1.7× 2.5
2.8 *cm.*	Hektor	2, 2 : 1	1.0× 1.6

The Hektor 13.5 cm. can be supplied in a shortened mount which screws into the Reflex Housing, where it covers its full distance range up to infinity. A similar use of the Leica lenses of shorter focal length is limited to close-up work, as the Reflex Housing acts as extension tube

It is essential to stop down a little further according to the reduction in working distance and focal length. It must also be remembered that the exposure time should be increased in accordance with the increase of extension (for example: for copying at a ratio of 1 : 1, four times normal exposure is required).

The View-Finders for the Leica

When using the Leica with lenses other than those of 5 cm. focal length, special view-finders must be employed to determine the field of view. These slip into the clip on the top of the camera body (p. 41).

THE UNIVERSAL FINDER, "VIDOM". Designed for use with lenses from 3.5 to 13.5 cm. focal length, the "Vidom" Finder is built like an astronomical telescope. It contains a rectangular aperture which can be enlarged or reduced by means of a milled ring, so as to show the image obtained with lenses of 3.5, 5, 7.3, 9, 10.5 and 13.5 cm. focal length. The milled ring bears an indicator which should be set opposite the focal length engraved on the instrument to show the image for the lens employed for distances between 30 ft. and infinity. A second shorter index line close to the other is referred to when taking close-ups at 3.5 to 6 ft. For distances between 6 and 30 ft. the milled ring is best set between the two index lines.

For compensating the parallax between finder and lens (displacement of both optical axes) the view-finder is fitted with a cam and lever motion for tilting the finder. This arrangement ensures that an object sighted through the centre of the finder appears really in the centre of the negative. No displacement is noticeable at distances over 12 ft. For shorter distances, however, the ensuing displacement has to be compensated for by tilting the finder. This is done with the small lever underneath the eyepiece, which is marked with the respective short distances and for infinity (∞).

When the camera is turned for taking upright pictures the image in the finder appears upside down. To remedy this the prism in the eyepiece has to be turned to the left through 90° until a definite stop is felt.

THE SMALL UNIVERSAL FINDER is designed for a specific lens combination only. The various fields are shown on a line-drawn plate. *Model I* for 3.5 5 and 7.3 cm. lenses; *Model II* for 3.5, 5 and 9 cm. lenses; *Model III* for 3.5, 5 and 10.5 cm. lenses; *Model IV* for 3.5, 5 and 13.5 lenses. These fields are correct for subjects within a distance of 30 ft., a second thin line within each field shows the correct image for distances of 3.5 to 6 ft. A small cross in the centre simplifies centring the subject.

The compensation of parallax is effected in the same way as described for the "Vidom" finder.

THE FRAME FINDER consists of an image frame and a sighting aperture. It is helpful for sports and landscape photography. It covers all focal lengths from 3.5 cm. up to 13.5 cm. In one position the image frame indicates the fields of the 5 and 9 cm. lenses, while the field of the 3.5 and 7.3 cm. lenses is shown when the frame is swung round 180°. Fitted with a special mask on the front frame in its position for 5 and 9 cm. lenses, the finder will give the field of the 13.5 cm. lenses, and swung round into its position for 3.5 and 7.3 cm. it will now give the field for 10.5 cm., while a pin-hole mask must be clipped in front of the rear sighting aperture. This additional pin-hole must not be used with the shorter focal length lenses. The sighting frame should always be held close to the eye. Parallax for close-ups can be compensated for by vertical displacement of the back sight. The frame finder can be collapsed when not in use.

THE FRAME FINDER FOR TELYT 20 cm. for sports photographs, can be clipped on to the reflex housing and is fitted with a parallax compensator on the back sight.

THE SPORTS FINDER is available for the 7.3 or 9 or 13.5 cm. lenses. Though a rapidly-moving object can be observed before it actually enters the field of view of the camera lens, the actual field of the lens is defined by a plainly visible light rectangle as a part of the angle of view presented by the finder, in which the object appears upright, the right way round and in natural size. It can therefore be observed with both eyes. The sports-finder is also equipped with a parallax compensating device. For close-ups from 3.5 to 12 ft. distances the compensator should be set to the appropriate figure, for distances between 12 and 30 ft., half-way between 12 and ∞ (infinity).

WIDE-ANGLE FINDER FOR 2.8 cm. is based on the sports finder described above, and gives a particularly clear and brilliant image of the object.

WIDE-ANGLE FINDER FOR 3.5 cm. is a simple optical view-finder similar to the normal fixed view-finder of the Leica.

REFLECTING FINDER for 5, 3.5 and 2.8 cm. focal length is the only finder type which is not used at eye-level. It is designed for use in cases where a lower view point is required, as for child and small animal photography. It is of prismatic construction, and gives a clear, sharply-defined image. The horizontal and vertical images fields are indicated by blocked-out corners. The field of view is that of the 5 cm. lenses. Two further models are equipped with a hinged-on negative front lens, enabling them to be used with the 3.5 cm. or 2.8 cm. lens in addition to the 5 cm. The reflecting finder has engraved on top, small cross-lines, and in front a small circle. By sighting with one eye only, the cross-line should appear in the centre of the circle. This

indicates that the camera is not slanting. This same finder may be used as an angular view-finder by simply turning the camera through 90°. As angular finder it can also be used at eye-level, where the normally horizontal position becomes vertical and vice versa.

ANGULAR FINDER for 5 cm. only (see also above "Reflecting View-finder" used as angular finder) enables one to make exposures without attracting attention, as the sighting device lies at right angles to the object to be photographed. The forked bracket of the angular view-finder is slipped into the clip on top of the camera and the small prism attached to the finder is switched in front of the eye-piece of the range-finder. Focusing is done by means of the reflecting prism. For *Leica I* and *Leica Standard* an alternative form without prism is used.

Leica Lens Hoods

The lens hood is a tube, as a rule made from metal, placed over the front of the lens to protect it from light coming from outside the actual picture area. There is **no** picture which could not be improved in clarity and brilliancy by the use of a lens hood. The wider the aperture of the lens the more important is the use of the lens hood. The light coming from objects outside the actual picture area will touch the lens and reduce the brilliancy of the picture considerably. This applies not only to photographs taken against the light—when the lens hood becomes indispensable —and in sunshine in general, but also to pictures in diffused light and indoors (on account of reflected light). For the Leica various lens hoods are available for the interchangeable lenses. They have been specially designed to give the maximum protection (p. 41).

Special lens hoods, non-collapsible, are available for 5 cm. Elmar and 5 cm. Hektor, 5 cm. Summar, 3.5 cm. Elmar, 2.8 cm. Hektor.

Collapsible lens hoods are made for 5 cm. Summitar, 5 cm. Xenon.

An extensible lens hood may be had which is suitable for the 5 cm. Elmar, 5 cm. Hektor, 9 cm. Elmar, 13.5 cm. Elmar and 13.5 c.m. Hektor lenses. This hood can be used, when fully collapsed, for the 3.5 cm. Elmar if without filter, otherwise the corners of the negative would be cut off.

The 7.3 cm. Hektor, 9 cm. Thambar, 10.5 cm. Elmar, 20 and 40 cm. Telyts are supplied complete with a lens hood, which, when reversed, fits snugly over the front of the lens.

All lens hoods may be used with filters, the filters themselves being specially recessed for this purpose.

THE TECHNIQUE OF FOCUS

Depth of Focus

Strictly speaking, an ideal photographic lens can give a critically-sharp image of a single plane only—so far as the image formed in the plane of the film is concerned. This is the "plane of focus", and its distance from the plane of the film represents the distance on which the lens has been focused. Still, points in front of and behind the actual distance focused at *appear* to be sharp. How is this possible? Any point lying outside the plane of focus will not be represented in the plane of the film as a point, but as a small "circle of confusion"; the diameter of this circle of confusion increases in size with the focal length of the lens. Furthermore, the larger the aperture of the lens the further the point to be represented lies from the plane of focus, and the nearer this plane is to the lens. Indeed, we know, the longer the focal length and the larger the aperture, the narrower the belt in front of and behind the distance focused which appears to be sharp. Still, the human eye does not perceive an image to be unsharp as long as its departure from "pin-point" delineation does not exceed certain limits. That area in front and behind the plane actually focused which although not "pin-point" sharp, can be accepted as sharp by the human eye, is described in photographic language as "depth of focus".

As a matter of experience it is found that the circle of confusion still appears as a sharp point if it is seen from a distance at which the angle of view which it subtends amounts to two minutes of arc at most. In plain English: at a viewing distance of 10 in. (25 cm.), which may be regarded as normal for a print between 6 × 4 in. and 8 × 6 in. (13 × 18 and 18 × 24 cm.) in size, this means that the highest permissible diameter of the circle of confusion is about 1/6 mm. For a Leica negative of 1½ × 1 in. (24 × 36 mm.) this corresponds to a maximum permissible diameter of 1/30 mm., for the circle of confusion. Incidentally, the average grain of our film emulsion limiting the fineness

of details which can still be recorded is of about the same diameter resolved.

All points which are represented on the Leica negative by circles of confusion not more than 1/30 mm. in diameter can be accepted as covered by "depth of focus."

Control of Depth of Focus

The depth of focus—being dependent on the focal length of the lens used, the distance actually focused at and the aperture employed—has to be ascertained for every shot separately. The depth of focus calculator on the Leica lens allows one to read off figures for depth of focus (p. 52) for the different stops and distances directly. The lens mount has been provided with a special scale bearing the aperture figures, diverging from either side of the index mark.

To read, first set the distance index (obtained by measuring or guessing) to, let us say, 12 ft. Assuming that we are working with a 5 cm. lens with aperture *f* 6.3, the two index lines marked "6.3" on the depth of focus ring point on one side to 9 ft., and on the other side to 18 ft. on the distance scale. The range of depth of focus, or good definition, is therefore from 9 to 18 ft. while actually set on 12 ft. ; similarly, with aperture *f* 4.5 a range of 10 to 15 ft., and with aperture *f* 18, one from 6 ft. to "infinity" would be given.

If it is desired to obtain the *utmost* depth of focus or a distant view with foreground, instead of the main index being set to infinity in the usual way, we use the index line of the "depth of focus scale" which corresponds to the aperture used. With aperture *f* 18, for example, the depth of focus covers a range from 6½ ft. to "infinity"; with aperture *f* 6.3, a range from 18 ft. to "infinity", and so on.

The range-finder may be used to utilize the depth of focus to the full by determining the largest aperture at which an object of given depth can be kept within the depth of field of the lens. If, for example, when taking a church interior it is found that the nearest point which is to be rendered in sharp focus is about 13 ft. away and the furthest about 160 ft., it will be seen that the Elmar 3.5 cm. need only

to be stopped down to *f* 4.5 and focused on about 22 ft. to give depth of field extending from 13 to 160 ft.

Limits of Depth of Focus

The widely-held idea that everything is equally sharp within the depth of focus and completely unsharp outside these limits is mistaken. It must be emphasized that, as we have said before, *critical* "pin-point" definition can be expected only in the plane actually focused.

For this very reason care should be taken to place the focus as exactly as possible at the spot on which the greatest sharpness is required. In the case of distant landscapes use should not be made of the hyperfocal distance (described below) if the greatest sharpness is required in the far distance. In this case, focusing on the object in the far distance will give better results. (This applies also to the safety-zone focusing, p. 49.)

Further, the assumed circle of confusion of 1/30 mm. which has been laid down by Leitz for their tables is derived on the supposition that the entire negative is viewed or enlarged. When small sections of the negative are greatly enlarged, the depth of focus decreases accordingly, because the circle of confusion is enlarged at the same time. That is just one more reason why focusing should be carried out as exactly as possible.

On the other hand, in exactly the same way as the sharpness is not absolutely uniform within the depth of focus, the region of unsharpness outside the depth of focus region increases only gradually.

The Hyperfocal Distance

The depth of focus extends for a greater distance in the direction of "infinity" than towards the camera. When a lens is focused on such a distance that the depth of focus just reaches the far distance (infinity), then the lens is focused on the "infinity-near point" or "hyperfocal distance." This adjustment of focus is always advisable when it is desired to secure *adequate sharpness from the farthest distance to as far as possible in the foreground, rather than* extreme *sharpness in the far distance only.* (See p. 50.

Safety-zone Focusing

There are opportunities in a photographer's life which, like time and tide, wait for no man; when, to bring your whole technical armament to bear—range-finder, exposure meter and the rest—would be to let your prey escape you for ever. Such situations are best dealt with by applying a kind of pre-prepared depth focusing, the following "safety-zone" method, details of which should be jotted down on to a piece of paper and kept handy in the Ever-ready case:—

Focus at 15 ft. (4 m.), stop 9.
With the 5 cm. Leica lenses
Everything between 9½ and 33 ft. will be sharp.
With the 3.5 cm. Leica-Elmar
Everything between 7 ft. and infinity will be sharp.

A second safety-zone method:—

Focus at 30 ft. (9 m.). stop 9.
With the 5 cm. Leica lenses
Everything between 14½ ft. and infinity will be sharp.

With these settings, a 27° Scheiner film and fair weather, nothing can go wrong. The exposure times being:—

For bright, sunny weather	...	...	**1/100 sec.**
For good, diffused light	...	...	**1/60 sec.**
For a dull day (not too dark)	...	...	**1/30 sec.**

Depth of Focus Tables

Depth of focus tables are included in this book, in spite of the fact that Leica lenses are fitted with a depth of focus calculator. This has been done for the following reasons: first, to allow comparisons to be made without having to experiment with all the various lenses; secondly, to give perfectly accurate figures which cannot be obtained with the calculator (the distance-scale calibration not being detailed enough for these purposes); and lastly, because a number of the very first Leica lenses are not fitted with the depth of focus calculator at all.

All tables are computed on the assumption that the circle of confusion is of 1/30 mm. diameter (see p. 46).

The figures on the left of each of the groups (pp. 53–61) relate to the setting of the lens stop. The bold (middle) figures in each group indicate the distance (*in feet*) to which the lens is to be set on the helical focusing scale. The corresponding figure above then gives the distance of the near limit (*in feet and inches*) and the figure below gives the distance of the distant limit (*in feet and inches*) of the region of depth of focus.

Table of focusing distances giving the greatest possi
for Leica lenses. The computation of the tables is

Focal	2.8 cm.		3.5 cm.		5 cm.		Focal	7.3 cm.	
Aperture	Setting of lens on helical focusing scale	Extent of depth of focus	Setting of lens on helical focusing scale	Extent of depth of focus	Setting of lens on helical focusing scale	Extent of depth of focus	Aperture	Setting of lens on helical focusing scale	Extent of depth of focus
		∞ to		∞ to		∞ to			∞ to
1.5	—	—	—	—	177–5	88–8½	1.9	280–0	140–0
2.0	—	—	—	—	133–0	66–6	2.2	240–0	120–0
2.2 (2.5)	—	—	—	—	107–0	53–6	3.2	167–0	83–6
3.2 (3.5)	—	—	34–0	17–0	77–0	38–6	4.5	118–0	59–0
4.5	—	—	27–0	13–6	60–0	30–0	6.3	85–0	42–6
6.3	12–0	6–0	20–0	10–0	42–0	21–0	9	60–0	30–0
9	9–0	4–6	13–0	6–6	30–0	15–0	12.5	42–0	21–0
12.5	6–0	3–0	10–0	5–0	22–0	11–0	18	30–0	15–0
18	4–0	2–0	7–0	3–6	15–0	7–6	25	21–0	10–6
25	3–0	1–6	—	—	—	—	36	—	—
36	—	—	—	—	—	—			

EXAMPLES.—Aperture: 6.3; lens, Elmar 5 cm. According to the table, the helical focusing mount is set to a distance of 42 ft. The resulting depth of focus then extends from 21 ft. to infinity. Were the lens set to "infinity" ∞ (instead of to 42 ft.), the depth of focus would have extended from "infinity" to 42 ft., whereas it here already begins at 21 ft.

Aperture 4.5; lens, 13.5 cm. Leitz Hektor. According to the table the helical focusing mount is set to a distance of 400 ft. The resulting depth of focus then extends from 200 ft. to infinity.

DISTANCE

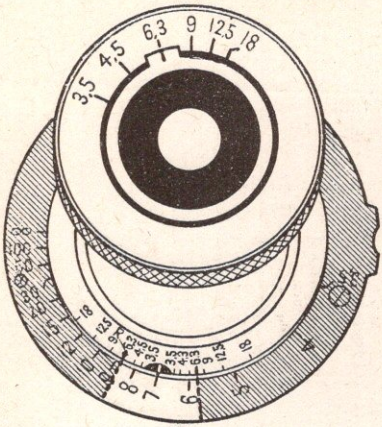
ble depth of focus from the foreground to infinity based on a circle of confusion of 1/30 mm. diameter.

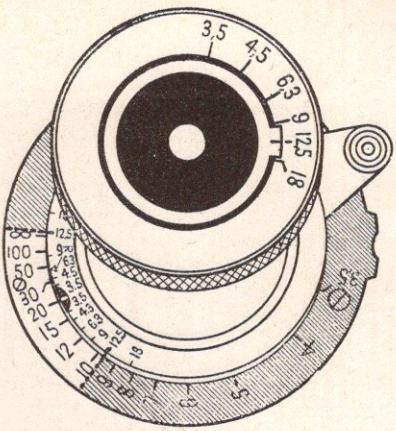
9 cm.		10.5 cm.		Focal	13.5 cm.		20 cm.		
Setting of lens on helical focusing scale	Extent of depth of focus	Setting of lens on helical focusing scale	Extent of depth of focus	Aperture	Setting of lens on helical focusing scale	Extent of depth of focus	Setting of lens on helical focusing scale	Extent of depth of focus	
	∞ to		∞ to			∞ to		∞ to	
—	—	—	—	4.5	400–0	200–0	875–0	437–6	ft. & in.
—	—	—	—	6.3	285–0	142–6	625–0	312–6	ft. & in.
—	—	—	—		200–0	100–0	440–0	220–0	ft. & in.
177–0	88–6	—	—	12.5	145–0	72–6	315–0	157–6	ft. & in.
128–0	64–0	170–0	85–0	18	100–0	50–0	220–0	110–0	ft. & in.
88–0	44–0	122–0	61–0	25	72–0	36–0	160–0	80–0	ft. & in.
62–0	31–0	87–0	43–6	36	50–0	25–0	110–0	55–0	ft. & in.
44–0	22–0	60–0	30–0						
32–0	16–0	44–0	22–0						
22–0	11–0	30–0	15–0						

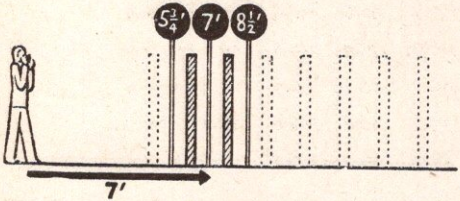
Aperture: 6.3; lens, 9 cm. Elmar. According to the table, the helical focusing mount is set to a distance of 128 ft. The resulting depth of focus then extends from 64 ft. to infinity.

NOTE.—It is repeated that the infinity near point (hyperfocal distance) should NOT be used when maximum sharpness is required in the far distance.

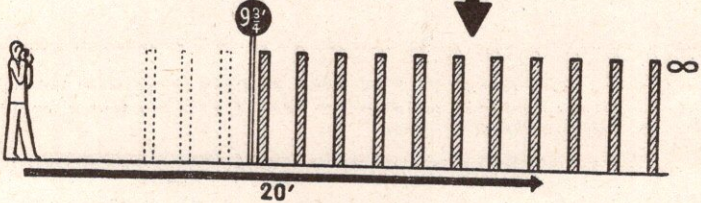
The values in this table are rounded off. The deviations from the theoretical values, however, are so small as to be of no practical consequence; whilst on the other hand these approximations render the table much more convenient.







The Depth of Focus Indicator (p. 47).
It allows the depth of focus to be read off at a glance for any stop once the lens is focused at any distance. This is the Elmar *f* 3.5 5 cm. lens. The example, **left**, shows it focused at 7 ft. and stopped down to 6.3; the depth of focus extends from 5¾ ft. to 8½ ft. The



example, **right**, shows the same lens focused at 20 ft. and stopped down to 12.5; now the depth of focus extends from 9¾ ft. to infinity. Should we want depths different from those created by the stops just suggested, we can make use of the depth of focus indicator in another way: we look up the area wanted on the outer ring, find the corresponding stops which would give us all this depth on the inner ring and then stop down the lens accordingly

DEPTH OF FOCUS FOR 2.8 cm. f 6.3 HEKTOR

	1–8⅝	2–1⅜	2–4⅛	2–8 11/16	3–3/16	3–6⅝	4–5/16	4–5 7/16	4–10 1/16	5–6	6–1	6–9	7–7	8–8	9–10	10–11	12–3
f 6.3	2	2½	3	3½	4	5	6	7	8	10	12	15	20	30	50	100	∞
	2–4 11/16	3–1 11/16	3–11 11/16	4–10 13/16	5–11	8–5	11–9	16–4	23–1	54–6	59–2	∞	∞	∞	∞	∞	∞

	1–7 7/16	1–11¼	2–2 11/16	2–5 13/16	2–8⅝	3–1⅞	3–6⅝	3–10¼	4–1 11/16	4–7⅝	5	5–5	6	6–8	7–4	7–11	8–7
f 9	2	2½	3	3½	4	5	6	7	8	10	12	15	20	30	50	100	∞
	2–7 5/16	3–6⅜	4–7⅜	5–11	7–6	12	20	38–2	120	∞	∞	∞	∞	∞	∞	∞	∞

	1–6⅛	1–9⅜	2–¼	2–2 13/16	2–5⅛	2–9⅛	3–½	3–3⅜	3–5 13/16	3–9 13/16	4–1 15/16	4–4½	4–8⅝	5–1	5–6	5–10	6–2
f 12.5	2	2½	3	3½	4	5	6	7	8	10	12	15	20	30	50	100	∞
	2–11½	4–2 7/16	5–10	8–1	11–4	26–4	21–4	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞

	1–4⅜	1–6 15/16	1–9 7/16	1–11⅛	2–1 13/16	2–3 11/16	2–6	2–7⅞	2–9½	3	3–1⅞	3–4	3–6⅜	3–9	3–11⅜	4–1 5/16	4–3 7/16
f 18	2	2½	3	3½	4	5	6	7	8	10	12	15	20	30	50	100	∞
	3–9	6	10	19–1	60	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞

	1–2 9/16	1–4 9/16	1–6¼	1–7 11/16	1–8 13/16	1–10⅞	2–7/16	2–1 11/16	2–2⅜	2–4 5/16	2–5 7/16	2–5 11/16	2–8 1/16	2–9 9/16	2–10⅞	2–11 15/16	3–1
f 25	2	2½	3	3½	4	5	6	7	8	10	12	15	20	30	50	100	∞
	5–8	13–2	107	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FOCUS FOR 3.5 cm. f 3.5 ELMAR

	3–2	3–7	4–4	5–1	5–10	6–6	7–9	8–11	10–5	12–8	16	20–5	25–7	34–5
f 3.5	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	3–11	4–6	5–10	7–3	8–9	10–5	14–1	18–5	26–7	48	232	∞	∞	∞
	3–1	3–6	4–3	4–11	5–7	6–2	7–3	8–3	9–7	11–5	14–2	17–5	21–2	26–10
f 4.5	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	4	4–8	6–2	7–9	9–6	11–5	16	21–10	34	79	∞	∞	∞	∞
	2–11	3–4	4	4–7	5–2	5–8	6–7	7–5	8–5	9–9	11–8	13–10	16–1	19–2
f 6.3	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	4–4	5–1	6–9	8–9	11–1	13–9	20–11	32	63	∞	∞	∞	∞	∞
	2–9	3–1	3–8	4–2	4–7	5	5–9	6–4	7–1	8	9–3	10–7	11–10	13–5
f 9	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	4–9	5–8	8	10–10	14–8	19–10	39	115	∞	∞	∞	∞	∞	∞
	2–7	2–10	3–4	3–8	4–1	4–4	4–11	5–4	5–10	6–6	7–4	8–1	8–10	9–8
f 12.5	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	5–6	6–10	10–5	15–10	25–6	47	∞	∞	∞	∞	∞	∞	∞	∞
	2–4	2–6	2–10	3–2	3–5	3–8	4	4–4	4–8	5	5–6	5–11	6–2	6–8
f 18	**3.5**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**15**	**20**	**30**	**50**	**100**	∞
	7–4	9–11	19–9	57–7	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FOCUS TABLE FOR 5 cm. ELMAR f 3.5, HEKTOR f 2.5, SUMMAR f 2, SUMMITAR f 2, XENON f 1.5

f 1.5	3–5½ **3.5** 3–6⅞	3–11 **4** 4–1⅛	4–10⅜ **5** 5–1⅝	5–9⅝ **6** 6–2½	6–8¾ **7** 7–3½	7–7⅞ **8** 8–4½	8–6¾ **9** 9–5¾	9–5⅝ **10** 10–7⅛	11–3 **12** 12–10	13–10 **15** 16–5	18–0 **20** 22–6	25–8 **30** 36–1	39–0 **50** 69–7	64 **100** 229–1	177–5 ∞ ∞
f 2 (f 2.2)	3–5 **3.5** 3–7	3–11 **4** 4–1	4–10 **5** 5–2	5–9 **6** 6–3	6–8 **7** 7–5	7–7 **8** 8–6	8–5 **9** 9–8	9–4 **10** 10–10	11–0 **12** 13–2	13–6 **15** 16–11	17–5 **20** 23–6	24–6 **30** 38–9	36–4 **50** 80–0	57–11 **100** ∞	133 ∞ ∞
f 2.5	3–4½ **3.5** 3–7⁹⁄₁₆	3–10⅛ **4** 4–2	4–9⅛ **5** 5–3⅜	5–8 **6** 6–5	6–6 **7** 7–7	7–5 **8** 8–9	8–3 **9** 9–11	9–1 **10** 11–2	10–8 **12** 13–8	13 **15** 17–8	16–8 **20** 25–1	23 **30** 43–2	33–2 **50** 102	49–7 **100** ∞	98 ∞ ∞
f 3.5 (f 3.2)	3–4 **3.5** 3–8½	3–9½ **4** 4–3	4–8 **5** 5–5	5–6 **6** 6–7	6–4 **7** 7–9	7–2 **8** 9–0	8–0 **9** 10–4	8–9 **10** 11–8	10–3 **12** 14–6	12–4 **15** 19–1	15–7 **20** 28	21 **30** 50	29 **50** ∞	41 **100** ∞	70 ∞ ∞
f 4.5	3–3½ **3.5** 3–9	3–8¾ **4** 4–4	4–7 **5** 5–6	5–5 **6** 6–9	6–2 **7** 8–0	7–0 **8** 9–4	7–9 **9** 10–9	8–5 **10** 12–3	9–10 **12** 15–5	11–9 **15** 20–8	14–8 **20** 31–7	19–4 **30** 66	26–2 **50** ∞	35–5 **100** ∞	55 ∞ ∞
f 6.3	3–2½ **3.5** 3–10	3–7½ **4** 4–5½	4–5 **5** 5–9	5–2 **6** 7–1	5–11 **7** 8–6	6–7 **8** 10–1	7–4 **9** 11–8	7–11 **10** 13–5	9–2 **12** 17–4	10–10 **15** 24–4	13–3 **20** 41	17 **30** 129	22 **50** ∞	28 **100** ∞	39 ∞ ∞
f 9	3–1 **3.5** 4–0	3–6 **4** 4–8	4–3 **5** 6–1	4–11 **6** 7–8	5–7 **7** 9–5	6–2 **8** 11–4	6–9 **9** 13–5	7–4 **10** 15–9	8–4 **12** 21–5	9–8 **15** 33–3	11–7 **20** 75	14–4 **30** ∞	17–8 **50** ∞	21–6 **100** ∞	27 ∞ ∞
f 12.5	3–0 **3.5** 4–3	3–4 **4** 5–0	4–0 **5** 6–8	4–7 **6** 8–8	5–2 **7** 10–10	5–8 **8** 13–6	6–2 **9** 16–7	6–8 **10** 20–4	7–5 **12** 30–9	8–6 **15** 63	9–11 **20** ∞	11–11 **30** ∞	14–2 **50** ∞	16–5 **100** ∞	20 ∞ ∞
f 18	2–9½ **3.5** 4–8⅛	3–1 **4** 5–8	3–8 **5** 7–11	4–2 **6** 10–8	4–8 **7** 14–4	5–0 **8** 19–3	5–5 **9** 26–4	5–9 **10** 37–3	6–5 **12** 98	7–2 **15** ∞	8–1 **20** ∞	9–5 **30** ∞	10–9 **50** ∞	12 **100** ∞	14 ∞ ∞

DEPTH OF FOCUS TABLE FOR 7.3 cm. HEKTOR f 1.9

f 1.9	3–5⅛ 3.5 3–6½	3–11¼ 4 4–0⅝	4–11 5 5–1⅛	5–10½ 6 6–1⅝	6–10 7 7–2⅛	7–9½ 8 8–3	8–8⅝ 9 9–3⅝	9–8 10 10–4½	11–6 12 12–6½	14–3 15 15–10	18–8 20 21–6	27–1 30 33–7	35 40 46–7	42–5 50 60–9	59–3 75 102	73–9 100 155	98 150 321	281 ∞ ∞
f 2.2	3–5⅛ 3.5 3–6½	3–11¼ 4 4–1	4–10¾ 5 5–1⅓	5–10¼ 6 6–2	6–9⅞ 7 7–2½	7–9 8 8–3⅓	8–8 9 9–4½	9–7¼ 10 10–5¼	11–5 12 12–7½	14–1 15 16	18–5 20 21–10	26–8 30 34–4	34–3 40 48–1	41–4 50 63–3	57–1 75 109–5	70–6 100 172	92–1 150 404	239 ∞ ∞
f 3.2	3–5⅛ 3.5 3–7	3–11 4 4–1⅛	4–10⅓ 5 5–2	5–9½ 6 6–2¾	6–8⅜ 7 7–3¾	7–7⅞ 8 8–5	8–6½ 9 9–6½	9–5¼ 10 10–7⅜	11–2 12 12–11	13–9 15 16–6	17–10 20 22–9	25–5 30 36–7	32–3 40 52–7	38–6 50 71–4	51–9 75 136	62–7 100 249	79 150 ∞	167 ∞ ∞
f 4.5	3–4⅝ 3.5 3–7⅛	3–10½ 4 4–1⅞	4–9⅜ 5 5–2⅜	5–8½ 6 6–4	6–7⅛ 7 7–5⅛	7–6 8 8–7	8–4½ 9 9–9	9–3 10 10–11	10–11 12 13–4	13–4 15 17–2	17–2 20 24–1	23–11 30 40–1	29–11 40 60–4	35–2 50 86–4	46 75 203	54–4 100 631	66–4 150 ∞	119 ∞ ∞
f 6.3	3–4⅛ 3.5 3–8	3–10 4 4–2⅛	4–8¾ 5 5–3⅜	5–7⅛ 6 6–5⅛	6–5⅜ 7 7–7⅛	7–3⅜ 8 8–10	8–2 9 10–1	8–11 10 11–4	10–6 12 14	12–9 15 18–3	16–2 20 26–2	22–2 30 46–5	27–2 40 75–8	31–2 50 122	39–10 75 645	45–11 100 ∞	54–2 150 ∞	84–10 ∞ ∞
f 9	3–3⅜ 3.5 3–8⅜	3–9 4 4–3½	4–7⅛ 5 5–5⅛	5–5⅛ 6 6–8	6–3 7 7–11	7–1 8 9–3	7–10 9 10–7	8–7 10 12	10 12 15	12 15 20–1	15 20 30–2	19–11 30 60–7	23–11 40 122	27–2 50 315	33–2 75 ∞	37–3 100 ∞	42–5 150 ∞	59–5 ∞ ∞
f 12.5	3–3 3.5 3–10¼	3–8 4 4–5	4–6 5 5–8	5–3 6 7	6 7 8–4½	6–9 8 9–10	7–5 9 11–5	8–1 10 13–1	9–4 12 16–8	11–1 15 23–1	13–8 20 37–7	17–8 30 100–6	20–8 40 616	23–1 50 ∞	27–3 75 ∞	30 100 ∞	33–3 150 ∞	42–9 ∞ ∞
f 18	3–1⅜ 3.5 4	3–6½ 4 4–7⅛	4–3 5 6	5 6 7–6	5–8 7 9–2	6–4 8 10–11	6–11 9 12–11	7–6 10 15–1	8–7 12 20–2	10 15 30–2	11–11 20 61–3	14–11 30 ∞	17–1 40 ∞	18–8 50 ∞	21–3 75 ∞	22–11 100 ∞	24–10 150 ∞	29–8 ∞ ∞
f 25	3 3.5 4–2¼	3–4⅛ 4 4–11	4 5 6–6	4–8 6 8–4	5–3 7 10–5	5–10 8 12–9	6–4 9 15–6	6–10 10 18–9	7–8 12 27–4	8–10 15 50–3	10–4 20 308	12–6 30 ∞	13–11 40 ∞	15 50 ∞	16–8 75 ∞	17–8 100 ∞	18–9 150 ∞	21–5 ∞ ∞

DEPTH OF FOCUS TABLE FOR 9 cm. ELMAR f 4

f4.5	3–5¼	3–11	4–10½	5–10	6–9	7–8	8–7	9–6	11–4	13–11	18–2	26–1	33–4	40	54–6	66–7	85–7	120	199
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–6¾	4–1	5–1½	6–2	7–3	8–4	9–5	10–6	12–9	16–3	22–3	35–4	50	66–9	121	200	∞	∞	∞
f6.3	3–5	3–10½	4–9¾	5–9	6–7¾	7–6	8–5	9–3	11	13–5	17–3	24–3	30–5	35–10	47–1	55–10	68–8	89	127
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–7¼	4–1¾	5–2½	6–3½	7–5	8–7	9–8	10–10	13–3	17	23–9	39–4	58–7	82–8	184	∞	∞	∞	∞
f9	3–4½	3–10	4–8¾	5–7½	6–6	7–4	8–2	9	10–7	12–10	16–4	22–5	27–7	32	40–7	47	55–8	68–5	89
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–7¾	4–2¼	5–3½	6–5	7–7	8–10	10	11–3	13–11	18–1	25–10	45–4	73	115	∞	∞	∞	∞	∞
f 12.5	3–4	3–9¼	4–7¾	5–6	6–4	7–1	7–11	8–8	10–1	12–2	15–3	20–5	24–7	28	34–6	38–11	44–9	52–7	64
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–8½	4–3	5–5	6–7½	7–10	9–2	10–6	11–10	14–9	19–7	29–2	56–8	107	231	∞	∞	∞	∞	∞
f 18	3–3	3–8	4–6	5–3½	6–1	6–9	7–6	8–2	9–5	11–2	13–9	17–11	21	23–6	27–10	30–8	34–2	38–7	44
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–9¾	4–5	5–7¾	6–11	8–4	9–9	11–4	12–11	16–6	22–8	36–6	93	∞	∞	∞	∞	∞	∞	∞
f25	3–2	3–6½	4–4	5–1	5–9	6–5	7	7–7	8–9	10–2	12–3	15–5	17–9	19–6	22–5	24–2	26–4	28–10	31–11
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	3–11	4–7	5–11	7–5	9	10–8	12–6	15–6	19–3	28–4	54	∞	∞	∞	∞	∞	∞	∞	∞
f36	3	3–5	4–1	4–9	5–4	5–11	6–5	6–11	7–9	8–11	10–6	12–9	14–3	15–4	17–1	18–2	19–4	20–8	22–2
	3.5	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	4–2	4–11	6–6	8–3	10–3	12–6	15–2	18–3	26–2	46–6	206	∞	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FOCUS TABLE FOR 10.5 cm. ELMAR f 6.3

f 6.3	6–9	7–8	8–7	9–5	11–3	13–10	17–9	25–7	32–6	38–9	52–3	63–3	80–2	109–5	172
	7	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	7–4	8–5	9–6	10–8	12–11	16–5	22–8	36–4	52–1	70–5	133	238	∞	∞	∞
f 9	6–8	7–6	8–5	9–3	10–11	13–4	17–2	24	30	35–4	46–3	54–8	66–10	86	120–7
	7	**8**	**9**	10	12	15	20	30	40	50	75	100	150	300	∞
	7–5	8–7	9–9	10–11	13–4	17–2	24	39–11	59–10	85–9	198	586	∞	∞	∞
f 12.5 ...	6–6	7–4	8–2	9	10–7	12–10	16–3	22–4	27–5	31–9	40–3	46–6	55	67–4	86–10
	7	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	7–7	8–10	10–1	11–4	13–11	18–2	26	45–10	74–2	118	551	∞	∞	∞	∞
f 18	6–3	7–1	7–10	8–7	10	12	15	20	24–1	27–4	33–5	37–7	43	50–2	60–3
	7	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	7–11	9–3	10–7	12	15	20	29–11	59–9	119	294	∞	∞	∞	∞	∞
f 25	6	6–9	7–6	8–2	9–5	11–2	13–8	17–9	20–10	23–3	28–10	30–3	33–8	37–11	43–5
	7	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	8–4	9–10	11–4	13	16–7	22–11	37–1	97–2	510	∞	∞	∞	∞	∞	∞
f 36	5–8	6–4	6–11	7–6	8–7	10	12	15	17–2	18–10	21–6	23–2	25–1	27–5	30–2
	7	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**75**	**100**	**150**	**300**	∞
	9–1	10–11	12–10	15	19–11	29–10	59–5	∞	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FOCUS TABLE FOR 13.5 cm. ELMAR 4.5 AND HEKTOR f 4.5

f 4.5	4–11¼	5–10⅛	6–10½	7–10⅛	8–9½	9–9	11–7⅝	14–5½	19–1	28	36	44	52	63	80	109	171	399
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–0⅜	6–1⅛	7–1½	8–2	9–2½	10–3	12–4½	15–7	21–1	32–6	44–6	57	71	92	133	241	∞	∞
f 6.3	4–11	5–10½	6–10	7–9⅞	8–8¾	9–8	11–6⅛	14–3	18–8	27	35	42–6	49–6	59	74	98	146	285
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–1 1/16	6–1 9/16	7–2⅛	8–2⅜	9–3½	10–4½	12–6¼	15–10	21–6	33–6	46–6	61	76	102	154	317	∞	∞
f 9	4–10½	5–9 15/16	6–9⅛	7–8¼	8–7¼	9–6½	11–4	13–11	18–2	26	33	40	46	54	67	86	120	199
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–1 9/16	6–2¼	7–3 1/16	8–4	9–5⅛	10–6½	12–9	16–3	22–3	35	50	67	86	120	201	∞	∞	∞
f 12.5	4–10	5–9⅛	6–8⅛	7–7	8–5½	9–4¼	11–1	13–7	17–6	25	31	37	42	49	59	73	97	143
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–2 3/16	6–3⅛	7–4¼	8–5⅜	9–7¼	10–9	13–1	16–9	23–3	38	55	77	103	157	330	∞	∞	∞
f 18	4–9⅛	5–8	6–6½	7–5	8–3	9–1	10–9	13	16–6	22–6	28–6	33	37	43	50	60	75	99
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–3 3/16	6–4½	7–6¼	8–8½	9–10⅜	11–1½	13–8	17–5	25	43	67	100	151	303	∞	∞	∞	∞
f 25	4–8⅛	5–6½	6–4½	7–2¼	8	8–9½	10–3	12–5	15–6	21	26	29	33	37	42	49	58	72
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–4½	6–6 9/16	7–9 1/16	9	10–3½	11–7½	14–5	19	28	51–6	90	165	366	∞	∞	∞	∞	∞
f 36	4–6¾	5–4⅓	6–1½	6–10⅜	7–7½	8–4	9–8	11–6	14	19	22	25	27	30	33	37	43	50
	5	**6**	**7**	**8**	**9**	**10**	**12**	**15**	**20**	**30**	**40**	**50**	**60**	**75**	**100**	**150**	**300**	∞
	5–6 1/16	6–10	8–1⅜	9–6½	11	12–6	15–10	21–5	33–6	75	203	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FOCUS TABLE FOR 20 cm. TELYT f 4.5

f 4.5	...	11–10 12 12–2	14–9 15 15–3	16–8 17 17–4	19–7 20 20–6	21–6 22 22–7	24–4 25 25–9	26–2 27 27–10	29 30 31	30–10 32 32–3	33–8 35 36–6	35–5 37 38–8	38–3 40 41–11	40–1 42 44–1	42–10 45 47–5	44–7 47 49–8	47–4 50 53	49–1 52 55–3	51–9 55 58–8
f 6.3	...	11–9 12 12–3	14–8 15 15–4	16–7 17 17–6	19–5 20 20–8	21–3 22 22–10	24–1 25 26–1	25–11 27 28–3	28–8 30 31–6	30–5 32 33–9	33–2 35 37–1	34–11 37 39–4	37–7 40 42–9	39–4 42 45	42 45 48–6	43–9 47 50–10	46–4 50 54–4	48 52 56–9	50–7 55 60–4
f 9	...	11–8 12 12–4	14–6 15 15–6	16–4 17 17–8	19–2 20 21	21 22 23–2	23–8 25 26–6	25–5 27 28–9	28–1 30 32–2	29–10 32 34–6	32–5 35 38–1	34–1 37 40–5	36–8 40 44	38–4 42 46–6	40–10 45 50–2	42–5 47 52–8	44–10 50 56–5	46–6 52 59	48–10 55 63
f 12.5	...	11–7 12 12–6	14–4 15 15–9	16–2 17 17–11	18–10 20 21–4	20–7 22 23–8	23–2 25 27–2	24–10 27 29–6	27–5 30 33–2	29–1 32 35–7	31–6 35 39–4	33–1 37 41–11	35–6 40 45–10	37–1 42 48–5	39–5 45 52–6	40–11 47 55–3	43–2 50 59–5	44–8 52 62–3	46–10 55 66–7
f 18	...	11–5 12 12–8	14 15 16–1	15–9 17 18–5	18–4 20 22	20 22 24–5	22–5 25 28–3	24 27 30–11	26–5 30 34–9	28 32 37–6	30–2 35 41–8	31–8 37 44–6	33–10 40 49	35–3 42 52	37–4 45 56–8	38–8 47 60	40–8 50 64–10	42 52 68–3	43–11 55 73–6
f 25	...	11–2 12 13	13–8 15 16–7	15–4 17 19–1	17–9 20 22–11	19–4 22 25–7	21–7 25 29–9	23–1 27 32–7	25–3 30 37–1	26–7 32 40–2	28–8 35 45	30 37 48–4	31–11 40 53–7	33–2 42 57–3	35 45 63–2	36–3 47 67	38 50 73–2	39–1 52 77–7	40–9 55 84–5
f 36	...	10–10 12 13–6	13–2 15 17–5	14–9 17 20–2	16–11 20 24–6	18–4 22 27–6	20–4 25 32–5	21–8 27 35–10	23–7 30 41–7	24–9 32 45–3	26–6 35 51–6	27–8 37 56	29–3 40 63–1	30–4 42 68–2	32–2 45 76–6	32–10 47 82–5	34–4 50 92	35–3 52 99–2	36–7 55 111

DEPTH OF FOCUS TABLE FOR 20 cm. TELYT f 4.5

f 4.5	...	...	56–2	61	65	73	82	90	109	128	146	163	194	223	275	318	389	467	874
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			64–5	70	76	88	100	113	146	181	219	259	350	457	737	1167	∞	∞	∞
f 6.3	...	...	54–9	58–11	63	71	79	86	104	121	137	151	178	203	244	278	330	385	625
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			66–4	72–7	79	92	105	119	156	197	243	294	417	577	1111	∞	∞	∞	∞
f 9	....	...	52–9	56–7	60–4	67–8	74–8	81	97	112	125	137	159	178	209	230	269	304	437
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			69–7	76–3	83–6	98	113	130	175	228	292	368	586	1380	∞	∞	∞	∞	∞
f 12.5	...	...	50–5	54	57	64	70	76	90	102	113	122	140	154	176	193	217	240	315
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			74	82	90	107	126	146	207	286	393	546	1205	∞	∞	∞	∞	∞	∞
f 18	...	...	47–1	50–1	52–10	58–7	63–9	69	80	89	97	105	117	127	142	152	167	180	219
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			82–8	93	103	126	153	184	292	478	876	∞	∞	∞	∞	∞	∞	∞	∞
f 25	...	...	43–6	46–1	48–6	53	57–4	62–2	70	77	83	88	97	100	114	120	129	136	158
			60	**65**	**70**	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			97	111	126	162	210	273	602	3063	∞	∞	∞	∞	∞	∞	∞	∞	∞
f 36	...	...	38–9	40–9	42–8	46–2	49–4	52–3	58–4	63–3	67–4	70–8	76–1	80–2	86	89	95	99	109
			60	**65**	70	**80**	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**400**	**500**	**700**	**1000**	**∞**
			133	160	195	298	509	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞

THE TECHNIQUE OF EXPOSURE

The correct exposure time depends on two sets of circumstances:—

(1) The amount and colour of light reflected from the object to be photographed. This, in its turn, depends on the season of the year, the time of day, situation, weather, etc.

(2) The speed of film, the kind of filter used, the aperture employed and probably an allowance for an increase in exposure in the case of special fine grain development.

The correct exposure time can be ascertained with the help of:—

EXPOSURE TABLES. These are based on mathematical calculations and practical experience. They tabulate all or most of the factors given above, and, if used with discretion, will give an exposure-figure which lies within the latitude of the film. Such an exposure table is given on p. 63.

OPTICAL EXPOSURE METERS, also called "visual" or "extinction type" meters. They measure, with the aid of the eye, the amount of light reflected. Their main advantage lies in the fact that they can be used under particularly poor light conditions—indoors, for example. Their accuracy suffers from the fact that the sensitivity of the eye to light varies considerably according to individuals. If used consistently and with care, however, they will give exposure figures well within the latitude of the film.

PHOTO-ELECTRIC EXPOSURE METERS. They are the most accurate and dependable means available for arriving at the right exposure time. They consist of a photo-electric cell which converts light-energy into electricity, which in turn moves an indicator over a table of light values. There are a number of photo-electric meters specially calibrated for the Leica—for example, *Weston-Leicameter*, *Leica-Sixtus*, *L.C.60*.

The field covered by an electric exposure meter is wider than that covered by a standard lens of the Leica (Weston-Leicameter=60°, Leica-Sixtus over 100°). With standard

EXPOSURE TABLE FOR DAYLIGHT

1. *Subject and month value*

Subject	*Jan. Nov. Dec.*	*Feb. Oct.*	*Mar. Sept.*	*April Aug.*	*May June July*
Open land- or seascape, without foreground	5	4	3	2	1
—with light foreground ...	6	5	4	3	2
Outdoor subjects with normal foreground, streets, architecture	7	6	5	4	3
—with dark foreground, Portraits, groups	8	7	6	5	4
Indoors well lit, near window	9	8	7	6	5
—normal	11	10	9	8	7

2. *Time and light value*

Time of day	*Clear sky*	*Light clouds*	*Med. clouds*	*Heavy clouds*
9 a.m.—11 a.m.	2	3	4	5
11 a.m.— 2 p.m.	1	2	3	4
2 p.m.— 4 p.m.	2	3	4	5
4 p.m.— 6 p.m.	3	4	5	6

3. *Film speed and aperture value*

Film speed Scheiner	*Stop 2*	*Stop 3.5*	*Stop 4.5*	*Stop 6.3*	*Stop 9*	*Stop 12.5*	*Stop 18*
31°	—6	—4	—3	—2	—1	0	1
28°	—5	—3	—2	—1	0	1	2
25°	—4	—2	—1	0	1	2	3
22°	—3	—1	0	1	2	3	4
19°	—2	0	1	2	3	4	5

4. *Result*

Value ...	—1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds	1/1,000	1/500	1/200	1/100	1/60	1/40	1/20	⅛	¼	½	1	2	4	8	15	30

Value ...	17	18	19	20	21	22	23
Minutes ...	1	2	4	8	16	30	60

Add the respective figures in the Tables 1, 2 and 3, the correct exposure time can then be taken from Table 4.

5 cm. and particularly long focus lenses, which have a considerably smaller angle, the measurement should be taken from a point nearer to the camera than the one at which the subject is actually situated. As any meter measures the light value of dark *and* light objects within its field, it will be necessary to point the instrument towards the darkest object within the area to be photographed, provided that no deliberate under-exposure of the shadows is intended, as it may be the case with particularly contrasty subjects like stage shots, etc.

The Right Negative

The employment of an exposure meter is strongly recommended in order to secure negatives suitable for, if necessary, considerable enlarging. Leica negatives must be very sharp, have fine grain and show a well-balanced gradation.

The Leica photographer who shoots haphazardly, relying on the latitude of modern films, just like a snapshoter with a box camera, does not deserve and will not get better pictures than the man with the five-shilling instrument.

The beginner will be particularly well advised to use the *exact time of exposure* suggested by his meter and to employ straightforward methods of development. In this way he will achieve negatives with the best definition for a reasonable degree of enlargement. The grain—provided he was using films of medium speed—will not show unpleasantly.

The advanced worker aiming at particularly fine-grained results and intending to use special fine grain developers, must be aware of the loss of speed caused by them and allow for the increase in exposure time. He will have the satisfaction of mastering by this method even subjects of very high contrast at the cost of some loss of definition which inevitably goes with generous exposure.

Again, intentional over-exposure or any variation of exposure in aiming at definite pictorial effects is only possible after the *correct* exposure time has been ascertained. Therefore, a reliable exposure meter is indispensable.

CIRCUS (above) by H. S. NEWCOMBE. *Xenon 5 cm., f 1.5, 1/200th second, M.C.M. 100 developer.*

HARBOUR NIGHT (p. 68) by VICTOR MEEUSSEN, *Elmar 3.5 cm., f 6.3, Kodak Panatomic film, 1½ minutes, D.76 developer.*

VILLAGE GREEN (p. 65) by W. G. BRIGGS. *Summar 5 cm., f 4.5, Kodak Plus X film, Ilford Micro 5 filter, 1/60th second, Meritol Metol developer.*

LONDON FOG (p. 66) by K. HUBSHMANN. *Elmar 3.5 cm., f 3.5, Kodak Super XX film, 1/60th second, Paraphenylenediamine developer.*

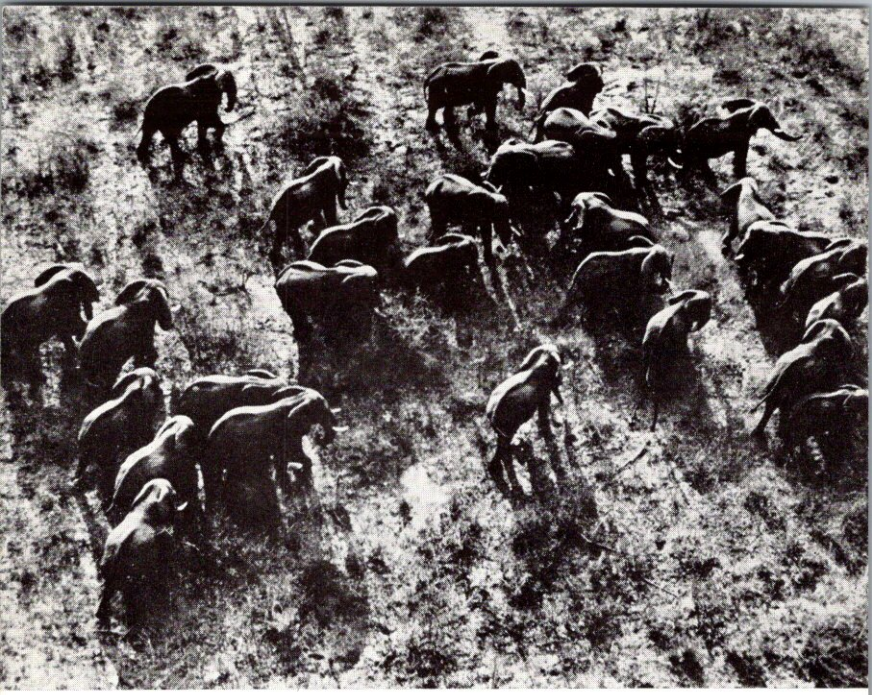
WINTER HOLIDAY (p. 67) by PAUL WOLFF. *Elmar 5 cm., f 8, Agfa Isochrom film, U.V. filter, 1/60th second, Leicanol developer.*

WAR FACTORY (p. 70) by W. G. BRIGGS. *Summar 5 cm., f 3.5, Kodak Super XX film, ½ second, Meritol Metol developer.*

THE MAN IN THE SAME COMPARTMENT (above) by HERBERT PAUL. *Summar 5 cm., f 2.8, Kodak Panatomic film, 1/30th second, Leicanol developer. (Taken through the buttonhole of the photographer from a seat opposite.)*

MR. CHURCHILL VERY PRIVATE (p. 72) by K. HUBSHMANN. *Elmar 5 cm., f 6.3, Kodak Plus X film, 1/100th second, Paraphenylenediamine developer.*


PARIS
Ouest
Nord
Halles



ELEPHANTS (above) by M. McADAM. *Taken with Elmar 13.5 cm. from low-flying aeroplane. Further data unknown.*

THE LADY WITH THE SHADOW (p. 73) by ZOLTAN GLASS. *Thambar 9 cm., f 3.5, Agfa Isopan F. film, two 500-Watt lamps, 1/20th second, Ultrafin S.F. developer.*

THE BATH (p. 74) by W. G. BRIGGS. *Elmar 9 cm., f 3.5, Kodak Super XX film, two photo-flood lamps, 1/100th second, Meritol Metol developer.*

LITTLE FRENCH SCHOOL (p. 75) by JEAN REISMAN. *Summar 5 cm., f 3.5, Kodak Super XX film, 1/60th second, Focal Superfine grain developer.*

BOAT-SWING (p. 76) by W. G. BRIGGS. *Summar 5 cm., f 4.5, Agfa FF film, 1/200th second, Meritol Metol developer.*

PLAY ON DECK (p. 77) by ZOLTAN GLASS. *Elmar 5 cm., f 6.3, Agfa Isopan F. film, 1/500th second, Ultrafin S.F. developer.*

DAHLIA (above) by W. G. BRIGGS. *Elmar 9 cm., f 9, Kodak Plus X film, 1/40th second, Meritol Metol developer.*

LEAVES (p. 79) by W. G. BRIGGS. *Elmar 9 cm., f 6.3, Agfa FF. film, 1/40th second, Meritol Metol developer.*

THE TECHNIQUE OF TONE

The Use of Filters

The photographic film, even when orthochromatic or panchromatic, fails to render colours in their true black and white tone values, so that the photograph often gives quite a false impression of the real scene. The explanation of this discrepancy is the following.

Scientifically speaking, to the human eye yellow appears to be over ten times as bright as blue, three times as bright as red, and one and a half times as bright as green. The average panchromatic film (p. 29), however, registers blue with a brilliance of about four-fifths that of yellow, green with one-third, and red with two-thirds of the brightness of yellow.

It is therefore evident that in order to obtain a colour rendering which shall correspond with some degree of accuracy to the impression of colours received by our eye, the comparative sensitivity of the various colours to each other in our film will have to be corrected. This can be achieved by the use of filters.

Filters are intended to correct on our negative material the various degrees of brightness of the actual picture. Principally, *they lighten objects of their own colour and darken those of their complementary colour* (e.g. a yellow filter will darken the blue of the sky). They may be used to obtain a colour rendering in our picture which corresponds more closely to the impression made upon our eye by the object: here we speak of "correction filters". Filters may also be employed to produce certain effects; for instance, our picture can be made to show heavy clouds against a particularly dark sky, whereas the actual landscape revealed only light clouds in a blue sky. Filters employed to such ends are termed "effect-filters".

All filters cut out certain parts of the light and an increase in exposure time is always necessary when using them. Exact figures can only be given for each particular case, according to the film used, for the exposure ratio depends

not only on the nature of the filter, but on the colour sensitivity of the film and on the colour of the light in which the photograph has to be taken. There are tables available which speak of 1.4 or 1.7 times the exposure, but we can cheerfully ignore these fractions and content ourselves with round figures, such as 1.5, 2, 3 times, etc., without fear of error.

FILTER FACTORS

In Daylight	*Orthochromatic Film*	*Panchromatic Film*	*Infra-Red Film*
Yellow Filter 0 ...	1.5	1.5	—
1 ...	2	2	—
2 ...	3	2.5	—
Green Filter	—	3	—
Orange Filter	—	4	—
Red Filter—Light ...	—	20	10
Medium ...	—	—	14
Dark ...	—	—	15
Ultra-Violet Filter ...	1.5	1.5	—
In Artificial Light			
Yellow Filter 0 ...	1.5	*No Increase*	—
1 ...	2	1.5	—
2 ...	3	2	—
Green Filter	—	3	—
Blue Filter	—	1.5	—

The following list gives a summary of the filters recommended and a short explanation of their use.

YELLOW FILTERS, suitable for orthochromatic and panchromatic film. They mainly reduce the actinic effect of blue, rendering it darker and are therefore particularly suitable for landscape photography In order to obtain clearly defined cloud effects on a normal blue sky. In case of a very light blue sky, a darker filter should be used and vice versa.

GREEN FILTERS suitable for panchromatic films. This effect is similar to that of yellow filters, but it also holds back red (renders it darker), to which the panchromatic film is comparatively oversensitive (photographing it too light).

SKY FILTERS are designed for photographing scenes with a bright background and a dark foreground, such as often occur in landscape photography. They serve mainly to avoid partial over-exposure, and are obtainable as graduated green filters for panchromatic film only, and graduated yellow filters for both orthochromatic and panchromatic material.

If the top part of the object (as in landscapes) is bright, the coloured part of the filter should cover the top part of the lens. No exposure increase is necessary if the exposure time has been determined for the darker part of the picture.

ULTRA-VIOLET FILTERS for orthochromatic and panchromatic film. The very light ultra-violet filter is only to be used in heights of 6,500 ft. (2,000 m.) and over to avoid an unduly dark sky, such as would be obtained by using a yellow filter. At the same time it absorbs the ultra-violet rays of the high atmosphere for which the lens is not corrected and which would reduce the definition.

ORANGE FILTERS are for panchromatic film only. They give over-correction, and serve, therefore, as an "effect" filter for drawing *heavy* clouds against a dark sky, and very clear distances in landscapes, eliminating light haze, etc.

RED FILTERS are for panchromatic film only. Of still stronger effect than the orange filter, for *extreme* contrast, creating black sky with brilliant clouds, faking sunshine into moonlight effects, etc.

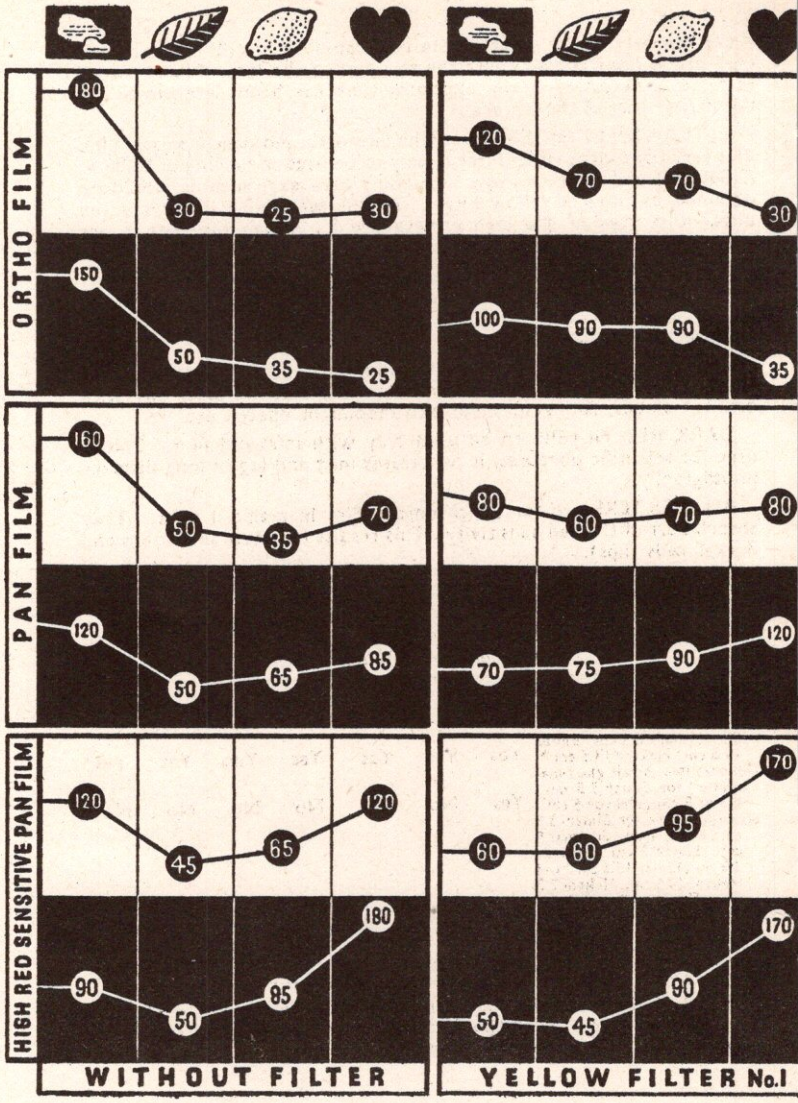
DARK RED FILTERS to be used only with infra-red film. Chiefly used for scientific purposes, it penetrates mist and fog in long distance photography.

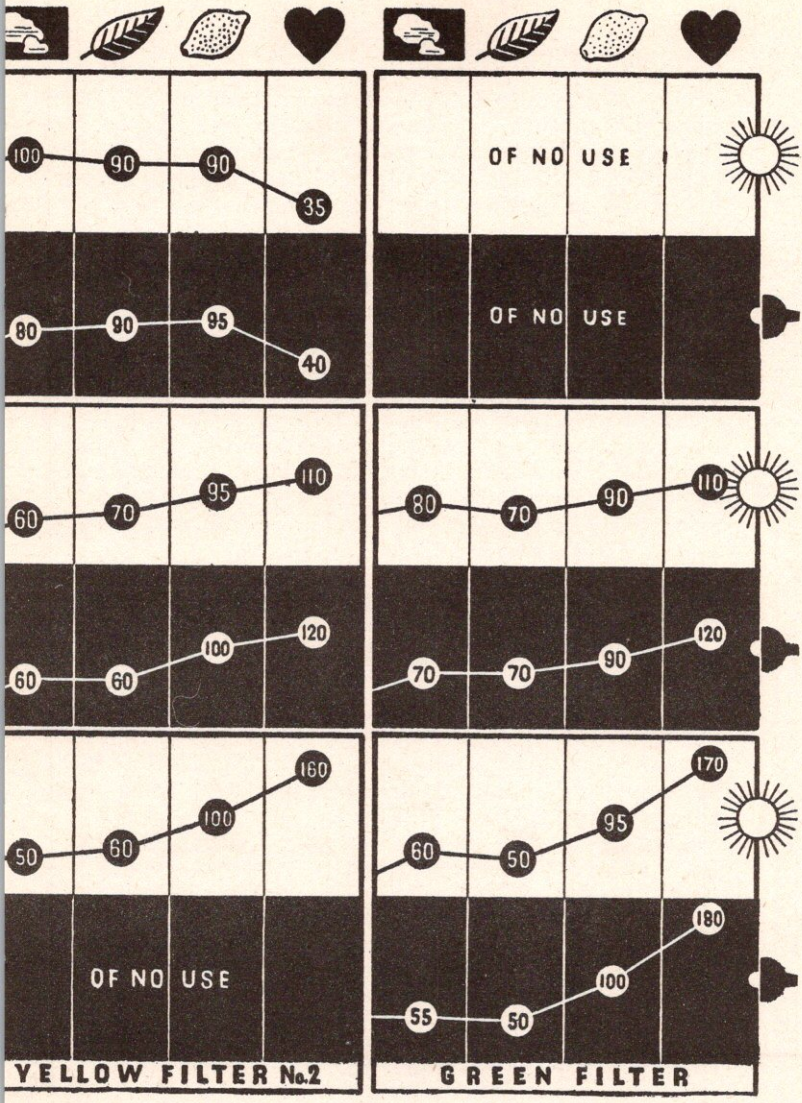
BLUE FILTERS are for panchromatic film in artificial light. They absorb part of the red sensitivity. This results in better skin-tones and darker reds (lips).

TYPES OF FILTERS AVAILABLE FOR INTERCHANGEABLE LEICA LENSES

	No. 0 Yellow	*No. 1 Yellow*	*No. 2 Yellow*	*Green*	*Gradu-ated*	*Red*	*Ultra-Violet*
Slip-on Filter for Hektor 2.8 cm., Elmar 3.5 cm., Elmar 5 cm., Hektor 5 cm., Elmar 9 cm., Elmar 10.5 cm., Elmar 13.5 cm., Hektor 13.5 cm.*	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Slip-on Filter (small glass diameter) for Elmar 3.5 cm., Elmar 5 cm., Hektor 5 cm.	Yes	No	Yes	No	No	No	No
Screw-in Filter for Elmar 3.5 cm., Elmar 5 cm., Summar 5 cm., Elmar 9 cm., Hektor 2.8 cm., Elmar 13.5 cm., and Hektor 13.5 cm., Hektor 7.3 cm., Thambar 9 cm., Telyt 40 cm.	Yes	Yes	Yes	Yes	No	Yes	Yes
Slip-on Filter for 5 cm., Summitar, 5 cm., Xenon 9 cm., Thambar, Telyt 20 cm. ...	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*They have the same diameter, therefore the same filter may be used for *all* lenses. With the 10.5 cm. Elmar the normal Leica filters may be used if pushed on to the lens hood instead of the lens mount.


ORTHO FILM
180
30
25
30
150
50
35
25
120
70
70
30
100
90
90
35
PAN FILM
160
50
35
70
120
50
65
85
80
60
70
80
70
75
90
120
HIGH RED SENSITIVE PAN FILM
120
45
65
120
90
50
85
180
60
60
95
170
50
45
90
170
WITHOUT FILTER
YELLOW FILTER No.1


100
90
90
35
80
90
95
40
OF NO USE
OF NO USE
60
70
95
110
60
60
100
120
80
70
90
110
70
70
90
120
50
60
100
160
OF NO USE
60
50
95
170
55
50
100
180
YELLOW FILTER No.2
GREEN FILTER

Polarizing Filter

There are occasions on which the judicious use of reflections will enhance the pictorial effect of the picture, but they are also frequently obtrusive and undesirable. Highly-polished subjects can be very difficult to illuminate successfully so as to obtain a true photographic rendering, since they will reflect too much light and so spoil the reproduction with a glare which obscures the detail. To overcome this difficulty the polarizing filter has been introduced. It consists of a layer of herapathite, cemented between two optical flat glasses. It suppresses light vibrating in one particular plane, while light vibrating in a plane at right angles to this will freely pass. Light reflections from glass, china, enamel, polished wooden surfaces, water, vibrate to a large extent in one plane (= it is polarized) and can therefore be almost extinguished by placing the polarizing filter in proper position over the lens. This filter will prove particularly useful when taking show windows, furniture, photography of wet objects, etc.

The filter has to be rotated to find out its best position on the lens. The Leica polarizing filter simplifies this as it consists of a clamping ring which fits over the Leica lens and a swing-out part in which the filter is mounted in a rotating ring. Swung out, the filter projects right over the camera and can be rotated to its best angle; the swinging back movement brings the filter exactly 180° downwards over the lens. As the polarizing filter is slightly tinted, the exposure time should be increased, the factor being about three times.

The Effect of Filters on Various Types of Film (pp. 84-85): *Let us assume that the value 100 represents "100 per cent. correct" tone rendering. Figures over 100 will indicate "too light" and figures under 100 "too dark" rendering of colours in black and white. Comparison of the different types of film materials when used in conjunction with the most popular filters will then show the percentage of "correctness" which can be achieved both in daylight and with photographic lamps. The symbols which stand for daylight and artificial light in our drawing on pp. 84-85 are obvious. The main colours of the spectrum are represented as follows: white clouds on dark background stand for blue, a leaf for green, a lemon for yellow and a heart for red (see also p. 81).*

SUBJECTS IN FRONT OF THE LEICA

In dealing with the various types of photographic subjects we shall necessarily confine ourselves to those within reach of the average Leica photographer. Subjects particular to specialized professional or scientific photography requiring skill and exactitude, which can only be developed by thorough training, cannot be usefully covered here. Neither shall we discuss photography in general, but we shall devote our attention merely to the peculiarities of the Leica and the suitability of the Leica equipment in approaching one or the other subject. *You will become a better photographer once you know what your camera will NOT do for you.*

LANDSCAPES. The typical picture-card "view" with the wide, open foreground and the distant background rich in diminutive detail, is a somewhat unthankful subject. Drawn by a lens of short or medium focus in a so much smaller size than it appears to our eyes, it may drop altogether beyond the resolving power of the film, particularly when over-exposed. Subjects the background of which is well filled by clean-cut forms of things not too far away, are much more easy to take. The inclusion of some matter with an interesting "profile" in the foreground helps to suggest space but may dwarf the main motif if not handled with discretion. Short focus lenses (2.8 cm.) will dramatize foreground and perspective. Long focus lenses (9 cm. and over) mellow the perspective and concentrate the picture around one single motif, producing shots much in the line of modern miniature photography. The "Universal" view-finder carried in the pocket and applied to the landscape as a sort of looking glass, is an excellent "finder of views" and helps to select the right lens for the scene. A lens hood is both parasol and umbrella to the lens, improving its sight in any weather. Orthochromatic films are still good for green landscapes. Medium speed panchromatic films are preferable for subjects rich in colourful detail. Fast panchromatic films with *increased* red sensitivity may help a bit with hazy views, but a filter does it just as well. Yellow filter for rendering clouds, orange filter for dramatic skies and to eliminate haze. When photographing against the light expose for the shadows.

More information in The new Photo Guide "All about Landscapes."

BUILDINGS. People who seem to have bought an inferiority complex with their miniature camera persist in arguing that it will produce architectural studies just like the old ground-glass camera with "movements", rising front, etc. They maintain that the difficulties presented to a camera of rigid construction in dealing with high perpendiculars

within a limited distance from the photographer can be overcome by the use of wide-angle lenses and/or elimination of the distortion when enlarging. Both claims are only partly correct. No wide-angle lens when used in a miniature is able to compete with the combined effect of wide-angle lens and raised front of the old camera. Further, wide-angle lenses must be used with discretion in architectural photography, as their emphatic suggestion of perspective may cause very misleading pictorial impressions. Lastly, there are only few enlargers available that will easily eliminate distortion of verticals without also introducing distortion of proportions. The photography of buildings with the Leica demands an entirely different angle of approach. The Leica is the very camera for photographing architectural detail. Countless charms of art, for centuries hidden, because too far from the human eye, were revealed for the first time by the use of the long focus (13.5–40 cm.) lenses. As very often parts only of the negative will be enlarged for this type of picture, the use of slow, fine grain films may be of advantage. Architecture and architectural background must be sharp; small stops are inevitable. As the resulting exposure times are likely to be long, sometimes very long, it is advisable to work from a stand and use the wire-release. For viewing, the Reflex Housing is preferable to the Universal Finder, which tends to give a somewhat exaggerated idea of tilts. Regarding tilts in general—a tilt recognizable as such is better than a camouflaged or accidental one. (Calibrated stands enabling tilts at known angles, in conjunction with wide-angle lenses locked in a position focused at infinity, allow the use of the Leica for photogrammetric surveys.)

More information in The new Photo Guide "All about Architecture."

PEOPLE. Legitimate "portraits" must have roundness and be undisturbed by background detail. This demands critical focusing, large apertures and the avoiding of a too close approach. Confined to small rooms the lens of normal focus (5 cm.) can be used for producing negatives a part of which can be enlarged to get heads only; it will, however, not be advisable to approach the sitter closer than about 6 ft. if distortions are to be avoided. Besides, no sitter will appreciate having the camera almost under his or her nose; this is another reason to work with lenses of longer focus. The lenses of 7.3, 9, and 13.5 cm. focus work well from a distance of 6 ft., producing negatives of direct portrait size. The Telyt 20 cm. is excellent for portraits, but wants a sitter-camera distance of about 6 yds. The Thambar 9 cm. is, of course, the portrait lens of the Leica, producing every possible shade of contour-softness and thereby an accentuated effect of roundness; it is, however, a delicate instrument that must be handled with caution, as its drawing changes considerably with every variation in aperture. Moreover, being a soft lens the Thambar will tend to reduce contrast and should not be used in conjunction with films of soft gradation, except for photographing very contrasty subjects. Medium speed panchromatic films will prove to be the best all-round material. The use of high-

speed pan films with much red sensitivity is not very advisable, as faces are likely to turn out too pale; if unavoidable, a pale blue filter should be used with them, and the lighting can be a contrasty one. Orthochromatic films should be used with yellow filter to tone down skin blemishes, and soft lighting is to be preferred. As exposure times are not likely to be very short, a stand must be used with long focus lenses. With normal lenses you can ride a chair, supporting the Leica on the chair's back. Do not stand with the camera held at your eye looking down at a sitting sitter if you are not fond of foreshortened skulls and diminutive chins. The full figure can be shown with advantage from a low angle and (more exaggerated) with a short focus lens; low angles having the additional benefit of removing the subjects from the surroundings and setting it against the neutral planes of sky or ceiling. Informal or "candid" glimpses of people must be got by stealth if one has no special gifts for coaxing one's subjects into sufficiently relaxed moods. Safety focusing (p. 49) will then be the right method of approach —at the hardly avoidable cost of sharp backgrounds. The Reflecting Finder will be useful to avoid drawing too much attention to the camera; this is inevitable when the camera is held at eye-level. The Angular Finder is another way out, but will hardly be successful with intelligent "victims".

More information in "Photographing People", by Hugo van Wadenoyen, or in The new Photo Guide "All about Portraits."

CHILDREN. Assuming that the Leica photographer is not fond of posed and sentimentally-arranged pictures of children (which, after all, do not require a technique different from that applied to "legitimate portraits") he will have to work with a short focus (2.8 or 3.5 cm.) lens indoors and one of medium focus (7.3 or 9 cm.) out of doors, as it is essential to allow for the child's attention being diverted by keeping the camera at some distance. Besides, photographs of children will definitely gain in charm if some of the surroundings are included and activity is shown. The movements of the child may demand some stopping down of the lens for more comfortable focusing and compensation by longer exposure times. Experience goes to show that slightly blurred outlines due to sudden moves will not show unpleasantly, but only add to the live appearance of the shot. Low angles are strongly recommended; looking down at children means dwarfing them in a ludicrously unflattering manner. Children get easily suspicious of cameras held at the "shooting" eye-level position. The Reflecting Finder is a help.

More information in "Phototips on Children", by Mary and Rudolf Arnheim.

ANIMALS. Same technique as with children. In the open the longer the focal length the better. To follow the movements of a shy animal with the range-finder is an almost hopeless task. Better to focus at a point to which the animal is likely to return and shoot when its picture

coincides in the finder. For taking a series of shots there is the quick-winding device and the Leica-Motor. The latter is, however, not altogether silent. It is better operated inside a "blimp" of the type used for sound film cameras.

More information in "Phototips on Cats and Dogs", by Edwin Smith.

SPORTS. Sport photography is essentially speed photography. Fast films will have to be given preference over fine grain materials. The choice of focal length will obviously depend on the camera position; still, lenses of medium focus (5 cm. to 9 cm.) are preferable as the field of action gets reduced with the growing focal length—neither do long focus lenses simplify the already complicated focusing problems. In order to be able to keep an eye on the subject before it enters the negative area, the Sports Finder should be used. If it is possible, one should focus at some spot which the subject has to pass; following the subject with the range-finder will not lead to success, while working with safety focusing methods cuts down the speed of the lens. All reserve speed, however, is needed to "arrest" movement and remain within the exposure latitude of the film. The actual exposure time required to arrest motion will depend on its speed, direction in relation to the axis of the lens, its distance from the camera and the focal length used. The faster the speed, the more oblique the angle, the shorter the distance and the longer the focus—the larger the trace of the subject on the negative and the quicker must the exposure be to catch a sufficiently sharp image of it. The fastest speed of the Leica shutter is 1/1,000 sec. It is a focal plane shutter: a slit of variable width formed by two curtains. When released the slit will flash across the wider length of the negative area. In doing so—and being only a slit—it will require more than 1/1000 sec. to complete what is called an exposure of 1/1,000 sec. The image of quite a few subjects can travel faster than that, particularly at close range or when photographed through a long focus lens. The result is distortion caused by the fact that the motion was not really stopped but kept on changing position before it could be reached by the slit. The shape of the distortion will depend on the direction of the shutter movement. If the shutter runs, as it were, *after* the subject, it will tend to draw it longer than it is. If it collides with it *headlong*, it may squash it. In both cases it will leave the verticals undamaged and keep them as such. If, however, the shutter movement cuts *across* the subject movement, it will tilt its verticals and push dignified parallelograms into merry rhomboidal shapes. Now, our eyes seem to be quite willing to accept some blur and some distortion for symbols of speed. It is usually thought that distortion in the direction of the movement is the more acceptable "symbol". As the Leica shutter travels from right to left in the horizontally held camera, and from top to bottom in the vertically held camera, it will work in the right way when horizontal movements are being shot with the horizontal camera and vertical movements with the vertical camera. Photographers who believe in the old rule that the

SHUTTER SPEEDS TO ARREST MOVEMENT

Subject	Relative motion in m.p.h.
Swimmer ...	2½
Walker ...	3
Runner ...	12½
Cyclist ...	15
Skater ...	28
Horse walking	4
,, trotting	9
,, galloping	19
Racehorse ...	31
Waves ...	15
Heavy waves	44
Boats making 10 knots ...	10
Boats making 20 knots ...	20
Tramcar ...	9
Motor car on road ...	35
Slow train ...	25
Express train	60
Aeroplane ...	95

The values given are for PERPENDICULAR displacement to the optical axis.

MOTION 45° to optical axis increase time by 50 per cent.

MOTION parallel to optical axis increase time 300 per cent.

Focal length of LENS	Distance Between Camera and Object					
3.5 cm.	2 m. / 6½ ft.	3.5 m. / 12 ft.	5 m. / 17 ft.	9 m. / 30 ft.	18 m. / 60 ft.	35 m. / 115 ft.
5 cm.	3 m. / 10 ft.	5 m. / 17 ft.	7.5 m. / 25 ft.	12.5 m. / 42 ft.	25 m. / 83 ft.	50 m. / 165 ft.
8.5 cm.	5½ m. / 18 ft.	9 m. / 30 ft.	13.5 m. / 45 ft.	22 m. / 75 ft.	45 m. / 150 ft.	90 m. / 300 ft.
13.5 cm.	8 m. / 27 ft.	13.5 m. / 45 ft.	20 m. / 66 ft.	34 m. / 110 ft.	67 m. / 220 ft.	135 m. / 440 ft.
18 cm.	12 m. / 40 ft.	20 m. / 66 ft.	30 m. / 100 ft.	50 m. / 165 ft.	100m. / 330 ft.	200 m. / 660 ft.

Relat. Motion m.p.h.	Shutter Speeds in Fractions of Seconds					
0—1	1/50	1/20	1/16	1/12	1/5	1/2
2	1/60	1/30	1/25	1/15	1/8	1/3
3	1/100	1/60	1/40	1/25	1/12	1/6
4	1/125	1/75	1/50	1/30	1/15	1/8
6	1/200	1/100	1/75	1/50	1/25	1/10
8	1/250	1/150	1/100	1/60	1/30	1/15
10	1/300	1/200	1/125	1/75	1/60	1/30
20	1/600	1/400	1/250	1/150	1/75	1/40
30	1/1000	1/600	1/400	1/250	1/125	1/60
40	1/1250	1/750	1/500	1/300	1/150	1/75
60	1/2000	1/1000	1/750	1/500	1/250	1/100
80	1/2400	1/1500	1/1000	1/600	1/300	1/150
100	1/3000	1/2000	1/1250	1/750	1/400	1/200

best is to have the shutter running *against* the subject, must turn the Leica upside down when photographing subjects going from left to right or from bottom to top (as the lens, of course, will reverse left and right of the picture). The photographer who prefers blurred backgrounds to blurred subject outlines should "swing" the camera in the direction of the subject movement without losing it from the finder while pressing the release button. Lastly, it must be remembered that when assessing the speed of a subject it is not its movement in general that counts, but that of its fastest moving parts, e.g. the legs of a horse running.

Further information in "My Way with the Miniature", by Lancelot Vining.

STAGE. The technique varies with type of the show. Theatre, circus, floor show, variety, all require different approach adapted to camera position and lighting conditions. Fast films of the type particularly sensitive to artificial light (the red portion of the spectrum) are most useful—provided the stage producer is not fond of greens and blues. Coloured lighting will often mislead even the electric expometer, which does not necessarily have the same colour sensitivity as the film. Stage lighting is also often uneven, and the reading obtained by the meter from some distance may record the average illumination of too large an area. The best stage pictures are mostly taken by people who have seen the show in question more than once or know the lighting conditions of the particular theatre from previous experience or—tell lies. The lighting as seen in the central axis of the stage gives flat pictures; it will show more contrasty effects taken slightly from the side. The front rows of the stalls are certainly the best to get fairly large figures with a lens of normal focus, but the low camera position must, of course, lead to distortion; pictures to show more than just a few figures are better taken from a box or with a lens of longer focus. The 7.3 cm. *f* 1.9 Hektor is the best stage lens with the Leica. Obviously, focusing by safety-zone methods would mean throwing away some of its speed. Besides, depth of focus is only desirable when photographing the whole of the stage including *decor*; even then those parts in shadow do not need to be sharply defined. When using the range-finder it will prove to work best pointed at contours dividing light and shadow. A stage is a limited area and most action would take place at spots which can be anticipated and pre-focused. Keep your eye at the view-finder and not the range-finder. Wait for the dramatic movements—which are also more often than not the "dead points" of motion—facilitating longer exposure times. With longish exposures support your elbows on the arms of your seat.

Further information in "My Way with the Miniature", by Lancelot Vining.

CLOSE-UP WORK

Optical Near-Focusing Device

This device enables the advantages of the automatic focusing of the Leica lenses to be utilized for close-ups nearer than 3.5 ft. It can be applied to all types of near distance photography such as small living creatures, plants, or *objets d'art*, as well as for copying illustrations, printed matter, etc. With this device *all* object-distances between 3 ft. 3 in. (1 m.) and 17 in. (44 cm.) to the plane of the film (= back of camera) can be set with the greatest rapidity and accuracy. The reduction ratio of image varies from X17.5 to X6.5; the size of the object covered from $16\frac{1}{2}$ in. × $24\frac{7}{10}$ in. (42 × 63 cm.), to $5\frac{9}{10}$ in. × $8\frac{9}{10}$ in. (15 × 22.5 cm.). (It may be observed that the 5 cm. lenses at 3.5 ft. distance includes a smallest object size of $17\frac{1}{4}$ × 26 in.; reduction ratio × 18.) See p. 101.

The device consists of a helical focusing arrangement which is screwed into the lens-changing flange of the Leica. This intermediate mount has an optical glass wedge, which comes to rest in front of the range-finder window and provides the necessary deflection of the object rays. Furthermore, a square stop to fit in front of the normal view-finder is fitted to this intermediate mount, which by means of a cam movement provides an automatic compensation for parallax and the diminution of the field of view noticeable with close-ups. The device has a bayonet catch arrangement, in which the bayonet fitting of the 5 cm. Leica lens barrel is inserted.

Two models are made, one to suit the 5 cm. Elmar *f* 3.5 and the other the 5 cm. Hektor *f* 2.5, Summar *f* 2, and Summitar *f* 2 lens. When focusing with the device, it should be observed that for establishing coincidence of image, only the centre of the range-finder should be used.

Working with the Near Focusing Device

1. **Use the device when photographs in distances between 3.5 ft. (1 m.) and $17\frac{1}{2}$ in. (44 cm.) should be taken.**

2. **Unscrew Leica lens in your own shadow.**
3. **Screw near-focusing device in Leica body moderately tight.**
4. **Push focusing mount of Leica lens towards lens front.**
5. **Fix lens with its bayonet barrel into the bayonet catch of the device.**
6. **Look through range-finder eyepiece.**
7. **Turn with the index finger of the left hand the focusing mount of the near-focusing device (and *not* that of the lens).**
8. **Stop when the two images in the eyepiece fuse into one.**
9. **For focusing use the middle of the range-finder only.**
10. **Determine the field of view through the Leica view-finder.**
11. **Release.**

Supplementary Lenses

These lenses are designed to cover also ranges shorter than the 3.5 ft. down to 10 1/16 in. They are achromatic and screw in the front lens-mount of the 5 cm. Elmar *f* 3.5 or (a second type) in the 5 cm. Hektor. For the 5 cm. Summar *f* 2 a special intermediate ring to take these supplementary lenses is available. The scope of application is roughly the same as indicated for the optical near-focusing device, but as the distance between object and camera back cannot be found by the range-finder but will have to be measured, these lenses are obviously less suitable for taking moving objects. Three lenses of different power are supplied:—

No. 1 for distances from 39½ in. to 22 9/16 in. for objects from 16 9/16 in. × 24 13/16 in. to 8 9/16 in. × 12 7/8 in. The reduction ranges from × 17.5 to × 9.1.

No. 2 for distances from 21 9/16 in. to 15 5/16 in. for objects from 8 7/16 in. × 12 5/8 in. to 5 5/8 in. × 8½ in. The reduction ranges from × 8.9 to 6.

No. 3 for distances from 12¼ in. to 10 1/16 in. for objects from 4¼ in. × 6 5/16 in. to 3 5/8 in. × 5 in. The reduction ranges from × 4.5 to 3.5.

CLOSE-UP FOCUSING TABLE FOR USE WITH THE 5 cm. ELMAR, HEKTOR OR SUMMAR

Setting of the helical focusing mount	With No. 1 Supplementary Lens			With No. 2 Supplementary Lens			With No. 3 Supplementary Lens		
	Distance of the object from the back of the camera (plane of the film)*	Resulting reduction in size	Permissible size of object	Distance of the object from the back of the camera (plane of the film)*	Resulting reduction in size	Permissible size of object	Distance of the object from the back of the camera (plane of the film)*	Resulting reduction in size	Permissible size of object
∞	39½ ins.	17.5 ×	16 9/16 × 24 13/16	21 9/16 ins.	8.9 ×	8 7/16 × 12 8/16	12¼ ins.	4.5 ×	4¼ × 6 7/16
100 ft.	38⅛ ins.	17.0 ×	16 1/16 × 24⅛	21⅛ ins.	8.8 ×	8 5/16 × 12 7/16	12 3/16 ins.	4.4 ×	4 5/16 × 6 5/16
50 ft.	37 9/16 ins.	16.5 ×	15⅝ × 23 7/16	21 ins.	8.6 ×	8 3/16 × 12¼	12⅛ ins.	4.4 ×	4 5/16 × 6¼
30 ft.	36 5/16 ins.	15.9 ×	15 1/16 × 22 5/16	20 11/16 ins.	8.5 ×	8 × 12	12 1/16 ins.	4.3 ×	4⅛ × 6 5/16
20 ft.	34 12/16 ins.	15.2 ×	14⅜ × 21 9/16	20 5/16 ins.	8.3 ×	7 13/16 × 11 11/16	11 12/16 ins.	4.3 ×	4 1/16 × 6 1/16
15 ft.	33⅝ ins.	14.6 ×	13⅜ × 20 11/16	19 7/16 ins.	8.1 ×	7⅝ × 11 7/16	11 7/16 ins.	4.2 ×	4 × 6
12 ft.	32 7/16 ins.	14.0 ×	13 5/16 × 19 13/16	19⅛ ins.	7.9 ×	7 7/16 × 11 5/16	11⅜ ins.	4.2 ×	3 13/16 × 5 12/16
10 ft.	31 5/16 ins.	13.4 ×	12 11/16 × 19	19 5/16 ins.	7.7 ×	7½ × 10 15/16	11 1/16 ins.	4.1 ×	3 15/16 × 5 11/16
9 ft.	30 9/16 ins.	13.1 ×	12 5/16 × 18½	18 14/16 ins.	7.6 ×	7⅛ × 10 11/16	11⅛ ins.	4.1 ×	3 15/16 × 5 11/16
8 ft.	29⅝ ins.	12.6 ×	11 12/16 × 17 12/16	18⅝ ins.	7.4 ×	7 × 10½	11 1/16 ins.	4.0 ×	3 13/16 × 5⅝
7 ft.	28⅝ ins.	12.1 ×	11½ × 17 5/16	18 5/16 ins.	7.2 ×	6 13/16 × 10¼	11 1/16 ins.	4.0 ×	3⅝ × 5⅝
6 ft.	27½ ins.	11.5 ×	10⅞ × 16 5/16	17⅞ ins.	7.0 ×	6⅝ × 9 15/16	11 1/16 ins.	3.9 ×	3 11/16 × 5½
5 ft.	25⅞ ins.	10.7 ×	10 1/16 × 15 3/16	17½ ins.	6.7 ×	6 5/16 × 9½	11⅛ ins.	3.8 ×	3 5/16 × 5⅝
4 ft.	23 12/16 ins.	9.7 ×	9 3/16 × 13⅝	16 7/16 ins.	6.3 ×	6 × 9	10⅞ ins.	3.6 ×	3 7/16 × 5 3/16
3.5 ft.	22 5/16 ins.	9.1 ×	8 5/16 × 12⅞	15 14/16 ins.	6.0 ×	5⅝ × 8½	10 14/16 ins.	3.5 ×	3⅜ × 5

* When using the 5 cm. Summar—which is longer in its construction—these figures should be increased by 1 cm. (⅜ in.).

Details regarding the setting of the camera lens, the distance and practicable size of the object, etc., will be found in the focusing tables for 5 cm. Elmar, Hektor or Summar on p. 95.

Lenses No. 1 and 2, in conjunction with the 5 cm. Elmar, may be used with full aperture for ordinary photographs. When using them for copying work they should be stopped down to *f* 6.3. In case of No. 3 lens, it is advisable to stop down to at least *f* 6.3, in view of the very small depth of focus. When using the supplementary lenses with 5 cm. Hektor *f* 2.5, or 5 cm. Summar *f* 2, the somewhat smaller diameter of the supplementary lens necessitates stopping down to about *f* 6.3. in any case.

The exposure is not appreciably increased when using these lenses in comparison with the exposure one would have given for the same object with the same stop at 3.5 ft. distance with the 5 cm. lens without supplementary lens.

If filters are to be used with the supplementary lenses, a special intermediate collar will have to be fitted on to the lens mount in the case of the 5 cm. Elmar *f* 3.5 or 5 cm. Hektor *f* 2.5.

Working with supplementary lenses is considerably simplified when a copying arm in conjunction with a column and baseboard (as a rule from an enlarger) is used. The copying arm holds the Leica in vertical position so that the object to be photographed can be placed on the baseboard. The correct distance can be ascertained by sliding the arm up and down according to the lens used and distance set as given in the table on p. 95.

Depth of Focus Tables for Supplementary Lenses

The figures on the left of the groups on pp. 97-99 relate to the setting of the lens aperture. The top row gives the adjustment of the helical focusing mount. The black figures in the middle of any group indicate the corresponding distance of the object from the back of the camera, while the figure above gives the near limit of the region of depth of focus, and the figure below the further limit.

DEPTH OF FOCUS TABLE FOR 5 cm. LENS WITH No. 1 SUPPLEMENTARY LENS

	∞	100	50	30	20	15	12	10	9	8	7	6	5	4	3.5	feet
f 3.5	37 1/4 39 1/2 41 3/8	36 7/8 38 1/2 40 1/4	36 37 9/16 39 3/16	34 7/8 36 7/16 37 1/8	33 5/8 34 1/2 36 5/8	32 3/8 33 5/8 34 15/16	31 1/4 32 7/16 33 5/8	30 1/4 31 7/16 32 7/16	29 9/16 30 7/16 31 1/16	28 3/4 29 5/8 30 3/4	27 1/16 28 1/2 29 1/16	26 5/8 27 1/2 28 3/8	25 3/16 25 7/8 26 1/16	23 1/4 23 1/2 24 1/2	22 22 1/16 23 1/8	ins.
f 4.5	37 3/8 39 1/2 41 7/8	36 7/16 38 1/2 40 5/8	35 6/8 37 1/16 39 1/16	34 1/2 36 1/16 38 3/16	33 1/4 34 1/2 36 2/4	32 1/16 33 5/8 35 3/16	30 1/2 32 7/16 34	29 1/2 31 7/16 32 3/4	29 5/16 30 7/16 32	28 1/2 29 3/4 31 1/16	27 9/16 28 1/2 29 1/2	26 3/8 27 1/2 28 3/4	24 1/2 25 7/8 26 3/8	23 1/16 23 1/2 24 1/16	21 7/8 22 1/16 23 1/16	ins
f 6.3	36 9/16 39 1/2 42 1/2	35 1/2 38 1/2 41 3/4	34 7/8 37 7/16 40 5/8	33 1/2 36 1/16 39 1/16	32 5/8 34 1/2 37 9/16	31 1/2 33 5/8 36 1/16	30 7/8 32 7/16 34 1/16	29 7/8 31 7/16 33 5/8	28 1/2 30 7/16 32 5/8	28 1/16 29 3/4 31 5/8	27 1/8 28 1/2 30 1/2	26 27 1/2 29 1/16	24 5/8 25 7/8 27 5/16	22 3/8 23 1/2 25 1/16	21 9/16 22 1/16 23 5/8	ins.
f 9	35 7/16 39 1/2 44 5/8	34 5/8 38 1/2 43 5/16	33 7/8 37 9/16 42 1/8	32 7/8 36 7/16 40 5/8	31 11/16 34 1/2 38 7/8	30 5/8 33 5/8 37 1/4	29 5/8 32 7/16 35 3/4	28 11/16 31 7/16 34 3/8	28 1/16 30 9/16 33 9/16	27 3/8 29 3/4 32 9/16	26 1/2 28 1/2 31 5/16	25 7/16 27 1/2 29 7/8	24 1/16 25 7/8 28	22 1/16 23 1/2 25 5/8	21 3/16 22 1/16 24 1/8	ins.
f 12.5	34 1/16 39 1/2 47	33 7/16 38 1/2 45 3/16	32 5/8 37 9/16 44 1/16	31 11/16 36 7/16 42 7/16	30 5/8 34 1/2 40 5/8	29 5/8 33 5/8 38 7/8	28 11/16 32 7/16 37 1/4	27 13/16 31 7/16 35 1/16	27 1/16 30 9/16 34 1/8	26 5/16 29 3/4 33 3/8	25 3/8 28 3/4 32 1/2	24 3/8 27 1/2 30 3/8	23 7/16 25 7/8 28 1/8	21 3/8 23 1/2 26 5/8	20 11/16 22 1/16 24 1/16	ins.
f 18	32 7/8 39 1/2 51 1/4	31 1/2 38 1/2 49 1/16	30 13/16 37 9/16 47 1/16	30 36 7/16 46	29 1/16 34 1/2 43 3/8	28 1/16 33 5/8 41 1/8	27 5/16 32 7/16 39 3/8	26 1/2 31 7/16 38 1/16	26 30 9/16 37 1/16	25 3/8 29 3/4 35 1/16	24 5/8 28 3/4 34 1/16	23 11/16 27 1/2 32 11/16	22 1/2 25 7/8 30 7/16	20 1/8 23 1/2 27 1/16	19 1/16 22 1/16 25 1/16	ins.
Maximum Object size	16 7/16 × 24 1/16	16 1/16 × 24 1/8	15 1/8 × 23 7/16	15 1/16 × 22 7/16	14 1/8 × 21 7/16	13 1/2 × 20 1/16	13 1/16 × 19 1/16	12 1/16 × 19	12 1/16 × 18 1/2	11 1/16 × 17 1/16	11 1/8 × 17 1/16	10 1/8 × 16 1/16	10 1/8 × 15 3/16	9 1/16 × 13 1/2	8 1/16 × 12 1/2	ins.

DEPTH OF FOCUS TABLE FOR 5 cm. LENS WITH No. 2 SUPPLEMENTARY LENS

	∞	100	50	30	20	15	12	10	9	8	7	6	5	4	3.5	feet
f 3.5	21 21 9/16 22 1/8	20 3/4 21 1/4 21 13/16	20 1/2 21 21 9/16	20 3/16 20 11/16 21 3/16	19 13/16 20 5/16 20 13/16	19 7/16 19 7/8 20 3/8	19 1/16 19 1/2 20	18 3/4 19 3/16 19 5/8	18 1/2 18 15/16 19 3/8	18 1/4 18 5/8 19 1/16	17 15/16 18 5/16 18 11/16	17 1/2 17 7/8 18 1/4	16 15/16 17 1/4 17 5/8	16 1/8 16 7/16 16 13/16	15 5/8 15 15/16 16 1/4	ins.
f 4.5	20 7/8 21 9/16 22 5/16	20 5/8 21 1/4 22	20 3/8 21 21 3/4	20 1/16 20 11/16 21 3/8	19 11/16 20 5/16 20 15/16	19 5/16 19 7/8 20 1/2	18 15/16 19 1/2 20 1/8	18 5/8 19 3/16 19 3/4	18 3/8 18 15/16 19 1/2	18 1/8 18 5/8 19 3/16	17 13/16 18 5/16 18 13/16	17 3/8 17 7/8 18 3/8	16 13/16 17 1/4 17 3/4	16 1/16 16 7/16 16 7/8	15 9/16 15 15/16 16 5/16	ins.
f 6.3	20 9/16 21 9/16 22 9/16	20 5/16 21 1/4 22 5/16	20 1/8 21 22	19 13/16 20 11/16 21 11/16	19 7/16 20 5/16 21 3/16	19 1/16 19 7/8 20 13/16	18 3/4 19 1/2 20 3/8	18 3/8 19 3/16 20	18 3/16 18 15/16 19 3/4	17 15/16 18 5/8 19 7/16	17 5/8 18 5/16 19 1/16	17 3/16 17 7/8 18 9/16	16 5/8 17 1/4 17 15/16	15 7/8 16 7/16 17 1/16	15 3/8 15 15/16 16 1/2	ins.
f 9	20 3/16 21 9/16 23 1/16	19 15/16 21 1/4 22 3/4	19 3/4 21 22 1/2	19 7/16 20 11/16 22 1/8	19 1/16 20 5/16 21 5/8	18 3/4 19 7/8 21 3/16	18 7/16 19 1/2 20 13/16	18 1/8 19 3/16 20 3/8	17 7/8 18 15/16 20 1/8	17 5/8 18 5/8 19 13/16	17 5/16 18 5/16 19 3/8	16 15/16 17 7/8 18 7/8	16 3/8 17 1/4 18 1/4	15 11/16 16 7/16 17 5/16	15 3/16 15 15/16 16 3/4	ins.
f 12.5	19 11/16 21 9/16 23 3/4	19 1/2 21 1/4 23 7/16	19 1/4 21 23 1/8	19 20 11/16 22 11/16	18 11/16 20 5/16 22 1/4	18 5/16 19 7/8 21 3/4	18 19 1/2 21 5/16	17 11/16 19 3/16 20 7/8	17 1/2 18 15/16 20 5/8	17 1/4 18 5/8 20 1/4	16 15/16 18 5/16 19 7/8	16 9/16 17 7/8 19 5/16	16 1/16 17 1/4 18 5/8	15 3/8 16 7/16 17 11/16	14 7/8 15 15/16 17 1/16	ins.
f 18	19 21 9/16 24 7/8	18 13/16 21 1/4 24 1/2	18 5/8 21 24 3/16	18 5/16 20 11/16 24 3/4	18 20 5/16 23 3/16	17 11/16 19 7/8 22 11/16	17 7/16 19 1/2 22 3/16	17 1/8 19 3/16 21 3/4	16 15/16 18 15/16 21 7/16	16 3/4 18 5/8 21 1/16	16 7/16 18 5/16 20 5/8	16 1/16 17 7/8 20 1/16	15 5/8 17 1/4 19 5/16	14 15/16 16 7/16 18 3/16	14 1/2 15 15/16 17 11/16	ins.
Maximum Object size	8 7/16 × 12 5/8	8 5/16 × 12 7/16	8 3/16 × 12 1/4	8 × 12	7 13/16 × 11 11/16	7 5/8 × 11 7/16	7 7/16 × 11 3/16	7 1/4 × 10 7/8	7 1/8 × 10 11/16	7 × 10 1/2	6 13/16 × 10 1/4	6 5/8 × 9 15/16	6 5/16 × 9 1/2	6 × 9	5 3/8 × 8 1/2	ins.

DEPTH OF FOCUS TABLE FOR 5 cm. LENS WITH No. 3 SUPPLEMENTARY FRONT LENS

	∞	100	50	30	20	15	12	10	9	8	7	6	5	4	3.5	feet
f 3.5	12 1/16 12 1/4 12 1/2	12 12 3/16 12 7/16	11 15/16 12 1/8 12 3/8	11 7/8 12 1/16 12 1/4	11 3/4 11 15/16 12 3/16	11 11/16 11 7/8 12 1/16	11 9/16 11 3/4 11 15/16	11 1/2 11 11/16 11 7/8	11 7/16 11 5/8 11 13/16	11 5/16 11 1/2 11 11/16	11 1/4 11 7/16 11 5/8	11 1/8 11 5/16 11 1/2	10 15/16 11 1/8 11 5/16	10 11/16 10 7/8 11 1/16	10 1/2 10 11/16 10 7/8	ins.
f 4.5	12 12 1/4 12 9/16	11 15/16 12 3/16 12 1/2	11 7/8 12 1/8 12 7/16	11 13/16 12 1/16 12 5/16	11 11/16 11 15/16 12 3/16	11 5/8 11 7/8 12 1/8	11 1/2 11 3/4 12	11 7/16 11 11/16 11 15/16	11 3/8 11 5/8 11 7/8	11 1/4 11 1/2 11 3/4	11 3/16 11 7/16 11 11/16	11 1/16 11 5/16 11 9/16	10 7/8 11 1/8 11 3/8	10 5/8 10 7/8 11 1/8	10 7/16 10 11/16 10 15/16	ins.
f 6.3	11 15/16 12 1/4 12 11/16	11 7/8 12 3/16 12 9/16	11 13/16 12 1/8 12 1/2	11 3/4 12 1/16 12 7/16	11 5/8 11 15/16 12 5/16	11 9/16 11 7/8 12 1/4	11 7/16 11 3/4 12 1/8	11 3/8 11 11/16 12	11 5/16 11 5/8 11 15/16	11 3/16 11 1/2 11 13/16	11 1/8 11 7/16 11 3/4	11 11 5/16 11 5/8	10 13/16 11 1/8 11 7/16	10 9/16 10 7/8 11 3/16	10 3/8 10 11/16 11	ins.
f 9	11 3/4 12 1/4 12 13/16	11 11/16 12 3/16 12 3/4	11 5/8 12 1/8 12 11/16	11 9/16 12 1/16 12 5/8	11 7/16 11 15/16 12 1/2	11 3/8 11 7/8 12 3/8	11 1/4 11 3/4 12 1/4	11 3/16 11 11/16 12 3/16	11 1/8 11 5/8 12 1/8	11 1/16 11 1/2 12	11 11 7/16 11 7/8	10 7/8 11 5/16 11 3/4	10 11/16 11 1/8 11 9/16	10 7/16 10 7/8 11 5/16	10 5/16 10 11/16 11 1/16	ins.
f 12.5	11 9/16 12 1/4 13 1/16	11 1/2 12 3/16 13	11 7/16 12 1/8 12 15/16	11 3/8 12 1/16 12 13/16	11 5/16 11 15/16 12 11/16	11 3/16 11 7/8 12 9/16	11 1/8 11 3/4 12 1/2	11 1/16 11 11/16 12 3/8	11 11 5/8 12 5/16	10 15/16 11 1/2 12 3/16	10 13/16 11 7/16 12 1/16	10 11/16 11 5/16 11 15/16	10 9/16 11 1/8 11 3/4	10 5/16 10 7/8 11 7/16	10 1/8 10 11/16 11 1/4	ins.
f 18	11 5/16 12 1/4 13 7/16	11 1/4 12 3/16 13 3/8	11 3/16 12 1/8 13 1/4	11 1/8 12 1/16 13 3/16	11 1/16 11 15/16 13 1/16	10 15/16 11 7/8 12 15/16	10 7/8 11 3/4 12 13/16	10 3/4 11 11/16 12 11/16	10 11/16 11 5/8 12 5/8	10 5/8 11 1/2 12 1/2	10 9/16 11 7/16 12 7/16	10 7/16 11 5/16 12 1/4	10 5/16 11 1/8 12 1/16	10 1/16 10 7/8 11 3/4	9 15/16 10 11/16 11 9/16	ins.
Maximum Object size	4 1/4 × 6 3/16	4 3/16 × 6 3/16	4 3/16 × 6 1/4	4 1/8 × 6 3/16	4 1/16 × 6 1/16	4 × 6	3 15/16 × 5 15/16	3 7/8 × 5 13/16	3 7/8 × 5 13/16	3 13/16 × 5 3/4	3 3/4 × 5 5/8	3 11/16 × 5 1/2	3 9/16 × 5 3/8	3 7/16 × 5 3/16	3 3/8 × 5	Ins.

Setting Device

This device facilitates the setting of the camera to the right distance and the rapid determination of the exact field of view when taking close-ups with front lenses No. 2 and 3. It consists of four extensible legs adjustable for various object distances, together with a clamping ring (screw the legs into the four bushes marked "V") by which it is firmly attached to the lens mount. The field of view is determined by the points of the four legs. The extensible legs are furnished with yellow and white marks indicating the exact setting of the various scales of reproduction. Yellow marks are referred to when working with the Summar, white with the Elmar or Hektor (p. 101).

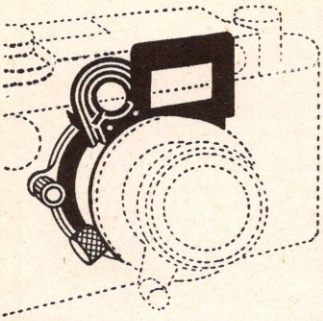
With front lens No. 3, lens mount beyond 3.5 ft., lowest mark on legs, an object measuring 5 in. × $3\frac{3}{8}$ in. can be taken.
With front lens No. 3, lens mount at ∞, middle mark on leg, an object size of $6\frac{5}{16}$ in. × $4\frac{1}{4}$ in. can be taken.
With front lens No. 2, lens mount beyond 3.5 ft., top mark of legs, an object size $8\frac{1}{2}$ in. × $5\frac{3}{8}$ in. will be included.
With front lens No. 2, lens mount at ∞, intermediate rods and top mark on legs, an object size of $12\frac{5}{8}$ in. × $8\frac{7}{16}$ in. can be taken.
Reduction size and distance may be taken from focusing table on p. 95, according to size of object, and consequently the depth of focus for each stop in the depth of focus table on p. 98.

Auxiliary Devices

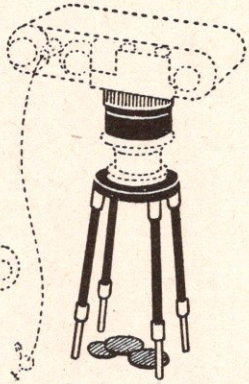
DEVICES FOR PHOTOGRAPHY AT SCALE 1 : 1.5, 1 : 2, 1 : 3, are designed for photographing coins, postage stamps, tiny animals, insects and plants, *objets d'art*. They are also very suitable for photographing finger-prints, documents, handwriting, as well as for clinical subjects. These devices are supplied in two forms. For use (*a*) with the 5 cm. Elmar or 5 cm. Summar and (*b*) for the 3.5 cm. wide-angle Elmar (p. 101).

The appliance consists of three intermediate collars marked 1 : 1.5, 1 : 2, 1 : 3, which are screwed between lens and camera-body, and a clamping ring with four detachable legs which are furnished with extensible steel rods. The clamping ring has four different bushes (for each of the three

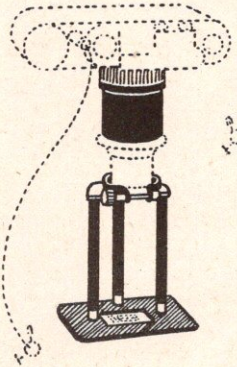
Near Focusing Devices (p. 93).



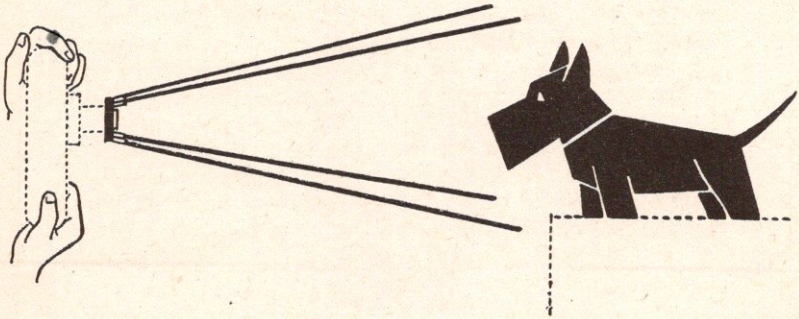
Optical near focusing device (p. 83).



Device for photographing at a scale of 1 : 1.5—1 : 3 (p. 100).



Device for photographing in natural size (p. 102).



Using the setting device for non-vertical arrangements (p. 100).

scales of reproduction) into which the legs are screwed so as to allow for the different angle at which the legs will have to spread to conform to the actual lens angle. The extensible steel rods are marked with yellow and white rings, which indicate how far they have to be withdrawn for the various scales of reproduction when using Summar (yellow) and Elmar (white). The short extension is for scale 1 : 1.5, the medium for 1 : 2, and the longest for 1 : 3 reproduction. The lens has to remain on infinity.

The size of object : greatest dimensions at scale of 1 : 1.5 about 1½ to 2¼ in. (36 × 54 mm.) ; 1 : 2 about 1⅞ in. × 2⅞ in. (48 × 72 mm.) ; 1 : 3 about 2⅞ in. × 4¼ in. (72 × 108 mm.).

Depth of Focus:	*f* 6.3	*f* 9	*f* 12.5	*f* 18	*Exposure required compared with ∞ setting*
Scale 1 : 1.5	1.58 mm.	2.25 mm.	3.12 mm.	4.5 mm.	2.8 ×
Scale 1 : 1.2	2.5 mm.	3.6 mm.	5 mm.	7.2 mm.	2.3 ×
Scale 1 : 3	5 mm.	7.2 mm.	10 mm.	14.4 mm.	1.75×

AUXILIARY DEVICE FOR PHOTOGRAPHING AT SCALE 1 : 1 (natural size). Its range of application is similar to that of the auxiliary devices: 1 : 1.5, 1 : 2, 1 : 3, but remains restricted to comparatively flat objects in view of the small depth of focus at such close quarters (p. 101).

It consists of a base plate on which stand three small columns carrying a clamping ring and an intermediate collar which screws between camera-body and lens. The device is supplied in three different forms: for 5 cm. Elmar, a second one for 5 cm. Summar, and thirdly one for 3.5 cm. Elmar. The lens has to remain on infinity.

The size of object for scale 1 : 1 is 1 × 1½ in. (24×36 mm.)

The depth of focus:	*f* 6.3	*f* 9	*f* 12.5	*f* 18
Scale 1 : 1 ...	0.8 mm.	1.2 mm.	1.67 mm.	2.4 mm.

The exposure time required compared with infinity setting is 4×.

LEICA ACCESSORIES

One of the outstanding features of the Leica and Leica-photography is the fact that an unequalled range of accessories especially designed for this camera make it suitable for practically every branch of photography: aerial and distant photography, close-up work, photomicrography, copying, clinical, surgical and X-ray photography, stereoscopy, panorama-shots, criminology, photographing recording, besides all the "normal" applications. There are Leica accessories too numerous to mention: we have confined ourselves to those of relatively general interest.

THE CABLE RELEASE. For time-exposures the Leica cable release should be used. It screws over the shutter release button after the removal of the milled protection-ring of the release knob. For long time-exposure the shutter of the Leica should be set to "Z", the cable-release pressed down and its fixing screw tightened. The shutter remains now open—without one's having to press the release all the time—until the cable release fixing screw is loosened again. When unscrewing the cable release from the shutter release button it is advised to hold the shutter speed dial so as to prevent the shutter from being set accidentally.

DELAYED ACTION RELEASE allows the automatic release of the shutter after a lapse of twelve to fifteen seconds, so that the photographer can take his place in the picture (group, etc.). It screws on to the thread of the release button of the Leica, and to "set" it the milled disc has to be wound clockwise as far as it will go. The delayed release is set into action by a slight pull on the knob on top of the instrument. If the release of the camera takes place too early, or if it does not release at all, the screw within the thread of the shaft has to be adjusted clockwise or anti-clockwise as the case may be (a quarter to half-turn is sufficient). P. 105.

REMOTE RELEASE is a device for making exposures and winding on the film from a distance, so that it is unnecessary to go near the camera. In fact, an entire cassette of 36 exposures can be exposed, one picture after another, without coming near the camera. The natural-historian and nature-lover will find that this attachment allows him to take wild animals, birds on their nests, etc., without disturbing his subject, once the camera has been set. Obviously a lens of long focal length is supreme for this type of work. The attachment consists of a strong plate, carrying the guides and rollers for film winding and shutter release cables as well as the shutter lever, which is placed over the shutter release button on the camera. Film winding is arranged by

means of a drum, which is separately clamped to the winding knob of the Leica. After shutter and film are wound, the drum moves back by a spring to its original position and winds up the slack of the operating cable ready for the next exposure.

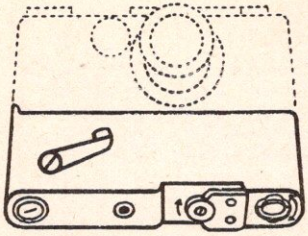
RAPID WINDER enables the Leica user to take series of photographs consecutively in quick succession. It consists of a Leica bottom lid which can be interchanged with the ordinary one. It has a trigger-lever moving in a slot which, manipulated with one finger of the left hand, transports film and sets shutter, while the right hand remains ready to press the shutter release button repeatedly. It must be noted that the lever of the rapid winder should be operated as smoothly as possible to avoid tearing off the film perforation; at the same time the lever must be pulled right along till it stops and be allowed to run right back each time. Leicas with numbers of less than 159,000 require a different take-up spool spindle—with an engagement slot—and cameras with numbers of less than 111,450 will have to be fitted with the bigger retaining pin for the bottom lid (p. 105).

THE LEICA MOTOR is a fully mechanized rapid winder which transports the film, sets the shutter and releases automatically a series of up to twelve exposures. It takes the place of the ordinary bottom lid and consists of a "motor", or, strictly speaking, of a precision clock-work mechanism. The release is in front. As long as it is pressed down the motor works, stopping immediately pressure is released, and restarting again on a further pressure. Pictures are taken at the rate of two per second. Regarding the use of this instrument for Leicas below No. 159,000, the same requirements apply as in the case of the "rapid winder" already mentioned (p. 105).

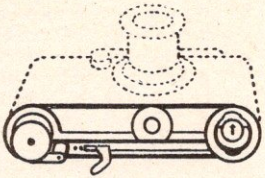
SINGLE EXPOSURE HOUSING serves, as its name indicates, for taking single exposures; perhaps a special type of film is to be tested, or the photograph is required at once, or ground-glass control of the image or definition is required. The device consists of a black lacquered light metal body, in the back of which is the focusing screen or dark slide, the Leica lens being screwed into the flange in front. Any of the Leica view-finders can be fitted on top. Tripod bushes are provided for vertical and horizontal pictures. An Ibsor diaphraghm shutter, which fits over the lens mount, is provided. It allows exposures from 1 to 1/125 sec. and "Time". The single dark slides take a piece of 35 mm. film of 40 mm. length, which is inserted (after drawing out the cover sheath) emulsion side towards sheath of slide. The ground-glass screen and dark slide can be removed from the "camera" body by pressing gently on the catch (p. 105).

SINGLE FILM HOLDER. This simple, cheap device comprises a metal frame with two slots, by means of which a piece of film 3¼ in. (8 cm.) long is held. The insertion of the film into the holder, of the holder into the camera and its removal after the picture has been taken, must all be done in the darkroom. Care must be taken to prevent the

Leica Accessories (p. 103).

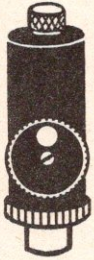


Leica motor (p. 104).

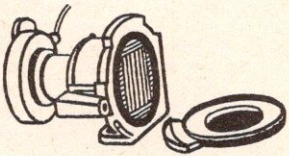


Rapid winder (p. 104).

Slow speed attachment (p. 107).

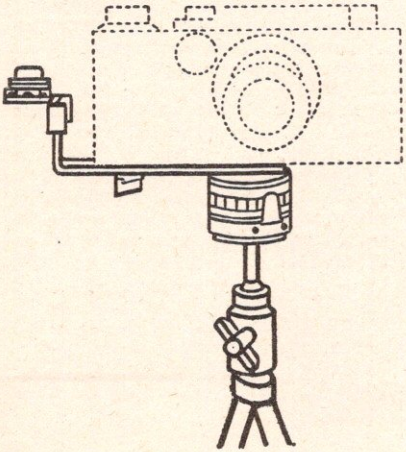


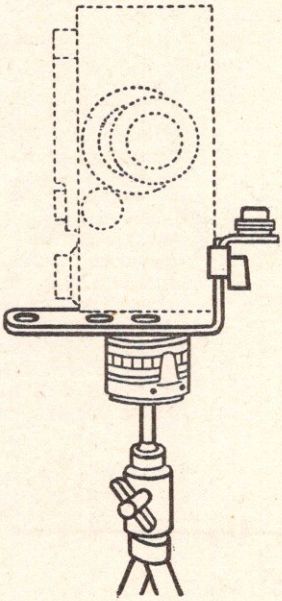
Delayed action release (p. 103).



Single exposure housing (p. 104).

Panoramic tripod head as used with the camera in horizontal (left) and vertical (right) position (p. 106).





film from getting scratched; this is best ensured by protecting it when inserting the holder into the Leica with a piece of blank film in front of the film emulsion. When the holder is firmly inserted, the piece of blank film is slowly withdrawn. Positive and infra-red films, which have no protective emulsion layer over their emulsion are not suitable for use in this holder.

PANORAMIC TRIPOD HEAD. This accessory is designed to take composite pictures of a panorama up to a complete revolution, either horizontal or upright. The scale ring of this head is interchangeable and can be obtained to suit the focal length of any Leica lens. The camera is best used with a ball-and-socket-head on a strongly-built tripod. The use of a case level is essential to ensure that the camera is *absolutely* level. The first exposure is taken with the panoramic head set to the index I, whereupon the camera is rotated until the snap catch engages in the mark engraved 2. In this position the second exposure is made and so on. Each scale ring is engraved with two rows of figures. The upper row serves when the camera is set as though for taking upright photographs, the lower one for horizontal pictures. An angular bracket constructed to carry the camera horizontally or vertically, and which also holds the case level, is used with all focal length lenses up to 10.5 cm. For lenses of greater focal length the panoramic head is screwed into the tripod thread of the lens itself (p. 105).

FLASHLIGHT-PHOTOGRAPHY WITH THE LEICA. The "flash-powder" of bygone days has been replaced by flash-bulbs which have almost incomparable advantages. Combustion takes place within the glass bulb which allows the light to pass through it unimpeded, while retaining all the by-products of combustion. Flash-bulbs are therefore smokeless, dustless, free of smell and without noise. Their volume of light is about equal to that of sunlight on a summer day, a fact which enormously widens the scope of photography, enabling pictures to be taken indoors and outdoors, in snow and rain, of subjects in motion or subjects at rest. The simplest method of working with flash-bulbs indoors and without any special gadgets is the following: mount the Leica on a tripod, set distance shutter to "Z" and the stop according to the distance between flash and subject. The instructions with the bulb include a table showing the correct aperture for various distances. Ordinary room light can be left switched on as long as it does not shine on to the lens. Press shutter release and keep it pressed down while releasing the flash-bulb by means of a 4.5-volt pocket torch; let go shutter release. An even better method consists in using a flash-bulb release "synchronizer", which automatically opens the shutter, releases the flash-bulb and closes the shutter again. Since these releases work with intervals of about 1/5 sec. between the actions, it is possible to dispense with a tripod and to make snap-shots indoors. More exactly adapted to the camera are "synchron-izers", such as the Leica Flashlight attachment, which allow the Leica

shutter to be set to the slower instantaneous speed up to 1/60 sec. The synchronization between attachment and shutter is such that immediately the shutter opens, combustion occurs. Lastly, the "flash-gun", such as "*Kalart*", "*Burvin*", etc., for the Leica can be synchronized with the shutter so exactly that exposure-times as short as 1/100, 1/200, 1/500 and even 1/1,000 may be taken out from the whole flash, when it is at its peak, thus enabling even the quickest movements to be photographed.

Special Attachments for Leicas of Earlier Type

SLOW-SPEED ATTACHMENT for the *Leica I*, *Leica Standard* and *Lecia II* gives the additional slower speeds from $\frac{1}{5}$ to 1 sec. that are more conveniently built into the *Leica III*, *IIIa*, *IIIb*. The attachment screws on to the thread of the release button. The transport knob has to be wound on, shutter speed dial set to "Z", and the slow-speed attachment then "set" by turning the two studs of the winder clockwise right up to the stop. Only after this can the desired speed be set. This is done by lifting the longer part of the winder from underneath and then turning it until the index line at its edge points towards the speed required; on releasing the winder it engages with the pin in the appropriate arresting hole. The shutter is released by means of the release button of the attachment. Keep the button depressed until the shutter is entirely run down (p. 105).

RANGE-FINDER for *Lecia I* and *Leica Standard*. As relying on guesswork for estimating distances is unsatisfactory, particularly with wide apertures, and the use of a tape measure is generally quite impracticable, a separate range-finder has been made available for use with those Leica models where it is not built-in. This is constructed on the "coincidence" principle. On one side of the square tube is the viewing aperture fitted with an eye-cup. Behind this (within the tube) is a semi-transparent silvered mirror at an angle of 45°, and at the other end of the tube a reflecting prism which can be tilted relatively to the fixed mirror by means of a cam mechanism attached to the calibrating focusing disc. Setting the index to infinity (∞) and looking through the viewing aperture one perceives in the middle of the circular field of view a smaller and lighter circle, and in this a double image of a near object the distance of which from the camera it is desired to ascertain. By simply turning the graduated disc the two images may be made to superimpose so that coincidence is so perfect that only one image instead of the previous double image, is visible. By means of a yellow glass one of the images is coloured; this is a great help in separating two images and so simplifies the adjustment for coincidence.

LEICA EQUIPMENT: WEIGHTS AND CODE WORDS

Object.	Weight.	Code Word
Leica Standard body only	13 oz.	ALVOO
Leica II body only...	14½ oz.	AIROO
Leica III body only	15 oz.	AFOOV
Leica IIIa body only	15 oz.	AENOO
Leica IIIb body only	15 oz.	ATOOH
2.8 cm. Hektor lens	3½ oz.	HOOPY
3.5 cm. Elmar lens	3½ oz.	EKURZ
5 cm. Elmar lens	4 oz.	ELMAR
5 cm. Hektor lens	4¾ oz.	HEKTO
5 cm. Summar lens	6½ oz.	SUMUS
5 cm. Xenon lens	12 oz.	XEMOO
7.3 cm. Hektor lens	17½ oz.	HEGRA
9 cm. Elmar lens	10 oz.	ELANG
9 cm. Thambar lens	17 oz.	TOODY
10.5 cm. Elmar lens	7 oz.	ELZEN
13.5 cm. Elmar lens	13 oz.	EFERN
13.5 cm. Hektor lens	13½ oz.	HEFAR
20 cm. Telyt lens with housing	38 oz.	TOOLP
40 cm. Telyt lens with housing	53 oz.	TLOOT
Leica range-finder	2½ oz.	FOKOS
Leica cassette	1½ oz.	FILCA
Universal finder for all lenses from 3.5 to 13.5 cm.	3½ oz.	VIDOM
Special finder for 2.8 cm.	1 oz.	SUOOQ
Special finder for 3.5 cm.	¾ oz.	WEISU
Frame finder with mask	¾ oz.	RASAL
Sports finder for 7.3 cm.	¾ oz.	SAIOO
Sports finder for 9 cm.	¾ oz.	SEROO
Sports finder for 13.5 cm.	¾ oz.	SYEOO
Angular view-finder	1½ oz.	WINTU
Reflecting view-finder for 5 cm.	1¾ oz.	AUFSU
Reflecting view-finder for 5 and 3.5 cm. ...	2 oz.	AYOOL
Reflecting view-finder for 5 and 2.8 cm. ...	2 oz.	AHOOT
Lens hood for 5 cm. Elmar	¼ oz.	FISON
Extensible lens hood	½ oz.	FIKUS
Lens hood for Summar	¾ oz.	SOOMP
Optical near focusing device	3½ oz.	NOOKY
Slow-speed attachment	2½ oz.	HEBOO
Single exposure housing	3 oz.	OLEYO
Delayed action release	1 oz.	APDOO
Leica motor...	12 oz.	MOOLY
Rapid winding device	3½ oz.	SCNOO

The most important items of Leica equipment are listed, together with their weights and the code words under which they often appear in the makers' and some dealers' catalogues.

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By H. W. Greenwood

Document photography is the modern technique of establishing records of anything written, typed, printed. Its results can be relied upon in the service of commerce, arts and industry, as well as in private work. This book is the first comprehensive survey of equipment available and gives straightforward advice for individual copying and mass recording.

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MAKING COLOUR PRINTS

By Jack H. Coote, F.R.P.S.

Whether you use a miniature or whether you work with separation negatives in a studio camera, the real problems start when thinking of paper prints. This book describes all the print-making processes in a comprehensive but simple manner, grading them according to the relative ease with which they may be worked by a newcomer to this field,

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AMATEUR PHOTOMICROGRAPHY

By Alan Jackson, B.Sc., A.I.C.

Photomicrography can be a hobby or a tool of science. It is a window into a world of fascinating forms, of countless secrets of life unseen by the naked eye. As a photographic technique, it has some rules of its own—as fully explained in this book by an expert.

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ALL-IN-ONE CAMERA BOOK

By W. D. Emanuel and F. L. Dash

The easy path to good photography! This book avoids presenting good photography as more difficult than it really is: a pleasant hobby with a technical background. The problems are simplified but not concealed. Even colour photography appears within reach of the amateur of to-day.

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VICTORIAN PHOTOGRAPHY

By Alex Strasser, F.R.P.S.

This book unfolds historic pages of pictures and documents. It mirrors the struggle with quaintly primitive tools. It reproduces masterpieces made with them. Both the technique and what it led to are very different from photography as we know it to-day. But there is much we can learn from the camera views of yesterday.

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IMMORTAL PORTRAITS

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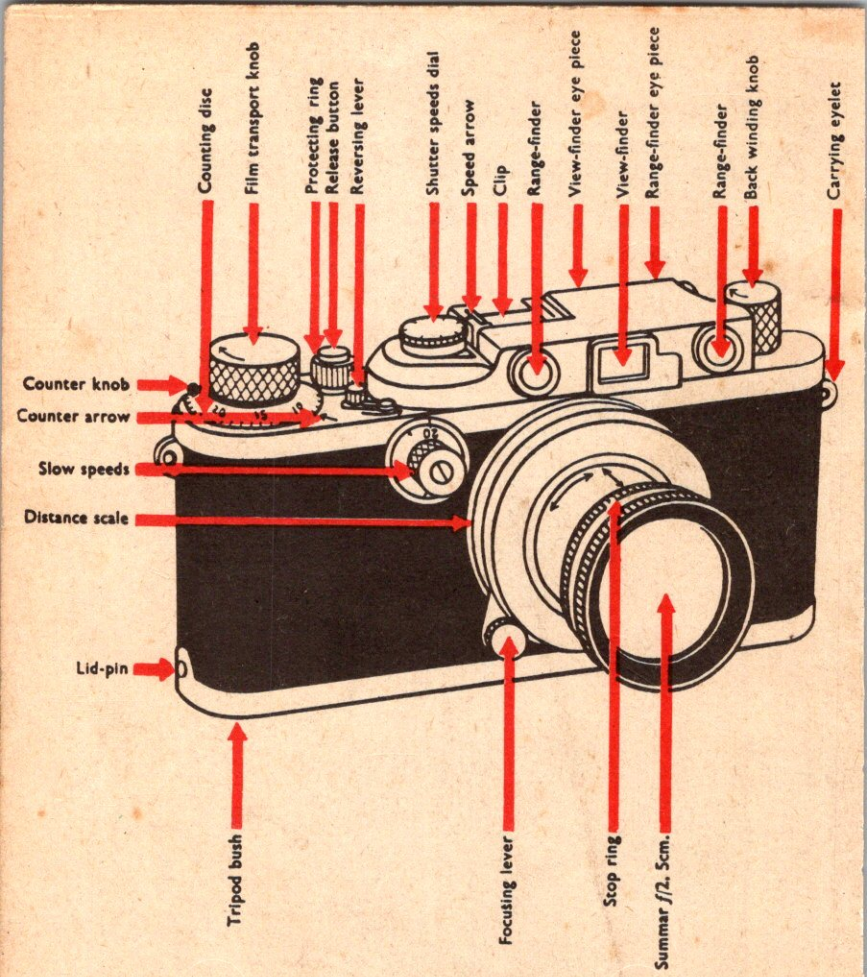

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