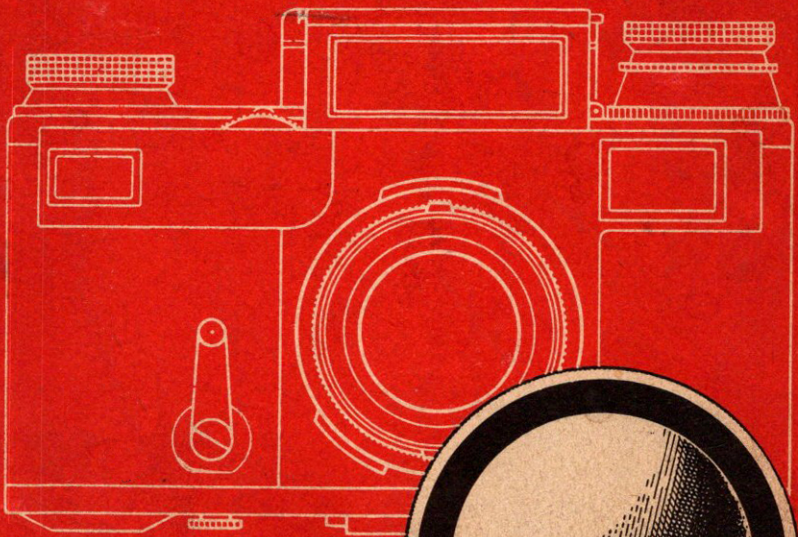


CONTAX GUIDE



CONDENSED COMPLETE
CORRECT
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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CONTAX GUIDE

WORKING WITH CAMERAS OF THE
CONTAX TYPE

By W. D. EMANUEL

A Focal Press Book



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by

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who, out of his practical and theoretical knowledge of the Contax, freely gave much valuable advice before this book was passed for print.

WHICH IS BETTER?

The Contax is a precision-built miniature camera loading 35 mm. cine-film, equipped with interchangeable lenses, most of them coupled to a range-finder for automatic focusing. It came out in 1932, seven years after the first camera of basically similar design, the Leica, appeared on the market. Photographers, both professional and amateur, as well as writers on photographic matters, both practical men and theorists, have been comparing, questioning, arguing the mutual likenesses and differences, advantages and disadvantages, scopes and limitations of these two makes ever since. The makers of the two instruments settled what there was to settle a long time ago, but the battle of the partisans goes on. Every buyer of one or the other camera seems to be a new volunteer keen to join the army of his side and do his bit for the "cause". Heretical disputes of the middle ages were hardly fought with more sincerity and less consideration for sober facts.

The Leica came first, the Contax was second. The designer of the Leica had done much valuable pioneering work that benefited the designer of the Contax. At the same time the makers of the Leica, having priority, could acquire a number of strategic patents, thereby forcing the makers of the Contax to find new solutions of problems whether they wanted to or not. Consequently, while some features of the Contax may represent an advance on the corresponding ones of the Leica, others are just virtues by necessity.

SHAPE, SIZE, WEIGHT. The Leica has smoother contours, the Contax a more angular shape. The Contax is slightly larger ($5\frac{1}{2}$ in. \times $2\frac{3}{4}$ in. \times $1\frac{3}{8}$ in. as against $5\frac{1}{4}$ in. \times $2\frac{3}{8}$ in. \times $1\frac{1}{4}$ in.) and weighs a fraction more ($29\frac{1}{2}$ ounces as against 28 ounces). If you have small hands you may prefer the "feel" of the Leica; if your hands are not so small you will get a more solid grip holding the Contax.

RANGE-FINDER. (1) Range-finder and view-finder have separate eye-pieces on the Leica; they are served through a single eye-piece in the latest models of the Contax. There can be no doubt that this latter method is more convenient as long as one works with a standard lens, i.e. the built-in view-finder is being used. (2) The base of the Leica range-finder is $1\frac{1}{2}$ in. long; that of the Contax range-finder 4 in. The longer base ensures greater accuracy when measuring the range of distant objects; in practice, however, the depth of focus of even the fastest lens will take care of minor errors

in operating the finder. The long base brings the front windows of the range-finder very near to the flanks of the camera, and the photographer must learn to grip his Contax and turn the focusing wheel without covering one of these windows with his fingers.

FOCUSING. Leica lenses are focused by a lever on the lens-mount; the Contax is focused by a milled wheel conveniently close to the release button at the top of the camera. This much handier method of focusing operates, however, only with the lenses of normal (5 cm.) focal length; all the other lenses must be focused by turning the lens-mount as the focusing wheel is not suitably geared for rotating them.

SHUTTER. (1) Both the Leica and the Contax have focal plane shutters. The Leica shutter is made of a special fabric of rubberized cloth; the Contax shutter uses a metal roller blind. They function with equal efficiency, but it is not unreasonable to assume that given extreme climatic conditions the Contax shutter will possibly stand longer and harder wear. (2) The Leica shutter travels along the longer side of the negative; the Contax shutter travels along the shorter side. As lateral movement is usually taken with the camera in horizontal position and movement up and down with the camera in vertical position, the Leica shutter may record the image distorted along the direction of the movement while the Contax shutter may record it distorted across the direction of its movement, always provided that the shutter was unable to keep pace with the subject. It is generally accepted that, if any, the Leica version of distortion is preferable. On the other hand, the Contax shutter, having to travel only 2/3 of the distance covered by the Leica shutter, has correspondingly less opportunity to produce distortion. (3) The times of the Leica shutter range from 1 sec. to 1/1000, while those of the Contax shutter range from 1/2 sec. to 1/1250.

RELEASE. The Leica release button protrudes from the top of the camera; the Contax release button is flush with the top of the winding knob. The latter arrangement is safer in preventing accidental release. (2) The Contax has a built-in delayed action release as an additional minor feature.

CHANGING LENSES. Contax lenses clip into bayonet catches on the camera; Leica lenses must be screwed in. The Contax method is quicker.

LENSES. (1) There are 13 lenses of different apertures and focal lengths offered for the Leica; 15 for the Contax. The focal lengths and the nominal apertures are very much the same in both cases. The actual performance of corresponding lenses is, of course, more varied as they are based on designs protected by patents. Much has been written and even more has been said about these differences, but no impartial quantitative reports have ever been published to allow unbiassed and reliable judgment. A certain amount of preference for Contax lenses has been displayed by a few Leica users who went to the length of having Contax Sonnar's fitted to their cameras; it would be, however, unfair to accept this sign as a reliable proof of the better quality of the Contax lenses; it would be better to take it as a mere indication of personal taste. (2) The longest focal length with the Contax (50 cm.) is 20 per cent. longer than the longest lens of the Leica. (3) The Contax has no portrait lens with adjustable
6 softness similar to the Thambar type available for the Leica. (4) The

Flektoskop of the Contax is designed to work with one of the tele-lenses only, while the corresponding Reflex Housing device of the Leica permits the use of all the tele-lenses available for that camera.

LOADING. To load the Leica the bottom panel is removed; to load the Contax the bottom and back of the camera (made of one piece) is removable. The latter method offers a number of indisputable advantages. (a) Loading is more comfortable. (b) It is easier to cut off exposed loads by exchanging the take-up cassette for an empty one. (c) The interior of the camera is accessible for cleaning. (d) The back can be exchanged for a single exposure plate adapter.

EXPOSURE METER. The latest model of the Contax has a built-in exposure meter; it is one of the very few cameras to have this feature, which is perhaps more attractive than important.

ACCESSORIES. Being the older camera the range of accessories available for the Leica is considerably larger than that available for the Contax.

POLICY OF DESIGN. During the seventeen years of its existence on the market the basic design of the Leica has never been changed. All improvements were simply additions to the original camera which could be fitted with them stage by stage. This is why some people came to regard the Leica as a better "investment" than the Contax, the makers of which followed a more liberal policy in designing new models. Whether this distinction still holds good is at present not easy to decide. The very latest model of the Leica is reported to have a somewhat longer body than all its predecessors and, if this is correct, the former conservative line of Leica policy can be regarded as abandoned.

PRICES. In this country (Great Britain) the listed prices of Contax cameras and lenses are about 1/3 higher than the corresponding prices for Leica. Contax accessories are comparatively even more expensive.

This kind of comparison of two cameras can serve some useful purpose only as long as the cameras in question represent a peak of the latest photographic design and do represent it exclusively. This was certainly true of the Leica and the Contax, which for fifteen years or so embodied the nearest approach to what is usually—and somewhat superficially—termed the modern "universal" camera. The end of the present war, however, is sure to bring the advent of new designs and new makes based on scientific experiences accumulated in many fields of war-time industrial activities and created by industries now engaged in those activities. Many a blueprint awaits the hour when tools and labour and materials will again be available for more peaceful wonders of the creative human mind than the things for which we need them to-day. And then, perhaps, we shall be able to tell more exactly which is the best camera: the Leica, the Contax or one yet to come. **7**

THE CONTAX CAMERA

The Contax is a very versatile miniature camera, equally suitable for all kinds of amateur photography and for professional use; for landscapes, interiors, portraits, press-photography, theatre and night photography, close-up, copying, scientific and photo-micrography.

The characteristic features of the Contax are the die-cast body, the built-in long-base range-finder mechanically coupled with the lens focusing, the interchangeable lenses, fitted by means of bayonet mounting, permitting rapid change with perfect accuracy, a metal focal-plane shutter with a range of $1/2$ sec. up to $1/1250$ th sec. in Contax II and III, and $1/25$ th to $1/1000$ th or $1/2$ to $1/1000$ th sec. in Contax I. The camera back is detachable, which is advantageous not only for loading, unloading and cleaning the Contax, but makes it possible to fit a special plate adapter when ground-glass focusing or single exposure on special plates or flat-films is required. Film transport and shutter-winding are automatically coupled; consequently double exposures are impossible. No re-winding of the film is required when working with the special Contax-spools or with two cassettes. As negative material the standard cine-film is employed for up to 36 exposures. A built-in optical direct vision view-finder—in case of Contax II and III in one eye-piece with the range-finder—gives the accurate image. A depth of focus indicator is provided, giving immediately the depth of focus with every setting of the lens and any given distance. Fifteen interchangeable lenses from 2.8 cm. wide-angle up to 50 cm. tele are at our disposal, besides numerous accessories which enlarge the scope of the Contax and make it adaptable to any branch of photography.

The Contax Models

CONTAX I (1932). When the first Contax came on the market, it incorporated already most of the features which made it one of the best known and most successful cameras. It included a long-base range-finder coupled with the lens-focusing, interchangeable lenses, the

metal focal plane shutter with speeds from 1/25th to 1/1000th sec. and the detachable back. This model was followed eighteen months later by an improved version of the same Contax I giving shutter speeds down to half a second, and finally in 1934 the hinged mirror type range-finder was replaced by the rotating wedge range-finder, giving greater accuracy.

CONTAX II (1936) was introduced with a range of mechanical improvements comprising combination of range-finder and view-finder in one eye-piece, increased range of shutter speeds up to 1/1250th sec., simplification of handling the shutter, more convenient placing of film-transport winder, built-in delayed-action release, satin chromium plating of all external metal parts, beside a number of minor improvements.

CONTAX III (1936), which appeared at the same time as the Model II, is similar to it, but has a photo-electric exposure-meter built in.

Sequence of Handling

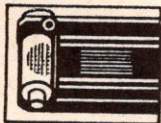
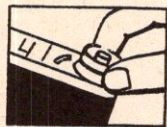
To start with we take it for granted that we have a Contax as well as a Contax film in daylight packing in front of us. Our first task is to load the camera with film. This should be done *in subdued daylight*.

Loading the Camera

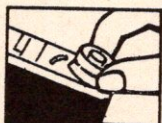
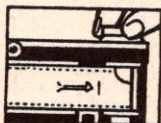
1. Wind shutter.
 2. Take off camera back.
 3. Insert film.
 4. Lift out take-up spool.
 - 5/6. Fix film on take-up spool and replace it.
 7. Wind take-up spool.
 8. Replace back.
 9. Set counting disc.
 10. Wind on paper-trailer.
 11. Wind to No. 1.
-
1. Wind up the shutter-winding knob as far as it will go in a clockwise direction until a hard stop is felt.
 2. Raise the two locking keys on the camera base and give them a half turn. In the open position the keys cannot be folded down against the camera body. Draw the camera back slightly downwards and then lift it away from the body of the Contax.
 3. Place the Contax-spool with its hollow end on the claw of the left-hand spool chamber, and break the gum strip that holds down the end of the paper-leader.

4. Pulling the leaf spring towards the film sprockets with the left forefinger, take out the empty spool in the right-hand spool chamber.
5. Tear off the sticky paper fastening the Contax-spool and thread the paper-leader through the wide slit of the take-up spool and fold back about $1\frac{1}{2}$ in. (3 cm.) sharply to the outside so that the black side of the paper lies outside. The take-up spool must be re-inserted in its chamber with the claw engaging in the hollow end.
6. In case of cameras supplied with the slightly modified take-up spool made of moulded plastic, the perforated paper-leader end of the film must be slid under the tongue until the first perforation hooks on to the tooth which is to be found there.
7. Turn on the take-up spool until the line to which the arrow on the paper-leader points lies over the teeth of the sprockets. To achieve this, press first the shutter release button down and turn it in an anti-clockwise direction. Now the take-up spool can be turned freely. Afterwards turn shutter release button back.
8. Now replace camera back, holding the paper strip in contact with the teeth of the sprockets with the thumb of the left hand. The camera back is placed on the body (not slid on) as close as possible to the upper edge of the guiding grooves. When the back is flat on, slide upwards to close the camera completely. Give half a turn to the locking keys on the under side of the camera to lock the back in place, and fold them back once more.
9. By means of the milled wheel of the Contax II and III (for Contax I see below), which turns the picture counting disc, set the red dot of the disc, which lies next to No. 27, to the small triangular indicator on the edge of the window above the disc, also marked with a red dot.
10. Press the shutter release button, and, while holding it down, turn it in an anti-clockwise direction until a stop is felt. In this position the release button will stay permanently at the lower level. Wind shutter knob until the picture counter shows the No. 36. While winding make sure that the re-wind knob of the Contax rotates during this operation; if it does *not* rotate it means that you have done something wrong, and the back must be removed to find the cause of the trouble.
11. By pressing the shutter release button and turning it in a clockwise direction, it once more returns to the upper level. The red dot on release button should now be opposite the red dot of the winding knob. Wind up the shutter and press shutter release button until the picture counter disc shows No. 1. The camera is then ready for the first exposure.

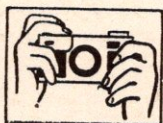
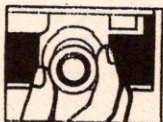
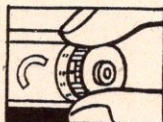
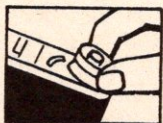
When using a Contax I, instead of the procedure from Nos. 9 to 11 (above) the following one should be adopted. The red dot near the engraved mark 29 of the counting disc must be set opposite the white index line by turning the disc in the direction of the arrow while pressing down the counter-disc catch. It is advisable, first of all, to



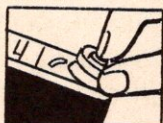
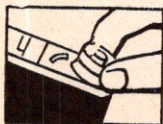
Sequence of operations when loading the Contax (see page 19).



Sequence of operations [for taking pictures (see page 15).



Sequence of operations when unloading the Contax (see p. 19).



give the counter disc a complete rotation before setting it to the red mark, in order to tighten the paper-leader which may have been wound rather loosely round the spool. The film-transport knob is now turned, at the same time pressing down the shutter release button. During this operation the rewind knob should likewise rotate, indicating that the film-movement is working correctly. After the counting disc has performed about eight rotations, the shutter release button is released and the shutter-winding knob turned as far as possible until a stop prevents further rotation. It is now possible to ascertain exactly the extent of film-leader which has been transported through the camera. The counting disc is now about three pictures before 0. The 0 should now be set to the beginning of the film (that is line 1 of the counting disc) by single turns, pressing down the shutter release button each time. When No. 1 is opposite the index line the camera is ready for the first exposure.

Full particulars about loading the Contax with other types of Daylight-films and with Contax-Cassettes may be found on page 22.

Holding the Contax

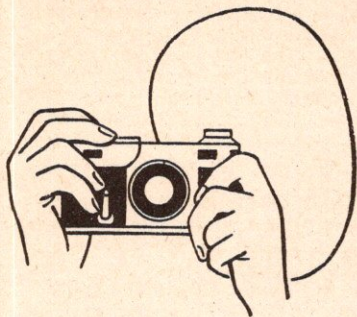
It is obvious that the camera should be held as steady as possible, as the slightest shake, even if not seen in the original negative, will become visible in the enlargement. Always stand with your legs apart.

A particularly steady hold of the camera is necessary when working with the long-focus lenses (p. 36). In this case the centre of gravity lies in the lens and therefore it is desirable to hold the camera by grasping the lens with the left hand. This hand will then attend to the focusing, while the right hand steadies the camera and operates the shutter.

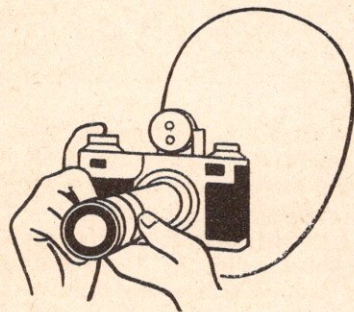
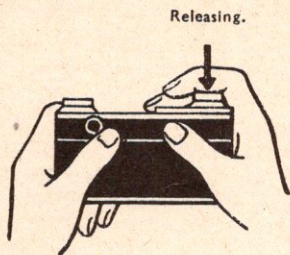
FOR HORIZONTAL PHOTOGRAPHS. Rest camera against cheek, keeping both elbows close to the body, the right hand clasping the camera, the right middle finger on the focusing wheel, the right forefinger on the shutter-release button. Little finger and third finger should be held downwards on the camera-front, to make sure that they do not cover the range-finder opening. The left hand has to hold the camera body without covering the range- and view-finder opening.

FOR VERTICAL PHOTOGRAPHS. Right and left hands are employed as advised for horizontal photographs, but the camera body is turned 45° to the left, so that the right hand works from above and the camera body is pressed against the forehead. Do not cover the range- and view-finder opening!

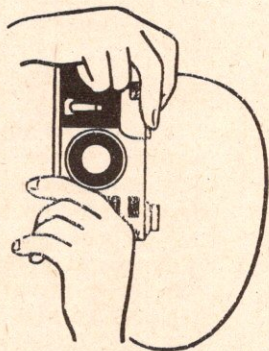
Holding the Contax (see p. 12)



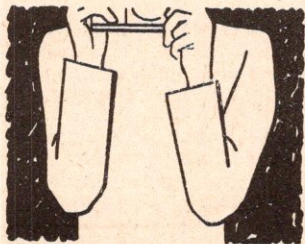
With 5 cm. lens in horizontal position (see page 12).



Holding horizontally when working with tele-lens.



With 5 cm. lens in vertical position (see page 12).



Rest elbows against body . . .



and stand firm with the legs apart.

To release the shutter (p. 15) the shutter release button should be pressed with the ball of the right forefinger. 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 $1/10$, $1/5$ and even $1/2$ sec. can be risked without incurring camera shake.

On the rectangular camera bush of the Contax is a hinged foot, which is usually folded backwards against the base of the camera. When, however, it is desired to hold the camera firmly, particularly when using the larger aperture lenses, the foot may be turned over and pointed forwards so that the camera will stand up on a table or other flat surface. When using the foot for this purpose the camera is quite firm and well balanced.

Use of a tripod is necessary when taking time-exposures, and it is recommended for speeds from $1/10$ to $1/2$ sec. and instantaneous exposures of $1/50$ or slower with the long-focus lenses up to 13.5 cm., while the lenses from 18 cm. to 50 cm. should always be operated from a tripod. A rigid tripod with a ball-and-socket head should be employed to allow the changing from horizontal to vertical position of the Contax. While the tripod or the ball-and-socket head should be screwed into the tripod bush on the bottom of the camera, with the 8.5 and 13.5 cm. Triotar and Sonnar lenses, as well as the Tele-Tessar 18 cm. $f6.3$, the lens-holder (p. 104) should be employed for securing the lens to the stand. This holder ensures a really stable connection between lens and tripod for both horizontal and vertical pictures. Moreover, it permits the focusing screen adapter (p. 104) to be exchanged conveniently for the Contax camera when working with these lenses. When working with the other tele-lenses (p. 36) or the Flektoskop (p. 48), the tripod bush will have

Carrying the Contax

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 Contax on a short strap round the neck, so that it lies on one's chest. Opening the case and lifting the Contax up to the eye is then a matter of a split second.

There are a number of different types of cases available for the Contax: The Ever-Ready case carries the Contax ready for use: there is a holding screw which prevents the camera 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 complete Contax outfit with auxiliary lenses, finders, filters, cassettes, etc. Separate cases for one lens or for any of the many Contax accessories or attachments are also on the market.

Shooting with the Contax

1. Pull out lens and fix it.
2. Wind film transport.
3. Set shutter speed.
4. Set stop.
5. Set distance.
6. Determine picture.
7. Release.

The manipulations here described should be practised so that in time they can be done practically automatically.

1. Pull out the lens and turn it to the right until a stop is felt (Not applicable for non-collapsible lenses: Sonnar f 1.5 and old type of Sonnar f 2.5 cm.)
2. Wind film transport knob by a complete turn of the winding knob until a definite hard stop is felt. The film will then at the same time be wound a complete picture forward.
3. Set shutter speed by lifting the milled shutter-winding knob of the Contax II and III against a strong spring and turning it still in the raised position until the black dot on its circumference is opposite the exposure time desired. The engraved numbers 2, 5, 10, 25, etc., indicate fractions of seconds i.e.: $1/2$, $1/5$, $1/10$, $1/25$ sec., etc. At this point the knob is released and will drop into position.

The catches for the $1/500$ and $1/1250$ sec. speeds are very close to each other. The $1/500$ speed is set by lifting the knob and turning forward from $1/250$ sec. until the catch allows the knob to drop

into position. When setting the shutter to 1/1250 sec. the knob is raised and turned as far towards the marking 1/250 as it will go; in the correct position it drops into place as the catch is reached.

When setting shutter speeds it is essential that the shutter is either fully wound up or fully run down. In both these positions the black dot may be set to the desired figure. It should also be noted that when changing from a slower speed to a higher one a certain amount of resistance is felt when turning the knob. This is due to the spring loading of the shutter slit, which must be altered for the different speeds and the knob must be wound against the extra tension.

If it is desired to have the shutter open fully, set the knob to "B" and then lock the shutter release button down by pressing it down to release the shutter and turning it in an anti-clockwise direction. The shutter may be closed later by turning the knob back in the clockwise direction until it rises to its normal working level.

Should, for some special purpose, the shutter be wound without transporting the film, e.g. for intentional double exposure of one frame, or if by accident one has released with the lens cap on the lens, press down re-wind knob on bottom of camera and hold at the same time re-wind knob on the camera left firmly. The shutter can now be set without moving film and without danger of damaging it by turning the shutter-winding knob in the usual manner.

DELAYED-ACTION SHUTTER RELEASE. Contax II and III have a built-in self-timer, which operates the shutter some ten seconds after the mechanism has been set in action. The shutter is first wound in the normal way, and then the delayed-action mechanism is wound by pulling the delayed-action lever to the left (anti-clockwise) as far as it will go. The clockwork is set going by pressing the release button (which becomes visible after pulling the delayed-action lever) in the direction of the arrow engraved on it. Any exposure time may be set for use with the delayed-action device. With the shutter set to "B" the delayed-action mechanism will give an exposure of approximately one second, and will then close the shutter. Even when the delayed-action mechanism is fully wound the shutter time may be set or the shutter wound up, but this can only be done with the delayed-action device either

Contax I. With the model with speeds from 1/25th to 1/1000th the procedure is the same as for Contax II and III. With the model with slow speeds, from 1/2 sec. on, the device for setting the exposure consists of a scaled disc, the adjusting ring and the knob for winding the shutter. The disc is covered for the greater part. In the part that lies visible there always appears one of the following four different exposure time groups:

- (a) Group for long time exposures: B, 1/2 sec.
- (b) Group for slow exposure times: 1/5 and 1/10 sec.
- (c) Group for normal exposure times: 1/25, 1/50, 1/100 sec.
- (d) Group for fast exposure times: 1/100, 1/200, 1/500, 1/1000 sec.

Set the shutter to the group desired by turning the adjusting ring anti-clockwise. The correct position is obtained by bringing a white or red dot opposite the black index on the front wall of the camera, a click being audible when snapping into the position.

4. Adjust iris diaphragm by turning milled stop-ring until 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. 50).

5. Set distance by looking through the eye-piece of the range-finder, which in case of Contax II and III is identical with that of the view-finder. A rectangular portion of the field in the centre of the picture will be seen to have a lighter shade, in which a double image of the object included in that portion of the field is detected. By turning the focusing wheel one of the images will be seen to move sideways, and when the two images fuse into a single one the lens is accurately focused at the distance of the object seen in that portion of the field. It should be noted that the object on which focus is desired should be in the centre of the lighter rectangular field and not at the left- or right-hand edges. The small lever behind the focusing wheel releases the infinity catch on the mechanism. When the focusing wheel is turned to focus, the catch is automatically pressed down and the focusing device is put into action.

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. 56 about quick shooting with zone focusing methods.

6. View the whole field (in case of Contax I by looking through the separate view-finder eye-piece). The field of view given is that for any of the 5 cm. focal length lenses. For lenses of other focal length special finders will have to be employed (see p. 44).

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.

7. Release by gentle pressure on the release button (see p. 12, Holding of Camera).

For long time exposures a special flexible cable release is delivered with the Contax which is screwed into the thread of the shutter release button. This release is different from other makes, having a movable plate between the pressure stud and the socket. By setting the shutter to "B" and pressing the stud of the cable release the shutter opens, and remains open until the plate of the release is pressed with the thumb.

This cable release can be used for short time exposures and for ordinary snapshot exposures merely by turning the movable plate to the right, which presses it down into the socket. In this position the release works just in the same way as the ordinary type.

When all the 36 exposures have been made (the number of exposures taken is automatically counted on the film counter), the film has to be wound on until the end of the paper

18 trailer is reached in order to remove it from the camera and

replace it by a new film. Both of these operations should be done in *subdued daylight*.

Unloading the Contax

1. **Wind paper trailer off.**
 2. **Release shutter release button.**
 3. **Take off camera back and remove film.**
 4. **Transfer empty spool.**
1. Press down the shutter release button (with Contax II or III the release button can be fixed as directed on p. 10/10) and wind on shutter-winding knob until the end of the paper trailer is reached. This point is found by noticing when the rewinding knob no longer revolves when the shutter-winding knob is turned.
 2. Again release the shutter release button when using Contax II or III, as directed on p. 10/11. With Contax I let go shutter release button.
 3. Take off camera back, as directed on p. 9/2, remove the full take-up spool and stick down the end of the paper trailer with the gum strip provided.
 4. Transfer the now empty spool from the left-hand chamber to the right-hand chamber. Always hold the leaf spring away from the spool when removing it from the camera.

For unloading of other film types than Contax-Daylight spool see page 22.

Cutting-off Exposed Film Parts

It has to be done 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 on account of the removable camera back. The shutter should be set for the next exposure and all there is to be done is to cut off with a pair of scissors the frame which lies in the film window. The remainder of the film should be trimmed again (see p. 25), re-inserted on the take-up spool and the camera closed. The camera is ready for the next exposure once the film counter has been set four numbers forward (the amount of film lost through cutting and re-inserting).

When working with Cassettes or Daylight cartridges (p. 22) the re-inserting can be done in daylight. In this case about 6 to 7 frames are lost, for, after inserting and closing, two blind exposures will have to be made to wind on the film piece which was exposed to the daylight.

Changing of Partly-exposed Films

Should a partly-exposed film be replaced by another one, as might happen if a few colour photographs were made in between some black and white pictures, one will have to see how many frames of the film to be removed are taken, by checking the film counter.

Now we rewind the film back into its original spool (see p. 19/1). When using cassettes or cartridges one has to be careful to wind only until a little resistance is felt. (In the ordinary way this resistance would have to be overcome in order to tear the film end from the take-up spool, otherwise there would be a danger of rewinding the whole film into our cassette or cartridge; then the film end would have to be extricated in the darkroom in order to be able to re-insert the film into the camera later on.) The re-wound film has to be taken out of the camera. On the beginning of the film we note the number of exposures taken for reference and put it into a container or wrap it up. Now we can load our camera with the colour film.

To use the partly-exposed film again, it has to be loaded into the camera in the usual way (see pp. 22 and 23). The release button should be left pressed down and will have to be turned until the number is indicated on the picture counter which corresponds with the number of exposures already made on the film. To be on the safe side *it is advisable to allow one to two more frames to pass*. When doing this winding on, one must make sure that the shutter is *not* set to "B". The rest of the film can now be exposed in the usual way.

CONTAX FILMS

The Contax film is the standard cine-film of 35 mm. width and is perforated. The Contax negative is 36 × 24 mm.

CONTAX-DAYLIGHT FILM SPOOL. The most convenient and simplest film loading is attained when the Contax spool is used. The manner of procedure is in every way identical with that of an ordinary roll-film camera, the film being wound from the original spool on to an empty one. The actual film strip of the Contax-spool is preceded and followed by front and end trailers of perforated black paper, so that the film can be loaded and removed in daylight (see p. 9).

DAYLIGHT FILM CARTRIDGES. The film is supplied in a tin, cardboard or plastic film cartridge, the latter being entirely light-tight, so that it can be placed in the camera and removed in daylight. When using cartridges it is, however, necessary to re-wind the exposed film into the cartridge, after it has been exposed (see p. 23).

CONTAX-CASSETTE. The Contax-Cassette is designed to be filled either with film from bulk length, darkroom refills or daylight refill films. After the cassette has been filled it can be placed in the camera and removed in daylight; it is, however, necessary to rewind the exposed film into the cassette after it has been exposed. By substituting the taking-up spool for a second cassette the re-winding may be saved (see p. 27).

DAYLIGHT REFILL FILM. The film is supplied on a centre-spool and covered with a front trailer to render it light-tight. The daylight refills have to be used in a Contax cassette or empty cartridge and can be loaded in daylight into these containers (see p. 29).

DARKROOM REFILL FILMS. These are ready-cut film strips for 36 exposures, which must be loaded into a Contax cassette or empty cartridge in the darkroom (see p. 29).

BULK FILM. Uncut 35 mm. film in lengths of 15 to 200 ft. from which lengths may be cut, trimmed, loaded in the Contax cassette or empty cartridge (see p. 27).

Using the Contax Spool

See pp. 9 to 12.

Using the Daylight-Film Cartridge

1. Open camera.
 2. Wind shutter.
 3. Insert daylight film cartridge.
 4. Remove take-up spool.
 5. Fix film end on take-up spool.
 6. Replace take-up spool.
 7. Replace camera back.
 8. Make two blind exposures.
 9. Set counting disc.
1. Open the camera by raising the two locking keys on the camera base and giving them half a turn. Draw the camera back slightly downwards and then lift it away from the body of the instrument.
 2. Wind up shutter as far as it will go in a clock-wise direction.
 3. Place Daylight Film Cartridge with its hollow end on the claw of the left-hand spool chamber.
 4. Pulling the leaf-spring towards the film sprocket with the left fore-finger, take out the empty take-up spool in the right hand spool-chamber.
 5. Pull out about 5 in. of film from the cartridge and thread the film-end through the wide slit of the take-up spool and fold it about $\frac{1}{2}$ in. sharply to the outside.
In case of cameras supplied with the slightly modified take-up spool made of moulded plastic, the film-end must be slid under the tongue until the first perforation hooks on to the tooth which is to be found there.
 6. Wind enough film on to the take-up spool so that when placing it in the spool chamber the teeth of the feeding sprocket engage with the perforation on both sides, and replace take-up spool in its chamber with the claw engaging in its hollow end.
 7. Now replace camera back, holding the film in contact with the teeth of the sprockets with the thumb of the left hand. The camera back is placed on the body as close as possible to the upper edge of the guiding groove. When the camera is flat on, slide upwards to close camera completely. Give half a turn to the locking keys on the under side of the camera to lock the back in place, and fold them back once more.
 8. Now release shutter and make two blind exposures, by twice winding and releasing shutter. During this operation the rewind knob should likewise rotate, indicating that the film movement is working correctly.

9. Set picture counter disc to "O". This is accomplished with Contax II and III by turning the milled counter disc until the "O" is opposite the small triangular indicator. With Contax I the counter disc catch has to be pressed down, while the disc itself is turned in the direction of the arrow until "O" is opposite the white index mark. When winding on, the counter disc will indicate No. 1 and the camera is ready for the first exposure.

UNLOADING when Daylight Cartridges are used: After having taken the 36 exposures—the number of exposures taken is automatically shown on the film-counting disc:—

1. Press rewind knob.
2. Rewind film.
3. Release rewind knob.
4. Remove back.
5. Remove film cartridge.

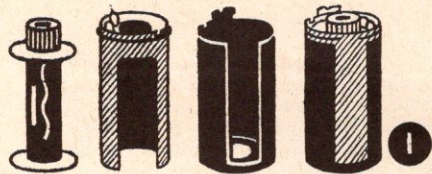
1. Press rewind release knob on bottom of Contax II and III and keep it pressed down. On Contax I turn rewind lever on bottom of camera from F (on some cameras V) to R and keep it pressed in this position.
2. Turn rewind wheel in direction of arrow until all film is rewound into the cartridge. This is distinctly felt as the turning becomes considerably easier the moment the film is wound back.
3. Release rewind knob or lever on base of camera.
4. Take off camera-back by raising the two locking keys and giving them half a turn. Draw the camera back slightly downwards and then lift it away from the body of the Contax.
5. Remove exposed film in cartridge for processing and insert next film.

For re-loading Daylight Film Cartridges, see p. 30.

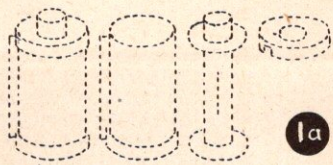
Using the Contax Cassette

While the filling of the Contax Cassette is described in detail on p. 29, the sequence of operations for loading the filled cassette into the camera (and removing it after all exposures have been made) is given here:—

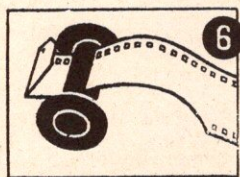
1. Open camera.
 2. Remove back.
 3. Wind shutter.
 4. Insert cassette.
 5. Load and close.
1. Open the camera by raising the two locking keys on the camera base and giving them half a turn.



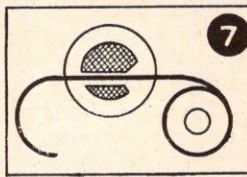
Centre spool Contax Inner shell Contax Outer shell Cassette closed



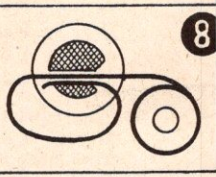
Daylight Cartridge closed Shell with bottom cover Centre spool Top cover



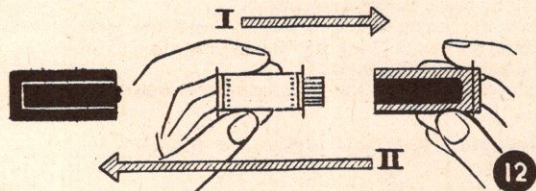
Fixing trailer on take-up spool



Fixing film end on centre spool of Cassette when film First phase



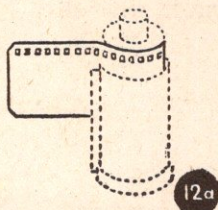
Second phase



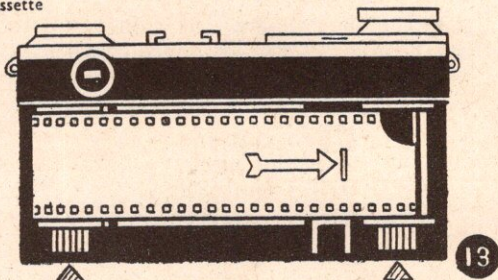
Assembling the Cassette



The way of Unexposed



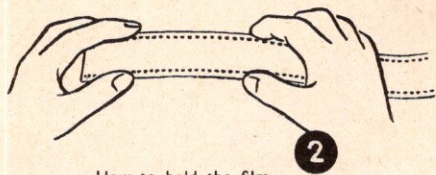
Assembling a cartridge



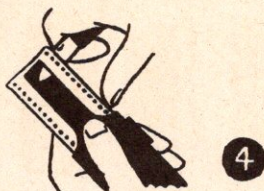
Unexposed spool

Inserting Contax daylight spool

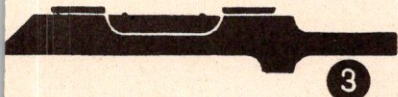
Take-up spool



How to hold the film



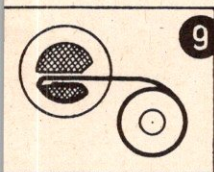
Trimming film with templet



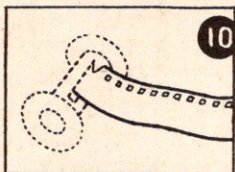
Contax trimming templet



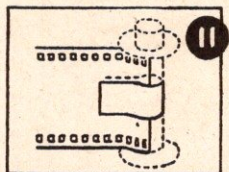
End and start of correctly trimmed film



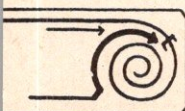
not be rewound
Third phase



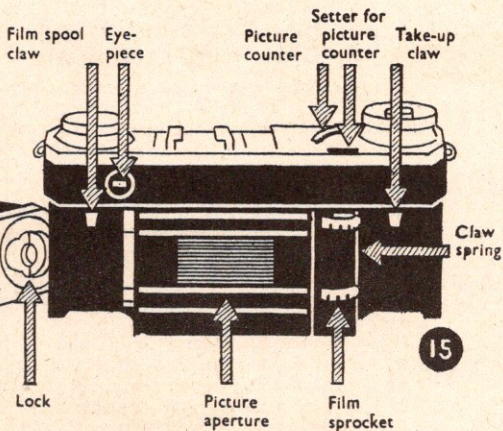
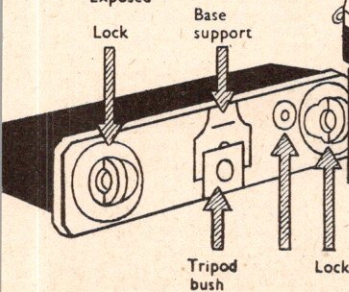
Fixing trailer on moulded
take-up spool



Fixing film end on centre
spool of cartridge.



in the Contax
Exposed



2. Draw the camera-back slightly backwards and downwards and then lift it away from the body of the instrument.
3. Wind shutter as far as it will go in a clockwise direction.
4. Place the cassette into the left-hand spool chamber, its hollow end on the claw, so that the outer small projecting piece lies in the channel cut in the spool chamber to receive it. (In the case of Contax I a spring stud replaces the channel cut in which the small projecting piece of the cassette has to grip.)
5. Now proceed exactly as described for Daylight Cartridges on p. 22, No. 4 to No. 9.

Using Two Contax Cassettes

When using a second Contax Cassette instead of the take-up spool for receiving the film, the re-winding will be saved and the chance of scratching the film in this procedure avoided. The sequence of operations is:—

1. **Open camera and insert cassette.**
 2. **Open second cassette.**
 3. **Draw the two containers apart.**
 4. **Fix film-end on metal spool.**
 5. **Put cassette parts together.**
 6. **Close cassette.**
 7. **Insert take-up cassette.**
 8. **Close camera and wind for first exposure.**
1. Open camera and insert the filled cassette exactly as described (p. 23, No. 1 to No. 3).
 2. Take second, empty take-up cassette, press down the small nickelled button and turn in clockwise direction until the apertures in the two containers are over each other.
 3. Draw the two containers apart.
 4. Thread the beginning of the film in the (metal) spool and fold $\frac{1}{8}$ in. towards the outside. When using moulded plastic spools hook the beginning of the film on to the tooth of the spool.
 5. Slide the inner and outer containers over the core.
 6. Close the cassette by turning until the word "zu" ("closed") is visible.
 7. Insert the taking-up cassette into the right-hand side spool chamber, its hollow end on the claw, so that the outer small projecting piece lies in the channel cut in the spool chamber to receive it. (In case of Contax I a spring stud replaces the channel in which the small projecting piece of the cassette has to grip.)
 8. Now proceed as described on p. 22, No. 8, to get camera ready for use.

UNLOADING when two cassettes are employed. After having taken the 36 exposures—the number of exposures is automatically shown on the counting disc:—

1. **Wind film-end on.**
2. **Open camera.**
3. **Remove film.**

1. Wind film transport on and release until the rewinding wheel no longer revolves when the shutter-winding knob is turned.
2. Take off camera-back by raising the two locking keys and giving them half a turn. Draw the camera back slightly downwards and then lift it away from the body of the contax.
3. Remove exposed film in right-hand side cassette for processing and insert next film.

Loading Film-Containers with Film

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. 32) 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. 32) are used, the red "ortho" safelight may be used.

In case of *positive films* (p. 32) amber light will do.

HANDLING. 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. 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!

MEASURING. 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.

TRIMMING of the film-ends for the Contax cassette is performed most correctly and simply by the cutting guide. Experience shows that it is not absolutely essential to work with the cutting guide, as long as one makes sure that the cut is about the shape shown in the drawing on p. 25/5 and does *not* go through a perforation hole. At the beginning of the roll of film make the long wedge-shaped cut for the centre spool of the cassette, then measure the length for the 36 exposures—64 in. (1.6 m.). At the end of this make the curved cut. The ready-cut film is now spooled on the centre-spool of the cassette or cartridge as described on p. 27. One will have to make sure to hold the film only by its edges; also care must be taken that no great pressure is put on the film, and that the film-ends are not squeezed when drawn through the hand.

CUTTING SHORT LENGTHS OF FILM. Any desired number of exposures can be loaded into the film containers.

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 | 11 $\frac{3}{4}$ | 30 | 14 | 31 $\frac{3}{4}$ | 80 | 27 | 51 | 130 |
| 2 | 13 $\frac{1}{3}$ | 34 | 15 | 33 | 84 | 28 | 52 $\frac{1}{2}$ | 133 |
| 3 | 15 | 38 | 16 | 34 $\frac{1}{2}$ | 88 | 29 | 54 | 137 |
| 4 | 16 $\frac{1}{4}$ | 41 | 17 | 36 $\frac{1}{4}$ | 92 | 30 | 55 $\frac{1}{2}$ | 141 |
| 5 | 17 $\frac{3}{4}$ | 45 | 18 | 37 $\frac{3}{4}$ | 95 | 31 | 57 | 145 |
| 6 | 19 $\frac{1}{4}$ | 49 | 19 | 39 $\frac{1}{4}$ | 100 | 32 | 58 $\frac{1}{2}$ | 148 |
| 7 | 20 $\frac{3}{4}$ | 53 | 20 | 40 $\frac{1}{2}$ | 103 | 33 | 60 | 152 |
| 8 | 22 | 56 | 21 | 42 | 107 | 34 | 61 $\frac{1}{2}$ | 156 |
| 9 | 23 $\frac{3}{4}$ | 60 | 22 | 43 $\frac{3}{4}$ | 111 | 35 | 63 | 160 |
| 10 | 25 $\frac{1}{4}$ | 64 | 23 | 45 | 114 | 36 | 64 $\frac{1}{2}$ | 164 |
| 11 | 26 $\frac{3}{4}$ | 68 | 24 | 46 $\frac{1}{2}$ | 118 | 37 | 66 | 167 |
| 12 | 28 $\frac{3}{4}$ | 73 | 25 | 48 | 122 | 38 | 67 $\frac{1}{2}$ | 171 |
| 13 | 30 | 76 | 26 | 49 $\frac{1}{2}$ | 126 | Including trimming | | |

When loading a container with short length of film into the camera, after having inserted the film, one should "take up the slack" by winding the rewind knob in the direction of the arrow until a slight resistance is felt.

Loading Contax Cassettes with Darkroom Film

1. **Work in the appropriate darkroom safelight.**
 2. **Prepare the film.**
 3. **Open Contax 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. 27. In case of darkroom refills remove wrappings. It is useful to fold the first $\frac{1}{2}$ in. (1 cm.) of the beginning of film slightly backwards. It prevents its slipping away.
 3. The Contax cassette is opened by pressing down the small nickelled button and by turning in clockwise direction until the slots in the two shells (containers) are over each other. The shells can now be drawn apart, and one has the three-piece cassette consisting of outer shell, inner shell and centre spool separated.
 4. The attaching of the film to the centre spool differs according to whether it is intended to rewind the film or not. In the first case a loop must be made to attach the film firmly as shown in diagram on p. 24. In the latter it is enough to bend the end of the film over, after slipping it through the slit in the centre spool.
 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.
 6. Introduce centre spool with film into inner shell, spool knob first, the beginning of the film lying in the slot.
 7. Slide the inner shell together with film into the outer shell, superimposing the two slots, film end outside.
 9. Close by giving the top (inner shell) half a turn clock-wise.

Loading Contax Cassettes with Daylight Refill Film

1. **No darkroom is necessary.**
2. **Remove wrapping and label of daylight refill film.**
3. **Open Contax 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. of film.**
9. **Cut paper leader off.**

3. Open cassette as described on p. 29, No. 3.
4. Introduce it into inner shell, spool knob first, the paper end lying in the slot. The actual centre spool, replaced here by the daylight refill spool, should be carefully kept, as it will be needed again when using darkroom loading film.
5. As described on p. 29, No. 7.
7. As described on p. 29, No. 9.
- 8 and 9. Pull the paper strip out. Fixed to its end is the actual film. Pull about 1 in. (2.5 cm.) of the actual film out and cut paper off. Fold the first $\frac{1}{2}$ in. of the film backwards (see p. 29, note 2).

Reloading Daylight Cartridges

The majority of cartridges consist of a centre spool, which is in a shell with top and bottom cover. The film leaves 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 the construction of the particular container (p. 24/1a).

While the Contax cassettes are actually designed to be reloaded, most of the containers of the daylight-loading films are intended by the makers to be used once only. Up to some time ago the question of reloading of cartridges rarely arose as proper cassettes as well as daylight films were plentiful. 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.

RELOADABLE CARTRIDGES AND DAYLIGHT REFILLS THAT FIT

| Make of Daylight Refills | Ilford Plastic Cart- ridge | Ilford Metal (Old) Cart- ridge | Kodak Metal Cart- ridge | Contax Cassette | Gevaert Plastic Cart- ridge | Mimosa Plastic Cart- ridge | Agfa Metal Cart- ridge |
|--------------------------------|-------------------------------------|--|----------------------------------|--------------------|--------------------------------------|-------------------------------------|---------------------------------|
| Kodak | No | Yes | Yes | Yes | No | No | Yes |
| Ilford | Yes | Yes | No | Yes | Yes | Yes | Yes |

Reloading Cartridges 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.
2. As described on p. 27.
 3. As described on p. 30.
 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 $1\frac{1}{2}$ 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 $\frac{1}{2}$ in. tape is used to secure the film. (See p. 25/11.)

Reloading Cartridges 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.
3. As described on p. 30.
 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, Mimosas, 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 over-sensitive 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
32 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 | Din | American Scheiner | Weston Scheiner | Weston Speed | H. & D. |
|----------|-------|-------------------|-----------------|--------------|---------|
| 12 | 1/10 | 8 | 11 | 1.5 | 38 |
| 15 | 4/10 | 11 | 14 | 3 | 75 |
| 18 | 7/10 | 14 | 17 | 6 | 150 |
| 21 | 10/10 | 17 | 20 | 12 | 300 |
| 24 | 13/10 | 20 | 23 | 24 | 600 |
| 27 | 16/10 | 23 | 26 | 50 | 1250 |
| 30 | 19/10 | 26 | 29 | 100 | 2500 |
| 33 | 22/10 | 29 | 33 | 200 | 5000 |

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).

CHARACTERISTICS OF SOME 35 mm. 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 | PR. | 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 | P. | 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.

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 Contax 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. 32). 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.

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. 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 the complementary colours to the actual ones. From this colour negative colour transparencies as well as colour and black and white enlargements on paper can be made. For the time being, this Kodacolor material is not available in Great Britain.) The second type, *Dufaycolor*, uses one single panchromatic layer with a resin printed on a dyed base, which produces a mosaic of blue and green squares separated by red lines. The single spots of colour are so small that they appear to our eye to form an even-coloured surface. In either case, the material produces not the usual negative but a positive film in its natural colours, which can be projected, viewed in a transparency-viewer, or used to make colour-enlargements on paper. This latter process is complicated, and costly.

CONTAX LENSES AND VIEW-FINDERS

In the Contax, Zeiss Tessars and Zeiss Sonnars of 5 cm. (2 in.) focal length are standard lenses. A number of other Zeiss lenses can also be used for all kinds of photographic work.

All lenses are interchangeable with the standard lenses by a *bayonet mount* on the front of the camera. This method of attaching lenses to the camera has been used for many years in cinematography, and its advantages are those of simplicity in lens changing, absence of wear and accurate seating of the various lenses in the camera body. The mounts of the lenses are arranged so that accessories such as filters, supplementary lenses, lens hoods, etc., can either be slipped on or screwed in.

All Contax-lenses from 3.5 cm. up to 18 cm. are coupled to the Contax range-finder (Sonnar 18 cm. either coupled or with Flektoskop). Or to be more accurate: all 5 cm. lenses, which fit into the *inner bayonet mount* are automatically focused by turning the focusing wheel of the camera, while all other lenses which fit the *outer bayonet* of the Contax work the reverse way round—the distance meter is operated by adjusting the focusing mount on the lens itself. Some lenses of particularly short and long focus must be used with special methods of focusing (pp. 43, 48).

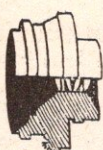
The *diaphragm* of the Contax lenses is adjusted by means of a milled ring on the lens front.

For each lens a *depth of focus* indicator is provided. This is fixed on the focusing mount of the camera body for the 5 cm. lenses, and provided on the tube of the other lenses. On either side of the distance indicator a scale is provided bearing the aperture figures. Once the distance is set the depth of focus is automatically given and distance figures can be read off opposite the aperture mark on the depth of focus scale, one figure giving the beginning, the other one the end of the depth of focus.

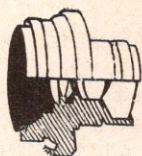
36 Fifteen different lenses, involving seven different apertures and nine different focal lengths (see p. 37), can be fitted to any



Tessar
 f 8, 2.8 cm.



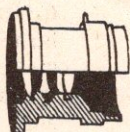
Orthometar
 f 4.5, 3.5 cm.



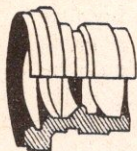
Biogon
 f 2.8, 3.5 cm.



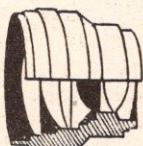
Biotar
 f 2, 4.25 cm.



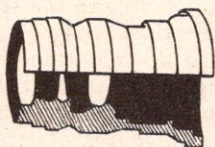
Tessar
 f 3.5, 5 cm.; f 2.8, 5 cm.



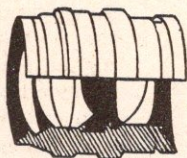
Sonnar
 f 2, 5 cm.



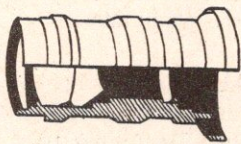
Sonnar
1.5, 5 cm.



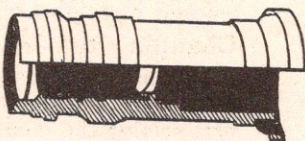
Triotar
 f 4, 8.5 cm.



Sonnar
 f 2, 8.5 cm.



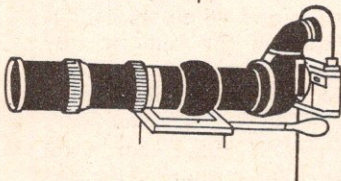
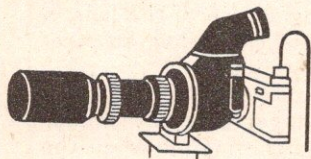
Sonnar f 4, 13.5 cm.



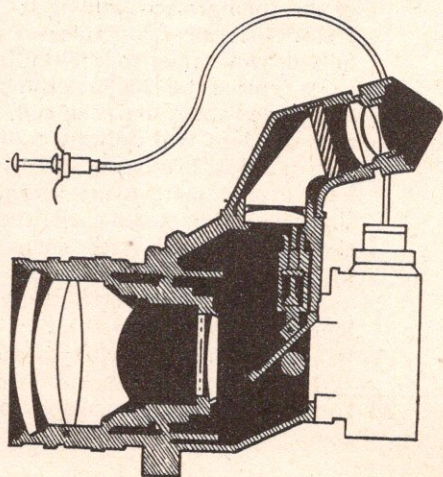
Tele Tessar K. f 6.3, 18 cm.

ele Tessar f 8, 30 cm. with Flektoskop.

Sonnar f 2.8, 18 cm. with Flektoskop.



Fern-lens f 8, 50 cm. with the Flektoskop.



Contax model. The technical data of the various lenses can be found in the table on p. 45. All these lenses are Zeiss makes of the Triotar, Tessar and Sonnar type. The normal types of Zeiss lenses known under the names of Triotars and Tessars, which are quite suitable for use on larger cameras, are *not* identical with those of similar name used in the Contax. New combinations and calculations had to be worked out, leading to the special Contax lenses because the 35 mm. miniature negative is so small that a much higher standard of definition is necessary. This could be achieved owing to the fact that the field of the lens for which correction must be made is relatively small compared with that necessary in lenses of larger cameras. Indeed, it is regrettable that some of the old names have been retained for these new lenses, as it is bound to create a certain amount of confusion and even prejudice.

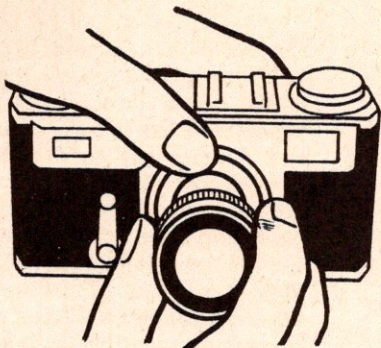
Changing the Lenses

LENSES OF 5 cm. FOCAL LENGTH are placed in the inner bayonet mount of the camera. They are removed by first setting the focusing mount to infinity (∞). Then the thumb is pressed on to the focusing mount so that the projection on the lens barrel, marked with a red dot, slides out of the spring catch holding it. A slight turn of the lens in a clockwise direction releases it, and it may then be carefully drawn out of the helical focusing mount.

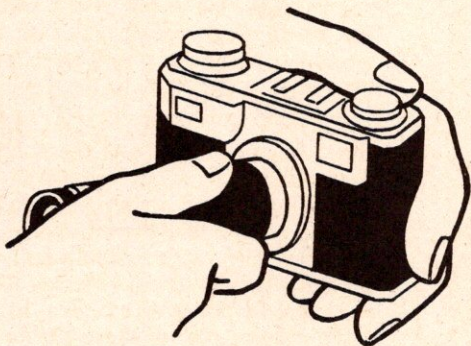
To replace the lens into the camera mount the operations mentioned above are reversed. It is important to remember that the lens will only fit easily into the mount when the two red dots are opposite each other and when the lens is held in the same plane as the front of the camera. By slightly turning to the *left*, the lens slips past the catch in the spring and the latter snaps back, holding the lens firmly in the infinity position.

ALL LENSES OTHER THAN THOSE OF 5 cm. focal length are placed on the outer bayonet mount. The lens is held so that the two red dots, one on the camera front and the other on the lens itself, are opposite each other, **38** and the lens is then turned to the left until a stop is felt.

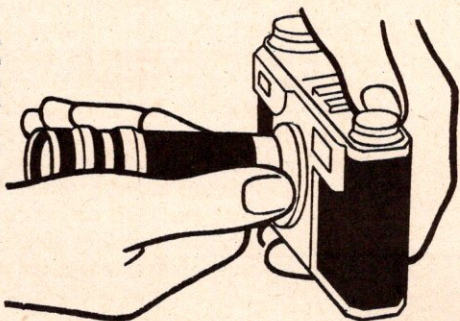
Removing the 5 cm. lens by first setting focusing mount to infinity (p. 38). The thumb is pressed on the focusing mount so that the projection on the lens barrel, marked with a red dot, slides out of the spring catch holding it. A slight turn of the lens in a clockwise direction releases it and it may then be carefully drawn out of the hellical focusing mount.



Inserting other than 5 cm. lenses. The lens is held so that the two red dots, one on the camera front and the other on the lens itself, are opposite each other, and the lens is then turned to the left until a stop is felt. The catch on the side of the lens will then be heard to snap into position.



The removal of the lenses fitting the outer bayonet follows the procedure of inserting them. The side catch must first be lifted with the thumb and then the lens is turned through 90 degs. to the right, in which position it may be removed from the camera.



Changing Lenses (see p. 38)

The catch on the side of the lens will then be heard to snap into position.

The removal of the lenses fitting the outer bayonet follows the procedure of inserting them. The side catch must first be lifted with the thumb, and then the lens is turned through 90° to the right, in which position it may be removed from the camera. To make sure that focusing mechanism is working correctly in conjunction, the focusing ring on the lens should be turned. When this is done, the focusing wheel on the camera should also revolve.

It is important to note that *when using long-focus lenses the focusing must be done by adjusting the ring on the lens and not by turning the focusing wheel of the camera.* The gear ratio of the mechanism is so high with these lenses that turning the wheel may damage the mechanism.

Since the centre of gravity lies in the lens when using a long-focus lens, it is desirable to hold the camera for exposure by grasping the lens with the left hand. This hand will then attend to the focusing, while the right hand steadies the camera and operates the shutter (p. 41).

The Choice of Lenses

The 5 cm. Tessars $f3.5$, $f2.8$ and the 5 cm. $f2$ Sonnar can be regarded as the standard lenses of the Contax 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 large aperture lenses enables one to use them invariably at their full opening. It will be appreciated that the depth of focus (p. 50) of these fast 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

2,8

3,5

4,25

5

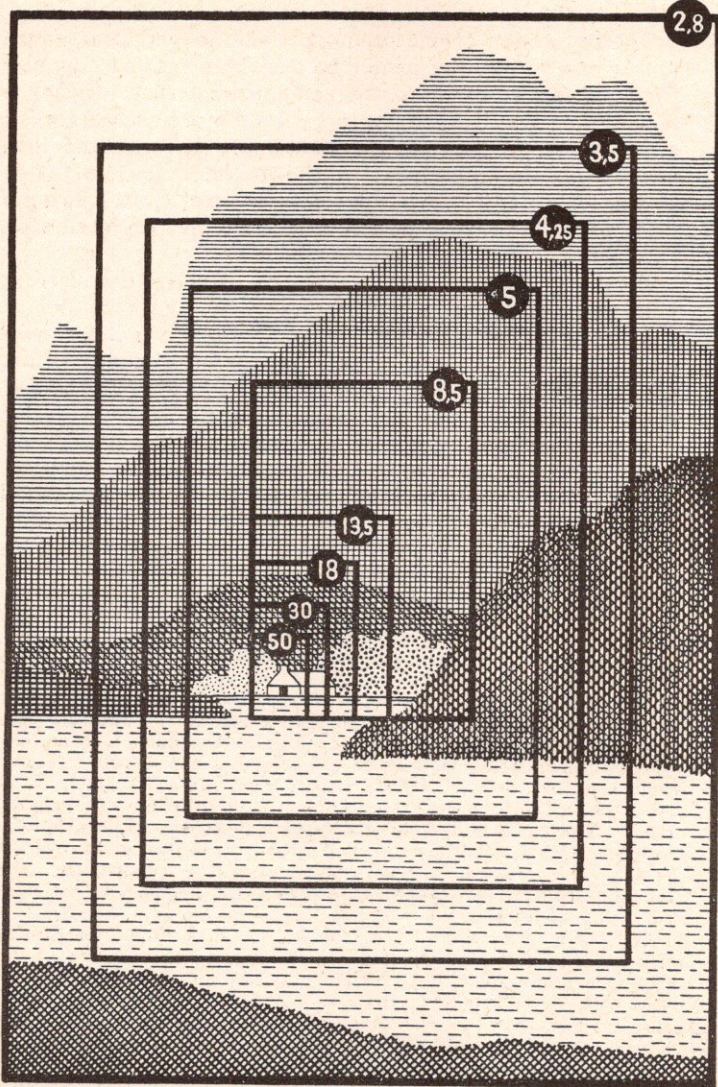
8,5

13,5

18

30

50



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 $1/50$, $1/25$ tend more easily to camera-shake—if not used on a rigid tripod—than lenses of normal focal length.

All 5 cm. Contax lenses may be used in the various enlargers and reproduction outfits.

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.

TESSAR f 3.5 5 cm. This lens may be called a universal type suitable for all average exposures, including landscapes, portraits, street-scenes, etc., except in conditions of poor light. At full aperture the definition at the edges of the picture is still needle sharp. The mount is collapsible.

TESSAR f 2.8 5 cm. Similar in design and quality to the Tessar f 3.5 5 cm., it passes over 50 per cent. more light at full aperture than the former. It has a particularly even illumination all over the negative. Its field of application is similar to that of the other Tessar and also suitable for more unfavourable light conditions. The mount is collapsible.

SONNAR f 2 5 cm. It may be considered as the all-round lens of wide aperture for the Contax. Apart from average subjects of all types the particular field of application is in artificial light work, interiors, theatre as well as photography of rapid movements. The definition is perfect even with full aperture, and it has great brilliancy and covering power. The correction remains undiminished at small aperture. The mount is collapsible. (There are, however, a number of old non-collapsible Sonnars on the market.)

SONNAR f 1.5 5 cm. It has the largest aperture of all Contax lenses. In spite of the increased aperture, the high standard of the f 2 Sonnar is also found in this lens. Its optical qualities are best when used with wide apertures up to f 5.6; it cannot be stopped down below f 11 as diffraction at smaller apertures would decrease its optical perfection. It will be preferred by photographers who need fast shutter

speeds in artificial light, e.g. for night and theatre work. The mount is rigid and does not collapse.

TESSAR f8 2.8 cm. This is the shortest focal length available for the Contax, giving an angle of 75° compared with the 45° of the 5 cm. lenses. It has a particularly wide angle of field for photographing interiors, architectural work in narrow streets, buildings, machine shops, etc. Used out of doors it will help to produce emphatic perspective effects with dominating foregrounds. It is advisable to stop the lens down to $f16$ to ensure perfect sharpness at the edges of the field. This short focus Tessar is not coupled with the range-finder as with so short a focal length and small an aperture very little focusing is necessary. Fine focusing is best done by using the Contax range-finder to find the distance before inserting the lens, and then setting the lens by hand. An attempt to use the range-finder with the 2.8 cm. lens in position might injure the mechanism and must *NOT* be tried.

ORTHOMETAR f4.5 3.5 cm. A comparatively fast lens of short focal length and perfect definition from the centre to the margins of the field. The angle of 60.5° is still conveniently large. The scope of application compared with the Tessar 2.8 cm. is increased owing to the wider aperture and increased covering power. This lens is coupled to the range-finder of the Contax.

BIOGON f2.8 3.5 cm. Combines fast aperture, short focal length, excellent definition and evenness of illumination. This 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 Biogon is, therefore, primarily used for architectural photographs and interiors. Corresponding to its short focal length the depth of focus covers a particularly wide field, even at comparatively large aperture. The Biogon can be used as a "quick shooting" lens for all general purposes when accurate focusing or distance setting would be inconvenient. This lens is coupled to the range-finder of the Contax.

BIOTAR f2 4.25 cm. In spite of wide aperture and angle of field (55°) its definition is perfect over the entire negative. Its scope is rather limited, being in between a moderate wide angle and normal lens. This lens is coupled to the range-finder.

TRIOTAR f4 8.5 cm. This lens is particularly light. The large aperture allows instantaneous work for photographing more distant views excluding the near foreground, portraits and architectural details of medium size. Owing to the increased working distance it is frequently used in portraiture to avoid distortion and throw the background out of focus. The definition with full aperture is good and can be gradually improved by stopping down.

SONNAR f2 8.5 cm. Besides the field of application as given for the Triotar 8.5 cm. this lens is above all suitable for theatre work and many types of sports photography. 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. lens the main object would be

reproduced on a fairly small scale. The wide aperture allows fast shutter speeds even under poor lighting conditions. The definition is perfect even at full aperture.

SONNAR f4 13.5 cm. A long focus lens for distant landscapes, architectural details, presswork from distant points, large portrait-heads, birds and big game photography. The optical qualities and corrections are remarkably good, fully covering the image at full aperture. Apart from the special view-finders for this lens the small rectangular (gilt coloured) range-finder inserted in the combined range- and view-finder eye-piece shows just a trifle less than the image recorded by the 13.5 cm. lens.

TELE-TESSAR K f6.3 18 cm. The Tele-Tessar is the first of a series of lenses which give too great a magnification to be used conveniently with the camera held in the hand. A rigid tripod or firm support is recommended. The lens (like all those mentioned before) is coupled to the Contax range-finder. The magnification of 3.5 X compared with 5 cm. lens makes it particularly suited for distant work, bird and big game photography and portrait heads with ciné "close-up" effect.

SONNAR f2.8 18 cm. A lens combining the advantages of a long focus lens and unusually large aperture. Its optical correction remains as critically accurate as with the other Sonnar lenses. Besides the applications as given for the Tele-Tessar 18 cm. it can be used in poor light and for sports pictures when fast speeds are essential. A special support for this lens and the camera carrying it—in form of a rifle stock—was introduced for fast sports photography, since an ordinary tripod is here quite unsuitable. The earlier models of the Sonnar 18 cm. had been supplied with coupling to the range-finder, but when working with large apertures the degree of accuracy cannot be as great as with shorter focal length. For this reason this Sonnar 18 cm. was later on supplied with the "Flektoskop" Reflex focusing attachment (p. 48).

TELE-TESSAR f8 30 cm. and FERN (DISTANCE) LENS f8 50 cm. Both of perfect optical quality and primarily designed for a range of 100 yds. and beyond as necessitated by various kinds of zoological, botanical and geographical photography. With these two lenses no connection between focusing mount and the range-finder can be provided. Since accurate sighting, free from all parallax error, is vitally necessary, they were formerly focused and sighted by a ground glass screen with magnifier and special finder; the latest models are used with the "Flektoskop" Reflex attachment (see p. 48).

The View-finders of the Contax

When using the Contax with lenses other than those of 5 cm. focal length, special view-finders must be employed to determine the field of view. These fit into the "shoe" on top of the camera.

44 ATTACHMENT FOR REDUCING THE FIELD OF VIEW when using 8.5 cm. or 13.5 cm. lenses, this consists of an adjustable mask

CONTAX LENSES COMPARED

| Name | Focal length | | Full aperture f | Lens speed values compared with f3.5 | Angle of field ° ‡ | Magnification or reduction compared with 5 cm. lens | If with coupling to range- finder | Mount | Diameter of filters | | Weight oz |
|-------------------|--------------|------------------|--------------------|--|--------------------------|--|--|--------------|---------------------|----------|------------------|
| | cm. | in. | | | | | | | slip-on | screw-in | |
| Tessar ... | 2.8 | 1 $\frac{1}{8}$ | 8 | 0.2 | 75 | 0.54 | no | rigid | 42 | 40.5 | 4 $\frac{1}{2}$ |
| Biogon ... | 3.5 | 1 $\frac{3}{8}$ | 2.8 | 1.6 | 62.5 | 0.67 | yes | rigid | 42 | 40.5 | 10 |
| Orthometar ... | 3.5 | 1 $\frac{3}{8}$ | 4.5 | 0.6 | 60.5 | 0.67 | yes | rigid | 42 | 40.5 | 8 |
| Biotar ... | 4.25 | 1 $\frac{5}{8}$ | 2 | 3 | 55 | 0.77 | yes | rigid | 42 | 40.5 | 9 |
| Tessar ... | 5 | 2 | 3.5 | 1 | 45 | 1 | yes | collapsible | 42/27 | 25.5 | 4 $\frac{1}{2}$ |
| Tessar ... | 5 | 2 | 2.8 | 1.6 | 45 | 1 | yes | collapsible | 42/27 | 25.5 | 4 $\frac{1}{2}$ |
| Sonnar ... | 5 | 2 | 2 | 3 | 45 | 1 | yes | collapsible* | 42 | 40.5 | 5 $\frac{1}{2}$ |
| Sonnar ... | 5 | 2 | 1.5 | 5 | 45 | 1 | yes | rigid | 42 | 40.5 | 7 |
| Triotar ... | 8.5 | 3 $\frac{3}{8}$ | 4 | 0.8 | 28 | 1.6 | yes | rigid | 42 | 40.5 | 14 $\frac{1}{2}$ |
| Sonnar ... | 8.5 | 3 $\frac{3}{8}$ | 2 | 3 | 28 | 1.6 | yes | rigid | 51 | — | 22 |
| Sonnar ... | 13.5 | 5 $\frac{7}{8}$ | 4 | 0.8 | 18.4 | 2.6 | yes | rigid | 42 | 40.5 | 18 $\frac{1}{2}$ |
| Tele-Tessar K ... | 18 | 7 $\frac{1}{8}$ | 6.3 | 0.3 | 13.6 | 3.5 | yes | rigid | 42 | 40.5 | 19 |
| Sonnar ... | 18 | 7 $\frac{1}{8}$ | 2.8 | 1.6 | 13.6 | 3.5 | † | rigid | 80 | 77 | 106§ |
| Tele-Tessar ... | 30 | 11 $\frac{7}{8}$ | 8 | 0.2 | 8.2 | 5.8 | no | rigid | — | 46 | 90§ |
| Fern lens ... | 50 | 19 $\frac{1}{4}$ | 8 | 0.2 | 5 | 9.6 | no | rigid | — | 70 | 183§ |

* Older models rigid.

† Older models coupled, newer ones with Flektoskop.

§ Inclusive Flektoskop.

‡ The value of the angle of field refers to the largest dimension of the image to the diagonal. With a 5 cm. (2 in.) lens the angle available when holding the camera horizontally is 36°, while the angle actually used is 32.3°; in vertical position the angle available is 24° and the angle used is 22.2°. With a 13.5 cm. (5 $\frac{3}{8}$ in.) lens with horizontal camera position the angle available is 14.3°, the angle used 13.3°, and in vertical position 9.3° and 9.2° respectively.

which slips into the camera "shoe" of Contax II or III, and comes to lie in front of the built-in finder.

In Contax I the field of the finder can be cut down by a special mask slipped in front of it. For strict accuracy these attachments are not sufficient, and one of the finders mentioned below should be employed.

UNIVERSAL FINDER. A revolving disc is fitted with appropriate optical equipment; by turning the disc the field of any of the 2.8 cm. (or 3.5 cm.), 5 cm., 8.5 cm., 13.5 cm. and 18 cm. is automatically shown in the finder. The image in the finder is the right way up and the right way round, and shows practically the same size whichever focal length of lens is being used. This facilitates observation and comparison of the effect of the lenses of various focal lengths. Correction for parallax error on near subjects is provided by appropriate setting of revolving disc.

MULTIPLE FINDER. This finder consists of a reversing tube in a rectangular box, giving the correct image for lenses of 5 and 8.5 cm. and for 13.5 and 18 cm. focal length. The change from the shorter to the longer focal lengths is arranged by reversing the tube. Two focal lengths are always shown on a line-drawn plate. A sliding adjustment on the foot of the instrument suitably engraved with distances allows parallax correction. Earlier models show Parallax compensation by a dotted line in the field of view. The image is the right way up and right way round. This finder is less expensive than the Universal finder but is not quite as convenient as the latter.

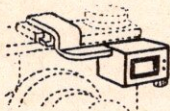
WIDE ANGLE FINDER. Similar in design to a normal optical finder, it shows the larger field of either the 2.8 cm., 3.5 cm., or the 4.25 cm. Contax wide angle lenses.

TELE-FINDER for use with the 18 cm. lenses is provided in a metal tube giving correct image and showing the image upright and the right way round.

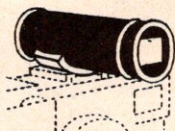
TELE-FINDER for 30 cm. or 50 cm. focal length for the lenses without Flektoskop, showing the correct image, with exact parallax compensation by means of a calibrated disc on top of the instrument.

ALBADA FINDER. A sports finder showing a bright and easily discernible field larger than actually covered by the camera; in the centre of this field the actual boundaries of the field covered by the lens are marked as white lines. These white boundary lines appear to be situated in the subject itself—an impression achieved by a mirror device—and the eye sees both the subject of the picture and the lines sharp. The fact that more than the actual field of the picture is seen makes it possible to watch the subjects before they actually appear in the camera field. Finally it is possible to watch the subject with one eye directly while the other sees through the finder. The Albada finder is particularly suitable for sports and speed photography. It shows an erect and laterally correct picture, but has no parallax compensation. It is collapsible, available in three variations, showing either the 5 cm. or 5 cm. and 8.5 cm. or 5. cm. and 13.5 cm. images.

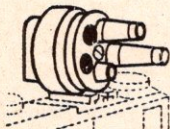
Lens Hoods (p. 48)



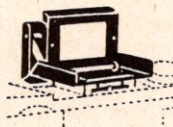
Finder Attachment.



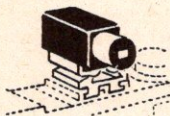
Special Tele Finder.



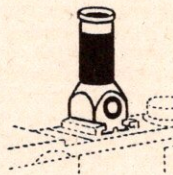
Universal Finder.



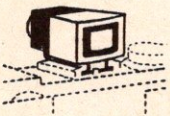
Van Albada Sports Finder.



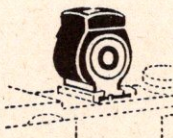
Multiple Finder.



Waist-level Finder.



Wide Angle-finder.



Prism Brilliant Finder.

Cylindrical Lens Hood



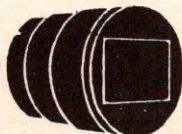
Slip-on Lens Hood.



Screw-in Lens Hood.



Collapsible Lens Hood.



Finders (p. 44)

THE WAIST-LEVEL FINDER for use with 5 cm. lenses gives horizontal pictures. It is designed for use in cases where a lower view-point is required, as for child, small animal and plant photography. Turned at right angles in its horizontal position, the camera may be used as an angular view-finder for making photographs without attracting attention. Used vertically this finder must be held at eye-level (the camera pointing at right angles to the direction of the image).

PRISM BRILLIANT FINDER is used in the same manner as the waist-level finder. The finder can be turned 45° to enable vertical pictures to be taken at waist-level.

THE FLEKTOSKOP. The latest models of the long focus lenses Sonnar *f* 2.8 18 cm., Tele-Tessar *f* 8 30 cm. and Fern lens *f* 8 50 cm. for the Contax are fitted with a reflex focusing device, which not only serves to compose and focus the image, but—with the 18 cm. lenses—renders an ordinary tripod unnecessary. It remains advisable, however, to use either a unipod or the special rifle-butt attachment. The combination is intended to simplify the photography of distant moving objects (sporting events, animal life, etc.).

The image on the ground-glass of the reflex device (see drawing, p. 37) can be observed, composed and focused right up to the moment of exposure. A pressure on the flexible release swings the mirror of the device out of the light-path and then releases the Contax shutter. The image is observed at eye-level for exposure in horizontal or vertical position. A magnifying system is provided which allows the entire image to be observed 5× normal size. The observation eye-piece is in a helical screw mount and fitted with a rubber eye-cup. Eyesight correction glasses can be included with the help of a screw-in mount. Adapting rings for near distance work with the Flektoskop can be inserted.

WHICH FINDER TO CHOOSE

| Focal length | Finders available |
|--------------|---|
| 2.8 cm. ... | Universal, wide-angle 1 |
| 3.5 cm. ... | Universal, wide-angle 2 |
| 4.25 cm. ... | Wide-angle 3 |
| 5 cm. ... | Camera, Universal, Multiple, Albada, Waist-level, Prism-Brilliant |
| 8.5 cm. ... | Universal, Reducing attachment, Multiple, Albada |
| 13.5 cm. ... | Universal, Reducing attachment, Multiple, Albada |
| 18 cm. ... | Universal, Tele-finder, Flektoskop |
| 30 cm. ... | Tele-finder, Flektoskop |
| 50 cm. ... | Tele-finder, Flektoskop |

The Contax 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). Various lens hoods are available for the interchangeable lenses.

THE SLIP-ON LENS HOOD of 42 mm. diameter mount is available to fit the 5 cm. Tessars, 5 cm. Sonnar $f2$, 8.5 cm. Triotar, 13.5 cm. Sonnar and 18 cm. Tele-Tessar. A slip-on lens hood of 51 mm. diameter mount is made for the 8.5 cm. Sonnar, a special slip-on hood for 2.8 cm. Tessar; screw-in lens hoods for 5 cm. Tessars, a further model for 5 cm. Sonnar $f2$, 13.5 cm. Sonnar, 18 cm. Tele-Tessar may be obtained.

THE TELESCOPIC LENS HOOD consists of three collapsible sections and is fixed on the bayonet fitting of the Contax body. It provides specially good protection. When the rings of this hood are drawn out and pushed back, the white marks engraved on them must form a continuous line. When drawn out, the rings are moved to the left until a resistance is felt, and in this position the white marks on the two front rings are in line with the red dot lying below.

The lens hood is attached to the external bayonet of the Contax by placing the hood with the red dot on the back ring against the register mark on the camera and fixing the hood in position by a slight turning movement anti-clockwise. To place the rectangular aperture correctly in position on the front rim of the lens hood, the red dot on the front ring of the lens hood must be on top.

When using 5 cm. Tessars, all three rings of the lens hood are fully drawn out.

When using 5 cm. Sonnars, the front ring of the lens hood is pushed back to the middle ring. In doing this, see that the red dot on the front ring of the lens hood is on top—i.e. is in the same position as the red dots on the back ring. This must be done, otherwise the field of the lens is partly cut off by the hood. If the front ring happens to be slightly askew, there is no need to worry.

When using long focus lenses, Triotar 8.5 cm., Sonnar 13.5 cm. and Tele-Tessar 18 cm., the lens hood is fixed by means of a connection ring which has a bayonet catch arrangement. This ring should be placed on the front rim of the lens. All three rings of the hood are drawn out, a sign that the rectangular opening in the lens hood is in correct position when the red dot on the foremost ring faces upwards. The hood must be set after focusing (as the whole lens rotates), which some photographers find to be a somewhat impracticable procedure.

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 Contax negative of 1½ × 1 in. (24 × 36 mm.) this corresponds to a maximum permissible diameter of 1/30 mm. for the circle of confusion. Inci-

50 dentally, the average grain of our film emulsion limiting

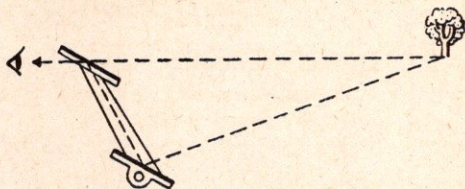
The Range-finder (p. 17)

In miniature cameras which use lenses of extremely large apertures and of long focal length, the accuracy of the range-finder is of first importance.

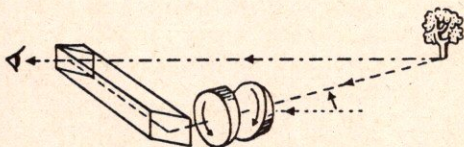
The accuracy of distance meters as used in cameras (mostly on the coincidence principle) depends on the distance between the two positions from which the object is viewed (the "base" of the meter). The longer the distance the more accurate can the measurement be made. The Contax is fitted with a meter of a long base, almost twice as long as the average camera distance meter. While the very early models of the Contax I were fitted with a meter of the "hinged mirror" principle, the later models of the Contax I have a "rotating-wedge" distance meter, with a remarkable gain of accuracy.

In Contax II and III a still further step in the development of the ideal distance meter has been taken. It works by the new "swing-wedge" method, and its field of view is arranged to coincide with the field of view with that of the 5 cm. camera lens. A combined distance meter and view-finder thus results.

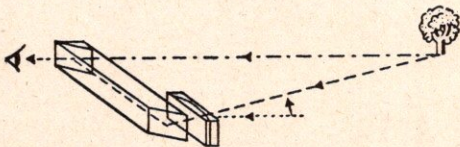
Further advantage of the Contax range-finder is that it is using a semi-gilded mirror. The direct image seen through the semi-gilded surface is green in shade, while the reflected image from the other end of the meter base is reddish. It is easier to judge when the two images are properly fused together in the Contax range-finder thanks to this colour contrast.



Principle of the "hinged mirror" type distance meter.



Principle of the "rotating wedge" type distance meter.



Principle of the "swing wedge" type distance meter.

the fineness of details which can still be recorded is of about the same diameter resolved. All points which are represented on the Contax negative by circles of confusion not more than $1/30$ mm. in diameter can be accepted as covered by "depth of focus".

Unfortunately (in our opinion) the manufacturers of the Contax have made a concession to those amateurs who are satisfied with small-size enlargements up to about postcard size and increased on the depth of focus indicator (p. 36) on the camera and the various lenses the permissible diameter for the circle of confusion from $1/30$ to $1/20$ mm. Consequently the figures read off for depth of focus on the camera and lenses respectively should only be accepted if no large-size or sectional enlargements are intended. In all other cases the depth of focus tables given on pp. 57 to 81 should be consulted; they are compounded for $1/30$ mm. as circles of confusion.

In this Contax Guide all references made to, and examples given for, "depth of focus" are for this $1/30$ mm. circle of confusion. Wherever direct reference to the depth of focus indicator of Contax and their lenses is made, the figures there given are quoted (followed by the figures for $1/30$ mm. circle of confusion in brackets).

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.

For the 5 cm. lenses the focusing flange of the Contax and for the other focal lengths the lenses themselves have been provided with a special scale bearing the aperture figures, diverging from either side of the index mark.

Let us assume we are working with a 5 cm. lens. The distance index on the focusing flange has to be set (by measuring or guessing) to, let us say, 12 ft.; we are using aperture $f5.6$. The two "5.6" index marks on the depth of focusing scale indicate $8\frac{1}{2}$ ft. on one side and $20\frac{1}{2}$ ft. on the other side on the distance scale. The range of depth of focus, or good definition, is therefore from $8\frac{1}{2}$ to $20\frac{1}{2}$ ft. (for $1/30$ mm. c.o.c.: $9\frac{1}{2}$ to $16\frac{1}{2}$ ft.), while actually set to 12 ft. Similarly, with aperture $f4$ a range of 9 to 17 ft. (for $1/30$ mm. c.o.c.: 10 to 15 ft.) and with aperture $f16$ one

from $5\frac{1}{2}$ ft. to "infinity" (for $1/30$ mm. c.o.c.: $6\frac{1}{2}$ to 55 ft.) 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 architecture with foreground it is found that the nearest point which is to be rendered in sharp focus is about 17 ft. away and the furthest about 110 ft., it will be seen that the 5 cm. lenses need only be stopped down to $f4$ and focused on 30 ft. to give depth of field extending from 17 to 110 ft. (for $1/30$ mm. c.o.c.: stop 5.6 distance setting 30 ft. gives depth of field from 18 to 100 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. 56.)

Further, the assumed circle of confusion of $1/30$ mm. which has been laid down is based 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.

The Hyperfocal Distance

The depth of focus extends for a greater distance in the direction of "infinity" than towards the camera. When **53**

Table of focusing distances giving greatest possible for Contax lenses. The computation of the tables

| Focal | 2.8 cm. | | 3.5 cm. | | 4.25 cm. | | 5 cm. ¹ | | 8.5 cm. |
|----------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| Aperture | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale |
| 1.5 | — | — | — | — | — | — | ∞ | 161-6 | — |
| 2 | — | — | — | — | 100-0 | 43-8 | 100-0 | 54-10 | ∞ |
| 2.8 | — | — | 50-0 | 23-6 | 50-0 | 26-4 | 100-0 | 46-5 | ∞ |
| 4 | — | — | 50-0 | 19-1 | 50-0 | 21-10 | 100-0 | 37-9 | ∞ |
| 5.6 | — | — | 30-0 | 12-9 | 30-0 | 14-5 | 50-0 | 23-3 | 100-0 |
| 8 | 10-0 | 4-10 $\frac{2}{3}$ | 20-0 | 8-9 | 20-0 | 9-10 | 30-0 | 15-1 | 100-0 |
| 11 | 7-0 | 3-6 | 12-0 | 5-10 | 15-0 | 7-4 | 30-0 | 12-9 | 60-0 |
| 16 | 5-0 | 2-5 $\frac{1}{2}$ | 8-0 | 3-11 $\frac{1}{2}$ | 10-0 | 4-11 $\frac{1}{2}$ | 15-0 | 7-7 | 50-0 |
| 22 | 4-0 | 1-10 $\frac{1}{2}$ | 6-0 | 2-11 $\frac{1}{2}$ | — | — | 12-0 | 5-9 $\frac{1}{2}$ | 30-0 |
| 32 | 3-0 | 1-4 $\frac{1}{2}$ | — | — | — | — | — | — | 30-0 |
| 45 | — | — | — | — | — | — | — | — | — |

¹ The value for f 3.5 is: Setting 100 ft.; Extent from 40-11 to ∞.

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

EXAMPLES.—Aperture: 5.6; lens Sonnar 5 cm. According to the table, the focusing mount is set to a distance of 50 ft. The resulting depth of focus then extends from 23 ft. 3 in. to infinity. Were the lens set to infinity (∞) instead of to 50 ft., the

DISTANCE

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

| 8.5 cm. | 13.5 cm. | | 19 cm.* | | 30 cm. | | 50 cm. | | |
|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------|
| Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | Setting of lens on focusing scale | Extent of depth of focus ∞ to . . . | |
| — | — | — | — | — | — | — | — | — | ft. & in. |
| 350-0 | — | — | — | — | — | — | — | — | ft. & in. |
| 250-0 | — | — | ∞ | 1100-0 | — | — | — | — | ft. & in. |
| 175-0 | ∞ | 441-0 | ∞ | 785-0 | — | — | — | — | ft. & in. |
| 55-7 | ∞ | 315-0 | ∞ | 560-0 | — | — | — | — | ft. & in. |
| 46-9 | ∞ | 221-0 | ∞ | 392-0 | ∞ | 1091-0 | ∞ | 3029-0 | ft. & in. |
| 30-11 | ∞ | 160-6 | 300-0 | 146-5 | ∞ | 794-0 | ∞ | 2203-0 | ft. & in. |
| 23-5 | 100-0 | 52-7 | 300-0 | 118-9 | ∞ | 546-0 | ∞ | 1515-0 | ft. & in. |
| 15-6 | 100-0 | 44-8 | 300-0 | 96-10 | ∞ | 397-0 | ∞ | 1103-0 | ft. & in. |
| 12-8½ | — | — | 100-0 | 49-8 | ∞ | 273-0 | ∞ | 758-0 | ft. & in. |
| — | — | — | 100-0 | 41-2½ | 180-0 | 93-6½ | ∞ | 540-0 | ft. & in. |

* The value of f 6.3 is: Setting ∞ ; Extent from 500 ft. to ∞ .

depth of focus would have extended from 43 ft. 3 in. to "infinity", whereas it here already begins at 23 ft. 3 in.

Aperture 5.6; lens 8.5 cm. Triotar. According to the table the focusing mount is set to a distance of 100 ft. The resulting depth of focus then extends from 125 ft. to "infinity" (∞).

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. 54.)

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 the following "safety-zone" method, a kind of pre-prepared depth focusing:

Focus at 15 ft. (4 m.), stop 8.

With the 5 cm. Contax lenses

Everything between 10 and 30 ft. will be sharp.

With the 3.5 cm. Biogon lens

Everything between 8 and 420 ft. will be sharp—or

Focus at 30 ft. (9 m.), stop 8.

With the 5 cm. Contax lenses

Everything between 15 ft. and "infinity" will be sharp.

Depth of Focus Tables

Depth of focus tables are included in this book, in spite of the fact that Contax and their lenses are fitted with a depth of focus calculator. This has been done for the following reasons: first, to give the more exact figures for 1/30 mm. circle of confusion (see p. 50); secondly, to allow comparisons to be made without having to experiment with all the various lenses; and lastly, to give perfectly accurate figures which cannot be obtained with the calculator (the distance scale calibration not being detailed enough for these purposes).

All tables are computed on the assumption that the circle of confusion is of 1/30 mm. diameter (see p. 50).

The figures on the left of each of the following groups 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 further limit (*in feet and inches*) of the region of

DEPTH OF FOCUS FOR 2.8 cm. TESSAR f 8

| | | | | | | | | | | | | | | |
|------|-------|-------|------|-------|-------|-------|--------|-------|-------|------|-------|------|------|-------|
| f 8 | 2-3½ | 2-10 | 3-3½ | 3-8½ | 4-½ | 4-4½ | 4-7½ | 4-10½ | 5-4 | 5-10 | 6-5½ | 7-3 | 8 | 9-6 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | ∞ |
| | 4-4 | 6-9½ | 10-4 | 15-11 | 25-8 | 47-11 | 145-11 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| f 11 | 2-1½ | 2-6½ | 2-11 | 3-2½ | 3-6 | 3-8½ | 3-11½ | 4-1½ | 4-4½ | 4-9 | 5-1½ | 5-7½ | 6-1 | 6-10½ |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | ∞ |
| | 5-2½ | 9-3 | 17-3 | 41-7 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| f 16 | 1-10½ | 2-2½ | 2-5½ | 2-8 | 2-10½ | 3 | 3-1½ | 3-2½ | 3-5 | 3-7½ | 3-10½ | 4-1½ | 4-4 | 4-9 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | ∞ |
| | 7-9 | 22-8 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| f 22 | 1-7½ | 1-10½ | 2-½ | 2-2½ | 2-4 | 2-5½ | 2-6½ | 2-7 | 2-8½ | 2-9½ | 2-11½ | 3-1½ | 3-2½ | 3-5½ |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | ∞ |
| | 19 | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| f 32 | 1-4½ | 1-6½ | 1-7½ | 1-8½ | 1-9½ | 1-10½ | 1-11½ | 1-11½ | 1-11½ | 2-½ | 2-1½ | 2-2½ | 2-3½ | 2-4½ |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | ∞ |
| | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |

DEPTH OF FOCUS FOR 4.25 cm. BIOTAR

| | | | | | | | | | | | | | | |
|------|-----------|-----------|------------|------------|------------|------------|-------------|-------------|-------------|--------------|--------------|-------------|----------|-------|
| f2 | 3-9½ | 4-8½ | 5-6½ | 6-5½ | 7-3½ | 8-½ | 8-10½ | 10-4½ | 12-7 | 15-11 | 21-7½ | 30-5½ | 43-8½ | 77-6 |
| | 4 4-2½ | 5 5-4 | 6 6-5½ | 7 7-8½ | 8 8-10½ | 9 10-1½ | 10 11-5½ | 12 14-2½ | 15 18-6½ | 20 26-10½ | 30 48-9½ | 50 140-3 | 100 ∞ | ∞ |
| f2.8 | 3-8½ | 4-7½ | 5-5½ | 6-2½ | 7-½ | 7-9½ | 8-5½ | 9-10½ | 11-9½ | 14-8½ | 19-5½ | 26-3½ | 35-8 | 55-4½ |
| | 4 4-3½ | 5 5-5½ | 6 6-8½ | 7 7-11½ | 8 9-3½ | 9 10-8½ | 10 12-2½ | 12 15-3½ | 15 20-6½ | 20 31-2½ | 30 65-1½ | 50 ∞ | 100 ∞ | ∞ |
| f4 | 3-7½ | 4-5½ | 5-2½ | 5-1½ | 6-7½ | 7-4 | 8 | 9-2 | 10-10 | 13-3 | 16-11 | 21-10 | 27-11 | 38-9 |
| | 4 4-5½ | 5 5-8½ | 6 7-1 | 7 8-6 | 8 10 | 9 11-8 | 10 13-5 | 12 17-4 | 15 24-4 | 20 41-1 | 30 130-11 | 50 ∞ | 100 ∞ | ∞ |
| f5.6 | 3-6 | 4-3 | 4-1½ | 5-7½ | 6-2½ | 6-9½ | 7-4 | 8-5 | 9-9 | 11-8 | 14-5 | 17-10 | 21-8 | 27-8 |
| | 4 4-7½ | 5 6-½ | 6 7-7 | 7 9-4 | 8 11-2 | 9 13-3 | 10 15-6 | 12 21 | 15 32-5 | 20 70-11 | 30 ∞ | 50 ∞ | 100 ∞ | ∞ |
| f8 | 3-4 | 4 | 4-7½ | 5-2 | 5-8½ | 6-2 | 6-7½ | 7-5 | 8-6 | 9-10 | 11-10 | 14 | 16-3 | 19-5 |
| | 4 5 | 5 6-8½ | 6 8-7 | 7 10-10 | 8 13-6 | 9 16-7 | 10 20-5 | 12 31 | 15 64-6 | 20 ∞ | 30 ∞ | 50 ∞ | 100 ∞ | ∞ |
| f11 | 3-1½ | 3-8½ | 4-2½ | 4-8½ | 5-1½ | 5-6½ | 5-10½ | 6-6½ | 7-4 | 8-4 | 9-7 | 11 | 12-4 | 14-1 |
| | 4 5-6½ | 5 7-8 | 6 10-3 | 7 13-8 | 8 18-1 | 9 24-3 | 10 33-4 | 12 76-1 | 15 ∞ | 20 ∞ | 30 ∞ | 50 ∞ | 100 ∞ | ∞ |
| f16 | 2-10½ | 3-3½ | 3-8½ | 4-1½ | 4-5 | 4-8½ | 4-11½ | 5-4½ | 5-11 | 6-6½ | 7-4½ | 8-1½ | 8-10½ | 9-8½ |
| | 4 6-7½ | 5 10-½ | 6 15-2½ | 7 24-½ | 8 42-7½ | 9 106-6 | 10 ∞ | 12 ∞ | 15 ∞ | 20 ∞ | 30 ∞ | 50 ∞ | 100 ∞ | ∞ |

DEPTH OF FOCUS FOR 5 cm. SONNARS AND TESSARS

| | | | | | | | | | | | | | | |
|-------|------------------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|--------------------|-------------------|--------------------|-------------------|----------------|------------------|--------------------|----------------------|
| f 1.5 | 3-11 | 4-10 $\frac{1}{2}$ | 5-9 $\frac{1}{2}$ | 6-8 $\frac{1}{2}$ | 7-7 $\frac{1}{2}$ | 8-6 $\frac{1}{2}$ | 9-5 | 11-2 | 13-9 | 17-10 | 25-4 | 38-2 | 61-10 | 161-6 |
| | 4 4-1 $\frac{1}{2}$ | 5 5-1 $\frac{1}{2}$ | 6 6-2 $\frac{3}{4}$ | 7 7-3 $\frac{3}{4}$ | 8 8-5 | 9 9-6 $\frac{1}{4}$ | 10 10-8 | 12 12-11 | 15 16-6 | 20 22-10 | 30 36-10 | 50 72-4 | 100 262 | ∞ ∞ |
| f 2 | 3-10 $\frac{1}{2}$ | 4-9 $\frac{3}{4}$ | 5-8 $\frac{3}{4}$ | 6-7 $\frac{3}{4}$ | 7-6 $\frac{1}{2}$ | 8-4 $\frac{3}{4}$ | 9-3 | 10-11 | 13-4 | 17-2 | 24-1 | 35-5 | 54-10 | 121-1 |
| | 4 4-1 $\frac{1}{2}$ | 5 5-2 $\frac{1}{2}$ | 6 6-3 $\frac{3}{4}$ | 7 7-5 | 8 8-6 $\frac{1}{2}$ | 9 9-8 $\frac{1}{2}$ | 10 10-11 | 12 13-4 | 15 17-1 | 20 23-11 | 30 39-10 | 50 85 | 100 ∞ | ∞ ∞ |
| f 2.8 | 3-10 | 4-8 $\frac{3}{4}$ | 5-7 $\frac{1}{2}$ | 6-5 $\frac{3}{4}$ | 7-4 | 8-2 | 8-11 $\frac{3}{4}$ | 10-7 | 12-10 | 16-3 | 22-4 | 31-9 | 46-5 | 86-6 |
| | 4 4-2 $\frac{1}{2}$ | 5 5-3 $\frac{1}{2}$ | 6 6-5 $\frac{1}{2}$ | 7 7-7 $\frac{1}{2}$ | 8 8-9 $\frac{1}{2}$ | 9 10 | 10 11-3 | 12 13-11 | 15 18-1 | 20 25-11 | 30 45-10 | 50 118 | 100 ∞ | ∞ ∞ |
| f 3.5 | 3-9 $\frac{1}{2}$ | 4-8 | 5-6 $\frac{1}{2}$ | 6-4 $\frac{1}{2}$ | 7-2 $\frac{1}{4}$ | 7-11 $\frac{3}{4}$ | 8-9 | 10-3 | 12-4 | 15-7 | 21 | 29-1 | 40-11 | 69-2 |
| | 4 4-2 $\frac{3}{4}$ | 5 5-4 $\frac{1}{2}$ | 6 6-6 $\frac{3}{4}$ | 7 7-9 $\frac{1}{2}$ | 8 9- $\frac{1}{4}$ | 9 10-4 | 10 11-8 | 12 14-6 | 15 19-1 | 20 28 | 30 52-9 | 50 178-8 | 100 ∞ | ∞ ∞ |
| f 4 | 3-9 $\frac{1}{4}$ | 4-7 $\frac{1}{2}$ | 5-5 $\frac{3}{4}$ | 6-3 $\frac{3}{4}$ | 7-1 | 7-10 $\frac{1}{2}$ | 8-7 $\frac{1}{4}$ | 10 | 12-1 | 15-1 | 20-1 | 27-5 | 37-9 | 60-7 |
| | 4 4-3 $\frac{1}{4}$ | 5 5-5 $\frac{1}{4}$ | 6 6-7 $\frac{3}{4}$ | 7 7-10 $\frac{3}{4}$ | 8 9-2 $\frac{1}{4}$ | 9 10-6 | 10 11-11 | 12 14-11 | 15 19-10 | 20 29-9 | 30 59-2 | 50 283 | 100 ∞ | ∞ ∞ |
| f 5.6 | 3-8 | 4-6 | 5-3 $\frac{1}{2}$ | 6- $\frac{1}{2}$ | 6-9 $\frac{1}{4}$ | 7-5 $\frac{3}{4}$ | 8-1 $\frac{3}{4}$ | 9-5 | 11-2 | 13-9 | 17-9 | 23-3 | 30-3 | 43-3 |
| | 4 4-4 $\frac{3}{4}$ | 5 5-7 $\frac{1}{2}$ | 6 6-11 $\frac{1}{2}$ | 7 8-3 $\frac{3}{4}$ | 8 9-9 $\frac{1}{4}$ | 9 11-4 | 10 12-11 | 12 16-6 | 15 22-10 | 20 36-11 | 30 96-9 | 50 ∞ | 100 ∞ | ∞ ∞ |
| f 8 | 3-6 $\frac{1}{2}$ | 4-3 $\frac{3}{4}$ | 5- $\frac{1}{4}$ | 5-8 $\frac{1}{2}$ | 6-4 $\frac{1}{4}$ | 6-11 $\frac{1}{2}$ | 7-6 $\frac{1}{2}$ | 8-7 $\frac{1}{2}$ | 10-1 | 12-1 | 15-1 | 18-11 | 23-3 | 30-3 |
| | 4 4-7 | 5 5-11 $\frac{1}{2}$ | 6 7-5 $\frac{1}{2}$ | 7 9- $\frac{1}{2}$ | 8 10-9 | 9 12-9 | 10 14-10 | 12 19-8 | 15 29-5 | 20 58 | 30 ∞ | 50 ∞ | 100 ∞ | ∞ ∞ |
| f 11 | 3-5 | 4-1 $\frac{1}{4}$ | 4-9 | 5-4 | 5-10 $\frac{3}{4}$ | 6-5 | 6-11 | 7-9 $\frac{3}{4}$ | 8-11 $\frac{1}{2}$ | 10-6 | 12-9 | 15-4 | 18-1 | 22 |
| | 4 4-10 | 5 6-5 | 6 8-2 | 7 10-2 | 8 12-5 | 9 15 | 10 18-1 | 12 25-11 | 15 46 | 20 202 | 30 ∞ | 50 ∞ | 100 ∞ | ∞ ∞ |
| f 16 | 3-2 $\frac{1}{4}$ | 3-9 $\frac{1}{2}$ | 4-4 | 4-9 $\frac{3}{4}$ | 5-3 $\frac{1}{4}$ | 5-8 $\frac{1}{2}$ | 6- $\frac{3}{4}$ | 6-8 $\frac{3}{4}$ | 7-7 | 8-8 | 10-1 | 11-8 | 13-2 | 15-2 |
| | 4 5-4 $\frac{1}{2}$ | 5 7-4 $\frac{1}{2}$ | 6 9-9 $\frac{1}{2}$ | 7 12-9 | 8 16-7 | 9 21-7 | 10 28-7 | 12 55 | 15 ∞ | 20 ∞ | 30 ∞ | 50 ∞ | 100 ∞ | ∞ ∞ |
| f 22 | 2-11 $\frac{1}{2}$ | 3-5 $\frac{3}{4}$ | 3-11 | 4-3 $\frac{3}{4}$ | 4-8 | 5 | 5-3 $\frac{1}{2}$ | 5-9 $\frac{1}{2}$ | 6-4 $\frac{3}{4}$ | 7-1 $\frac{3}{4}$ | 8-1 | 9- $\frac{1}{2}$ | 9-11 $\frac{1}{2}$ | 11 |
| | 4 6-1 $\frac{3}{4}$ | 5 8-11 | 6 12-9 | 7 18-6 | 8 27-9 | 9 45-7 | 10 93-10 | 12 ∞ | 15 ∞ | 20 ∞ | 30 ∞ | 50 ∞ | 100 ∞ | ∞ ∞ |

DEPTH OF FOCUS FOR 8.5 cm. SONNAR AND TRIOTAR

| | | | | | | | | | | | | | | | |
|------|-----------|------------|------------|------------|------------|-------------|--------------|--------------|-------------|-------------|------------|--------------|--------------|---------------|--------|
| f2 | 3-11½ | 4-11½ | 5-10¾ | 6-10¾ | 7-10 | 8-9½ | 9-8¾ | 11-7½ | 14-4¾ | 18-11 | 27-8 | 43-9 | 51-3 | 77-10 | 350 |
| | 4 4-½ | 5 5-¾ | 6 6-1½ | 7 7-1¾ | 8 8-2½ | 9 9-2¾ | 10 10-3½ | 12 12-5 | 15 15-8 | 20 21-2 | 30 32-9 | 50 58-3 | 60 72-4 | 100 139-10 | ∞ ∞ |
| f2.8 | 3-11½ | 4-11 | 5-10½ | 6-9¾ | 7-9 | 8-8½ | 9-7½ | 11-5½ | 14-2 | 18-6 | 26-10 | 41-8 | 48-5 | 71-6 | 250 |
| | 4 4-¾ | 5 5-1½ | 6 6-1¾ | 7 7-2½ | 8 8-3 | 9 9-4 | 10 10-4¾ | 12 12-7 | 15 15-11 | 20 21-9 | 30 34-1 | 50 62-5 | 60 78-10 | 100 166-4 | ∞ ∞ |
| f4 | 3-11 | 4-10½ | 5-9¾ | 6-9 | 7-8 | 8-6¾ | 9-5¾ | 11-3 | 13-10 | 18 | 25-8 | 38-11 | 44-9 | 63-8 | 175 |
| | 4 4-1 | 5 5-1¾ | 6 6-2½ | 7 7-3½ | 8 8-4½ | 9 9-5¾ | 10 10-7 | 12 12-10½ | 15 16-5 | 20 22-6 | 30 36-2 | 50 69-10 | 60 91-1 | 100 232 | ∞ ∞ |
| f5.6 | 3-10½ | 4-9¾ | 5-8¾ | 6-7¾ | 7-6½ | 8-5 | 9-3½ | 10-11¾ | 13-5 | 17-3 | 24-3 | 35-9 | 40-7 | 55-7 | 125 |
| | 4 4-1½ | 5 5-2½ | 6 6-3½ | 7 7-4¾ | 8 8-6¼ | 9 9-8 | 10 10-10 | 12 13-3 | 15 17 | 20 23-9 | 30 39-4 | 50 83 | 60 114-11 | 100 ∞ | ∞ ∞ |
| f8 | 3-10 | 4-9 | 5-7½ | 6-6 | 7-4½ | 8-2½ | 9 | 10-7 | 12-10 | 16-4 | 22-5 | 31-11 | 35-8 | 46-9 | 87-6 |
| | 4 4-2 | 5 5-3½ | 6 6-5 | 7 7-7 | 8 8-9½ | 9 10 | 10 11-3 | 12 13-10½ | 15 18 | 20 25-10 | 30 45-5 | 50 115-10 | 60 189 | 100 ∞ | ∞ ∞ |
| f11 | 3-9½ | 4-7¾ | 5-6 | 6-4 | 7-1½ | 7-11 | 8-8 | 10-1½ | 12-2½ | 15-3 | 20-5 | 28-1 | 30-11 | 38-11 | 63-8 |
| | 4 4-3 | 5 5-4¾ | 6 6-7 | 7 7-10 | 8 9-1½ | 9 10-5½ | 10 11-9¾ | 12 14-8½ | 15 19-6 | 20 29 | 30 56-4 | 50 229 | 60 ∞ | 100 ∞ | ∞ ∞ |
| f16 | 3-8½ | 4-6½ | 5-3¾ | 6-¾ | 6-9½ | 7-6 | 8-2½ | 9-5½ | 11-2¾ | 13-9½ | 17-10 | 23-5 | 25-4 | 30-6 | 43-9 |
| | 4 4-4½ | 5 5-7¼ | 6 6-10¾ | 7 8-3½ | 8 9-8½ | 9 11-3 | 10 12-10½ | 12 16-5 | 15 22-7 | 20 36-5 | 30 93-7 | 50 ∞ | 60 ∞ | 100 ∞ | ∞ ∞ |
| f22 | 3-7 | 4-4½ | 5-1 | 5-9¼ | 6-5½ | 7-¾ | 7-8 | 8-9½ | 10-3 | 12-4½ | 15-6 | 19-6 | 20-10 | 24-2 | 31-10 |
| | 4 4-6½ | 5 5-10½ | 6 7-3¾ | 7 8-10½ | 8 10-6¾ | 9 12-4¾ | 10 14-4¾ | 12 19 | 15 27-11 | 20 52-7 | 30 ∞ | 50 ∞ | 60 ∞ | 100 ∞ | ∞ ∞ |
| f32 | 3-5 | 4-1½ | 4-9 | 5-4½ | 5-11 | 6-5½ | 6-11 | 7-9¾ | 8-11½ | 10-6½ | 12-8½ | 15-3 | 16-1 | 18 | 21-10 |
| | 4 4-9¾ | 5 6-4½ | 6 8-1½ | 7 10-1½ | 8 12-4½ | 9 14-11½ | 10 18 | 12 25-10 | 15 45-11 | 20 203 | 30 ∞ | 50 ∞ | 60 ∞ | 100 ∞ | ∞ ∞ |

DEPTH OF FOCUS FOR 13.5 cm. SONNAR

| | | | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|------|--------|--------|-------|--------|-------|-------|-------|-------|-------|
| f 4 | 4-11½ | 5-11 | 6-10¾ | 7-10¼ | 8-10 | 9-9¾ | 11-8½ | 14-6½ | 19-1¾ | 28-1½ | 44-11 | 52-10 | 81-7 | 441 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-½ | 6-1 | 7-1¼ | 8-1¾ | 9-2 | 10-2¾ | 12-4 | 15-6½ | 20-11 | 32-2 | 56-4 | 69-4 | 129-1 | ∞ |
| f 5.6 | 4-11½ | 5-10¾ | 6-10¼ | 7-9¾ | 8-9¼ | 9-8½ | 11-7 | 14-4 | 18-10 | 27-5¼ | 43-3 | 50-6 | 76 | 315 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-1 | 6-1¼ | 7-1¾ | 8-2¼ | 9-3 | 10-3¾ | 12-5½ | 15-8¾ | 21-4 | 33-1 | 59-4 | 74 | 146-2 | ∞ |
| f 8 | 4-10¾ | 5-10¼ | 6-9¾ | 7-8¾ | 8-8 | 9-7 | 11-4¾ | 14-¾ | 18-4½ | 26-5½ | 40-10 | 47-3 | 68-11 | 221 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-1¼ | 6-1¾ | 7-2½ | 8-3½ | 9-4¼ | 10-5½ | 12-8 | 16-¾ | 21-11½ | 34-8 | 64-6 | 82-2 | 182-2 | ∞ |
| f 11 | 4-10¼ | 5-9¾ | 6-8¾ | 7-7¾ | 8-6½ | 9-5¼ | 11-2¼ | 13-9 | 17-10 | 25-4 | 38-2 | 43-9 | 61-9 | 160-6 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-1¾ | 6-2½ | 7-3½ | 8-4¾ | 9-6 | 10-7½ | 12-11½ | 16-6 | 22-9½ | 36-9 | 72-4 | 95-5 | 263 | ∞ |
| f 16 | 4-9¾ | 5-8¾ | 6-7¾ | 7-5¾ | 8-4¼ | 9-2¼ | 10-10¼ | 13-3 | 16-11¾ | 23-8 | 34-6 | 39 | 52-7 | 110-4 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-2½ | 6-3¾ | 7-5¼ | 8-7 | 9-9 | 10-11½ | 13-4¾ | 17-3¼ | 24-3¾ | 41 | 90-9 | 130-4 | ∞ | ∞ |
| f 22 | 4-8¾ | 5-7¾ | 6-5¾ | 7-3¾ | 8-1½ | 8-11¼ | 10-6 | 12-8¼ | 16-1 | 21-11 | 30-11 | 34-5 | 44-8 | 80-8 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 60 | 100 | ∞ |
| | 5-3½ | 6-5¼ | 7-7½ | 8-10 | 10-1 | 11-4¼ | 14-¼ | 18-4 | 26-5¼ | 47-6 | 130-9 | 233 | ∞ | ∞ |

DEPTH OF FOCUS FOR 18 cm. SONNAR AND TELE-TESSAR K

| | | | | | | | | | | |
|-------|-------|-------|--------|--------|--------|--------|--------|--------|-------|-------|
| f 1.8 | 8-11½ | 9-11 | 11-10½ | 14-9¾ | 19-8 | 29-2¾ | 47-10¾ | 91-10 | 237 | 1100 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-¾ | 10-1 | 12-1½ | 15-2½ | 20-4½ | 30-9¾ | 52-4 | 109-9 | 409 | ∞ |
| f 4 | 8-10¾ | 9-10½ | 11-10 | 14-8¾ | 19-6½ | 28-11 | 47-½ | 88-9 | 217 | 785 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-1½ | 10-1½ | 12-2 | 15-3½ | 20-6 | 31-2 | 53-4 | 114-6 | 485 | ∞ |
| f 5.6 | 8-10½ | 9-10 | 11-9 | 14-7½ | 19-4 | 28-6 | 45-11½ | 84-11 | 195-6 | 560 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-1¾ | 10-2 | 12-3 | 15-4¾ | 20-8½ | 31-8 | 54-10 | 121-7 | 644 | ∞ |
| f 6.3 | 8-10½ | 9-9¾ | 11-8¾ | 14-7 | 19-3 | 28-4 | 45-5¾ | 83-4 | 500 | — |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | ∞ | ∞ |
| | 9-1¾ | 10-2½ | 12-3½ | 15-5½ | 20-9¾ | 31-10½ | 55-6 | 124-11 | ∞ | ∞ |
| f 8 | 8-9¾ | 9-9½ | 11-8 | 14-5½ | 19-¾ | 27-11 | 44-5 | 79-9 | 170-2 | 392 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-2½ | 10-3 | 12-4½ | 15-6¾ | 21-½ | 32-5½ | 57-2 | 133-11 | 1267 | ∞ |
| f 11 | 8-9 | 9-8½ | 11-6½ | 14-3½ | 18-8¾ | 27-2½ | 42-7½ | 74-2 | 146-5 | 285 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-3½ | 10-4 | 12-6 | 15-9½ | 21-5½ | 33-5½ | 60-6 | 153-6 | ∞ | ∞ |
| f 16 | 8-7½ | 9-6½ | 11-4 | 13-11¾ | 8-2½ | 26-1 | 39-11½ | 66-4 | 118-9 | 196-2 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-4¾ | 10-6 | 12-9 | 16-2½ | 22-2½ | 35-3½ | 66-10 | 203 | ∞ | ∞ |
| f 22 | 8-6 | 9-4½ | 11-1½ | 13-7½ | 17-7½ | 24-10½ | 37-1¾ | 58-11 | 96-10 | 142-8 |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | 300 | ∞ |
| | 9-6¾ | 10-8½ | 13-½ | 16-8½ | 23-1¾ | 37-9½ | 76-6 | 330 | ∞ | ∞ |
| f 32 | 8-3½ | 9-1½ | 10-9 | 13-1 | 16-8½ | 23-1 | 33-3 | 49-8 | 98-1 | — |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | ∞ | ∞ |
| | 9-10 | 11-¾ | 13-7 | 17-7 | 24-11½ | 42-10½ | 101-1 | ∞ | ∞ | ∞ |
| f 45 | 8-½ | 8-9¾ | 10-3¾ | 12-5½ | 15-7¾ | 21-1½ | 29-3½ | 41-2¾ | 69-9 | — |
| | 9 | 10 | 12 | 15 | 20 | 30 | 50 | 100 | ∞ | ∞ |
| | 10-2¾ | 11-6¾ | 14-4½ | 18-10¾ | 27-8½ | 51-10 | 171-5 | ∞ | ∞ | ∞ |

DEPTH OF FOCUS FOR 30 cm. TELE-TESSAR

| | | | | | | | | | | | | |
|------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|----------|
| f 8 | 8-11 $\frac{1}{4}$ | 11-10 $\frac{1}{2}$ | 14-9 $\frac{3}{4}$ | 17-8 $\frac{3}{4}$ | 23-6 | 29-2 $\frac{3}{4}$ | 34-10 $\frac{1}{2}$ | 43-3 | 56-11 | 83-2 $\frac{1}{2}$ | 154-7 | 1091 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9- $\frac{3}{4}$ | 12-1 $\frac{1}{2}$ | 15-2 $\frac{1}{4}$ | 18-3 $\frac{1}{2}$ | 24-6 $\frac{1}{4}$ | 30-9 $\frac{3}{4}$ | 37-2 $\frac{1}{4}$ | 46-10 $\frac{3}{4}$ | 63-5 $\frac{1}{4}$ | 98 | 215 | ∞ |
| f 11 | 8-11 | 11-10 | 14-9 | 17-7 $\frac{1}{2}$ | 23-4 | 28-11 $\frac{1}{4}$ | 34-5 $\frac{3}{4}$ | 42-7 $\frac{1}{2}$ | 55-10 | 80-11 | 146-10 | 794 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9-1 | 12-2 | 15-3 $\frac{1}{4}$ | 18-4 $\frac{3}{4}$ | 24-8 $\frac{1}{2}$ | 31-1 $\frac{3}{4}$ | 37-8 | 47-7 $\frac{3}{4}$ | 64-10 | 101-5 | 233 | ∞ |
| f 16 | 8-10 $\frac{1}{2}$ | 11-9 $\frac{1}{4}$ | 14-7 $\frac{1}{2}$ | 17-5 $\frac{1}{2}$ | 23- $\frac{1}{4}$ | 28-5 $\frac{3}{4}$ | 33-10 | 41-7 $\frac{3}{4}$ | 54-1 $\frac{3}{4}$ | 77-4 $\frac{1}{4}$ | 35-6 | 546 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9-1 $\frac{1}{2}$ | 12-3 | 15-4 $\frac{3}{4}$ | 18-7 | 25- $\frac{3}{4}$ | 31-8 $\frac{1}{4}$ | 38-5 $\frac{3}{4}$ | 48-11 $\frac{1}{2}$ | 67-3 $\frac{1}{2}$ | 107-7 | 268 | ∞ |
| f 22 | 8-9 $\frac{3}{4}$ | 11-8 | 14-5 $\frac{3}{4}$ | 17-3 | 22-8 $\frac{1}{4}$ | 27-11 $\frac{1}{2}$ | 33-1 | 40-6 | 52-2 $\frac{3}{4}$ | 73-6 | 124 | 397 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9-2 $\frac{1}{4}$ | 12-4 | 15-6 $\frac{1}{2}$ | 19-9 $\frac{3}{4}$ | 25-5 $\frac{3}{4}$ | 32-4 $\frac{1}{2}$ | 39-5 $\frac{3}{4}$ | 50-7 $\frac{1}{2}$ | 70-6 | 116-1 | 328 | ∞ |
| f 32 | 8-9 | 11-6 $\frac{1}{2}$ | 14-3 $\frac{1}{4}$ | 16-11 $\frac{1}{4}$ | 22-1 $\frac{1}{2}$ | 27-1 $\frac{1}{4}$ | 31-10 $\frac{3}{4}$ | 38-9 | 49-3 $\frac{3}{4}$ | 67-10 | 108-8 | 273 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9-3 $\frac{1}{4}$ | 12-6 | 15-9 $\frac{3}{4}$ | 19-2 $\frac{1}{2}$ | 26-2 $\frac{1}{2}$ | 33-7 | 41-3 $\frac{3}{4}$ | 53-8 | 76-7 | 133-8 | 525 | ∞ |
| f 45 | 8-7 $\frac{3}{4}$ | 11-4 $\frac{1}{4}$ | 13-11 $\frac{3}{4}$ | 16-6 $\frac{1}{2}$ | 21-5 $\frac{1}{2}$ | 26-1 | 30-6 | 36-8 | 46 | 61-8 | 93-6 $\frac{3}{4}$ | 194-9 |
| | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 60 | 90 | 180 | ∞ |
| | 9-4 $\frac{3}{4}$ | 12-8 $\frac{3}{4}$ | 16-2 | 19-8 $\frac{3}{4}$ | 27-2 $\frac{3}{4}$ | 35-3 $\frac{1}{2}$ | 43-11 $\frac{1}{4}$ | 58-2 $\frac{3}{4}$ | 86-3 $\frac{1}{4}$ | 166-6 | ∞ | ∞ |



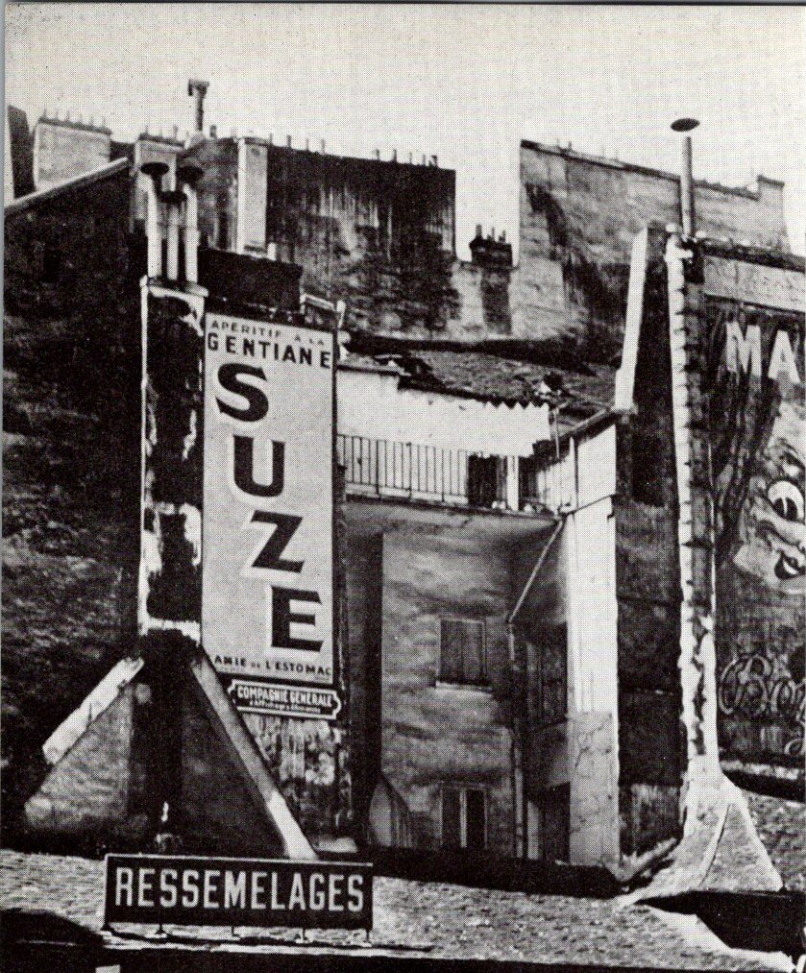
OVER THE FROZEN DANUBE. *The right job for the miniature camera: poor winter light, fading sun, plus speed.—Tessar 5 cm., f 3.5, 1/250 sec.—*J. DULOVITS.



OSTEND HARBOUR. All the space, the horizontal expansion in this picture is due to the functional use of the wide angle lens.—Biogon 3.5 cm., f 4, 66 1/100 sec.—G. SCHUH.



LONDON SUBURB. *Against the light viewpoint and the long focus perspective brings pattern and charm even into a dreary street.—Sonnar 13.5 cm., f 8, 1/25 sec.—EDWIN SMITH.*



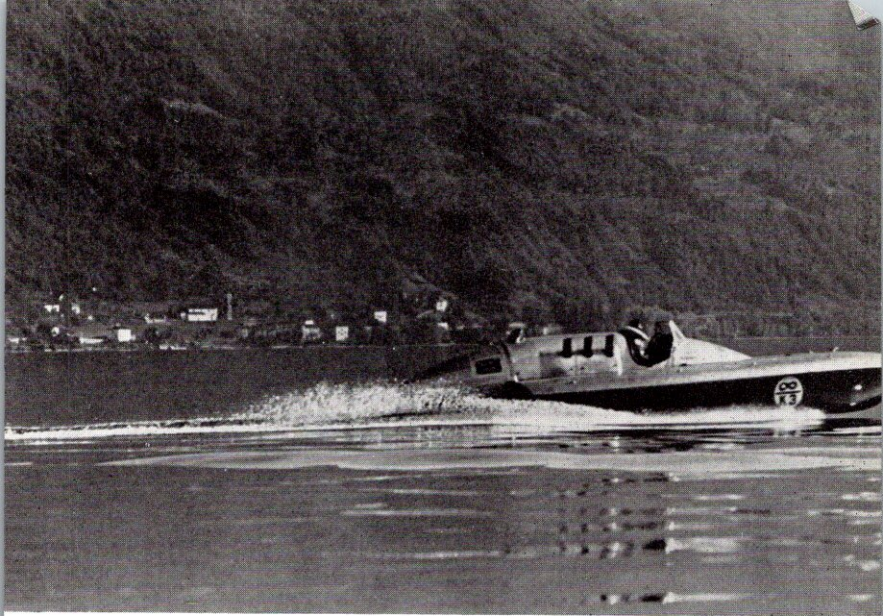


PARIS LANDSCAPE (p. 68). The miniature camera has grown up to find styles of its own. This unconventional view of a Paris street, cutting out all the foreground and emphasizing everything high up, brings out a view which is so well known to anybody whose first acquaintance with Paris has been through the windows of a railway carriage. It may be called a bit of photographic surrealism.—Sonnar 5 cm., $f 4$, $1/250$ sec.—G. SCHUH.

THERE WAS PEACE IN ROTTERDAM (above). The lights of a little open-air café behind the fence, in addition to those gleaming through the upper storey windows of the house opposite, are all that helped to produce this picture.—Sonnar 5 cm., $f 1.5$, $1/2$ sec.—E. van MOERKERKEN.



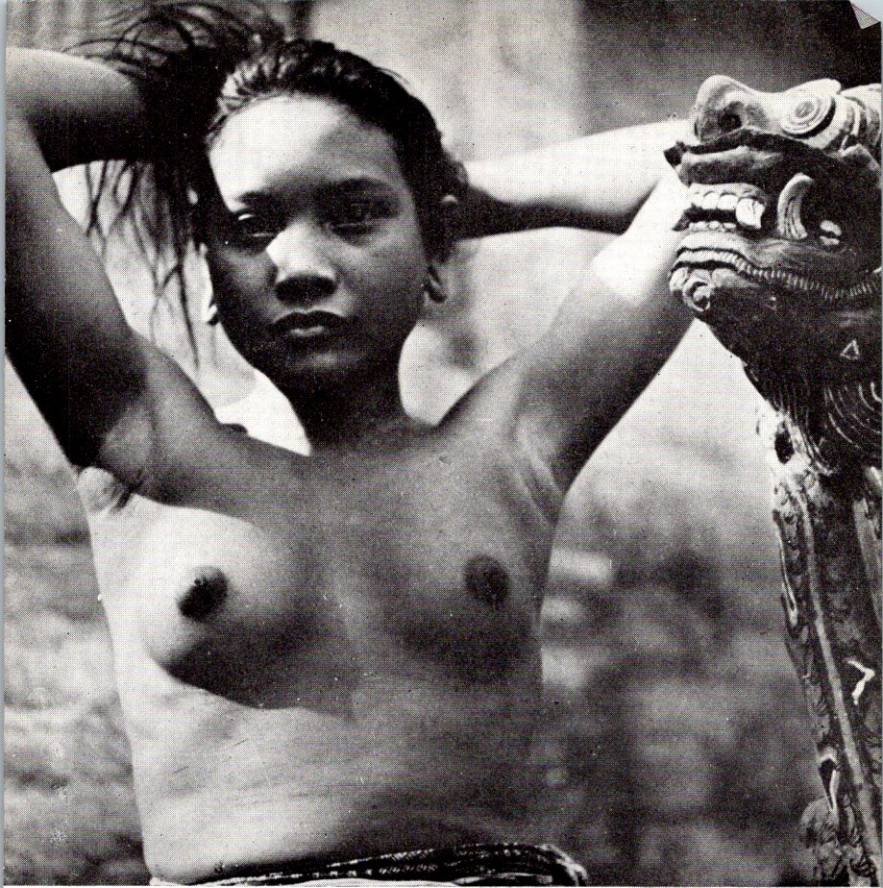
THE NIGHT SCOT LEAVING KING'S CROSS. In times before the black-out was invented and when it was not a crime to take photographs in railway stations, the miniature could show what it can really do: for example, photographing a travelling express train at 10 p.m. on a January night.—



CAMPBELL WITH THE BLUEBIRD ON LAKE LOCARNO. The use of a long-focus lens separates excellently subject and background, cutting out at the same time all the unnecessary foreground. The very short exposure time helped to produce brilliantly sharp rendering of the boat.—Sonnar 18 cm., f 4, 1/1250 sec.—A. STEINEMANN.



THE MEN IN THE PUB. There is not much light in these sort of places, at least not in the sense of the word which interests the photographer if he wants to steal a candid shot of a couple of "regulars". Still, he has done so and caught all the atmosphere of a London bar.—Sonnar 5 cm., 72 f 2, 1/50 sec.—G. SCHUH.



THE GIRL OF BALI. It is a posed picture; still, it is posed without displaying that painfully self-conscious look we know so well and condemn so much in modern photography.—Sonnar 8.5 cm., *f* 4, 1/100 sec.—G. SCHUH.







Portraiture proper, as it was understood by the photographers of the last generation, is not one of the particular fields of photographic technique for which miniature cameras were expressly made. Old and bulky instruments are adequate for this style of work. Portraits taken with the miniature are bound to replace dignified attitude and well-balanced composition by different qualities: live directness and originality of viewpoint.

ARAB CHIEF (p. 74). Triotar 8.5 cm., f 8, 1/15 sec.—A. WOLFF.

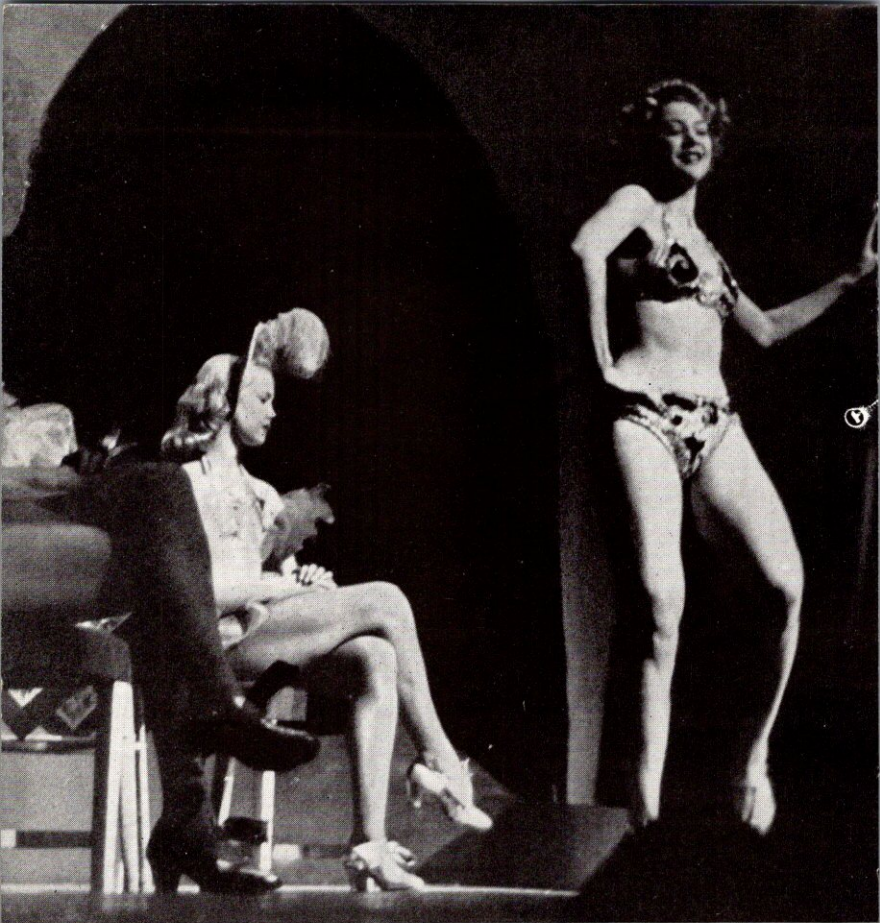
LADY WITH A CIGARETTE (p. 75). Artificial lighting.—Sonnar 8.5 cm., f 4, 1/10 sec.—L. A. LEIGH.

Dealing with children, the miniature changed the whole outlook of photography. Expression and movement replaced the artificial poses and theatrical dressing-up of yesterday's pictures of children.

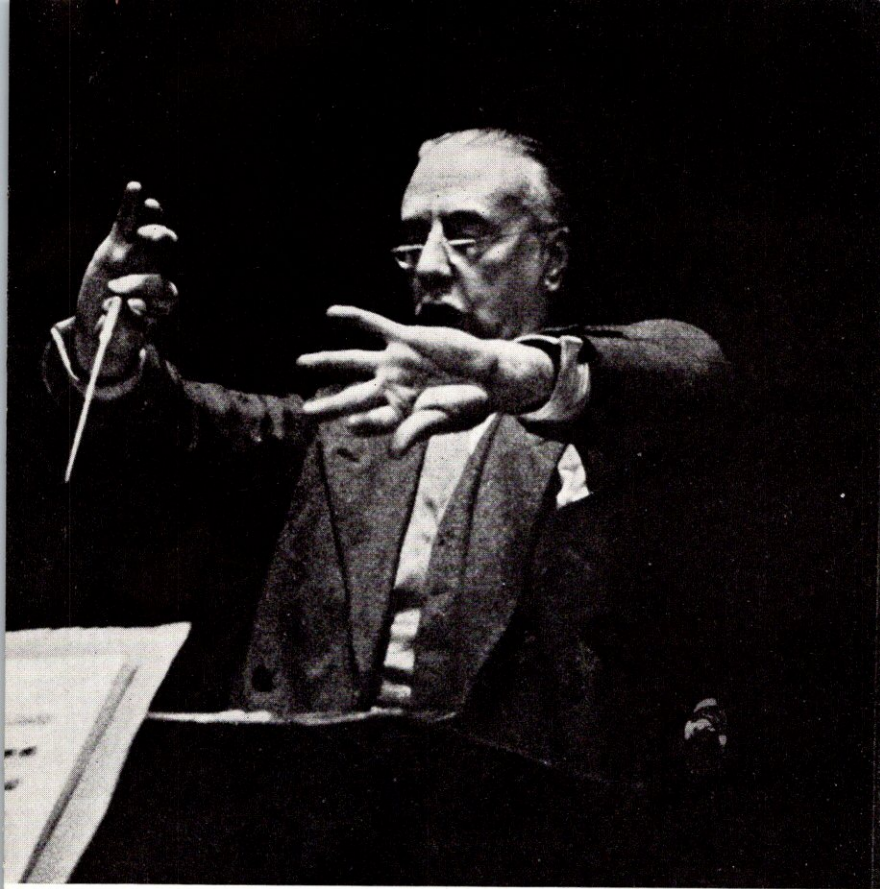
THE LAUGH (above). Daylight only.—Sonnar 5 cm., f 2, 1/100 sec.—HUGO van WADENOYEN.

76 THE JUMP (opposite). Daylight and electric light combined.—Sonnar 5 cm., f 2, 1/250 sec.—HUGO van WADENOYEN.





SHOWPIECE. Theatrical photography depends on having a good seat and being quickly responsive to dramatic movements. Apart from this, it is mainly a problem of lighting. There is likely to be either too little light or too much contrast of light, and in the latter case (as in the example above) the photographer must be prepared to lose at least some quality, either in the light or in the shadows.—Sonnar 5 cm., f 2 1/125 sec.—



SIR THOMAS BEECHAM. *Studies of conductors at work are by now commonplace and we are inclined to forget that, thanks to the miniatures, they open an entirely new vista into the spirit of music and the character of the best of its representatives.—Sonnar 8.5 cm., f 2, 1/15 sec.—*MARLYN SEVERN.



CARD TRICK. Backed up by flash-gun and speed lamp, the photographer can show us "the in-betweens" from the start to the end of a movement, which are unseen by the human eye.—Sonnar 5 cm., f 5.6, 1/1250 sec.,

80 Burvin gun, two No. 1 Photoflux flash bulbs.—LANCLOT VINING.

DEPTH OF FOCUS FOR 50 cm. TELE-TESSAR

| | | | | | | | | | | |
|------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|-----|------|
| f 8 | 17-10 $\frac{1}{2}$ | 20-10 $\frac{1}{2}$ | 23-10 | 29-8 $\frac{1}{2}$ | 35-7 $\frac{1}{2}$ | 44-4 $\frac{1}{2}$ | 58-10 $\frac{1}{2}$ | 87-5 $\frac{1}{2}$ | 273 | 3029 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-1 $\frac{1}{2}$ | 21-1 $\frac{1}{2}$ | 24-2 $\frac{1}{2}$ | 30-3 $\frac{1}{2}$ | 36-5 | 45-7 $\frac{1}{2}$ | 61-2 $\frac{1}{2}$ | 92-8 $\frac{1}{2}$ | 333 | 00 |
| f 11 | 17-10 $\frac{1}{2}$ | 20-9 $\frac{1}{2}$ | 23-9 | 29-7 $\frac{1}{2}$ | 35-5 $\frac{1}{2}$ | 44-1 $\frac{1}{2}$ | 58-5 $\frac{1}{2}$ | 86-6 $\frac{1}{2}$ | 264 | 2203 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-1 $\frac{1}{2}$ | 21-2 $\frac{1}{2}$ | 24-3 | 30-4 $\frac{1}{2}$ | 36-6 $\frac{1}{2}$ | 45-10 $\frac{1}{2}$ | 61-7 $\frac{1}{2}$ | 93-9 $\frac{1}{2}$ | 347 | 00 |
| f 16 | 17-9 $\frac{1}{2}$ | 20-8 $\frac{1}{2}$ | 23-7 $\frac{1}{2}$ | 29-5 $\frac{1}{2}$ | 35-2 $\frac{1}{2}$ | 43-9 | 57-9 $\frac{1}{2}$ | 85- $\frac{1}{2}$ | 251 | 1515 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-2 $\frac{1}{2}$ | 21-3 $\frac{1}{2}$ | 24-4 $\frac{1}{2}$ | 30-7 | 36-10 | 46-4 | 62-5 | 95-7 | 374 | 00 |
| f 22 | 17-8 $\frac{1}{2}$ | 20-7 $\frac{1}{2}$ | 23-6 $\frac{1}{2}$ | 29-3 | 34-11 | 43-3 $\frac{1}{2}$ | 56-11 $\frac{1}{2}$ | 83-3 $\frac{1}{2}$ | 236 | 1103 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-3 $\frac{1}{2}$ | 21-4 $\frac{1}{2}$ | 24-6 | 30-9 $\frac{1}{2}$ | 37-2 | 46-10 $\frac{1}{2}$ | 63-4 $\frac{1}{2}$ | 97-10 $\frac{1}{2}$ | 412 | 00 |
| f 32 | 17-7 $\frac{1}{2}$ | 20-5 $\frac{1}{2}$ | 23-3 $\frac{1}{2}$ | 28-11 | 34-5 $\frac{1}{2}$ | 42-6 $\frac{1}{2}$ | 55-8 $\frac{1}{2}$ | 80-7 | 215 | 758 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-4 $\frac{1}{2}$ | 21-6 $\frac{1}{2}$ | 24-8 $\frac{1}{2}$ | 31-2 | 37-8 $\frac{1}{2}$ | 47-8 $\frac{1}{2}$ | 65- $\frac{1}{2}$ | 101-11 | 495 | 00 |
| f 45 | 17-5 $\frac{1}{2}$ | 20-3 $\frac{1}{2}$ | 23- $\frac{1}{2}$ | 28-6 | 33-10 | 41-7 $\frac{1}{2}$ | 54-1 $\frac{1}{2}$ | 77-3 $\frac{1}{2}$ | 193 | 540 |
| | 18 | 21 | 24 | 30 | 36 | 45 | 60 | 90 | 300 | 00 |
| | 18-6 $\frac{1}{2}$ | 21-9 $\frac{1}{2}$ | 25- $\frac{1}{2}$ | 31-8 | 38-5 $\frac{1}{2}$ | 48-11 $\frac{1}{2}$ | 67-3 $\frac{1}{2}$ | 107-8 | 673 | 00 |

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 usually give an exposure-figure which lies within the latitude of the film. Such an exposure table is given on p. 83.

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.

The field covered by photo-electric exposure meters is as a rule wider than the 5 cm. (standard lens) shows. For example, the built-in meter of the Contax III gives about 65° in horizontal and 60° in vertical position, thus corresponding roughly with a 3.5 cm. wide-angle. (The *Zeiss Helios* meter

82 has an angle of 92° horizontally and vertically, the *Sixtus*

EXPOSURE TABLE FOR DAYLIGHT

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

1. Subject and month value

| Subject | Jan. Nov. Dec. | Feb. Oct. | Mar. Sept. | April Aug. | May June July |
|---|----------------------|--------------|---------------|---------------|---------------------|
| Open land- or seascape, with- out foreground | 5 | 4 | 3 | 2 | 1 |
| —with light foreground | 6 | 5 | 4 | 3 | 2 |
| Outdoor subjects with normal foreground, streets, archi- tecture | 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 1.5 | Stop 2 | Stop 2.8 | Stop 4 | Stop 5.6 | Stop 8 | Stop 11 | Stop 16 |
|------------------------|-------------|-----------|-------------|-----------|-------------|-----------|------------|------------|
| 31° | —7 | —6 | —4 | —3 | —2 | —1 | 0 | 1 |
| 28° | —6 | —5 | —3 | —2 | —1 | 0 | 1 | 2 |
| 25° | —5 | —4 | —2 | —1 | 0 | 1 | 2 | 3 |
| 22° | —4 | —3 | —1 | 0 | 1 | 2 | 3 | 4 |
| 19° | —3 | —2 | 0 | 1 | 2 | 3 | 4 | 5 |

4. Result (sum of Tables 1 + 2 + 3 = "Value")

| Value ... | —1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-----------|--------|-------|-------|-------|------|------|------|-----|-----|---|---|----|----|----|----|----|
| Seconds | 1/1000 | 1/500 | 1/250 | 1/100 | 1/50 | 1/25 | 1/10 | 1/5 | 1/2 | 1 | 2 | 4 | 8 | 15 | 30 | 60 |
| Value | ... | 15 | 16 | 17 | 18 | 19 | 20 | 21 | | | | | | | | |
| Minutes | ... | 2 | 4 | 8 | 16 | 30 | 60 | 120 | | | | | | | | |

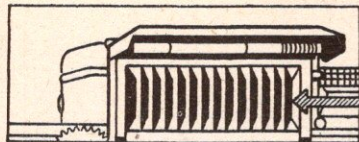
one of 102° vertically and 122° horizontally, the *Western Universal* 60° horizontally and vertically, *Metrovic* 126° horizontally and 94° vertically.) Therefore with Standard 5 cm. and long focus lenses, which have a considerably smaller angle, the measurement should be taken from a point nearer to 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 may be the case with particularly contrasty subjects like stage shots, etc.

The Exposure Meter of the Contax III

In the Contax III a photo-electric exposure meter is incorporated as a part of the instrument. The actual cell is situated in the rectangular box on top of the Contax III between film wind and rewind knob (see p. 85). It measures in horizontal position an angle of about 65° , in vertical position of 60° . The light that falls through the prism window on the cell produces an electric current, causing the needle of the measuring instrument to deflect to an extent varying with the intensity of brightness. Compensation for the variable brightness of the object (and incidentally of the electric current) is obtained by the resistance connected to the exposure time scale on the rewind knob, which shows the exposure time for all stops. For use:—

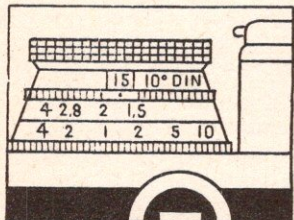
1. Set film speed.
 2. Open cover.
 3. Point instrument to object.
 4. Set needle.
 5. Read off exposure time.
 6. Use multiplier where applicable.
1. The black mark below the rectangular opening of the diaphragm scale (see drawing, p. 85) has to be set to the number corresponding to the speed of the film used. The film speeds are either indicated in $^\circ\text{Sch.}$ or $/10 \text{ DIN}$. Corresponding values may be taken from the table on p. 33.

The built-in photo-electric exposure meter of Contax III (p. 84).

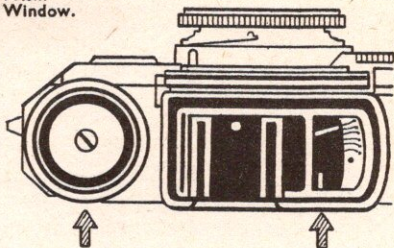


Prism Window.

Scale Ring.

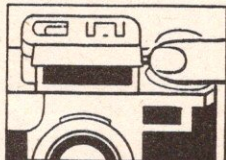


From top to bottom: Film-speed; Aperture; Exposure-time.



Rotating Ring.

Indicating Needle in Window.



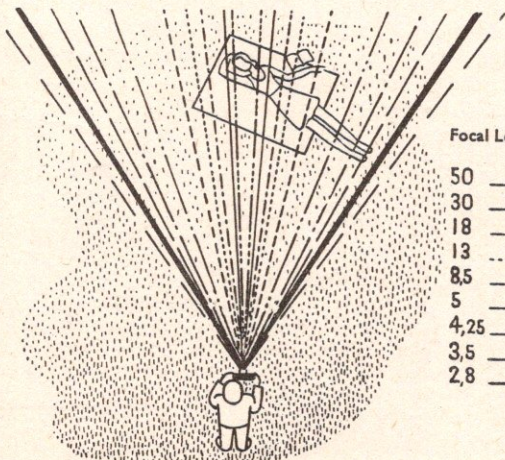
Open Meter.



Set Needle.



Close Meter.



Focal Length of Lenses in em's.

| | |
|------|-------|
| 50 | _____ |
| 30 | _____ |
| 18 | _____ |
| 13 | _____ |
| 8,5 | _____ |
| 5 | _____ |
| 4,25 | _____ |
| 3,5 | _____ |
| 2,8 | _____ |

The angle covered by the various Contax lenses (thin lines) in comparison with the angle (bold lines) of the Contax built-in exposure meter. (See page 82).

2. To open the exposure meter the cover of the prism window has to be raised by pressing on the knob on the right-hand top of the meter box (seen from front), as shown in drawing, p. 85. The cover will remain in a horizontal position, acting as a shade against strong sky-light.
3. For ascertaining the exposure time the camera should be pointed to the centre of the subject to be photographed. If the degree of brightness varies considerably, or full details in the deep shadow parts are desired, it is advisable to aim the camera at the shaded parts and to approach as near as possible to them.

Furthermore it must be borne in mind that the angle of acceptance of the prism covers about 65 degrees, to correspond with a 3.5 cm. lens. When using lenses of longer focal length with the corresponding smaller angle (see table of Contax lenses on p. 45) it remains essential either to approach the subject rather close in order to measure the exposure or, if that is not permissible, to adjust the exposure time read off in accordance with the difference in brightness compared with its surroundings. For example: the circle of acceptance of the Contax exposure meter at 10 ft. distance registers all the light reflected from a circle of about $9\frac{1}{2}$ ft. diameter, which roughly corresponds with the angle of the 3.5 cm. lens. Using a 13.5 cm. focal length lens, the field covered at the same distance is only about $3\frac{1}{2}$ ft., and to ensure that our meter registers the light reflected from this $3\frac{1}{2}$ ft. field we should approach to 4 ft. to determine the exposure when taking the subject at 10 ft. distance (see drawing on p. 85).

4. To set needle in the top window the bottom ring on the rewind-knob (see drawing on p. 85) should be rotated until the needle points to the diamond mark \blacklozenge . Where the intensity of brightness is very low (e.g. indoors) the needle cannot be brought to the diamond mark \blacklozenge even when the bottom ring has been fully turned to the left (anti-clockwise). With the ring in this position the exposure time indicated on the scale (see below) must be multiplied by a factor which is determined by the position of the needle on the scale below the diamond mark. The numbers 2, 5, 10, 20 and 40 on the scale denote that the indicated exposure times must be multiplied by 2, 5, 10, 20 or 40, as the case may be. If the needle happens to be between the "multipliers" the factor may be estimated. For instance, if the needle is between the numbers 5 and 10, the factor is 8. A condition for the accuracy of all measurements with "multipliers" is that the bottom ring must be turned anti-clockwise to its left-hand limit.

5. The correct exposure time corresponding to any lens aperture (or the aperture for any pre-selected exposure time) can be read off on the rewind knob. The bottom scale shows exposure times, black numbers denoting fractions of seconds, e.g. 25 = 1/25 sec., 2 = 1/2 sec., whereas the red numbers indicate full seconds. Intermediate values can be obtained by setting the stop accordingly.
6. After reading off the exposure time when working with the "multiplier" one has to multiply the result by the appropriate number, as explained under 4, second part.

The principal conversion with the "multipliers" may be taken from the following table:—

| Readings on the exposure time scale | Exposure time to be employed with Multiplier | | | | |
|---|---|------|------|-----|-----|
| | 2 | 5 | 10 | 20 | 40 |
| 100 ... | 1/50 | 1/25 | 1/10 | 1/5 | 1/2 |
| 50 ... | 1/25 | 1/10 | 1/5 | 1/2 | 1 |
| 25 ... | 1/10 | 1/5 | 1/2 | 1 | 2 |
| 10 ... | 1/5 | 1/2 | 1 | 2 | 4 |
| 5 ... | 1/2 | 1 | 2 | 4 | 8 |
| 2 ... | 1 | 2.5 | 5 | 10 | 20 |
| 1 ... | 2 | 5 | 10 | 20 | 40 |

ADJUSTMENT OF THE EXPOSURE METER. Through improper handling it might happen that the zero-point position of the needle becomes displaced (the zero-point is at the beginning of the meter scale next to "40"). In such an eventuality the exposure meter can be readjusted. The scale is displaced by turning the screw at the side of the meter casing opposite the film counter with a fine screwdriver, while the bottom ring on the rewind-knob should be fully wound in a clockwise direction to its limit and the meter cover closed and covered with a piece of dark cloth. Adjust the scale until the zero-point lies exactly opposite the needle.

The Right Negative

Contax negatives must be very sharp, have fine grain and show a well-balanced gradation.

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.

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.

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. 32), 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,

88 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 ignore these fractions and content ourselves with round figures, such as 1.5, 2, 3 times, etc., without fear of error.

The following list gives a summary of the filters :

YELLOW FILTERS (G1, G2, G3), 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 (GR50), 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 over-sensitive (photographing it too light).

SKY FILTERS (VG6) 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 (G0), for orthochromatic and panchromatic film. The very light ultra-violet filter is only to be used at 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 (G4) are for panchromatic film only. They give over-correction, and serve, therefore, as an "effect" filter for drawing heavy clouds against a dark sky, creating very clear distances in landscapes, eliminating light haze, etc.

RED FILTERS (R10, R15) are for panchromatic film only. Of stronger effect than the orange filter, for extreme contrast, creating black sky with brilliant clouds, faking sunshine into moonlight effects, etc.

DARK RED FILTERS (R20, R30), to be used only with infra-red film. Chiefly used for scientific purposes, it penetrates mist and fog in long distance photography.

BLUE FILTERS (B40) are for panchromatic film in artificial light. They absorb part of the red sensitivity. This results in better skin-tones and darker reds (lips).

FILTER FACTORS

| Filter | Ortho. | Pan. | Infra-Red |
|--------------------------|--------|------|-----------|
| G0 Ultra-violet ... | 1 | 1 | — |
| G1 Light yellow ... | 2 | 2 | — |
| G2 Medium yellow ... | 3 | 3 | — |
| G3 Dark yellow ... | 4 | 4 | — |
| G4 Orange ... | 8 | 5 | — |
| B40 Blue ... | — | 1½-2 | — |
| GR55 Yellow-green ... | 2 | 2 | — |
| GR50 Green ... | — | 3-4 | — |
| VG6 Graduated yellow ... | 1 | 1 | — |
| R10 Light red ... | — | 8-12 | 8-12 |
| R15 Medium red... | — | — | 20-25 |
| R20 Dark red ... | — | — | 20-25 |
| R30 Black-red ... | — | — | 500 |

The normal 42 mm. slip-on type filter is *not* suitable for 5 cm. Sonnar *f* 1.5, Biogon *f* 2.8 and Orthometar *f* 4.5. For these lenses special 42mm. filters with wider aperture on their front are supplied.

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, photographing wet objects, etc.

The filter has to be rotated to find out its best position on the lens. The Contax polarizing viewing device for 5 cm. Contax lenses simplifies this, as it consists of a second polarizing filter coupled to that on the camera lens, in a rotating double-mount (see p. 104). By viewing the object through the finder-polarizer and turning the rotating ring until the best or desired degree of elimination is seen, the second filter in front of the taking lens is set simultaneously. As the filter is brownish tinted the exposure should be $\times 4$. This polarizer acts at the same time as a yellow filter. When using the *f* 1.5 Sonnar 5 cm. a slight vignetting in the corners must be taken into account.

SUBJECTS IN FRONT OF THE CONTAX

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 (8.5 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 Contax demands an entirely different angle of approach. The Contax 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 (13.5–50 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 Universal Finder is most suitable. Regarding tilts—a tilt recognizable as such is better than a camouflaged or accidental one.

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 8.5 and 13.5 cm. focus work well from a distance of 6 ft., producing negatives of direct portrait size. The Sonnar 18 cm. is excellent for portraits, but wants a sitter-camera distance of about 6 yds. 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 Contax 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. 56) will then be the right method of approach—at the hardly avoidable cost of sharp backgrounds. The Brilliant 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 Brilliant Finder used as Angular Finder is another way out, but will hardly be successful with intelligent "victims".

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

CHILDREN. Assuming that the Contax 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 (3.5 cm.) lens indoors and one of medium focus (8.5 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 Brilliant Finder is a help. (Animals: Same technique as with children.)

More information in "Phototips on Children", by M. & R. Arnheim.

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 8.5 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 Albada 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 Contax shutter is 1/1250 sec. It is a focal plane shutter: a slit of variable width formed by two metal blinds. When released the slit will flash down the shorter length of the negative area. In doing so—and being only a slit—it will require more than 1/1,250 sec. to complete what is called an exposure of 1/1250 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 movement, as it were, cuts across the subject movement, it will tilt its verticals and

push dignified parallelograms into merry rhomboidal shapes. If the shutter runs after the subject, it will tend to draw it longer than it is. If it collides with it headlong, it may squash it. Now, our eyes seem to be quite willing to accept some blur and some distortion as symbols of speed. It is usually thought that distortion in the direction of the movement is the more acceptable "symbol". As the Contax shutter travels from top to bottom in the horizontally held camera, and from left to right in the vertically held camera, it will work in the right way when horizontal movements are being shot with the vertical camera and vertical movements with the horizontal camera. Photographers who believe in the old rule that the best is to have the shutter running *against* the subject, must turn the Contax upside down in vertical position so that the release knob part of the camera is downwards when photographing subjects going from right to left 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.

STAGE. The technique varies with the type of the show. Theatre, circus, floor show, variety, all require a 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 exposure meter, 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 from which 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 Sonnar $f\ 2.8.5$ cm. is the best stage lens with the Contax. 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.

94 Keep your eye at the view-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.

SHUTTER SPEEDS TO ARREST MOVEMENT

| Subject | Relative motion in m.p.h. | Focal length of LENS | Distance Between Camera and Object | | | | | |
|---|---------------------------|----------------------|--|---------|---------|---------|---------|---------|
| | | | 2 m. | 3.5 m. | 5 m. | 9 m. | 18 m. | 35 m. |
| Swimmer ... | 2½ | 3.5 cm. | 2 m. | 3.5 m. | 5 m. | 9 m. | 18 m. | 35 m. |
| Walker ... | 3 | | 6½ ft. | 12 ft. | 17 ft. | 30 ft. | 60 ft. | 115 ft. |
| Runner ... | 12½ | 5 cm. | 3 m. | 5 m. | 7.5 m. | 12.5 m. | 25 m. | 50 m. |
| Cyclist ... | 15 | | 10 ft. | 17 ft. | 25 ft. | 42 ft. | 83 ft. | 165 ft. |
| Skater ... | 28 | 8.5 cm. | 5½ m. | 9 m. | 13.5 m. | 22 m. | 45 m. | 90 m. |
| Horse walking | 4 | | 18 ft. | 30 ft. | 45 ft. | 75 ft. | 150 ft. | 300 ft. |
| „ trotting | 9 | 13.5 cm. | 8 m. | 13.5 m. | 20 m. | 34 m. | 67 m. | 135 m. |
| „ galloping | 19 | | 27 ft. | 45 ft. | 66 ft. | 110 ft. | 220 ft. | 440 ft. |
| Racehorse ... | 31 | 18 cm. | 11 m. | 18 m. | 27 m. | 45 m. | 90 m. | 180 m. |
| Waves ... | 15 | | 36 ft. | 60 ft. | 90 ft. | 150 ft. | 300 ft. | 600 ft. |
| Heavy waves | 44 | Relat. Motion m.p.h. | Shutter Speeds in Fractions of Seconds | | | | | |
| Boats making 10 knots ... | 10 | | 0—1 | 1/50 | 1/20 | 1/16 | 1/12 | 2/5 |
| Boats making 20 knots ... | 20 | 2 | 1/60 | 1/30 | 1/25 | 1/15 | 1/8 | 1/3 |
| Tramcar ... | 9 | 3 | 1/100 | 1/60 | 1/40 | 1/25 | 1/12 | 1/6 |
| Motor car on road ... | 35 | 4 | 1/125 | 1/75 | 1/50 | 1/30 | 1/15 | 1/8 |
| Slow train ... | 25 | 6 | 1/200 | 1/100 | 1/75 | 1/50 | 1/25 | 1/10 |
| Express train | 60 | 8 | 1/250 | 1/150 | 1/100 | 1/60 | 1/30 | 1/15 |
| Aeroplane ... | 95 | 10 | 1/300 | 1/200 | 1/125 | 1/75 | 1/60 | 1/30 |
| 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. | | 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 |

CLOSE-UP WORK

Optical Near-Focusing Device "Contameter"

This device permits the taking of instantaneous photographs of small objects at close range. 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.

The Contameter works on the same principle as the coupled range-finder. Special supplementary lenses are placed over the 5 cm. Contax lens, giving sharp focus at three distances of 20, 13, and 8 inches (50, 33 and 20 cm.) with a scale of reproduction of 1 : 10, 1 : 6.5 and 1 : 4 respectively, while the 5 cm. lens used alone at its closest setting 35½ in. gives a scale of reproduction of 1 : 20. The instrument comprises a kind of range-finder, three interchangeable prisms and three supplementary lenses. Two different Contameters, one for Contax I and II, a second one for Contax III are made. (See p. 104).

Working with the Contameter

1. Set 5 cm. lens to "infinity".
 2. Fix range-finder in camera shoe.
 3. Slip appropriate supplementary lens on front of camera lens.
 4. Slip corresponding prism in tube on range-finder.
 5. Set stop and exposure time.
 6. Focus and view with Contameter.
 7. Release.
2. The Contameter range-finder has two shoes, one marked "50-33" the other one "20". When working on 50 or 33 cm. distance the shoe with the "50-33" marking should be slipped into the camera shoe and the other one when working at 20 cm. distance. These shoes are corrected so as to obviate parallax error.
 3. The supplementary lenses are marked "50", "33" and "20", indicating the distance in cm. for which they are suitable.
 4. The three prisms are similarly marked "50", "33" and "20", and the one corresponding to the supplementary lens to be used must be pushed into the tube of the range-finder.

5. Setting of stop and exposure time is done in the usual way.
 6. To focus, the camera is moved backwards and forwards from and to the subject until the images in the Contameter fuse. The angle of view is seen approximately by looking through the eye-piece.

DEPTH OF FOCUS FOR CONTAMETER

| Lenses set to ∞ | Distance of subject | Permissible size of subject | Depth at f 5.6 from | Depth at f 5.6 to | Depth at f 8 from | Depth at f 8 to | Depth at f 11 from | Depth at f 11 to |
|-------------------------|---------------------|--|---------------------|----------------------|---------------------|----------------------|---------------------|------------------|
| Supplementary lens '50' | 1'9 $\frac{1}{2}$ " | 10 $\frac{1}{2}$ " × 1'3 $\frac{1}{2}$ " | 1'8 $\frac{1}{2}$ " | 1'10 $\frac{1}{2}$ " | 1'8 $\frac{1}{2}$ " | 1'11 $\frac{1}{2}$ " | 1'7 $\frac{1}{2}$ " | 2' |
| Supplementary lens '33' | 1'3" | 7" × 10 $\frac{1}{2}$ " | 1'2 $\frac{1}{2}$ " | 1'3 $\frac{1}{2}$ " | 1'2 $\frac{1}{2}$ " | 1'3 $\frac{1}{2}$ " | 1'2" | 1'4" |
| Supplementary lens '20' | 9 $\frac{1}{2}$ " | 4 $\frac{1}{2}$ " × 7 $\frac{1}{2}$ " | 9 $\frac{1}{2}$ " | 10" | 9 $\frac{1}{2}$ " | 10" | 9 $\frac{1}{2}$ " | 10" |

Supplementary Lenses (Proxars)

These lenses are designed to cover also ranges shorter than 38 in. down to 12 $\frac{3}{4}$ in. They are available either to push on the 5 cm. Contax lens (42 mm. diameter) or to screw into the front lens mount (40.5 mm.). For the Tessars 5 cm. f3.5 or f2.8 supplementary lenses of 27 mm. diameter may be used to push on to the lens aperture control ring of these lenses.

The scope of application is roughly the same as indicated for the Contameter, but as the distance between object and camera cannot be found by the range-finder but will have to be measured, these lenses are obviously less suitable for taking moving objects. Two lenses of different power are supplied:—

Proxar 1 for distances from 38 in. to 18 $\frac{1}{2}$ in. for objects from 17 $\frac{3}{4}$ in. × 26 $\frac{1}{2}$ in. to 8 in. × 12 in. The reduction ranges from × 18.8 to × 8.5.

Proxar 2 for distances from 20 in. to 12 $\frac{3}{4}$ in. for objects from 9 $\frac{1}{4}$ in. × 14 in. to 5 $\frac{1}{2}$ in. to 8 $\frac{1}{4}$ in. The reduction ranges from × 9.8 to × 5.8.

Details regarding the setting of the camera lens, the distance, practicable size of the object and scale of reduction will be found in the focusing tables on pp. 98–100.

Depth of focus tables for close-up work with supplementary lenses are not given in this work for various reasons: (i) Mostly flat objects (copying of documents, etc.) without depth will be taken at this close range; (ii) for table top work the depth of focus table for work with the Contameter (p. 96) may give some indication; (iii) the ground glass screen when using plate-back adaptor shows the depth of field.

CLOSE FOCUSING TABLE FOR USE WITH PROXAR LENSES

I. FOR SONNAR f 1.5 5 cm.

| Setting of lens on focusing scale | * Distance of subject with Proxar I at | | | | | | Permissible size of subject | | Resulting scale of reduction I: | |
|-----------------------------------|--|-----------------|-----|-----------------|------|-----------------|-----------------------------|--------------------------|---------------------------------|------|
| | f 4 | | f 8 | | f 11 | | | | | |
| | ft. | in. | ft. | in. | ft. | in. | ft. | in. | | |
| ∞ | 3 | $1\frac{1}{4}$ | 3 | $1\frac{1}{2}$ | 3 | $1\frac{1}{2}$ | 1 | $5\frac{3}{4} \times 2$ | $2\frac{1}{2}$ | 18.8 |
| 100 | 3 | $0\frac{1}{2}$ | 3 | $0\frac{1}{2}$ | 3 | $0\frac{1}{2}$ | 1 | $5\frac{1}{4} \times 2$ | 2 | 18.3 |
| 60 | 2 | $11\frac{1}{2}$ | 3 | 0 | 2 | $11\frac{3}{4}$ | 1 | 5×2 | $1\frac{1}{2}$ | 17.9 |
| 50 | 2 | $11\frac{1}{4}$ | 2 | $11\frac{3}{4}$ | 2 | $11\frac{1}{2}$ | 1 | $4\frac{3}{4} \times 2$ | 1 | 17.7 |
| 30 | 2 | $10\frac{1}{4}$ | 2 | $10\frac{1}{2}$ | 2 | $10\frac{1}{4}$ | 1 | $3\frac{3}{4} \times 1$ | $11\frac{3}{4}$ | 16.7 |
| 20 | 2 | $8\frac{3}{4}$ | 2 | $9\frac{1}{4}$ | 2 | $8\frac{1}{2}$ | 1 | $3\frac{1}{4} \times 1$ | $10\frac{3}{4}$ | 16.0 |
| 15 | 2 | $7\frac{1}{4}$ | 2 | $7\frac{1}{2}$ | 2 | $7\frac{1}{4}$ | 1 | $2\frac{1}{4} \times 1$ | $9\frac{1}{2}$ | 15.2 |
| 12 | 2 | $6\frac{3}{4}$ | 2 | $6\frac{1}{2}$ | 2 | $6\frac{1}{4}$ | 1 | $1\frac{3}{4} \times 1$ | $8\frac{3}{4}$ | 14.6 |
| 10 | 2 | 5 | 2 | $5\frac{1}{4}$ | 2 | 5 | 1 | $1\frac{1}{2} \times 1$ | $8\frac{1}{4}$ | 14.1 |
| 9 | 2 | $4\frac{1}{4}$ | 2 | $4\frac{1}{2}$ | 2 | $4\frac{1}{4}$ | 1 | 1×1 | $7\frac{1}{2}$ | 13.8 |
| 8 | 2 | $3\frac{1}{4}$ | 2 | $3\frac{1}{2}$ | 2 | $3\frac{1}{2}$ | 1 | $0\frac{1}{2} \times 1$ | $6\frac{3}{4}$ | 13.1 |
| 7 | 2 | $2\frac{1}{4}$ | 2 | $2\frac{1}{2}$ | 2 | $2\frac{1}{2}$ | 1 | 0×1 | 6 | 12.7 |
| 6 | 2 | $0\frac{3}{4}$ | 2 | 1 | 2 | 1 | 0 | $11\frac{1}{4} \times 1$ | 5 | 11.9 |
| 5 | 1 | $10\frac{3}{4}$ | 1 | $11\frac{1}{4}$ | 1 | 11 | 0 | $10\frac{1}{2} \times 1$ | $3\frac{3}{4}$ | 11.0 |
| 4 | 1 | $8\frac{3}{4}$ | 1 | 9 | 1 | $8\frac{3}{4}$ | 0 | $9\frac{3}{4} \times 1$ | $2\frac{1}{2}$ | 10.2 |
| 3 | 1 | $6\frac{1}{4}$ | 1 | $6\frac{1}{2}$ | 1 | $6\frac{1}{2}$ | 0 | 8×1 | 0 | 8.5 |

| Setting of lens on focusing scale | * Distance of subject with Proxar II at | | | | | | Permissible size of subject | | Resulting scale of reduction I: | |
|-----------------------------------|---|----------------|-----|----------------|------|----------------|-----------------------------|-------------------------|---------------------------------|-----|
| | f 4 | | f 8 | | f 11 | | | | | |
| | ft. | in. | ft. | in. | ft. | in. | ft. | in. | | |
| ∞ | 1 | $7\frac{1}{2}$ | 1 | $7\frac{1}{2}$ | 1 | $7\frac{1}{2}$ | 0 | $9\frac{1}{4} \times 1$ | 2 | 9.8 |
| 100 | 1 | $7\frac{1}{4}$ | 1 | $7\frac{1}{4}$ | 1 | $7\frac{1}{4}$ | 0 | $9\frac{1}{4} \times 1$ | 2 | 9.8 |
| 60 | 1 | 7 | 1 | $7\frac{1}{4}$ | 1 | 7 | 0 | 9×1 | $1\frac{1}{2}$ | 9.6 |
| 50 | 1 | $6\frac{3}{4}$ | 1 | 7 | 1 | 7 | 0 | 9×1 | $1\frac{1}{2}$ | 9.6 |
| 30 | 1 | $6\frac{1}{2}$ | 1 | $6\frac{1}{2}$ | 1 | $6\frac{1}{2}$ | 0 | $8\frac{3}{4} \times 1$ | $1\frac{1}{4}$ | 9.4 |
| 20 | 1 | 6 | 1 | $6\frac{1}{4}$ | 1 | $6\frac{1}{4}$ | 0 | $8\frac{1}{2} \times 1$ | $0\frac{3}{4}$ | 9.0 |
| 15 | 1 | $5\frac{1}{2}$ | 1 | $5\frac{3}{4}$ | 1 | $5\frac{3}{4}$ | 0 | $8\frac{1}{4} \times 1$ | $0\frac{1}{4}$ | 8.8 |
| 12 | 1 | $5\frac{1}{4}$ | 1 | $5\frac{1}{2}$ | 1 | $5\frac{1}{2}$ | 0 | 8×1 | 0 | 8.5 |
| 10 | 1 | $4\frac{3}{4}$ | 1 | 5 | 1 | 5 | 0 | 8×1 | 0 | 8.3 |
| 9 | 1 | $4\frac{1}{2}$ | 1 | $4\frac{3}{4}$ | 1 | $4\frac{3}{4}$ | 0 | $7\frac{3}{4} \times 0$ | $11\frac{1}{2}$ | 8.1 |
| 8 | 1 | $4\frac{1}{4}$ | 1 | $4\frac{1}{2}$ | 1 | $4\frac{1}{2}$ | 0 | $7\frac{1}{2} \times 0$ | $11\frac{1}{4}$ | 7.9 |
| 7 | 1 | 4 | 1 | 4 | 1 | 4 | 0 | $7\frac{1}{4} \times 0$ | 11 | 7.7 |
| 6 | 1 | $3\frac{1}{2}$ | 1 | $3\frac{1}{2}$ | 1 | $3\frac{1}{2}$ | 0 | 7×0 | $10\frac{1}{2}$ | 7.3 |
| 5 | 1 | $2\frac{1}{2}$ | 1 | $2\frac{3}{4}$ | 1 | $2\frac{3}{4}$ | 0 | $6\frac{3}{4} \times 0$ | 10 | 7.1 |
| 4 | 1 | $1\frac{1}{2}$ | 1 | $1\frac{1}{2}$ | 1 | $1\frac{1}{2}$ | 0 | 6×0 | 9 | 6.5 |
| 3 | 1 | $0\frac{1}{2}$ | 1 | $0\frac{1}{2}$ | 1 | $0\frac{1}{2}$ | 0 | $5\frac{1}{2} \times 0$ | $8\frac{1}{4}$ | 5.8 |

CLOSE FOCUSING TABLE FOR USE WITH PROXAR LENSES

2. FOR SONNAR f2 5 cm.

| Setting of lens on focusing scale | * Distance of subject with Proxar I at | | | | | | Permissible size of subject | Resulting scale of reduction I: | | |
|-----------------------------------|--|------------------|-----|------------------|-----|------------------|-----------------------------|---------------------------------|------------------|------|
| | f4 | | f8 | | f16 | | | | | |
| ft. | ft. | in. | ft. | in. | ft. | in. | ft. | in. | | |
| ∞ | 3 | 1 $\frac{1}{4}$ | 3 | 2 | 3 | 1 $\frac{3}{4}$ | 1 | 5 $\frac{3}{4}$ × 2 | 2 $\frac{1}{2}$ | 18.8 |
| 100 | 3 | $\frac{1}{2}$ | 3 | 1 $\frac{1}{4}$ | 3 | 0 $\frac{1}{2}$ | 1 | 5 $\frac{1}{4}$ × 2 | 2 | 18.3 |
| 60 | 2 | 11 $\frac{1}{2}$ | 3 | 0 $\frac{1}{2}$ | 3 | 0 $\frac{1}{4}$ | 1 | 5 × 2 | 1 $\frac{1}{2}$ | 17.9 |
| 50 | 2 | 11 $\frac{1}{4}$ | 3 | 0 $\frac{1}{4}$ | 2 | 11 $\frac{1}{2}$ | 1 | 4 $\frac{3}{4}$ × 2 | 1 | 17.7 |
| 30 | 2 | 10 | 2 | 10 $\frac{1}{2}$ | 2 | 10 $\frac{1}{4}$ | 1 | 3 $\frac{3}{4}$ × 1 | 11 $\frac{3}{4}$ | 16.7 |
| 20 | 2 | 8 $\frac{1}{2}$ | 2 | 9 | 2 | 9 | 1 | 3 $\frac{1}{4}$ × 1 | 10 $\frac{3}{4}$ | 16.0 |
| 15 | 2 | 7 | 2 | 7 $\frac{1}{2}$ | 2 | 7 $\frac{1}{4}$ | 1 | 2 $\frac{1}{4}$ × 1 | 9 $\frac{3}{4}$ | 15.2 |
| 12 | 2 | 5 $\frac{3}{4}$ | 2 | 6 $\frac{1}{2}$ | 2 | 6 | 1 | 1 $\frac{1}{4}$ × 1 | 8 $\frac{3}{4}$ | 14.6 |
| 10 | 2 | 4 $\frac{1}{2}$ | 2 | 5 $\frac{1}{4}$ | 2 | 5 | 1 | 1 $\frac{1}{2}$ × 1 | 8 $\frac{1}{4}$ | 14.1 |
| 9 | 2 | 3 $\frac{3}{4}$ | 2 | 4 $\frac{1}{4}$ | 2 | 4 | 1 | 1 × 1 | 7 $\frac{1}{2}$ | 13.8 |
| 8 | 2 | 3 | 2 | 3 $\frac{1}{2}$ | 2 | 3 $\frac{1}{4}$ | 1 | 0 $\frac{1}{2}$ × 1 | 6 $\frac{3}{4}$ | 13.1 |
| 7 | 2 | 1 $\frac{3}{4}$ | 2 | 2 $\frac{1}{2}$ | 2 | 2 | 1 | 0 × 1 | 6 | 12.7 |
| 6 | 2 | 0 $\frac{1}{2}$ | 2 | 1 | 2 | 1 | 0 | 11 $\frac{1}{4}$ × 1 | 5 | 11.9 |
| 5 | 1 | 10 $\frac{3}{4}$ | 1 | 11 $\frac{1}{2}$ | 1 | 11 $\frac{1}{4}$ | 0 | 10 $\frac{1}{2}$ × 1 | 3 $\frac{3}{4}$ | 11.0 |
| 4 | 1 | 8 $\frac{3}{4}$ | 1 | 9 $\frac{1}{2}$ | 1 | 9 $\frac{1}{4}$ | 0 | 9 $\frac{3}{4}$ × 1 | 2 $\frac{1}{2}$ | 10.2 |
| 3 | 1 | 6 | 1 | 6 $\frac{1}{4}$ | 1 | 6 $\frac{1}{4}$ | 0 | 8 × 1 | 0 | 8.5 |

| Setting of lens on focusing scale | * Distance of subject with Proxar II at | | | | | | Permissible size of subject | Resulting scale of reduction I: | | |
|-----------------------------------|---|-----------------|-----|-----------------|-----|-----------------|-----------------------------|---------------------------------|------------------|-----|
| | f4 | | f8 | | f16 | | | | | |
| ft. | ft. | in. | ft. | in. | ft. | in. | ft. | in. | | |
| ∞ | 1 | 7 $\frac{1}{4}$ | 1 | 8 | 1 | 8 | 0 | 9 $\frac{1}{4}$ × 1 | 2 | 9.8 |
| 100 | 1 | 7 | 1 | 7 $\frac{3}{4}$ | 1 | 7 $\frac{3}{4}$ | 0 | 9 $\frac{1}{2}$ × 1 | 2 | 9.6 |
| 60 | 1 | 6 $\frac{3}{4}$ | 1 | 7 $\frac{1}{2}$ | 1 | 7 $\frac{1}{2}$ | 0 | 9 × 1 | 1 $\frac{1}{2}$ | 9.8 |
| 50 | 1 | 6 $\frac{1}{2}$ | 1 | 7 $\frac{1}{2}$ | 1 | 7 $\frac{1}{2}$ | 0 | 9 × 1 | 1 $\frac{1}{2}$ | 9.6 |
| 30 | 1 | 6 $\frac{1}{4}$ | 1 | 7 | 1 | 7 | 0 | 8 $\frac{3}{4}$ × 1 | 1 $\frac{1}{4}$ | 9.4 |
| 20 | 1 | 5 $\frac{3}{4}$ | 1 | 6 $\frac{1}{2}$ | 1 | 6 $\frac{1}{2}$ | 0 | 8 $\frac{1}{2}$ × 1 | 0 $\frac{3}{4}$ | 9.0 |
| 15 | 1 | 5 $\frac{1}{4}$ | 1 | 6 | 1 | 5 $\frac{3}{4}$ | 0 | 8 $\frac{1}{4}$ × 1 | 0 $\frac{1}{4}$ | 8.8 |
| 12 | 1 | 5 | 1 | 5 $\frac{1}{2}$ | 1 | 5 $\frac{1}{4}$ | 0 | 8 × 1 | 0 | 8.5 |
| 10 | 1 | 4 $\frac{1}{2}$ | 1 | 5 | 1 | 4 $\frac{3}{4}$ | 0 | 8 × 1 | 0 | 8.3 |
| 9 | 1 | 4 $\frac{1}{4}$ | 1 | 4 $\frac{3}{4}$ | 1 | 4 $\frac{1}{2}$ | 0 | 7 $\frac{3}{4}$ × 0 | 11 $\frac{1}{2}$ | 8.1 |
| 8 | 1 | 4 | 1 | 4 $\frac{1}{2}$ | 1 | 4 $\frac{1}{4}$ | 0 | 7 $\frac{1}{2}$ × 0 | 11 $\frac{1}{4}$ | 7.9 |
| 7 | 1 | 3 $\frac{3}{4}$ | 1 | 4 | 1 | 4 | 0 | 7 $\frac{1}{4}$ × 0 | 11 | 7.7 |
| 6 | 1 | 3 | 1 | 3 $\frac{1}{2}$ | 1 | 3 $\frac{1}{2}$ | 0 | 7 × 0 | 10 $\frac{1}{2}$ | 7.3 |
| 5 | 1 | 2 $\frac{1}{2}$ | 1 | 3 | 1 | 2 $\frac{3}{4}$ | 0 | 6 $\frac{3}{4}$ × 0 | 10 | 7.1 |
| 4 | 1 | 1 $\frac{1}{2}$ | 1 | 1 | 1 | 1 $\frac{3}{4}$ | 0 | 6 × 0 | 9 | 6.5 |
| 3 | 1 | 0 $\frac{1}{2}$ | 1 | 0 $\frac{3}{4}$ | 1 | 0 $\frac{1}{2}$ | 0 | 5 $\frac{1}{2}$ × 0 | 8 $\frac{1}{4}$ | 5.8 |

* Distance between front of supplementary lens and subject.

CLOSE FOCUSING TABLE FOR USE WITH PROXAR LENSES

3. FOR TESSAR f 3.5 and f 2.8 5 cm.

| Setting of lens on focusing scale | * Distance of subject with Proxar I at | | | | | | Permissible size of subject | Resulting scale of reduction I: | |
|-----------------------------------|--|-----------------|-----|-----------------|------|----------------|-----------------------------|---------------------------------|------|
| | f 4 | | f 8 | | f 16 | | | | |
| | ft. | in. | ft. | in. | ft. | in. | | | |
| ∞ | 3 | 1 | 3 | $3\frac{3}{4}$ | 3 | 5 | 1 7 × 2 | $4\frac{1}{2}$ | 20.0 |
| 100 | 3 | 0 | 3 | $2\frac{1}{2}$ | 3 | $3\frac{1}{4}$ | 1 $6\frac{1}{4}$ × 2 | $3\frac{1}{2}$ | 19.4 |
| 60 | 2 | $1\frac{1}{4}$ | 3 | $1\frac{1}{2}$ | 3 | $2\frac{3}{4}$ | 1 $5\frac{3}{4}$ × 2 | $2\frac{1}{2}$ | 18.8 |
| 50 | 2 | 11 | 3 | 1 | 3 | 2 | 1 $5\frac{1}{2}$ × 2 | 2 | 18.5 |
| 30 | 2 | $9\frac{3}{4}$ | 2 | $1\frac{1}{2}$ | 3 | $0\frac{3}{4}$ | 1 5 × 2 | $1\frac{1}{2}$ | 17.9 |
| 20 | 2 | $8\frac{1}{4}$ | 2 | 10 | 2 | 11 | 1 $4\frac{1}{4}$ × 2 | $0\frac{1}{4}$ | 17.1 |
| 15 | 2 | 7 | 2 | $8\frac{1}{2}$ | 2 | $9\frac{1}{2}$ | 1 $3\frac{1}{2}$ × 1 | 11 | 16.3 |
| 12 | 2 | $5\frac{1}{2}$ | 2 | 7 | 2 | 8 | 1 $2\frac{1}{2}$ × 1 | $9\frac{3}{4}$ | 15.4 |
| 10 | 2 | $4\frac{1}{2}$ | 2 | $5\frac{3}{4}$ | 2 | $6\frac{1}{2}$ | 1 2 × 1 | 9 | 14.8 |
| 9 | 2 | $3\frac{3}{4}$ | 2 | $4\frac{1}{2}$ | 2 | $5\frac{3}{4}$ | 1 $1\frac{1}{2}$ × 1 | $8\frac{1}{4}$ | 14.2 |
| 8 | 2 | $2\frac{3}{4}$ | 2 | $3\frac{3}{4}$ | 2 | $4\frac{3}{4}$ | 1 1 × 1 | $7\frac{1}{2}$ | 13.8 |
| 7 | 2 | $1\frac{3}{4}$ | 2 | $2\frac{3}{4}$ | 2 | $3\frac{1}{2}$ | 1 $0\frac{1}{2}$ × 1 | $6\frac{3}{4}$ | 13.1 |
| 6 | 2 | $0\frac{1}{2}$ | 2 | $1\frac{1}{4}$ | 2 | 2 | 0 $11\frac{3}{4}$ × 1 | $5\frac{3}{4}$ | 12.5 |
| 5 | 1 | $10\frac{3}{4}$ | 1 | $11\frac{1}{2}$ | 2 | $0\frac{1}{4}$ | 0 $10\frac{3}{4}$ × 1 | $4\frac{1}{4}$ | 11.5 |
| 4 | 1 | $8\frac{1}{2}$ | 1 | 9 | 1 | $9\frac{3}{4}$ | 0 $9\frac{3}{4}$ × 1 | $2\frac{1}{2}$ | 10.2 |
| 3 | 1 | 6 | 1 | $6\frac{1}{4}$ | 1 | $6\frac{1}{2}$ | 0 $8\frac{1}{4}$ × 1 | $0\frac{1}{2}$ | 8.8 |

| Setting of lens on focusing scale | * Distance of subject with Proxar II at | | | | | | Permissible size of subject | Resulting scale of reduction I: | |
|-----------------------------------|---|----------------|-----|----------------|------|----------------|-----------------------------|---------------------------------|------|
| | f 4 | | f 8 | | f 16 | | | | |
| | ft. | in. | ft. | in. | ft. | in. | | | |
| ∞ | 1 | $7\frac{1}{4}$ | 1 | 8 | 1 | $8\frac{1}{4}$ | 0 $9\frac{1}{2}$ × 1 | $2\frac{1}{4}$ | 10.0 |
| 100 | 1 | 7 | 1 | $7\frac{1}{2}$ | 1 | $7\frac{3}{4}$ | 0 $9\frac{1}{4}$ × 1 | 2 | 9.8 |
| 60 | 1 | $6\frac{3}{4}$ | 1 | $7\frac{1}{4}$ | 1 | $7\frac{1}{2}$ | 0 $9\frac{1}{4}$ × 1 | 2 | 9.8 |
| 50 | 1 | $6\frac{3}{4}$ | 1 | $7\frac{1}{4}$ | 1 | $7\frac{1}{2}$ | 0 9 × 1 | $1\frac{1}{2}$ | 9.6 |
| 30 | 1 | $6\frac{1}{4}$ | 1 | 7 | 1 | $7\frac{1}{4}$ | 0 9 × 1 | $1\frac{1}{2}$ | 9.4 |
| 20 | 1 | $5\frac{3}{4}$ | 1 | $6\frac{1}{4}$ | 1 | $6\frac{3}{4}$ | 0 $8\frac{3}{4}$ × 1 | 1 | 9.2 |
| 15 | 1 | $5\frac{1}{4}$ | 1 | $5\frac{3}{4}$ | 1 | $6\frac{1}{4}$ | 0 $8\frac{1}{4}$ × 1 | $0\frac{1}{4}$ | 8.8 |
| 12 | 1 | 5 | 1 | $5\frac{1}{4}$ | 1 | $5\frac{3}{4}$ | 0 8 × 1 | 0 | 8.5 |
| 10 | 1 | $4\frac{1}{2}$ | 1 | 5 | 1 | $5\frac{1}{4}$ | 0 8 × 1 | 0 | 8.5 |
| 9 | 1 | $4\frac{1}{4}$ | 1 | $4\frac{3}{4}$ | 1 | 5 | 0 8 × 1 | 0 | 8.3 |
| 8 | 1 | 4 | 1 | $4\frac{1}{2}$ | 1 | $4\frac{1}{2}$ | 0 $7\frac{3}{4}$ × 0 | $11\frac{1}{2}$ | 8.1 |
| 7 | 1 | $3\frac{3}{4}$ | 1 | 4 | 1 | 4 | 0 $7\frac{1}{2}$ × 0 | $11\frac{1}{4}$ | 7.9 |
| 6 | 1 | $3\frac{1}{4}$ | 1 | $3\frac{1}{2}$ | 1 | $3\frac{3}{4}$ | 0 $7\frac{1}{4}$ × 0 | 11 | 7.7 |
| 5 | 1 | $2\frac{3}{4}$ | 1 | $2\frac{3}{4}$ | 1 | $3\frac{1}{2}$ | 0 7 × 0 | $10\frac{1}{2}$ | 7.3 |
| 4 | 1 | $1\frac{3}{4}$ | 1 | $1\frac{3}{4}$ | 1 | $2\frac{1}{4}$ | 0 6 × 0 | 9 | 6.5 |
| 3 | 1 | $0\frac{1}{4}$ | 1 | $0\frac{1}{2}$ | 1 | 1 | 0 $5\frac{3}{4}$ × 0 | $8\frac{1}{2}$ | 6.0 |

* Distance between front of supplementary lens and subject.

The Proxars may be used with apertures of $f4$ or smaller for ordinary photographs, but owing to the very small depth of focus it is advisable to stop down to $f8$. 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 ft. distance with the 5 cm. lens without Proxar.

Close-up lenses may conveniently be used in conjunction with focusing screen and plate adapter (see p. 103).

Copying Stand 1 : 4 to 1 : 1

This apparatus is designed for making copies of flat originals and photographs of small objects in original size or slightly reduced. It consists of a U-shaped base and an extensible column with setting notches for semi-automatic focusing for these degrees of reduction—1 : 4, 1 : 3, 1 : 2, 1 : 1.5, 1 : 1—three intermediate rings with bayonet mounts on either side to adapt to the camera and to hold the lens, four interchangeable metal masks fitting into the base, indicating the camera field at the various degrees of reduction. See drawing page 104.

The size of object: greatest dimensions at scale of 1 : 1 is $1 \times 1\frac{1}{2}$ in. (24×36 mm.); 1 : 1.5 about $1\frac{1}{2} \times 2\frac{1}{2}$ in. (36×54 mm.); 1 : 2 about $1\frac{7}{8} \times 2\frac{7}{8}$ in. (48×72 mm.); 1 : 3 about $2\frac{7}{8} \times 4\frac{1}{4}$ in. (72×108 mm.); 1 : 4 about $4 \times 6\frac{1}{4}$ in. (102×155 mm.).

DEPTH OF FOCUS WITH THE COPYING STAND

| | $f5.6$ | $f8$ | $f11$ | $f16$ | Exposure required compared with ∞ setting |
|---------------|---------|---------|---------|----------|--|
| Scale 1 : 4 | 8 mm. | 14 mm. | 18 mm. | 27 mm. | 1.25 \times |
| Scale 1 : 3 | 4 mm. | 7 mm. | 9 mm. | 13.5 mm. | 1.75 \times |
| Scale 1 : 2 | 2 mm. | 3.2 mm. | 4.5 mm. | 6.5 mm. | 2.3 \times |
| Scale 1 : 1.5 | 1.8 mm. | 2.1 mm. | 2.9 mm. | 4 mm. | 2.8 \times |
| Scale 1 : 1 | 0.7 mm. | 1 mm. | 1.6 mm. | 2.1 mm. | 4 \times |

LARGE COPYING DEVICE. A large copying device has been made for the Contax, giving the widest possible scope in near distance work. A description has been omitted as very few of these devices are on the market and sufficiently detailed instructions would take up a considerable number of pages.

Close Work with Normal Lenses

While on the previous pages exact data are given relating to close-up work with special devices, it might be of interest to know the size of object covered by the standard 5 cm. lenses set at various distances and the scale of reduction resulting, which are given in the table below:

| Distance in feet | Size of Object | Scale of Reduction |
|------------------|--|--------------------|
| 3 | 1 ft. 10 in. × 1 ft. 2 $\frac{3}{4}$ in. | 15.6 |
| 4 | 2 ft. 6 $\frac{1}{2}$ in. × 1 ft. 8 $\frac{1}{2}$ in. | 21.4 |
| 5 | 3 ft. 2 $\frac{3}{4}$ in. × 2 ft. 1 $\frac{3}{4}$ in. | 27.3 |
| 6 | 3 ft. 10 $\frac{3}{4}$ in. × 2 ft. 7 $\frac{1}{4}$ in. | 33 |
| 7 | 4 ft. 7 $\frac{1}{4}$ in. × 3 ft. 0 $\frac{3}{4}$ in. | 39 |
| 8 | 5 ft. 3 $\frac{3}{4}$ in. × 3 ft. 6 $\frac{1}{2}$ in. | 45 |
| 9 | 6 ft. 0 $\frac{1}{4}$ in. × 4 ft. 0 $\frac{1}{2}$ in. | 51 |
| 10 | 6 ft. 8 $\frac{3}{4}$ in. × 4 ft. 5 $\frac{3}{4}$ in. | 57 |
| 12 | 8 ft. 0 $\frac{1}{2}$ in. × 5 ft. 4 $\frac{1}{4}$ in. | 68 |
| 15 | 10 ft. 2 in. × 6 ft. 9 $\frac{1}{4}$ in. | 86 |
| 20 | 13 ft. 7 in. × 9 ft. 0 $\frac{3}{4}$ in. | 115 |
| 30 | 20 ft. 7 in. × 13 ft. 8 $\frac{1}{2}$ in. | 174 |
| 50 | 34 ft. 4 in. × 22 ft. 11 in. | 291 |
| 100 | 69 ft. × 46 ft. | 584 |

The Copy Can Show More than the Eye Sees

When copying hand-writing, MSS. yellow with age, faded, etc., contrast can be improved by using filters with *pan-chromatic material*.

FILTERS TO SEPARATE COLOURS

| The colour which should appear light (= Background) | The colour which should appear dark (= Printing) | Filter to be used |
|--|---|-------------------|
| White | Blue | Yellow/orange |
| | Green | Red |
| | Yellow | Blue |
| | Red | Green |
| Yellow | Blue | Yellow/orange |
| | Green | Red |
| | Red | Green |
| Red | Blue or Green | Red |
| | | Red |
| Green | Red or Blue | Green |
| | | Yellow |
| Blue | Red or Yellow | Blue |
| | | Blue |

CONTAX ACCESSORIES

One of the outstanding features of the Contax and Contax photography is the fact that a wide range of accessories especially designed for this camera make it suitable for practically every branch of photography: aerial and far distance photography, close-up work, photo-micrography, copying, clinical, surgical and X-ray photography, stereoscopy, panorama-shots, photographing records (micro-copying), besides all normal applications. There are Contax accessories too numerous to mention; we have confined ourselves to those of relatively general interest.

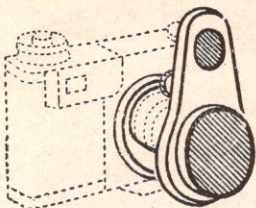
THE FOCUSING ADAPTER. This device, consisting of a metal tube carrying at one end a ground-glass screen, and at the other a bayonet mount for the lens, allows one to focus long-focus lenses in conjunction with the lens holder (see p. 104). For copying, this adapter is fixed to the copying stand. The distance from the mount to the ground-glass screen is exactly the same as the distance from the lens mount to the film in the camera. When fixing the focusing adapter to the lens the field covered and definition can be observed and adjusted on the ground-glass screen. For critical focusing and to eliminate side light a magnifier glass in a metal tube may be pushed over the back of the adapter.

PLATE BACK ADAPTER. This device has been designed for single exposures on plates or cut films and allows ground-glass screen observation, such as might be necessary for special technical or scientific purposes when special types of negative material are employed or single exposures only are made, etc. It consists of a duplicate camera back, interchangeable for the normal one, but carrying in the centre an adapter for a metal dark slide (p. 104). The plate size is 3×4.5 cm. ($1\frac{1}{2} \times 1\frac{1}{4}$ in.), but giving the normal image size of $1\frac{1}{2} \times 1$ in. (36×24 mm.). The dark slide is slipped sideways into the slide-holding mechanism, and when after closing the back of the adapter the dark slide cover is withdrawn the slide-holding mechanism pushes the plate forward into the exact position normally occupied by the film in the camera. Two models of the plate adapter are supplied, one for Contax I, a second one for Contax II and III.

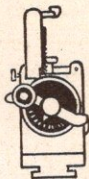
The focusing is arranged either in the usual way by means of the range-finder or with the

GROUND-GLASS SCREEN. It consists of a fine grain focusing screen in a metal frame—on one side two holders for convenient handling, on the other side four short legs with balls to fit snugly into the film-aperture (p. 104). In order to insert the ground-glass screen, set shutter to "B", release; while release-knob remains pressed down, insert

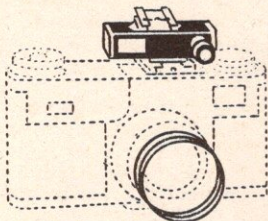
Contax Accessories



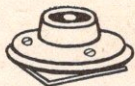
Polarizing—Viewing Device
(p. 90).



Delayed Action
Release (p. 105).



Contameter (p. 96).



Spirit Level (p. 105).

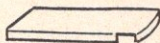
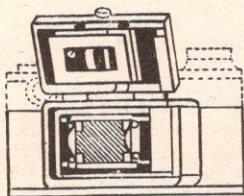
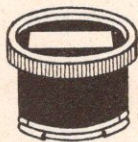
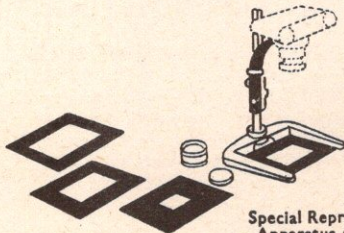


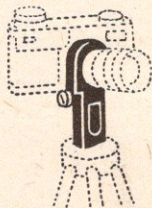
Plate back Adapter
with Slide (p. 103).



Focusing Screen Adapter
(p. 103).



Special Reproduction
Apparatus (p. 101).



Lens Holder.
(p. 14).

ground-glass screen and let release go. When removing screen, the shutter will close automatically.

In order to use the Contax on a tripod when working with removed back—e.g. inserting ground-glass screen, etc.—a special ball-and-socket head with a fitting to slip into the finder shoe may be employed. The camera is then worked upside down.

SPECTACLE LENS HOLDERS. For wearers of spectacles who find the presence of their glasses troublesome when looking through range and view-finder, special correcting glasses to screw into the combined finder eye-piece of Contax II and III or a pair (for the separate view and range-finder) for Contax I may be obtained.

DELAYED ACTION RELEASE. While Contax II and III are provided with a built-in delayed action release (see p. 9) a separate delayed action release for Contax I, to fit into the shoe on top of the camera, may be had. It gives automatic time exposures up to 10 seconds as well as all speeds within the range of shutter speeds.

SPIRIT LEVEL. A spirit level used to assure that the camera is in a horizontal position can be slipped into the finder shoe of the Contax.

FLASHLIGHT PHOTOGRAPHY WITH THE CONTAX. 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 Contax on a tripod, set distance shutter to "B" 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 snapshots indoors. Considerably more exactly adapted to the camera are "flash-guns", such as "Kalart", "Burvin", etc., which can be synchronized to the Contax shutter so exactly that exposure times as short as 1/250, 1/500 and even 1/1250 may be taken out of the whole flash, when it is at its peak, thus enabling even the quickest movements to be photographed.

CAMERAS OF THE CONTAX FAMILY

THE SUPER-NETTEL

SIMILARITIES TO THE CONTAX: 36 exposures on 35 mm. Ciné-film. Automatic film-transport. Focal-plane shutter, metal blinds. Removable back. Coupled range-finder.

DIFFERENCES FROM THE CONTAX. Non-interchangeable lens. Two separate eye-pieces for view- and range-finder. Camera-lens held in position by lazy-tongs unit and connected with the body by bellows.

THE BODY is die cast, leather covered, the metal parts being either enamelled black or chromium plated. The front of the camera is covered when the instrument is closed by the hinged base-board, giving the lens additional protection. The lens-carrier is attached to the hinged base-board and bellows forming the connection between lens and body. The lens is held in position by a strong lazy-tongs unit. The back of the body is detachable and all controls—winding knob for shutter and film, rewinding knob and finder shoe—are grouped on the top of the instrument. The centre of the body base carries the tripod bush.

THE LENS fitted is either the *Triotar* f 3.5 5 cm. (2 in.) or the *Tessar* f 3.5 5 cm. (2 in.) or the *Tessar* f 2.8 5 cm. (2 in.). Filters, supplementary lenses and lens hood are screwed into a thread on the mount of the front lens (25.5 mm.).

THE VIEW-FINDER is an inverted Galilean telescope and reduces the image seen to approximately half actual size.

FOCUSING is worked automatically by the coupled wedge-type range-finder. The wedges are situated over the lens carrier. The base of the range-finder is relatively short, which is no disadvantage, since lenses of extremely large apertures and long focal length are not used.

DEPTH-OF-FOCUS scale for every position of the lens is engraved round the mount of the distance meter wedges.

THE SHUTTER is a metal blind focal plane, giving exposures of 1/5, 1/10, 1/25, 1/50, 1/100, 1/200, 1/500, 1/1000th, and time.

THE RELEASE is in the centre of the film-winding knob.

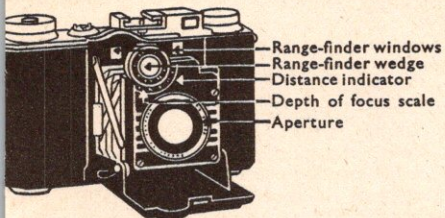
THE FILM is automatically wound on to the next picture when the shutter is set. Negative material same as for Contax.

NUMBER OF EXPOSURES made on the film is recorded on a counter on the top plate of the camera-body.

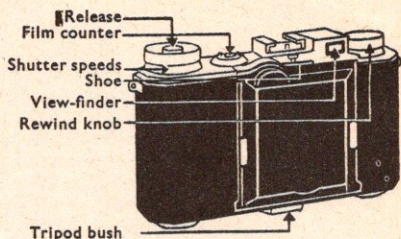
ACCESSORIES AND ATTACHMENTS. Supplementary lenses for close-ups similar to those of the Contax. Special Contameter to fit Super-Nettel camera. Same filters as for Contax. Any of the 5 cm. finders as supplied for Contax I or II may be used, also Albada finder, Waist-level finder, Prism Brilliant finder. Spectacle lens holder. Lens hood; besides the screw-in type a special rigid lens hood with rectangular aperture to fit on the camera front bayonet.

TABLES. All tables relating to 5 cm. (2 in.) focal length apply to the Super-Nettel.

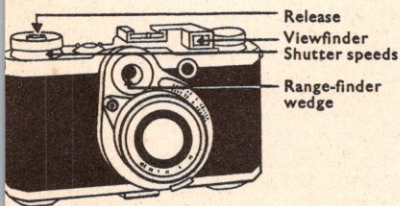
Cameras of the Contax Type.



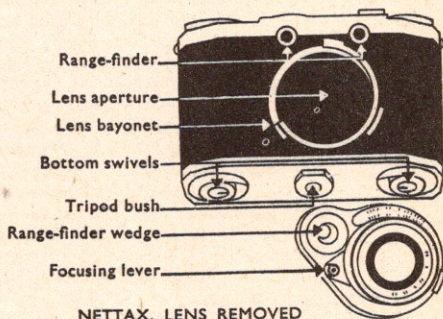
SUPER NETTEL, OPEN



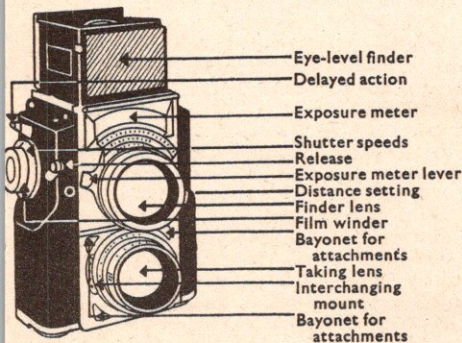
AND CLOSED



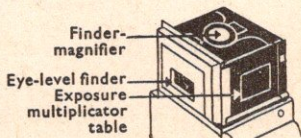
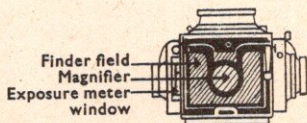
NETTAX



NETTAX, LENS REMOVED



CONTAFLEX



REFLEX-FINDER OF CONTAFLEX

THE NETTAX differs from the *Super-Nettel* in that it has interchangeable lenses and a rigid construction without bellows.

SIMILARITIES TO THE CONTAX: 36 exposures on 35 mm. Ciné-film. Automatic film-transport. Focal plane shutter, metal blinds. Removable back. Focusing by coupled range-finder. Interchangeable lenses. Rigid construction without bellows.

DIFFERENCES FROM THE CONTAX. View- and range-finder with two separate eye-pieces. Limited number of auxiliary lenses.

THE BODY of die-cast aluminium has chromium-plated metal parts, as with the *Super-Nettel*, but without bellows and base-board. The lens, as in the case of the Contax, is attached to the body by a bayonet.

LENSES. Tessar f 3.5 5 cm. (2 in.) or f 2.8 5 cm. (2 in.) is the standard outfit of the Nettax; Triotar f 5.6 10.5 cm. ($4\frac{1}{8}$ in.), as longer focal length and a wide angle Tessar f 8 2.8 cm. ($1\frac{1}{4}$ in.) may be used.

RANGE-FINDER. On the separate base and wedge system. The rotating wedge system is attached to the focusing mount of the Nettax lenses.

DEPTH-OF-FOCUS calculator engraved on the lens mount.

VIEW-FINDER, SHUTTER, shutter release, exposure counter, negative material, etc., are similar to those on the *Super-Nettel*.

ACCESSORIES AND ATTACHMENTS. Supplementary lenses for close-ups. Special Contameter to fit Nettax. Filters same as Contax. Finders: any of the 5 cm. finders as supplied for the Contax may be used, also the Albada, the Waist-level and Brilliant Prism finder for the 10.5 cm. Triotar, with rigid Albada finder for both the 5 and 10.5 cm. lenses, and for the 2.8 wide angle the tubular 2.8 wide angle finder. Spectacle lens holder. 27 mm. slip-on lens hood or 25.5 screw-in lens hood or filters. 42 mm. lens hood or filters for the long focal length are available.

TABLES. All 5 cm., 2.8 cm. and 10.5 cm. focal length tables apply.

THE CONTAFLEX is designed on the well-known twin-lens plan. It is, in fact, the Contax suitably modified, with a second camera built on top of it, which has a lens of longer focal length (f 2.8, 8.5 cm.) giving an image for focusing of twice the area of the negative. The focusing screen is a plano-convex lens matted on the under side, parallax error is automatically corrected (but only for 5 cm. lenses) by a mask.

EXPOSURE METER is built into the body of the camera, and it works on the same principles as that of the Contax III.

THE FINDER HOOD is at the same time designed as an Albada finder for eye-level photographs. A delayed action release is built in. The other technical points are similar to those of the Contax cameras.

LENSES from 3.5 cm. ($1\frac{3}{8}$ in.) to 13.5 cm. ($5\frac{3}{8}$ in.) as use in the Contax cameras are available in a special Contaflex mount.

ACCESSORIES AND ATTACHMENTS. Supplementary lenses, Contameter, full range of filters (42 mm. diameter), wide-angle, waist-level finder, 42 mm. lens-hood as well as rigid lens-hood with rectangular aperture to fit on the bayonet of the camera body are available.

TABLES. All tables for Contax relate similarly to Contaflex.

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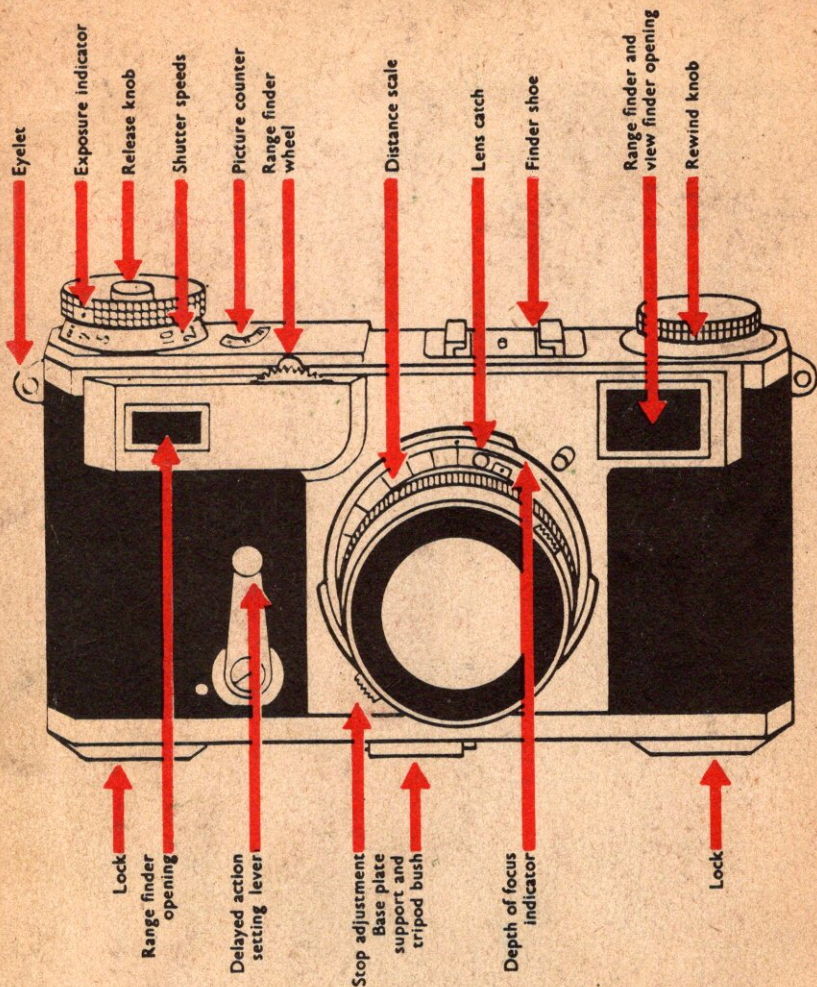
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