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ROLLEIFLEX GUIDE

ROLLEIFLEX ORIGINAL
ROLLEIFLEX BABY
ROLLEIFLEX SPORTS
ROLLEIFLEX STANDARD
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ROLLEIFLEX AUTOMATS
ROLLEIFLEX 2.8 - 2.8C - 2.8D
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THE ROLLEIFLEX: MODEL BY MODEL

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1967 Edition

Printed 1967 in Great Britain by Staples Printers Limited, Rochester, Kent

THE ROLLEIFLEX CAMERA

The Rolleiflex is the original rollfilm, twin-lens reflex camera design, from which virtually all other cameras of this type are derived. It takes 12 exposures $2\frac{1}{4} \times 2\frac{1}{4}$ in. (6×6 cm.) on standard 120 rollfilm or 24 exposures on 220 film with specially adapted models. A "baby Rolleiflex 4×4 cm. for 12 exposures on 127 rollfilm is also available.

Two lenses—matched for focal length—are mounted one above the other on a common panel. The upper lens projects an image of the subject via a mirror to a focusing screen in the top of the camera, while the lower one projects a similar image on to the film. The focusing screen image, therefore, shows at all times the full size picture—upright but reversed left to right—as it will appear on the film. To compensate for any parallax between the viewing and taking lens a mask is built into the viewing camera below the focusing screen.

The focusing screen on top of the camera is protected in the closed position by the folded-down finder hood. When opened, this forms a light excluding hood $2\frac{1}{2}$ in. high; it carries a magnifier for critical focusing. A frame finder for eye-level direct vision use is built into the hood.

The hood on current models is removable and can be replaced by a pentaprism, which permits eye-level focusing, showing the image upright and right-way-round.

The finder lens in all models is faster than the taking lens and cannot be stopped down. This ensures a bright focusing screen image and, having rather less depth of field than the taking lens, allows for very critical focusing.

The interior of the camera body is fitted with light baffles which effectively avoid scatter of light and enhance the brilliance of the picture.

The Rolleiflex is focused by a large focusing knob on the side of the camera. This is geared to the front panel and smoothly and simultaneously controls both lenses. A depth of field indicator is incorporated.

Current models are available with a built-in photo-electric

exposure meter which in most cases is coupled to the aperture setting.

A film type indicator is built into the film transport knob.

Film transport is effected by a crank situated on the side of the camera. It locks when the correct amount of film has been wound on to bring each new frame of film into position. A counter registers the number of exposures made.

A tripod bush is located in the centre of the camera base.

The back of the camera hinges open for the insertion and removal of films and can also be removed. It carries a substantial spring-loaded pressure plate.

Transporting the film automatically tensions the shutter. The shutter is released by a body release knob on the front of the camera. When not in use, it can be locked to prevent accidental release. The shutter cannot be released until the film has been wound on, thus preventing double exposures. To avoid blank frames, the film cannot be wound on until the previous frame has been exposed.

The shutter on most current models is a Synchro-Compur with speeds from 1 sec. to 1/500 sec. as well as B. It has built-in delayed action and is flash synchronised.

Both the taking and finder lenses together with the shutter are enclosed in a dustproof casing, which has peep windows at the top showing shutter speeds and apertures.

A wide range of accessories is available for the Rolleiflex.

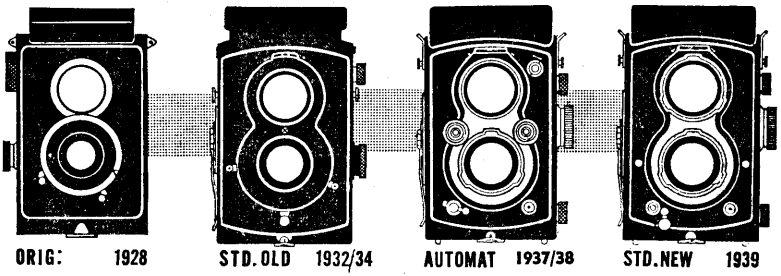
Both finder and taking lens carry bayonet rings for fitting filters, close-up lenses and similar attachments.

The Rolleiflex is about $5\frac{1}{2}$ in. high, $3\frac{3}{4}$ in. wide and $3\frac{3}{4}$ in. deep. Its weight is about $34\frac{1}{2}$ ozs. The body is an aluminium alloy casting.

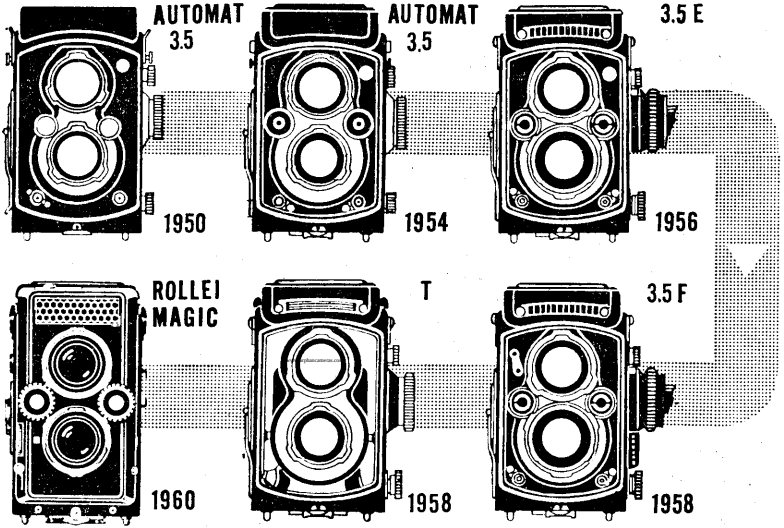
The Rollei Magic models have a few different features which are detailed in the green pages.

Rolleiflex Evolution

The original Rolleiflex was introduced in 1928. It took six exposures $2\frac{1}{4} \times 2\frac{1}{4}$ in. on 117 film, which is now discontinued. It can be converted to take 12 exposures $2\frac{1}{4} \times 2\frac{1}{4}$ in. on size 620 film. A film transport knob advances the film, exposures are counted in a red window. It is fitted with a 70 mm. Tessar *f* 4.5 lens in a Compur shutter (1 to 1/300 sec.



The first Rolleiflex of 1928 started the basic system of the twin-lens rollfilm reflex. The standard model of 1932 to 1934 already incorporated the transport crank and lenses mounted on a common panel, while the Automat from 1937 onwards had aperture and speed setting wheels and automatic loading features. The Standard New of 1939 is a simpler version of the Automat of that time.



The post-war Automat 3.5 models featured a redesigned finder hood and flash synchronised shutters. From 1954 onwards exposure value shutters were built in, and—since 1956—exposure meters. On the model 3.5F of 1958 the meter is coupled with the aperture and speed setting. In the same year a simpler model T appeared, while the Rollei Magic of 1960 has the exposure meter coupled with a fully programmed shutter for automatic control.

B, T). The finder hood has a built-in mirror for eye-level reflex focusing. Parallax is compensated by reduction of the reflex picture. The taking lens mount diameter, 24 mm. In 1929 the same camera, but with a 75 mm. Tessar *f* 3.8 was marketed; the finder lens aperture is *f* 3.1.

Rolleiflex Standard of 1932 has a 75 mm. Tessar *f* 4.5 or *f* 3.8 lens in Compur shutter (1 to 1/300 sec., B and T). The lens mount diameter is 28.5 mm. Finder lens aperture is *f* 3.1. Finder hood has a frame finder. Parallax is compensated by reduction of the reflex picture. Takes 12 exposures on 120 or 20 film. Film transport by lever crank. First exposure set by red window, thereafter by automatic counter. In 1934, the same model appeared with a 75 mm. Tessar *f* 3.5 and Compur Rapid shutter to 1/500 sec. B and T.

The Rolleiflex Automat 1937 has a 75 mm. Tessar *f* 3.5 in Compur Rapid shutter (1 to 1/500 sec., B, but not T) with built-in delayed action release. The taking-lens has bayonet mount to accept bayonet mounted attachments. The *f* 2.8 finder lens has push-on mount (later also fitted with bayonet mount). Finder hood contains mirror for eye-level reflex focusing, also automatic parallax compensation. Film transport is by a lever crank, coupled with the shutter setting. This makes double exposures impossible. Film feed is automatic, there is no red window.

The Rolleiflex Standard New of 1939 has a 75 mm. Tessar *f* 3.5 in Compur Rapid shutter (1 to 1/500 sec., and B), but no delayed action release. It has a window for setting the first exposure, the automatic film counter then takes over. Film transport is coupled with shutter setting. Finder lens (also with bayonet mount like the taking lens) is *f* 3.1.

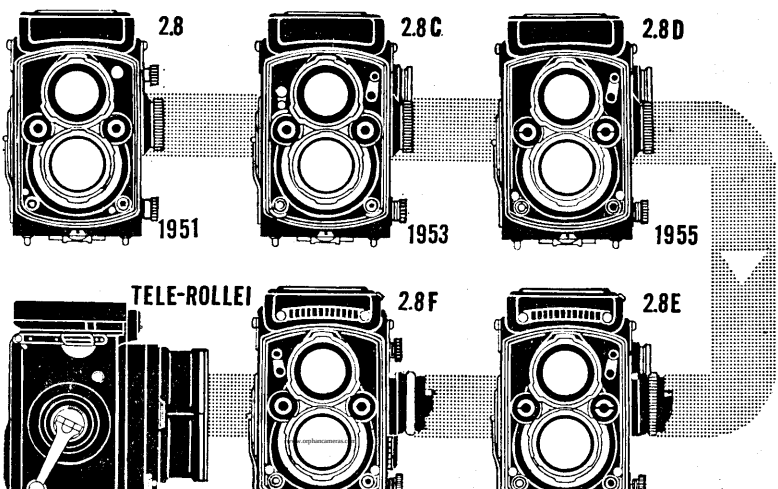
The Rolleiflex Automat of 1945 has a 75 mm. Tessar or Xenar *f* 3.5 and bayonet mounts on both lenses; other features are the same as on the 1937 model.

The 1950 model has a coated 75 mm. Tessar or Xenar lens in a Compur Rapid shutter (1 to 1/500 sec., B), and built-in flash contact. The redesigned finder hood has both an eye-level reflex finder mirror and direct vision frame finder. In the same year, a second model of the same camera appeared with an 80 mm. Tessar *f* 2.8 and a larger Compur shutter with a top speed of 1/400 sec.

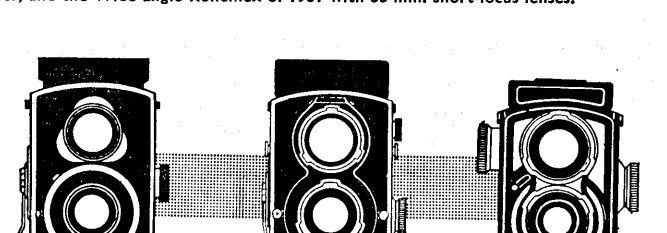
In 1951 both the *f* 3.5 and the *f* 2.8 lens models appeared with a Synchro-Compur shutter with MX-synchronisation, and a time exposure lock.

Th Rolleiflex 2.8C of 1953 with 80 mm. Xenotar or Planar *f* 2.8 lens incorporates various improvements over the 1951 model: internal baffles to eliminate stray light, an extra large focusing knob with built-in film indicator, an adjustable focusing magnifier, self-locking shutter speed and aperture settings, and a fitted counter knob for the Rolleikin accessories. The coupling of film transport and shutter setting can be disconnected to permit intentional double exposures.

The Rolleiflex Automat 3.5 of 1954 has a Synchro-Compur shutter with exposure value scale, internal baffles and a larger focusing knob



Special models with an f 2.8 lens appeared from 1951 onwards. These became progressively more elaborate and in 1956 appeared with built-in exposure meter which was coupled in the 2.8 F of 1960. Two special models also belong logically to this series; the Tele-Rolleiflex of 1959 with 135 mm. long focus lenses, and the Wide-angle Rolleiflex of 1961 with 55 mm. short-focus lenses.



In addition to the 2¼ × 2¼ in. Rolleiflex models small-size Rolleiflexes also were made from time to time. The first of these, the Baby Rolleiflex of 1931 and the Sports Rolleiflex from 1933 onwards were scaled-down versions of the current standard models. The Rolleiflex 4 × 4 of 1957 is in many respects a counterpart of the larger model T, but has a transport knob instead of a winding crank.

with built-in film indicator. Models since 1955 have an improved aperture-speed coupling system with a coupling release button.

The Rolleiflex 2.8D of 1955 has a Synchro-Compur shutter with exposure value scale. The XM synchronising lever is combined with the self-timer setting lever. A coupling release button on the aperture wheel disengages the aperture-speed coupling for independent settings when required.

The Rolleiflex 2.8E of 1956 is similar to the 2.8D model but has built-in photo-electric exposure meter and automatic depth of field indicator. It is fitted with an 80 mm. Planar or Xenotar *f* 2.8 lens.

The Rolleiflex 3.5E of 1956 is similar to the Rolleiflex Automat of 1955, but has built-in photo-electric exposure meter and automatic depth of field indicator. It is fitted with a 75 mm. Planar *f* 3.5 lens and was also available with Xenotar *f* 3.5 lens but without exposure meter. Subsequent installation of the meter is possible on the latter model.

The Rolleiflex 2.8E2 of 1959 is similar to the Rolleiflex 2.8E but fitted with a detachable hood and improved extra bright focusing screen.

The Rolleiflex F of 1958 with *f* 3.5 Planar or Xenotar lens is like model 3.5E but has the meter coupled to the stop-speed setting, is fitted with a detachable hood, and an improved extra bright focusing screen.

Rolleiflex 3.5E3 of 1962 is a Rolleiflex F without the built-in exposure meter. It was replaced in 1967 by the Rolleiflex F (both with *f* 3.5 and *f* 2.8 lens) without exposure meter. The meter can be built in and coupled to shutter speed and aperture settings.

The Rolleiflex T of 1958 has a 75 mm. *f* 3.5 Tessar, detachable hood and improved extra bright screen and facilities for changing the format from $2\frac{1}{4} \times 2\frac{1}{4}$ to $2\frac{1}{4} \times 1\frac{5}{8}$ or $1\frac{5}{8} \times 1\frac{5}{8}$ in.; models prior to 1962 not fitted for the 35 mm. Rolleikin outfit. A single lever (instead of the familiar wheels) controls exposure values, stops and shutter speeds. An exposure meter is fitted or can be installed by the user.

The Tele-Rolleiflex, introduced in 1959, is a special model with 135 mm. Sonnar *f* 4 long-focus lenses for professional and feature photography. It has disengageable speed/stop coupling. An exposure meter is not fitted, but can be installed by the user. The back is fitted with a glass film plane.

The Wide-angle Rolleiflex of 1961 is a special model with 55 mm. Distagon *f*4 short focus lenses for wide-angle photography. It is otherwise similar to the Tele-Rolleiflex in all other control features.

The Rolleiflex 2.8F of 1960 with Planar or Xenotar *f* 2.8 is like the model 2.8E/2 but has the meter coupled to the speed-aperture settings. (Except for the faster lenses, this camera is identical with the model 3.5F.)

The Rolleiflex 3.5E3 and 2.8E3, 1963 are similar to the 3.5F and 2.8F but without exposure meter. Aperture and shutter speed are cross-coupled and indicate exposure values.

The Rolleiflex F models have also been available without exposure meter, since 1964.

The Rollei-Magic of 1960 has a built-in photo-electric meter which automatically sets aperture-speed combinations on the built-in scaleless Prontormat shutter.

Rolleiflex 2.8E3 of 1962 is a Rolleiflex 2.8F without the built-in exposure meter.

Rollei-Magic II of 1962 is a Rollei MAGIC I, but fitted with a shutter which permits in addition to fully-automatic operation also individual setting of speeds (1/30 to 1/500 sec.) and apertures.

The Rollei-Magic II, 1963 also permits manual exposure setting. In this case the exposure meter indicates exposure values, which can be set on the shutter.

All Rolleiflex models $2\frac{1}{4} \times 2\frac{1}{4}$ in. supplied since late 1964 are fitted with the Rolleiclear Focusing Screen with split-image rangefinder wedge.

24-exposure 220 Film

A 220 film has been introduced, primarily designed for the professional user, giving 24 exposures $2\frac{1}{4} \times 2\frac{1}{4}$ in. on one roll. Special versions of the current Rolleiflex $2\frac{1}{4}$ in. models are made (at extra cost) accepting 120 and 220 film.

The 4 × 4 cm. Rolleiflex Models

The Sports Rolleiflex of 1931 (the first few models were called Babyflex) takes 12 exposures $1\frac{5}{8} \times 1\frac{5}{8}$ in. (4 × 4 cm.) on standard vest pocket (size 127 or 27) film. It has a 60 mm. Tessar *f* 3.5 or *f* 2.8 lens, and a Compur shutter (1 to 1/300 sec., B and T). The lens mount diameter is 28.5 mm., the finder lens *f* 2.8. The finder hood has an eye-level frame finder. Parallax is compensated by reduction of finder picture. A lever crank advances the film. One lever sets and releases the shutter by a two-way action. The first exposure is set in the red window, thereafter by automatic counter. Push-on filter and other attachments.

In 1933 this camera appeared with peep windows above the finder lens. In 1934, a 60 mm. *f* 2.8 Tessar in a Compur Rapid shutter (1 to 1/500 sec., B and T) replaced the previous lens and shutter, and double bayonet mount on both lenses was added in 1938. All these models were discontinued in 1940.

The Rolleiflex 4 × 4 of 1957 has a 60 mm. Xenar *f* 3.5 lens in Synchro-Compur exposure value shutter (1 to 1/500 sec., XM synchronised, with self-timer). The finder hood incorporates an eye-level frame finder and the shutter cannot be fired while the hood is folded. Film transport is by winding knob on the right-hand side; exposure counting is automatic.

HANDLING THE ROLLEIFLEX

In order to simplify the description and handling of the Rolleiflex camera without being confused by different features of individual models, this guide has been divided into a general section which applies to all Rolleiflex models while the requirements and consequently different handling of each model are found on the green pages.

For convenience, a symbolic reference system is also used in the general section. Wherever the sign ■ appears, further details will be found in the camera pages of the green section for each camera type. Similarly, the sign ● refers to accessory sections. The appropriate pages are marked accordingly in the bottom left- or right-hand corner.

Holding

Hold the camera as steady as possible, as the slightest shake, even if its effect is not visible in the negative, will become apparent in the enlargement. Always stand with your legs apart for extra steadiness.

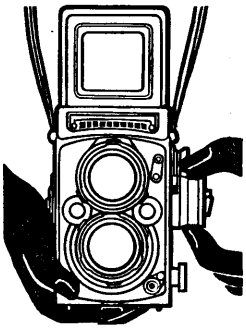
When working with the reflex finder at chest-level, place the camera in the palm of the right hand, with right index finger on the release on the front while thumb and index finger of the left hand rest on the focusing knob.

When using the eye-level finder or pentaprism hold up the camera so that the eye is level with the back sight in the focusing hood or the eyepiece of the prism. Grip the body with both hands, placing the index finger of the right hand on the release. Press the camera body against nose and forehead to give it additional support.

To release the shutter, press the button with the right hand index finger. Use finger pressure only, keeping the grip steady. The pressure must be slow and smooth. The slower the exposure time, the smoother must be the release, as the risk of camera shake is greater.

For slow speed exposures in the hand at chest-level, hold the breath and release smoothly to avoid shake.

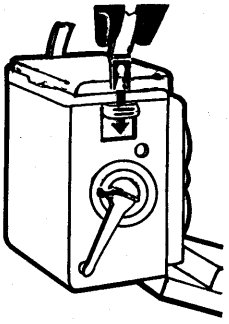
When using long exposures while holding the camera at eye-level, rest the camera against some support, or at least

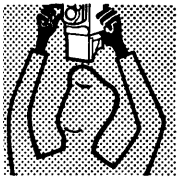


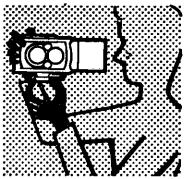
Left: Support and steady the camera with your right hand, thumb on the release button, while operating the focusing knob.

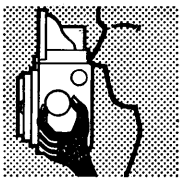
The ideal body stance. Sling the camera round your neck, supporting it against the chest, and stand with your feet slightly apart.

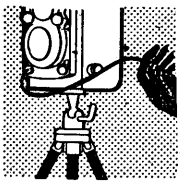
Right: The ever-ready case protects the camera, yet keeps it instantly ready for use. The special neck strap, pushed through the eyelets of the camera protruding from the case, holds the camera securely in its ever-ready case as well as providing a steady support.











Although the standard hold for the Rolleiflex is the steadiest, various alternatives are possible in special situations. You can hold the camera above your head to shoot over crowds, etc. (*left*); you can shoot round the corner (*centre left*); or for action subjects you can use the eye-level finder (*centre right*), or the pentaprism finder. For time exposures mount the Rolleiflex on a tripod (*right*) and release the shutter with the aid of the cable release.

lean against something stable. In this way 1/8 sec., or more, can be risked without incurring camera shake.

A tripod is necessary when taking exposures of 1/15 sec. or longer with the delayed action release.

Carrying

However elegant it may be to carry the camera on a long strap from the shoulder, this is quite unsuitable for quick action. A better method is to carry it on a short strap around the neck at chest-level—ready for work.

The ever-ready case enables the Rolleiflex to be used without removing it and there is a holding screw which prevents the camera from falling out.

The Reflex Finder

The reflex finder is a viewing-cum-focusing device. It consists of a focusing screen on top of the camera, a plastic screen incorporating millions of minute refracting optical elements. This gives an extremely bright image right to the edges, and high colour brilliance, without any noticeable pattern.

The $2\frac{1}{4}\times2\frac{1}{4}$ Rolleiflex models since 1964 have a focusing screen with split-image rangefinder centre, the two halves of which are lined up to get sharp definition. This 'Rollei-clear' screen can be fitted to some earlier models.

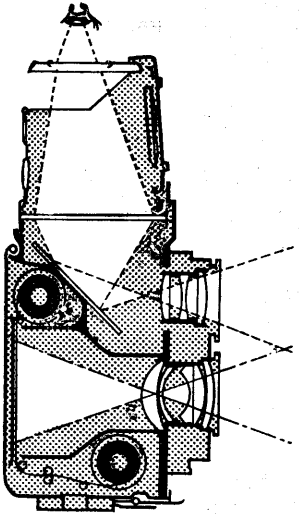
The image entering the camera through the finder lens is reflected on to it by a mirror. This reflex image remains visible even during and after the exposure.

Its purpose is first to show the exact picture area, and secondly to help in getting the picture sharp on the film.

Viewing

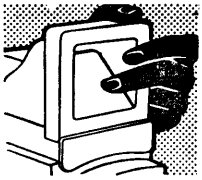
The picture on the screen appears upright but reversed left to right. Movements are also reversed left to right. To follow a moving object the camera must be turned against the apparent movement. A finder hood extension is available to keep stray light from the screen and so makes the image appear brighter.

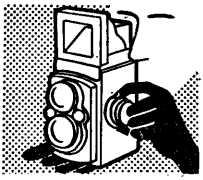
On the Rolleiflex models since 1960 the focusing hood is removable and can be replaced by an eye-level pentaprism

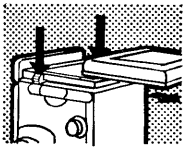


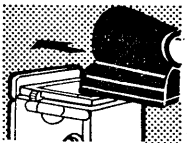
Left: The standard method of viewing with the Rolleiflex is to look straight down on the ground glass screen in the top of the camera. A large hinged magnifier in the hood swings out to enlarge the whole screen area. You can thus judge the image sharpness really accurately (p. 42).

Below: To use the eye level frame finder (e.g. for sports subjects) push in the front panel of the focusing hood (*left*) and look through the upper aperture in the back of the hood (*right*). On the Automat 1954/1958 this also brings down a second mirror in the hood, enabling you to watch the ground glass screen through the magnifier in the lower aperture at the back of the hood (*bottom right*).

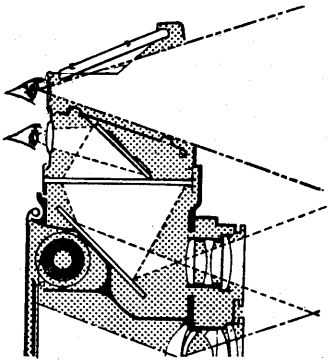








The hood of current Rolleiflex models is removable on pressing the two catches at the side (*left*). The hood can then be lifted off and replaced by a pentaprism unit for eye-level focusing and viewing. To mount either unit, place over the focusing screen and slide forward to make the catches engage.



giving an upright and right-way-round image even if the camera is turned sideways or upside down.

With the frame finder built into the focusing hood you can also follow movement—it shows an upright and right-way-round image. The frame finder of the Rolleiflex (since 1950) has below its viewing eyepiece a second eyepiece with a built-in magnifier. Using the lower eyepiece, you can focus the image which is reflected by a mirror from the ground glass and then, by slightly lifting the eye, switch over to the frame finder. This enables you to focus and view at eye-level, if not simultaneously so, at least with a minimum of time lag.

When using the frame finder, do not attempt to turn the camera to the right or left away from the eye, nor try to move the eye from the centre of the back sight. This "spying round the corner" is deceptive, as only that section will appear on the negative which you see in the finder looking straight ahead with the eye close to and in the centre of the opening.

Although one is likely to hold the camera reasonably level, make sure that vertical lines of the picture run parallel with the grid, or on earlier models with the sides of the focusing screen frame. You can tilt the camera intentionally but see that the effect does not look like an accidental tilt.

Parallax Compensation

All Rolleiflex models produced since 1937 have a mask built into the camera below the focusing screen. This moves automatically with the distance setting to compensate the viewing error on the screen which would occur on account of the different position of viewing and taking lens. Your Rolleiflex is in consequence free from any parallax error when using the reflex screen, either directly, or via the pentaprism.

The frame finder, however, yields a view of its own as it views from a point away from the lens. The greater the distance between the two, the bigger the difference of this point of view, i.e. the parallax. Parallax hardly counts when viewing and taking something at a reasonable distance, as the difference of viewpoint is negligible as compared with the distance between camera and subject.

But if we photograph anything at close quarters—take a portrait for example—the parallax may show. The image as seen through the frame finder may include all of, say, a hat worn by the subject of your portrait, while quite a portion of it may be cut off in the picture taken.

So do not use the frame finder at close quarters. If you must use it, make allowances by including in the frame finder view a strip on the top you can do without in the picture. That strip must be the wider the closer you are to the subject.

Focusing

The second purpose of the reflex finder—obtaining the best possible definition—is at the same time one of the most important means to ensure good results.

The less experienced user of the reflex screen is apt to accept, all too hastily, a seemingly sharp impression of the image for satisfactory definition. There are, however, different degrees of sharpness and you can make use of these very differences to find the best possible setting.

Turn the focusing knob to and fro while observing how the main object to be focused becomes more and more sharp up to a point beyond which it will again lose definition.

At this "beyond" stage reverse the movement of the focusing knob. Slowly narrow down the degree of to and fro movement of the focusing knob until you unmistakably arrive at the point of the very best definition.

You encircle, as it were, the point which you want absolutely sharp by going over and over again its neighbourhood, all of which will appear reasonably sharp. Before or beyond the point of maximum definition the image still appears sufficiently sharp, but do not be deceived by this fact—the image is not good enough for enlarging.

When watching the screen at waist-level, swing the built-in magnifying glass into position; this will help to check critical sharpness. The camera is best raised near to the eye when using the magnifier. When you have finished with it, lower it again, otherwise—with the magnifier in front of the screen—you may get excellent definition, but may lose sight of the picture as a whole. The magnifying lens can be changed and users with defective eyesight can obtain alternative lenses with correction of +3 to −3 diopters.

The frame finder cannot be used for focusing, apart from the quick change arrangement of the models since 1950 (not on Rollei Magic, T and 4×4).

This procedure is unsuitable for photographing moving subjects. The frame finder is, however, more effective with zone focusing methods (p. 58). These ensure that all subjects within a certain depth of field will be recorded sharp. This last method of focusing is, in fact, preferable to any other when dealing with rapidly moving subjects in front of a reflex camera. It is almost impossible to catch and shoot fast motion when you are looking down with your attention fixed on the mirror that shows directions and movement the wrong way round. With a frame finder, it is quite easy to follow everything and keep the other eye on the subject before it comes into the field of the finder.

Alternatively for action shots you can pre-focus the camera at a distance at which the subject will be at a given moment, or focus on a spot which the subject has to pass.

With subjects liable to react self-consciously (e.g. children), focus on some object which is the same distance from the camera as your real subject, but in a different direction. When the range is found, swing the camera round and shoot.

Shooting ■

Practise the following operations first with an empty camera until you can do them practically automatically.

1. **Work the film transport.** This advances the film counter and tensions the shutter.
2. **Set the exposure.** Adjust the shutter for the right amount of light for the subject conditions (p. 31). On Rolleiflex models with built-in photo-electric exposure meter, the meter indicates the setting or even sets the controls.
3. **Select the aperture-speed combination** you want to use; smaller aperture for greater depth of field (p. 31) or faster speed to arrest movement (p. 39).
4. **Focus and determine the picture area** to obtain a sharp picture and the view you want.
5. **Release** the shutter gently.

LOADING AND UNLOADING

The Rolleiflex uses the standard size 120 rollfilm. It gives 12 exposures $2\frac{1}{4}\times2\frac{1}{4}$ in. (6×6 cm.). The Rolleiflex 4×4 uses the size 127 rollfilm for 12 exposures $1\frac{5}{8}\times1\frac{5}{8}$ in. (4×4 cm.). These are film spools which are loaded into the camera in daylight. Avoid loading or unloading the camera in brilliant sunlight. Choose a shady spot or do it in the shadow of your own body if nothing better is available.

Loading

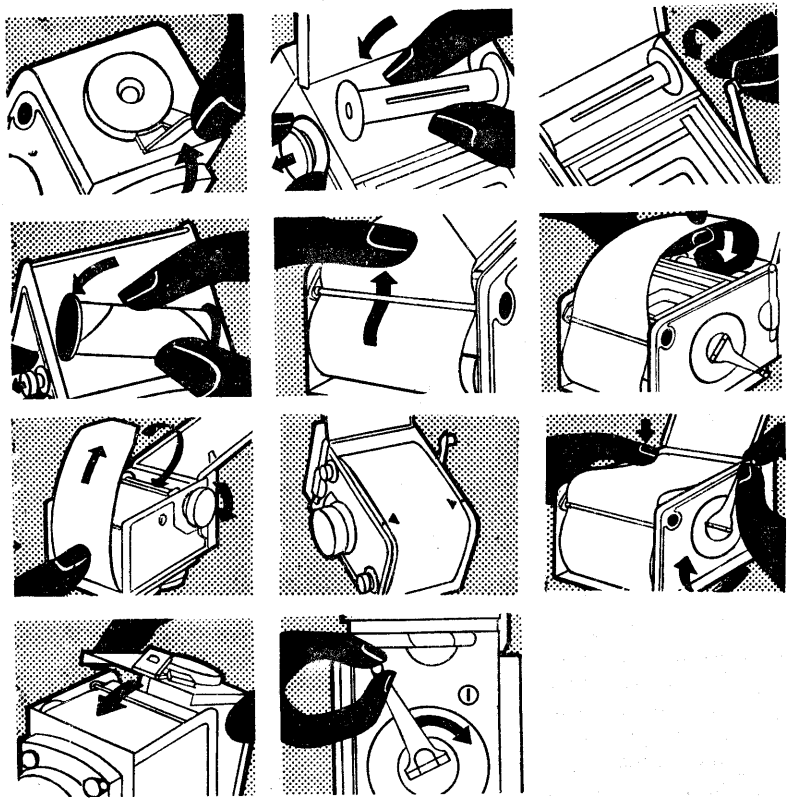
1. **Open the camera back** by holding the camera upside down, turn the safety lock with arrow engraved on it in the direction of the arrow. Then press the projecting end of the latch away from camera body. Now grip the back panel by the two side nipples and pull up.

   It is important to check that the two position pressure lock has the inscription "$2\frac{1}{4}\times2\frac{1}{4}$" visible below the film pressure plate in the side of the back panel when rollfilm is used. If a 35 mm. film has previously been used and the pressure lock shows "$1\times1\frac{1}{2}$", press the pressure plate against the camera back and push it up until it stops. When released it must spring forward into its normal position.

2. **Insert the film.** The empty spool in the bottom chamber has to be transferred into the top chamber. Pull out the spring-knob on the camera side wall and turn it a little, so that it locks in the out position. Remove the empty spool and insert it into the top chamber. For this purpose, pull out the spring knob of top chamber, and turn to fix it in the open position. Place the empty spool with the grooved end towards the film transport into the top chamber so that the groove engages in the film transport cross bar. Now allow the spring catch to spring back by turning it back into its original position: this will engage the empty spool in the chamber.

   Insert the roll of film in the bottom chamber after

LOADING

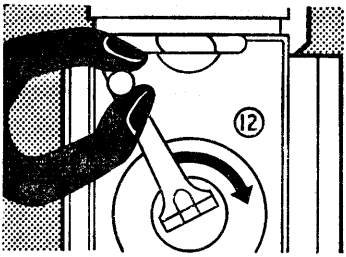


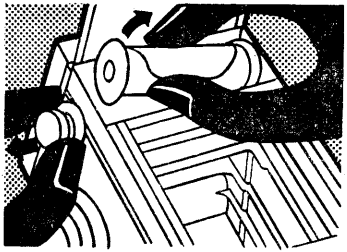
Top row: Unlock and open back latch (*left*); open back and insert empty spool in take-up chamber (*centre*); turn crank to make the wide slot in spool face outwards (*right*).

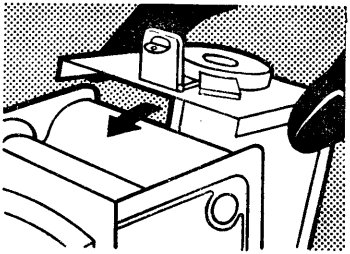
Second row: Insert full spool of film in the feed chamber (*left*); feed end of backing paper through the feeler rollers (*centre*); pull paper over picture aperture and thread into the take-up spool slot (*right*).

Third row: On Rolleiflex T, Rollei Magic II, 4 × 4 and early models without feeler rollers, draw backing paper off feed spool and thread straight into take-up spool slot (*left*); on model T and Rollei Magic II, wind until arrows on backing paper are opposite marks on the film channel (*centre*); on all models, tighten backing paper by winding the film slightly (*right*).

Bottom row: Close and lock camera back (*left*); wind on until film counter shows No. 1 (*right*).







Top left: When all twelve exposures have been taken, the crank can be turned freely Wind off the end of the paper on to the take-up spool. On the Rolleiflex 4×4 turn the winding knob.

Top right: Unlock and open the latch, swing open the camera back.

Bottom left: Remove the full take-up spool from the camera, taking care not to unroll the film.

Bottom right: Close the camera or reload with a new film.

breaking the seal so that the pointed end of the backing paper points upwards towards the empty spool. Turn back the spring knob, it will engage and hold the roll of film in its correct position.

Draw the paper end *between* the two feeder rollers over the film aperture to the empty take-up spool. Insert the wedge-shaped end of the paper into the wide slot of the take-up spool.

3. **Close the camera** by pushing the back panel against the camera body until the latch engages. Now turn safety lock back against the direction of the arrow engraved there.
4. **Get the film ready** for the first exposure by cranking the film handle until it comes to a definite stop shortly after a slight resistance has been overcome. Now turn the handle anti-clockwise back to the stop and fold it over into rest position. The film counter will have set itself automatically, showing No. 1 in the window.
5. **Set the film speed and type.**

Unloading

After all 12 exposures have been taken, the film transport can be cranked freely. The film counting window shows a white circle in place of a number.

1. **Wind off the paper** by turning the crank five times.
2. **Open the camera back.**
3. **Remove the exposed film,** then close camera back or reload with a new film.

FILMS AND FILTERS

There are two kinds of films available for the Rolleiflex: black-and-white and colour.

Black-and-White Film

This produces a negative in which the colours and brightness range of the subject are translated into black and white. From it, prints or enlargements on paper (or, in special cases, black-and-white transparencies) can be made.

The black-and-white film used normally is panchromatic, that means that it is sensitive to all colours. There is a choice of several types differing mainly in sensitivity as well as certain other characteristics.

SLOW FILMS are of low sensitivity, requiring comparatively great exposure. Their main advantage is the extremely fine grain, permitting a high degree of enlargement without its granular structure becoming unpleasantly visible. Such films also yield images of the greatest sharpness. On the other hand, these slow films are not very suitable for coping with fast movement in other than exceptionally good lighting, nor for general work in poor light. Such films are rated at 40–80 ASA or 17–20 DIN.

MEDIUM SPEED FILMS still yield a reasonably fine grain with good gradation. They are the most suitable material for all-round photography, other than in poor light. These films are rated at 80–160 ASA or 20–23 DIN.

FAST FILMS with somewhat coarser grain (still acceptable for reasonable degrees of enlargement) will cope with most light conditions including poor light and interiors in favourable conditions. This is the right film for the photographer who wants to be prepared for the unusual, to arrest fast movement with high shutter speeds, as well as shots in poor light. The speeds are 200–400 ASA or 24–27 DIN.

ULTRA FAST FILMS are primarily intended for high-speed sports shots in dull weather, interior snapshots in poor light, night photography and ill-lit stage pictures. These

films are specialist types for conditions where normal materials are totally inadequate. They should not be used for general photography. The high speed is achieved at some cost in definition and graininess. Speed ratings range from 500–1600 ASA or 28–33 DIN.

The above speed figures are based on the latest ASA Standard for film speeds (and on the BS and DIN Standards under revision). These figures, when used on the exposure meter, give minimum correct exposures, to make the most of the versatility of the film and of the image quality. They are also the figures quoted by most film manufacturers. Sometimes films are, however, still rated according to earlier standards which in effect incorporated a generous safety factor against underexposure—by the simple process of overexposing films about 100 per cent (well within the exposure latitude of most black-and-white films). So you may come across films apparently only half as fast as others of similar type, because of this difference in ratings. The table on p. 70 indicates the current film speeds to be used with the exposure meter, even if the film packing gives a lower rating. This applies to *black-and-white negative* materials only; speed rating methods have not changed for colour films.

There is a wide range of different makes of films in all speeds on the market. Their characteristics, apart from speed, vary slightly from make to make. It is safe to say that all well-known brands are reliable and good. The best film is the one you are used to. Professional photographers and advanced amateurs may find one or the other characteristics of a particular make—i.e., its gradation, granular structure, acutance, etc.—of particular value for specific jobs.

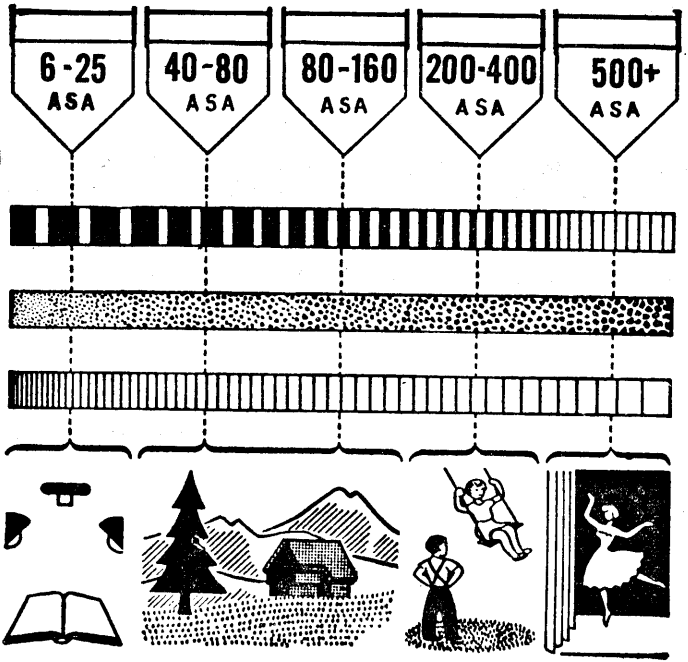
Colour Film

These films produce an image in colour after appropriate processing, corresponding directly or indirectly to the natural colours of the subject. From the practical point of view, colour film is as easy to use as black-and-white film but needs a little more care in exposure. Processing is more complex and is often carried out by the film-maker or specially appointed processing laboratories.

There are two basic types of colour film: reversal and negative.

(continued on page 26 after the green section)

FILM SPEED, CONTRAST, GRAIN, RESOLVING POWER



Generally speaking, low speed goes with **greatest** contrast, finest grain, and highest resolving power, and vice versa. The film speed in the *top row* points to the corresponding contrasts, grain, and resolving power. The contrast row (*from left to right*) shows how high contrast becomes medium and low with the faster films. The grain row shows (*from left to right*) how fine grain becomes progressively coarser with increasing speed, while the resolving power row indicates the gradual decrease in maximum resolution with the fastest films. The bottom row indicates the type of subject for which films of the various speeds are best; copying (special document films), general views and pictures of people (fine grain and medium speed films), high-speed action (high-speed films) and poor light conditions (ultra-speed films).

(*continued from page* 24 *before the green section*)

Colour Reversal Film

This produces a colour transparency on the actual film exposed in the camera. This transparency held up to the light shows a positive image with all parts of the subject in their original colours. It can be viewed in a suitable transparency viewer with a magnifier or it can be projected in a slide projector to give a large and brilliant picture on a screen.

There is little doubt that the projected image is the most natural and best for showing colour.

Although the colour transparency is an end product, it can still be used to make:

(*a*) duplicate positive colour transparencies,
(*b*) a black-and-white negative which can then be used to produce black-and-white prints or enlargements,
(*c*) a colour negative for making colour prints and enlargements, as from colour negative film (described below),
(*d*) direct colour enlargements on colour reversal paper.

Colour prints on paper invariably show a loss of colour quality as compared with the original positive transparency.

For correct colour rendering, colour reversal films have to be carefully matched to the light by which they are to be exposed. Accordingly, most makes are available in two or more of the following types:

(*a*) daylight colour film (type D or T) which will give correct colour reproduction in daylight or with blue-tinted flash bulbs,
(*b*) artificial light type colour film which will give correct rendering by photoflood illumination (type A or K), or high-power tungsten light,
(*c*) artificial light type colour film (type B) which will give correct rendering with the high-power studio lamps.

Colour films made for one kind of light may often be used under different light conditions with the aid of a conversion filter as recommended by the manufacturer.

Different makes of colour film may yield transparencies of a slightly different characteristic colour quality, colour

saturation and colour contrast. Which you prefer is very much a matter of personal taste, and you can only be recommended to try various makes to find the one which suits you best.

Colour Negative Film

On processing, this produces a colour negative which shows a negative image of the subject in its complementary colours—e.g., blue appears yellow, red appears blue-green, and so on. These colours may sometimes be hidden under an overall orange or reddish tint.

The main purpose of the colour negative is the production of colour prints on paper. The quality is generally higher than that obtained from a positive transparency.

From the colour negative you can make:

(*a*) any number of colour prints in varying sizes,

(*b*) direct black-and-white prints or enlargements, in the same way as from a black-and-white negative,

(*c*) positive colour transparencies for viewing or projection.

Most colour negative films are suitable for exposure by any type of light—e.g., daylight, flash or photofloods. The necessary adjustment of the colour rendering is carried out during the printing stage. Manufacturers sometimes recommend conversion filters even with colour negative films. These mainly serve to simplify the subsequent correction needed in printing.

Colour Film Speeds

The majority of colour films, reversal and negative, are rated between 25 and 64 ASA or 15–19 DIN, corresponding to a slow to medium speed for black-and-white material. A few films go up to 160 ASA or more for poor light conditions. Others may be as slow as 10 ASA or 11 DIN.

As with black-and-white films, the slower types tend to yield improved image detail, especially with negative colour film, while the fastest emulsions may show slightly reduced colour saturation and image sharpness.

The Choice of Colour Film

Making your choice between colour reversal or negative film (in spite of the various uses that can be made of either type of material) remains an individual question.

First there is the way you want to see the result, as a colour print or as a colour transparency. The print has no doubt much to commend itself. It is easily shown, stored and carried about. The transparency calls for the aid of a viewer or projector.

Next, the cost of a colour print is about three times that of the transparency. This may at times be mitigated by the fact that from unsuitable negatives no colour prints need or can be made. The transparency user, however, has additional outlay in the form of a viewer or projector with screen (in most cases both).

Rolleiflex transparencies made on size 120 film need projecting in a large-size projector which takes $2\frac{3}{4} \times 2\frac{3}{4}$ in. slides. Alternatively, you can cut down the transparency to fit 2×2 in. miniature slide frames ($1\frac{5}{8} \times 1\frac{5}{8}$ in. super slides). Certain Rollei models (■) can yield $1\frac{5}{8} \times 1\frac{5}{8}$ in. transparencies directly. With the Rolleikin outfit (●) and 35 mm. film you get 24×36 mm. transparencies for mounting in 2×2 in. standard frames.

A final point to consider is the quality. The transparency will record each colour and its brilliance in full. Held to the light or projected on a screen, the brightness range, which may be 100 : 1, is fully or almost fully retained. It shows colours brilliant with great depth and realism. The colour print can at its best only reflect four-fifths of the light falling on it and even the darkest tones reflect about one-twentieth to one-tenth, so that the full range is no more than 16 : 1. While the colour print is, by necessity, duller than the transparency, it is only fair to say that the eye soon adjusts itself to the reduced brightness range, and subjects without great contrasts will be very satisfying.

From the point of view of convenience, reversal film has the advantage that it directly gives finished colour pictures of high quality and is still capable of producing colour prints

as well. For the maximum versatility and control in print making, however, negative film is superior.

Filters for Black-and-White Film

By its nature, a black-and-white film can only translate colour values of the subject into tones of lighter or darker grey. Mostly these correspond fairly closely to the brightness of the colours, but do not, of course, differentiate between them. In certain cases the difference between the brightness of two colours may be so slight that both record in almost the same tone of grey.

There a filter helps by modifying the depth of one or the other colour, and so making it show up lighter or darker than it would normally.

The commonest example is the blue sky in a landscape, with white clouds. The blue is so brilliant (and the film is often excessively sensitive to it) that the clouds do not show up against it. By putting a yellow filter in front of the camera lens we can subdue or "hold back" the blue, so making it record darker in the final print. We can even go further and over-emphasize the effect progressively with an orange or red filter; these darken the blue so much that the sky looks almost black for a really dramatic effect.

The same considerations hold for other filter effects. For instance, the film renders a red rose in the same tone of grey as the green leaves of the rose bush. With the colour contrast gone, the rose disappears in its surroundings. A green filter makes the rose darker and the leaves lighter; conversely, a red filter will show up the rose as light against dark foliage. Scientifically, both filters falsify the tone rendering, but produce a more acceptable pictorial result.

In all these cases a filter *lightens objects of its own colour and darkens objects of its complementary colour*. Apart from isolated instances in pictorial photography, such contrast control is very valuable in copying and scientific work (e.g., photomicrography).

All filters cut out some part of the light and thus, as a compensation, an increase in exposure time is necessary

when using them. This is stated on most filters in the form of a filter factor indicating by how much (e.g., 2 times, 3 times) the exposure must be increased with that filter. The factors are approximate for they depend not only on the nature of the filter but also on the exact colour sensitivity of the film and on the colour of the prevailing light.

Filters for Colour Film

The normal yellow, orange and other filters for black-and-white film must never be used with colour films as they would give the colour picture a strong overall colour tint.

In daylight and with daylight type film, only a haze filter is required. It is almost colourless but for a slight straw tinge. It is usefully employed on hazy days and in high altitudes to avoid excessive bluishness of the colour picture, especially with distant landscapes, seascapes and near water. This filter does not call for any change in exposure. It is also useful for colour photography with electronic flash as it produces somewhat warmer tones.

The Planar, Xenotar, Sonnar and Distagon lenses have the inherent characteristics of the haze filter, so that no such filter needs to be used with these lenses.

Conversion filters are used if a colour film, balanced for one type of light, should be used in another type of light.

The Polarizing Screen

Highly-polished subjects may reflect glare which obscures the detail. This can be overcome by the polarizing screen.

It has the special property of suppressing so-called "polarized" light. Light reflections from glass, china, enamel, polished wooden surfaces, water, to a large extent are polarized and can, therefore, be almost extinguished by placing the polarizing filter in proper position over the lens.

The filter must be rotated in front of the finder lens to find out its best position and then transferred to the camera lens in this position. The filter has a 3× factor.

The polarizing screen is, in addition, particularly useful in colour photography where it darkens a blue sky.

EXPOSURE

Exposure means—to expose the film in your camera to light. The dose of light any film needs to produce the right sort of image depends on how sensitive that film is to light. A fast film is more sensitive than a slow film.

Once your choice of film is settled, the basic condition of exposure is settled with it. You are now left with the problem of scaling the light you find in front of your camera to the amount your film needs.

Your job is to judge the light reflected from the subject you are about to photograph. Your grandfather as an amateur photographer used to take into account his geographical position, the time of the year, the hour of the day, the state of the sky, as well as the tone of the subject itself, and by so adding one thing to another size up the light reflected from the subject. The experienced professional, of course, hardly ever worked that way. He just had a look and he knew.

Today a light meter or exposure meter does the same for any photographer. It takes a look, it measures the light and it lets you know.

In fact, it does more than that. It translates the light measured straight into terms of photographic exposure. It does so by presenting you with the choice of aperture numbers and shutter speeds, sorting them out in pairs.

Aperture and Speed

The aperture number or *f* stop controls the *amount of light* allowed to enter through the lens. These numbers run in a series: 2–2.8–4–5.6–8–11–16–22. Each higher stop number lets through half the light of the next lower number (next larger stop).

The shutter speed controls the *length of time* for which the lens is kept open to light. Shutter speed figures represent fractions of a second: 2 = $\frac{1}{2}$ second, 4 = $\frac{1}{4}$ second . . . 500 = 1/500 second.

The actual exposure is a product of these two: "how

much" and "how long". A large amount of light striking the film for a short time may produce an image similar to that produced by a small amount of light striking the film for a long time. Hence the free choice from a series of balanced aperture-shutter combinations offered by your exposure meter: more or less open apertures paired with more or less quick shutter speeds, and more or less stopped down apertures paired with more or less slow shutter speeds.

Cameras of recent vintage combine these pairs, made up of aperture stops and shutter speeds, into single figures which are then called exposure values or light values. Once you set the exposure value suggested by the exposure meter both the aperture and the shutter speed move up and down in step against each other, and so keep the resulting exposure right at every combination.

With exposure meters built into the camera and coupled to cross-linked aperture-speed controls you set the right exposure without looking up the number either on the meter or the camera. You set the exposure visually by following the swing of the needle in the meter and matching it with a pointer or a circle on the spot where the needle comes to rest.

Certain shutters (e.g. Prontormat) are linked to the exposure meter in such a way that the meter automatically selects and sets a correct aperture-speed combination an instant before release. In that case, no choice of alternative settings is available; simpler operation is obtained at some sacrifice of versatility. This applies to Rollei-Magic I but not the Model II.

Choosing the Combination

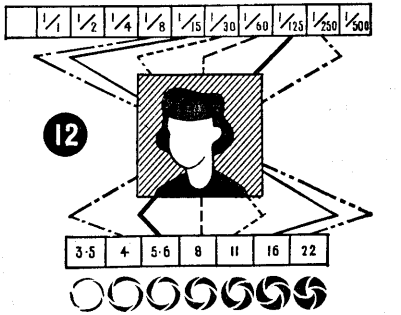
But whether you work out the right exposure from an elaborate table or chart;

whether you are presented with a series of exposure values or pairs of aperture figures and shutter speeds;

whether you just set the exposure to the point shown by the needle in your meter;

you still have one decision to face: which aperture-shutter combination to choose for any given shot. Paradoxically

The exposure value system works by assigning a single setting, one of a series of plain numbers, to the exposure. A low exposure value corresponds to a great exposure, progressively higher exposure values correspond to correspondingly decreased exposures. Thus, if an exposure value of 12 yields a correctly exposed negative, settings of 11 or 10 yield over-exposed negatives, settings of 13 or 14 under-exposed ones. Every exposure value yields double the exposure (twice as much light reaching the film) of the next higher value, and half the exposure obtained with the next lower value. Intermediate settings are also possible. On Rollei cameras with exposure value scale the exposure values are set either on one of the setting wheels of the camera, or in a special window, or on a ring on the side of the viewfinder lens or taking lens.



Every exposure value corresponds to a series of aperture and shutter speed combinations, each combination yielding the same exposure. Thus an exposure value of 12 would cover settings of 1/250 second at *f*4, 1/125 second at *f*5.6, 1/60 second at *f*8, and so on. The aperture and speed controls of an exposure-value shutter are cross-coupled so that setting a slower shutter speed at the same time stops down the lens accordingly, and setting a larger aperture in turn adjusts the shutter speed to keep the exposure constant.

enough, they all are right yet one is better than the other.

Why should it be so?

Because both the aperture and the shutter also have secondary functions and effects.

The aperture not only controls the amount of light that is allowed to pass the lens—it also has a bearing on how much of the image will be sharp.

The shutter, in controlling the length of time for which the light strikes the film, will inevitably record any movement that happened during that time as a slight or greater blur.

So you are left with three things to think of:

How fast is the action you want to catch?

How much of the scene in front of the lens has to be sharp?

Is the light good enough to go by either?

If there is fast action you have to choose and pre-set an appropriately fast shutter speed (p. 39) and then pair it with the stop you get by the cross-coupled controls or from your meter.

If the scene is to be sharp from a point close to the lens to some other point well away from it, you should choose the stop that will yield the necessary depth of field (p. 40) and then pair it with the shutter speed necessary for the correct exposure.

If the light is very poor, the chances are that you may not be able to cope with either extremely fast or particularly deep subjects.

Yet your choice in putting shutter speed or depth of field first should still be governed by what you value most about the picture you propose to take.

Exposure nowadays is no problem at all. You can arrive at the right exposure by guessing it, measuring it, or just leaving it to the camera. But to hit it off in such a way that it will produce the picture *you* want is still a matter of intelligent judgment. Only the fully automatic shutter relieves you even of this decision (with some sacrifice of versatility).

Time Exposures

When the light is very weak, especially when you have to use a small stop, even the slowest shutter speed may be too short. In that case, you need time exposures. Set the shutter to B and press the release button. The shutter now remains open for any length of time until you let go of the release button.

For such time exposures, the camera must be mounted on a firm support such as a tripod.

It is safest to release the shutter with the help of a cable release to avoid shaking the camera. This release screws into the release button.

For long time exposures, where the shutter is to remain open for longer than you can conveniently keep the release depressed, use a cable release with a lock. To make the exposure set the shutter to B, press the cable release plunger with the locking plate lifted. The shutter will now remain open until the locking plate is depressed. On cable releases with locking screws, tighten the screw on pressing the plunger and undo the screw to close the shutter.

The Self-timer

The Rolleiflex carries a delayed-action release or self-timer. This is controlled by the same lever as the flash synchronization. When you press the release button with the self-timer in operation, the shutter only goes off after a delay of 8–10 seconds and you have time to take your place in your own picture. The camera must, of course, be mounted on a tripod.

Using an Exposure Meter

To get the best results an exposure meter has to be used intelligently. This may look like a contradiction, since we have already said that it is an accurate light-measuring instrument. But light from all parts of the subject—highlights, shadows and middle tones—falls on the meter, so the reading it gives us is an average one for the whole subject area.

Meters are scaled to suit typically average subjects—i.e., subjects with average areas of light, dark and middle tones. So if you point the meter at a subject of this kind, the exposure reading will be correct.

But if the subject is not average—if there are large highlight areas and little shadow, or large shadow areas with few highlights—then you have to modify the exposure reading to obtain the best results.

So there is more to using a meter than just pointing it at the subject and accepting without question the reading indicated.

The usual method of using a meter is to point it directly at the subject. This gives the correct exposure reading provided the subject has an average mixture of highlights, shadows and middle tones. But if there is a large bright area, or a large dark area, the best method is to go near to the main subject and take a close-up reading. For example, if the subject is a figure against a white or dark background, by going closer you will reduce the amount of background affecting the meter and therefore get a reading in terms of a more average subject, which is what you want.

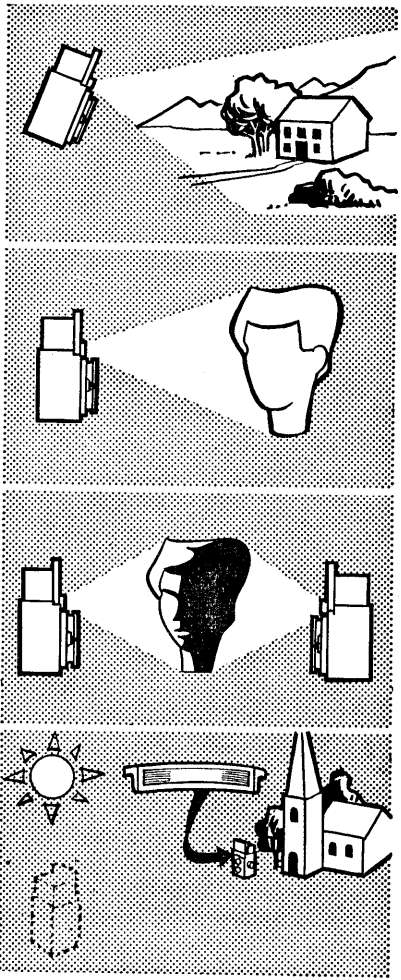
For some subjects you can take a reading from really close up, aiming the meter at the part of the subject that you want to make sure has optimum exposure. For instance, many photographers take a close-up reading of the sitter's face in portraiture; out of doors you can take the reading from the back of your hand instead of going up to the subject.

If you cannot go close up to a subject that needs a close-up reading, then try to find something near at hand that is similar in tone to the subject and take a reading from this.

When taking readings of general scenes including a good deal of sky, you have to tilt the meter down slightly to reduce the area of sky "seen" by the meter. The sky is a bright highlight, and by tipping the meter down to exclude some of it, the subject becomes "average" in tone range.

Open views, such as distant landscapes, usually have very light shadows, so you can give a shorter exposure than the

EXPOSURE METER MEASUREMENT



For normal readings point the camera with the exposure meter at the subject by observing the latter on the screen. With outdoor scenes point the camera slightly downwards to exclude excessively bright sky areas.

For more accurate readings, especially of figures against a very light or very dark background, go close to the subject so that the meter takes in just the subject tself.

With very contrasting subjects with unpredictable proportions of very bright and very dark areas, take separate close-up readings of the light and dark parts. The correct exposure is a mean of the two.

For incident-light readings—especially with colour film—point the camera with the meter from the subject towards the camera position to be used for the exposure. For this reading fit the diffusing screen supplied with the camera over the exposure meter cell. With a separate exposure meter there is of course no need to carry the camera around for such incident-light readings.

meter indicates. It is usual to give half the exposure—i.e., use double the shutter speed, or use one stop smaller.

INCIDENT LIGHT MEASUREMENT. Another method of assessing exposure is to measure the strength of the light falling on the subject instead of that reflected by it. But if you point the meter straight at the light you get a much higher reading than if you point it at the subject. So the light has to be cut down for the meter to indicate the correct exposure. This is done by fitting a white diffuser supplied with the meter over the honeycomb cell. The diffuser is designed to reduce the light by just the right amount. It also serves another important purpose, and this is to ensure that the meter includes all the light falling on the subject over an angle of almost a full 180°.

The incident light method is particularly useful for reversal colour films, and for subjects with contrasty backgrounds when it is impossible to take a close-up reading.

To take a reading, the method is simply to turn your back on the subject and point the meter in exactly the opposite direction. If the main light—say the sun—is coming from the side, don't just partly turn round and point the meter at this; turn round completely, and let the main light strike the meter at the same angle at which it strikes the subject.

If the light on the subject is different from that on yourself at the camera position (say if the subject is in the shade, and you are in the sun), you must then go up to the subject and take the reading, pointing the meter towards the camera position.

AGAINST THE LIGHT subjects are extreme cases of non-average tone range. The main lighting becomes a very bright highlight in the field of view, so if you point the meter straight at the subject it will indicate too short an exposure and give you a silhouette effect in the final picture.

This is all right if you want a silhouette. But if you want correct exposure for the subject, you should either take a close-up reading, or take a reflected light reading from the

camera position and give four to eight times the exposure indicated.

COLOUR FILMS have little exposure latitude, so particularly careful reading is advisable. The meter is used in the same way as for black-and-white films.

Because of the importance of the highlights, if you are using a meter from the camera position for an against-the-light shot, it is best only to double the reading, and not multiply it four to eight times as recommended for black-and-white negative films.

Shutter Speeds and Movement

The actual shutter speed you need within a series of available aperture combinations is governed by considerations of camera steadiness as well as of subject movement.

An unsteady camera hold results in camera shake. Even the slightest shake will result in inferior definition of the negative. Practical experience goes to show that 1/125 sec. is safe, while you have to hold the camera particularly steady when using 1/60 or 1/30 sec. Where lighting conditions make even longer exposure times essential and there is no subject movement, either support the camera on a tripod or look round for extra support for your elbows and hands —e.g. a wall, railing, etc.

The shutter speed required to arrest movement depends of course primarily on the speed with which the subject moves. Remember, however, that parts of the subject (e.g. the legs of a runner) may move faster than the subject as a whole; you may sometimes have to compromise and show such parts slightly unsharp. Often that is not a serious fault, as slight blurring—provided the main part of the subject is sharp—helps to emphasize the impression of movement.

Other factors to consider are the distance of the subject—the farther away, the less noticeable the movement blur; the focal length of the lens—a long-focus lens in effect brings the subject nearer; and the direction of the movement. Objects moving across your field of view blur more than if

they are approaching or receding.

The most convenient way of allowing for all these factors is with the aid of a simple table (p. 66).

Aperture and Depth of Field

When you focus the camera on a given object, the image of that object will be really sharp on the film. Things nearer or farther away will be gradually less and less sharp, until they are noticeably blurred. The range of distances over which objects are still acceptably sharp, before you do notice the loss of definition, is known as the depth of field.

You can control the extent of this sharp zone by the lens aperture. As you stop down the lens, the zone of sharpness grows in both directions; as you open up the lens, its depth decreases.

You can obtain the actual zone of sharpness at various apertures and distances from depth tables, but in practice the most convenient way is to use the depth of field indicator. This exists in two types. On some Rolleiflex models it is a special scale of aperture numbers marked opposite the distance scale. There are two sets of such numbers from the largest stop (*f*2.8) to the smallest (*f*22) on each side of the focusing index (the mark that indicates the distance to which you have set the lens).

At any distance setting, the distance figures opposite each pair of aperture numbers on the depth of field scale give the near and far limits of sharpness. For example, at 10 ft. you may find the two stop values 5.6 on the scale (*f*5.6) opposite about 8 and 11 ft.—so you have a sharp zone from 8 to 11 ft. At *f*2.8, the distances opposite the stop values 2.8 may be $9\frac{1}{2}$ and $10\frac{1}{2}$ ft. respectively; at *f*11 you might get a sharp zone from 7 ft. to 15 ft.

You will also notice that the depth of field is greater at far distances than at near ones. At 5 ft. and *f*5.6 the sharp zone only covers from about $4\frac{1}{2}$ to $5\frac{2}{3}$ ft.—less than $1\frac{1}{2}$ ft. altogether—against nearly 3 ft. at the 10 ft. setting.

Other Rolleiflex models have an automatic depth of field indicator consisting simply of an extending white strip.