GUIDE

ZENITH

ZENITH B
ZENITH E
ZENITH EM
ZENITH Photosniper
ZENITH TTL

CONTENTS

THE ZENITH SYSTEM

The Zeniths are 35 mm single-lens reflex (SLR) cameras designed for accurate focusing, exact viewing and versatility.

The die-cast body has a hinged-on back and is covered in black wear-resistant material with metal parts black anodised or satin chrome finished. The camera yields up to 36 negatives 1 x 1½ in (24 x 36 mm) on perforated 35 mm film.

It has an eye-level reflex finder which shows the image in almost natural size. The built-in pentagonal prism produces an upright and right way round view. The image in the Zenith B and E models is on a ground glass focusing screen. The Zenith EM and TTL use a fresnel viewing and focusing screen with a microprism rangefinder centre surrounded by a ground glass ring. The screen image is brilliant and evenly illuminated right into the corners. The exposure meter needle of the TTL model is visible in the right hand side in the viewfinder field with centering circle of the through lens (TTL) metering system.

The taking lens forms the finder image; in consequence the finder shows the same field as will be obtained on the film without any parallax error. The reflex image remains correct at any distance with any lens including close-up supplementary lenses, extension bellows, extension tubes and other attachments.

The screw-mounted standard lens is interchangeable with a range of long-focus and wide-angle lenses. The mount is the popular M42 'universal' type, so you can choose from a wide range of independent lenses, or those made for other cameras.

The Helios lens of the Zenith B and E has pre-set aperture, the Industar has manual aperture. The Helios M lens of the Zenith EM and TTL has fully automatic aperture setting whereby an internal link between the shutter release and the lens mount couples with the automatic iris lenses in such a way that the aperture is stopped down only during the actual exposure. At other times, it is fully open to allow the image on the reflex screen to be viewed with maximum brilliance and minimum depth-of-field for greatest accuracy.

The lens mount carries a depth-of-field indicator and a focusing scale in metres. Focusing is effected by a helical

movement which is part of the lens mount. The automatic aperture lens of the Zenith EM and TTL can be switched to manual setting of the aperture to allow the depth-of-field to be checked and also carries an infra red index mark.

The shutter of the Zenith models is a self-capping focal plane type travelling across the film horizontally. Self-capping means that the shutter remains closed while being tensioned, ensuring full light protection of the film. Focal plane means that it moves right in front of the negative material. With this type of shutter lenses can be changed while the camera is loaded. The shutter speeds are 1/30, 1/60, 1/125, 1/250, 1/500 and B.

The shutter is flash synchronised for flashbulbs and electronic flash with standard 3 mm coaxial socket.

The Zenith E and EM have a photoelectric exposure meter built into the camera top plate, but it is not coupled to the shutter or aperture controls. The Zenith TTL camera has a TTL (through the lens) meter with a CdS cell. It is coupled to the shutter and aperture with meter needle visible in the viewfinder.

The camera takes standard 35 mm cassettes. The film runs from the cassette to the take-up spool and is rewound after exposure. The film transport is effected by a lever movement. One swing of the lever advances the film and the film counter which is around the centre shaft of the transport lever. A film speed indicator for ASA and DIN speed rating is built into the rewind knob. This must be set to the correct value for the built-in exposure meters (not on the Zenith B) to work properly.

A delayed-action release (self-timer) is built into the front plate of the camera.

The shutter release is on the top plate and has a cable release thread in its centre. A tripod bush is placed in the camera's base.

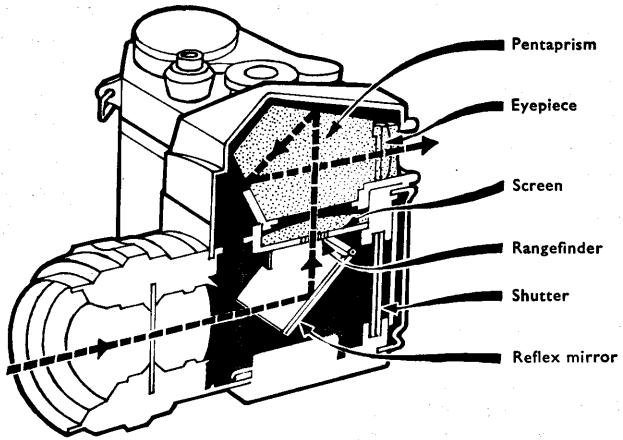
The Zenith EM and TTL have lugs for the attachment of a carrying strap.

The dimensions of the cameras, while slightly varying, are approximately 3.4 x 3.8 x 6.2 in. Weight with standard lens is up to 2 lb.

The Zenith Models

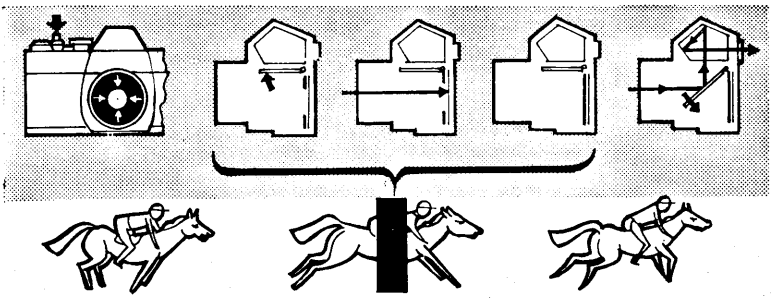
Zenith B is as described above and fitted with either the

ZENITH SLR REFLEX SYSTEM



Above: a section through the camera shows the optical system of the lens, the mirror, the ground glass screen with the fresnel lens and micro-prism zone of EM and TTL and the pentaprism and viewing eyepiece. The broken arrow indicates the path of the light while observing the image.

Below: on pressing the release button of Zenith EM and TTL the iris diaphragm closes down to its pre-set aperture by an internal link (on Zenith E *f*2, the pre-set ring has to be turned by hand as far as it will go), then the mirror flies up, the shutter opens and closes again, and the reflex mirror returns to make the image once more visible in the finder. The actual period of the blackout of the screen with this instant mirror return system is therefore confined to the exposure itself—as symbolised by the black strip in the bottom diagram. The image is visible at all other times before and after taking the picture.



50 mm *f*3.5 Industar, four-element lens in three groups with focusing range from 0.65 metres to infinity and an angle of view of 45°, or the 58 mm *f*2 Helios 44, a six-element lens in four groups with focusing range from 0.5 metres to infinity and an angle of 40°. Up to about 1970 this model had a 39 mm thread lens mount which was then replaced by the now standard 42 mm thread. Model B is now discontinued. The Zenith was its similar (39 mm thread) predecessor.

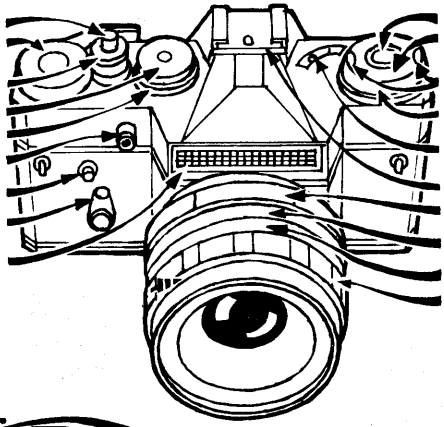
Zenith E is as the Zenith B above, but with a built-in photo-electric exposure meter which is not coupled to the shutter or aperture controls of the camera. This model is fitted with a 42 mm thread lens mount.

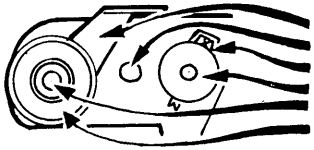
Zenith EM is basically a Zenith E, above, but features in place of the plain ground glass focusing screen a bright fresnel focusing screen with central ground glass and microprism spot for most accurate focusing. As standard lens the *f*2 Helios 44M 58 mm is fitted with fully automatic re-opening aperture which can be switched to manual setting too. This Helios 44M lens is of six elements in four groups focusing from 0.5 metres to infinity with an angle of view of 40°.

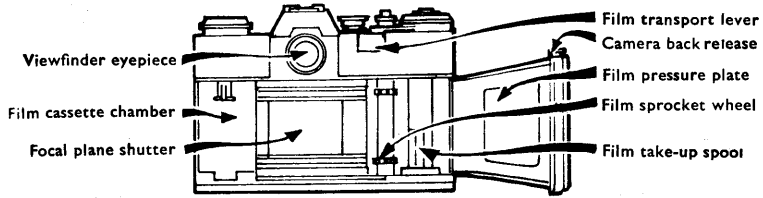
Zenith ES Photosniper is a special version of the Zenith E camera combined with the TAIR-3 PhS 300 mm *f*4.5 lens which has a quick focusing device and which is mounted in rifle style with shoulder butt and pistol finger release. Its spring-loaded, pre-set diaphragm closes down to the pre-set position at the moment of shooting; for this purpose the Zenith ES varies from the E model in that it has an additional release button at the bottom of the camera body. It also features a more remote exit pupil of the viewfinder eyepiece for easier shooting.

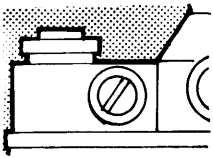
Zenith TTL, introduced late 1978, features the same lens and viewfinder as the Zenith EM above, but has CdS through the lens metering with pointer on the viewfinder indicating the position for correct, over- and underexposure. Its shutter speed selector dial is larger, easy to read and non-rotating. A fold down crank is provided for rewinding.

ZENITH B, E, EM AND TTL

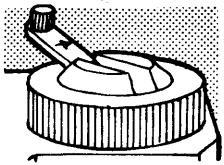








The battery compartment of the rear plate of the Zenith TTL.



The rewind crank of the Zenith TTL.

HANDLING THE ZENITH

As with all manufactured articles, the Zeniths are subject to a continuous process of development. This means that there may be minor differences in design or specification between your camera and these instructions.

Holding

It is obvious that the camera should be held as steady as possible as the slightest shake, even if not seen in the negative, will become visible in the enlargement.

FOR HORIZONTAL PHOTOGRAPHS hold the camera in the palm of both hands, the fingers gripping the front of the body. the thumbs against the back. Use the middle finger of the left hand to move the lens focusing mount, and the index finger of the right hand to operate the release button. Keep the elbows pressed against the body. Either the right or the left eye may be used on the finder.

Always stand with your legs apart.

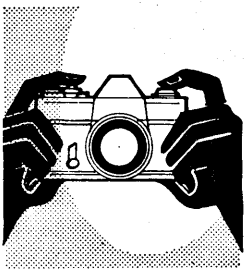
FOR VERTICAL PHOTOGRAPHS turn the camera through 90° so that the left hand presses the camera against your forehead from above. Use the thumb and the index finger to move the focusing mount. The right hand holds the camera from below with the thumb on the release button. It is of no consequence if the position of the hands is reversed; you can suit your own convenience.

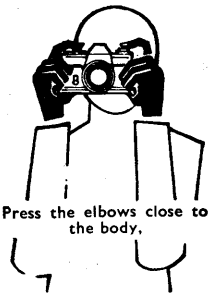
To release the shutter, press the release button with the ball of the finger (or thumb). Use finger pressure only, and keep the hand and its grip on the camera steady. The actual pressing down will have to be done slowly and smoothly. The slower the exposure time, the smoother must be the release.

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 a 'press-release' action exposure of about ¼ second can be risked without incurring camera shake.

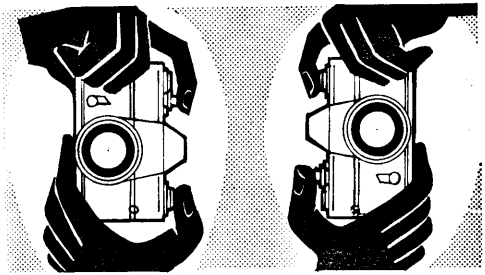
Such a support is also desirable for faster exposures, as quite a lot of movements take place inside the camera after pressing

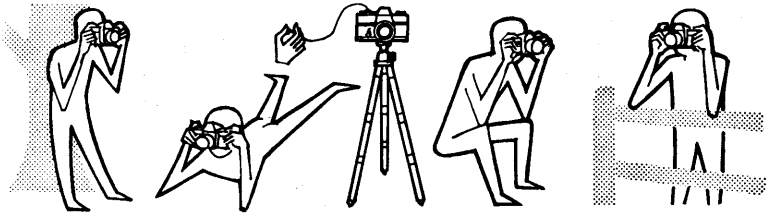
For horizontal shots (*right*) hold the camera in the palm of both hands, the fingers gripping the front of the body, and the thumbs against the back. Focus the lens with the middle finger of the left hand.





For upright shots (*below*) turn the camera through 90° so that the left hand supports it from underneath. Alternatively, turn it round in the other direction, so that the left hand presses the camera against the forehead from above. In this case the thumb of the right hand presses on the release button, while the palm of the right hand supports the weight of the camera.





Above: It is specially important to keep the camera really steady during the exposure and for a fraction of a second after pressing the release button. Whenever possible support your body against something solid, such as a tree or wall or prop up your hands against your knees or a table, particularly with slow speeds. Use a cable release for time exposures from a tripod.

the release button. A slightly unsteady hold may thus easily lead to blurred pictures.

The use of a tripod is necessary when taking time exposures. For upright photographs from the tripod use a ball-and-socket head to allow changing from horizontal to vertical position.

Carrying

For convenience and protection, the camera should always be carried in its ever-ready case. This case is designed to hold the camera ready for use.

To be ready for quick action, it is best to carry the camera on a short strap round the neck so that it lies on your chest. Lifting it to the eye then takes a split second.

Viewing and Focusing

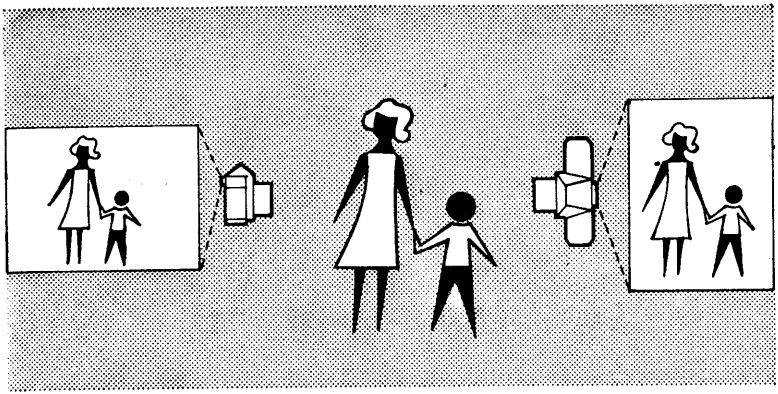
Focus after cocking the rapid-wind lever to ensure that the reflex mirror is in 100% correct position.

The image reflected by the lens on to the screen is always visible with the exception of the actual instant of release.

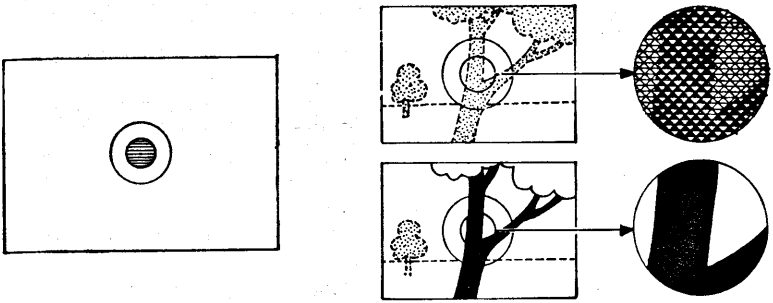
The brilliant image appears in natural size, free from parallax. A viewing pentaprism shows the image upright and right-way-round at eye-level and on models TTL and EM a fresnel field lens ensures even illumination into the very corners.

The best way to arrive at critical definition is to turn the focusing mount of the lens, (which on models B and E should be set to full aperture), slowly to and fro while observing on the ground glass the subject to be focused. As you turn the mount, the image becomes more and more sharp up to a certain point, beyond which it again loses definition. At this 'beyond' stage, turn the mount back again, narrowing down the degree of movement until you arrive at the point of best definition. Zenith TTL and EM have a micro-prism image centre. It shows distinctly fuzzy outlines while the lens is not focused and becomes clear on setting the lens correctly.

This 'becoming clear' is rather different in character from the normal ground glass image. Just before the image becomes sharp, it appears broken up into numerous dots on the micro-screen. The moment the image is really sharp, this dot pattern



The viewfinder shows the image upright and the right way round, whether the camera is held for horizontal (*left*) or vertical (*right*) shooting. With the standard lens the image also appears in approximately natural viewing size.



The Zenith EM and TTL viewing screen (*left*) consists of a circular microprism spot. The remaining area is covered by a fresnel lens. The central area is the microprism zone which acts as a kind of multiple rangefinder. When the image is sharply focused, the pattern of dots virtually disappears (*right*). When the image is out of focus it appears blurred; the pattern is then strongly visible. It remains visible even as the image approaches sharpness, breaking up the picture rather like the lines of a television screen or an engraver's screen. The disappearance of the pattern at the point of maximum focus is quite abrupt, and thus provides a really accurate means of checking the exact image sharpness. The Zenith B and E has a ground glass focusing screen covering the whole image field.

becomes invisible. Always have the lens at full aperture when focusing with the microprism.

Finally the fine grain ground glass collar around the centre spot of the Zenith TTL and EM may be found helpful when focusing contrastless or colourless objects and also when using telephoto or wide-angle lenses.

Focusing Moving Subjects

The orthodox way of focusing with the ground glass may be adopted for taking photographs of subjects that are fairly stationary. A different method of focusing is required when taking subjects in motion. Set the lens to 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 liable to react self-consciously (e.g. children) set the lens to a suitable distance, and then approach the subject, exposing as soon as the screen image appears sharp.

Alternatively, focus at some object which is at the same distance from the camera as the subject, but in a different direction. When you have found the range swing round to press the release button as soon as the victim slips into the field of view of the finder.

Pre-viewing the Depth-of-Field

You can examine the precise depth-of-field you get with the pre-selected aperture before taking the picture, in the case of Zenith B and E by simply closing the aperture ring to the stop you intend to use; in the case of Zenith TTL and EM turn the serrated wheel on the lens mount nearest to the camera body from A (automatic aperture) to M (manual aperture) when the lens will stop down automatically to the pre-selected value. The image will, of course, become darker, but you can see the extent of sharpness to the foreground and the background from the subject you have focused on. See also Aperture and Depth-of-Field, page 46. After pre-viewing, re-set lens for normal working.

Infra Red Film Indicator

The Helios 44M lens of Zenith TTL and EM has an infra red focusing mark indicated by a red R beside the distance indication mark. When infra red film is used, focus in the ordinary way. Then read off the distance on the lens mount scale and turn this to the red letter R engraved on the distance scale. For example, if the focusing scale points to 10 m, turn the focusing ring so that the 10 m mark comes to lie opposite the R.

Delayed Action Release

A self-timer, or delayed-action release, is built into the front of the camera body to the left of the lens. This timer permits self-portraits.

It is advisable to place the camera on a rigid support, preferably a tripod or the edge of a table. Set shutter speed, aperture and transport film as usual.

To use the delayed-action release, swing the lever downwards as far as it will go, anti-clockwise, before or after the film transport lever has been advanced. On Zenith TTL and EM the Helios 44M lens has to be switched to 'M' (manual position). To bring the timer into action, press the button just above the self-timer setting lever and the shutter will automatically be released after about 7 seconds.

Film Plane Position

If extremely critical focusing with a tape measure is necessary (not required for general photography), you can measure the distance from the subject to 3 mm inside the rear edge of the top plate of the camera.

Shooting

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

1. **Transport the film by** moving the transport lever as far as it will go. This advances the film and film counter and tensions the shutter ready for the next exposure.
2. **Set the shutter speed** (before or after cocking the shutter)

by lifting and turning the speed dial either way to bring the required speed opposite the mark in the centre of the dial – on the TTL, the mark on the camera top plate.

For short time exposures, set the shutter speed to B; the shutter will remain open as long as the release is depressed.

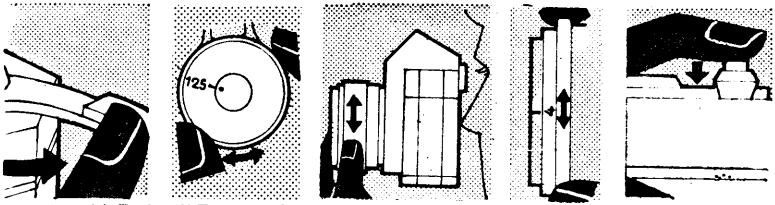
For long time exposures, you can press the release button (on B) and turn it anti-clockwise; the shutter will then remain open until you turn the release clockwise again.

3. **Set the aperture** on Industar *f*3.5 by turning the aperture ring to the required number.

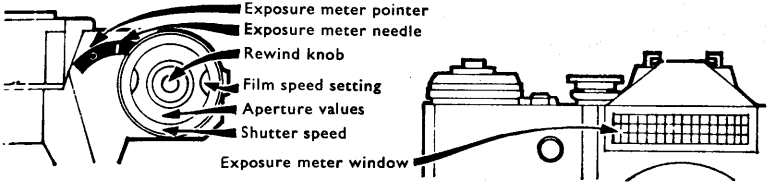
On the Helios 44 lens for Zenith B and E turn the lens front ring with the aperture numbers engraved on it until the aperture required points to the red indicator mark. It will click into position. After checking the picture field in the finder, turn the milled aperture ring (behind the aperture scale) to the left as far as it will go. This action sets the lens to the pre-set stop.

The Helios 44M lens for Zenith EM and TTL is normally used with fully automatic aperture. Ensure that the A/M switch is set to A (automatic) and then turn the aperture setting ring to the required stop where it will click into position. The aperture remains fully open for viewing and focusing and closes down automatically to the pre-selected value on pressing down the shutter release button. If this lens is required to be used with manual setting (e.g. to observe the depth-of-field visually) set the A/M switch to M (manual) and then set the aperture value selected on the aperture ring and the lens will stop down immediately to the stop chosen.

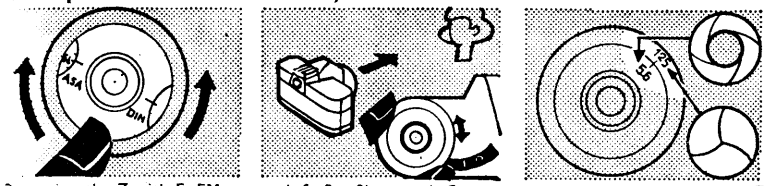
4. **Focus** and determine the picture area by looking through the finder eyepiece. Turn the focusing ring on the lens



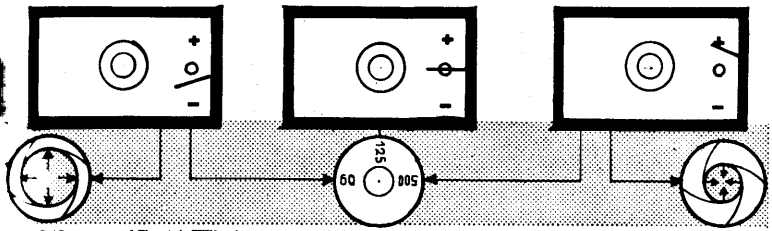
Shooting with Zenith (1) Transport film and tension shutter with the transport lever. (2) Set shutter speed. (3) Compose and focus image. (4) Set aperture on lens. (5) Release shutter.



The exposure meter of Zenith E, EM



Operating the Zenith E, EM meter. *Left.* Set film speed. *Centre.* Point camera at subject and turn outer rim of meter dial until the needle in the adjacent window bisects the circular mark. *Right.* Read off a suitable pair of shutter speeds and apertures and transfer the corresponding settings to the camera controls.



The CdS meter of Zenith TTL. Aperture and shutter speed are set for correct exposure on the Zenith TTL when the needle bisects (*centre*). When it falls, the lens must be opened up or a slower shutter speed set. When it rises, the lens must be closed down or a faster shutter speed set.

and EM allows you to measure the light giving the correct aperture for any given shutter speed. To use the meter:

1. **Set the film speed** either in ASA or DIN (according to the film you are using) by turning the top disc of the meter until the speed points to the index line in the cut-out segment.
2. **Point camera to subject** and turn the outer ring of the meter until in the cut-out meter window the needle cuts the movable circle through the middle.
3. **Read off on the outer rim** of the meter opposite any shutter speed the corresponding aperture. To simplify matters pre-select and set on the shutter the speed you want to use (e.g. 1/125 for general outdoor work) read off the aperture opposite 125 and set this on the lens mount.

   The shutter speeds engraved in black are those which you have on the shutter dial, the red ones are time exposures which require a rigid support of the camera and non-moving objects and can only be obtained with B setting of the shutter.
4. **Make sure the shutter is** set to the speed you want to use and set the aperture on the front of the lens mount.

Determining the Exposure with Zenith TTL

The Zenith TTL has a built-in CdS meter which is powered by a 1.25V mercury battery. The life of the battery in normal use is in excess of one year. Its power declines sharply towards the end of its life, resulting in sluggish movement of the meter needle which indicates the need for replacement. To change the battery, unscrew with a coin the lid to the left of the view-

To use the TTL Meter

1. **Check that the correct film speed** is set on the camera.
2. **Pre-set the shutter speeds.** For general photography outdoors the most useful speed to pre-set is 1/125 sec.
3. **Switch to the meter** by pressing the shutter release to its first pressure point.
4. **Turn the aperture ring** while looking through the viewfinder until the circle on the right of the finder is bisected by the movable exposure meter needle. When it comes to rest in the centre, you have the correct exposure. If the needle does not reach the centre, even if you open up the aperture fully, that indicates there is insufficient light for a correct exposure at the pre-set shutter speed. Then you need either a slower shutter speed or flash. With the needle off centre towards the + mark with the aperture fully stopped down, it means too much light and the shutter has to be set to a higher speed. Alternatively the aperture can be pre-set and the shutter speed dial turned until the circle in the finder is bisected by the needle.

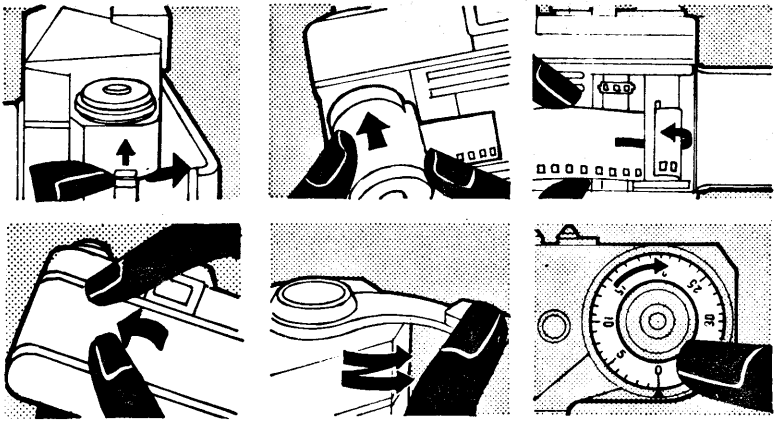
LOADING AND UNLOADING

The Zenith cameras, use standard perforated 35 mm film. It is available in various packings (see also page 25), the most convenient being standard daylight cassettes. These are light-tight containers with a ready-cut and trimmed length of film for 36 or 24 exposures and are loaded into the camera in daylight.

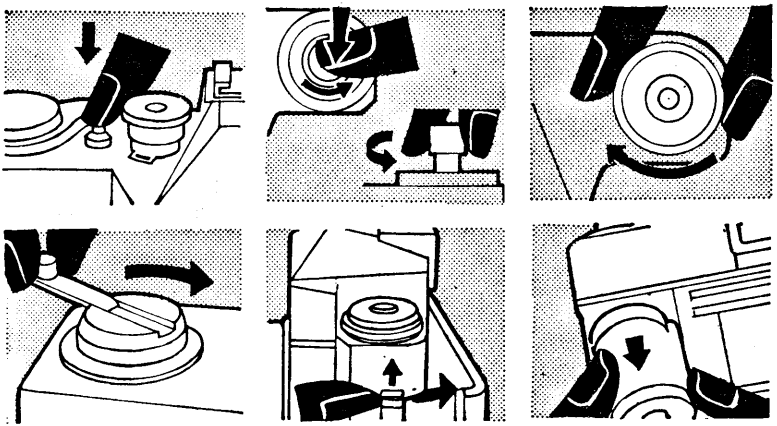
Avoid loading or unloading the camera in brilliant sunlight, though; choose a shady spot or do it in the shadow of your own body if nothing better is available.

Loading

1. **Make sure that the shutter release** is NOT set to 'T' lock position, and on models EM and TTL the rewind release ring is in normal position where the three dots line up.
2. **Open the camera back** by pulling out the sliding catch at the side of the camera body, permitting the camera back to swing open on its hinges.
3. **Pull up the rewind knob** as far as it will go, then place a loaded film cassette into the empty film chamber (below the rewind knob) with its hollow part towards the rewind key, while pushing up the cassette retaining spindle. The mouth of the cassette with the film end must point towards the take-up spool. Push the rewind knob back.
4. **Attach the film leader to the take-up spool.** Hold the cassette in position with the left thumb, while pulling with the right hand 4 to 4½ in (10 to 11 cm) of film from it. Push the free end of the film into one of the slots in the take-up spool of the Zenith TTL or EM camera and under the spring of the Zenith B or E. The take-up spool can be turned on its axis by its serrated lower flange to bring a slot or the spring into the most convenient position for inserting the film. Turn the serrated flange of the take-up spool in the direction of the film cassette until the film slack is taken up. Before closing the camera back, make sure that the perforations of the film engage in the teeth of the film transport sprockets.



Loading the Zenith. (1) Open camera back. (2) Insert cassette. (3) Thread film into take-up spool. (4) Close camera back. (5) Make 2 blind exposures. (6) Set film counter.



Unloading the Zenith. (1) Depress rewind button on model B, (2) on others, press centre of exposure meter and turn anti-clockwise to release the rewind knob. (3) Rewind film, (4) ditto on TTL. (5) Open camera back. (6) Extract cassette.

5. **Close the camera back** by pressing the hinged back on to the body. On models B and E slide the locking latch down to secure it in this position.
6. **Wind on the film and release the shutter twice.** This advances the first two frames which have been exposed to the light while inserting the film into the camera. These two wasted leader frames do not count as part of the number of exposures on the film.
7. **Set the film counter** on top of the film transport lever only after winding on the film. Turn the disc in an anti-clockwise direction until the engraved arrow head on the rim points to 'O' – to get ready to take wind the lever once more. When inserting the film, check it is properly loaded by observing the rewind knob (at the opposite end of the camera to the transport lever) as when you advance the film, the rewind knob should turn anti-clockwise. This proves that the film is being pulled out of the cassette on to the take-up spool. In the case of films shorter than 36 exposures, it is advisable to take up the possible film slack in the cassette by first turning the rewind knob in a clock-wise direction until a resistance is felt.
8. **Set film speed** on models with built-in exposure meter. On Zenith E and EM turn cut-out in top of rewind disc to the ASA or DIN speed of the film employed, on TTL turn the disc around the rewind crank until the required ASA or DIN speed figure point to the index mark on the camera's top plate.

   The disc on Zenith B rewind knob is intended as a reminder of the film type and speed you have inserted into the camera. It does not influence the working of the camera at all. To set: hold rewind knob and apply thumb pressure on disc and turn it until film type and speed lines up with the index mark.

Unloading

After all exposures have been made (the number of exposures taken is automatically shown on the film counter disc), unload the camera.

1. **As a precaution** against exposing the last frame to the light – as releasing the rewind has the effect of firing the shutter – place the lens cap back on the lens (or cover it with any other light-tight object).

2. **Set for rewinding.** On Zenith B and E press the rewind button between the shutter speed dial and frame counter wheel in the top plate of the camera and keep it depressed during the rewinding of the film.

   On Zenith EM and TTL press shutter release button and turn the rewind release ring (on the base of the release button) fully anti-clockwise. This permits rewinding the film without applying constant pressure.

3. **Rewind the film.** Rewind the film into its original cassette by turning the rewind knob clockwise. On Zenith E and EM gently press and turn the centre of the rewind knob, anti-clockwise and the rewind knob will spring up. Zenith TTL has a fold-up crank. Winding becomes distinctly easier the moment the film is fully wound back.

4. **Open the camera back**, remove the cassette, then close the camera back or reload with a new film.

The Double and Blank Exposure Lock

The Zenith cameras are fitted with a double and blank exposure lock. This means that the same piece of film cannot be exposed twice and, further, that the film cannot be wound on by mistake before an exposure has been made.

If, therefore, you cannot press the release button, you must transport the film by means of the rapid-winding lever. If the rapid-winding lever cannot be moved, the camera is ready for use or you have come to the end of the film and you have to unload.

To ensure that the interlock mechanism works, always release the shutter button fully before operating the film transport lever. If you have wound on the film and still cannot depress the shutter release, check that its collar has not accidentally moved to the 'lock' position.

Cutting off Exposed Lengths

If a film which is only partly exposed has to be processed, set the shutter for the next exposure and in the darkroom or in complete darkness, cut off with a pair of scissors the frame which lies in the film aperture. Retrim the remainder of the film (see pages 25–26), fix it again on the take-up spool and close the camera.

It is ready for the next exposure once the film counter has been set three numbers forward (the amount of film lost through cutting and reloading).

The reinserting can be done in daylight. In this case a total of about 6 frames are lost for, after inserting and closing, two blind exposures have to be made.

Some makes of colour film which are returned to the manufacturers for processing are for technical reasons only accepted in their full length and should, therefore, not be cut.

Changing Partly Exposed Films

To replace a partly exposed film by another one, for instance if you want to take a few colour photographs in between some black and white shots, proceed as follows:–

1. **Check the number of exposed frames** on the film counter.
2. **Rewind the film** but stop immediately you feel a slight resistance. This resistance comes from pulling the film end from the take-up spool. If the film is to be reloaded again, you must not pull the whole film into the cassette, otherwise the film end would have to be extracted by opening the cassette in the darkroom.
3. **Unload the re-wound film** and note the number of exposures taken on the beginning of the film. Now you can load the camera with any other type of film.

   When reloading, load the partly exposed film in the usual way, cover the lens with a lens cap (or hold some opaque material against the lens) and as additional precaution stop fully down. Wind the release until the film counter has advanced by the number of frames already

exposed. To be on the safe side it is advisable to allow one more frame to pass.

The rest of the film can now be exposed in the usual way.

Other Film Packings

In addition to standard cassettes, some 35 mm films are also available in various loose packings for loading into cassettes. This is a cheaper way of using film as you do not have to buy a new cassette every time with the film. The following packings are available.

DARKROOM REFILLS are lengths cut and trimmed for 36 exposures and have to be loaded into a cassette in total darkness (e.g. in a darkroom, or a light-tight changing bag).

BULK FILM is supplied in lengths of 6 m to 60 m (18 to 200 ft) and is the most economical way of using film. A suitable length is cut off to be loaded into a cassette in total darkness. Working in total darkness with refills or bulk film is not difficult. It is, however, advisable to practise filling with a dummy film first in daylight before starting the darkroom work.

Handling, Winding and Trimming the Film

When handling the actual film, particular care must be taken not to touch its emulsion (matt) side. Always handle it and wind on the centre spool of the cassette by holding the film by 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.

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

The film ends need trimming. At the beginning of the roll of film make either a straight or wedge-shaped cut for the centre

spool of the cassette and measure off the required length of film (see table, below). At the end of this make the curved cut for the take-up spool. The curved cut should start between the fifth and sixth bottom perforation, when the emulsion is towards you, and must not go through a perforation hole.

The ready-cut film is now spooled on the centre spool of the cassette. While winding in, hold the film only by its edges.

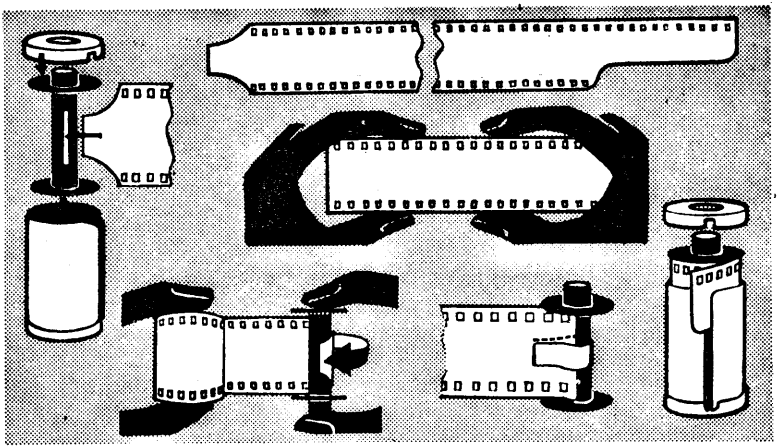
Also, take care not to press too hard on the film, and not squeeze the film-ends when drawing through the hand. Failure to take the first precautions may result in fogging, while neglect of the latter precaution may give rise to peculiar kinds of exposure effects known as 'lightning flashes'. These are due to electrical discharges and appear as dark, zigzag lines running from the edge of the film toward the centre of the picture.

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

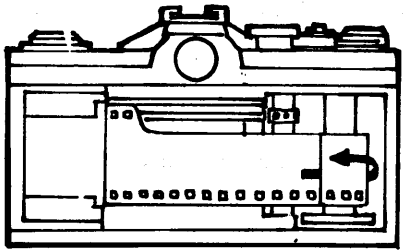
Number of Exposures	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*		*Number of Exposures*	*Length of Film Required*	
	in.	cm		in	cm		in	cm
1	11¾	30	14	31¾	80	27	51	130
2	13	34	15	33	84	28	52½	133
3	15	38	16	34½	88	29	54	137
4	16¼	41	17	36¼	92	30	55½	141
5	17¾	45	18	37¾	96	31	57	145
6	19¼	49	19	39¼	100	32	58½	148
7	20¾	53	20	40½	103	33	60	152
8	22	56	21	42	107	34	61½	156
9	22¾	60	22	43¾	111	35	63	160
10	25¼	64	23	45	114	36	64½	164
11	26¾	68	24	46½	118	37	66	167
12	28½	72	25	48	122	38	67½	171
13	30	76	26	49½	126	Including trimming		

Loading Standard Cassettes

The majority of cassettes 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 cassette, according to the construction of the particular container.



To load standard 35 mm cassettes, trim the required length of film at each end or use ready-trimmed refills. Push the end of the film into the cassette spool or attach with adhesive tape. Handling the film by the edges only, wind it on to the spool and place the spool in the cassette, allowing an inch or two of leader to protrude. When loading the camera (*below*) push the leader into the take-up spool and place the cassette in the chamber. Turn the spool by its edge to ensure that the film passes correctly over the sprockets and under the spool before closing the camera back.



Most cassettes are actually intended by their makers to be used once only, and with the film originally supplied in it. However, provided they are reasonably robustly made, and the light trapping velvet slot is in good condition, these cassettes can be reloaded many times, and will give perfectly good results, if handled carefully.

Loading with Bulk Film or Darkroom Refills

Work in total darkness and prepare the film as described on page 27.

1. **Open the cassette.**
2. **Fix the film to the centre spool.** If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, it has been proved best to wind a 1½ in (4 cm) piece of cellulose tape round the centre spool, so that on either side about ½ in tape is used to secure the film.
3. **Wind the film on the centre spool.**
4. **Insert the centre spool into shell,** leaving the first 2 in (5 cm) of film protruding through the light-trap.
5. **Close the cassette.** Where top and bottom are originally fastened by the outside label, fix the top and bottom cover to the shell preferably with a length of cellulose tape.

Daylight Loaders

A number of simple daylight loaders are available. They have two chambers: one to hold the bulk film, and the other the cassette. First you fill the bulk film chamber in total darkness; from then on, you load the cassettes in the light. You open the cassette chamber, fix the end of the bulk film to the cassette spool, then assemble the cassette and put it in the loader. Close the cassette chamber, and you are ready to wind the film in. Some loaders have a frame counter. On

others you count the number of turns of the winding handle. Either way, it is easy to load just the amount of exposure you want. There is just one small problem: the *last* two frames in the cassette are fogged during loading, so you cannot 'squeeze' an extra shot on.

FILM AND FILTERS

Black-and-white film 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 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 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 very low light. These films are rated at 100–160 ASA or 21–23 DIN.

FAST FILMS with somewhat coarser grain (still acceptable for reasonable degrees of enlargement) will cope with most light 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. The high speed is achieved at some cost in definition and graininess. Speed ratings range from 500–1600 ASA or 28–33 DIN.

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.

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 types of colour film; reversal and negative, also known respectively as colour slide film and colour print film.

Colour Reversal Film

This produces a colour transparency on the actual film exposed in the camera. This transparency, when held up to the lights, 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.

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.

For correct colour rendering, colour reversal films have to be matched to the light by which they are to be exposed. Accordingly, some are available in two types:

(a) daylight colour film 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 or high-power tungsten (studio) lights.

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. The colours are complicated by the presence of an overall orange or brick-red 'mask'. This helps to produce accurate colours in the final print.

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:

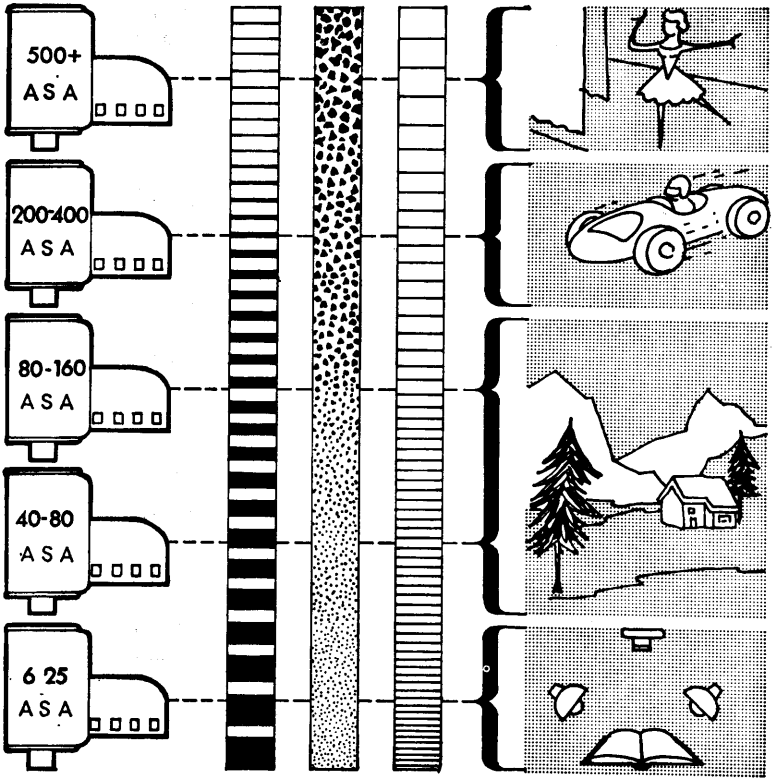
(a) any number of colour prints in varying sizes;

(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 colouring 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.

FILM SPEED, CONTRAST, GRAIN, RESOLVING POWER



Generally speaking, low speed goes with greatest contrast, finest grain and highest resolving power. The film speed (*left*) points to the corresponding contrast, grain and resolving power in the three bars. The contrast bar shows (*from top to bottom*) how low contrast becomes medium and then high as speed decreases. The grain bar shows the corresponding transition from coarse to fine grain and the resolution bar demonstrates the superior resolving power (more lines) of the slower film. The type of subject to which each type of film is best suited is shown on the right.

Colour Film Speeds

Colour film speeds closely match those of black-and-white materials. As with black-and-white films, the slower types tend to yield more 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 much to commend it. It is easily shown, stored and carried. The transparency calls for 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 no colour prints need or can be made from unsuitable negatives. The transparency user, however, has additional outlay in the form of a viewer or projector with screen (in most cases both).

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 contrast 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.

Care of Colour Film

Colour films should be processed as soon as possible after exposure. Always store films in a dry, cold place. Avoid damp or humidity. 35 mm films which have become damp show white specks. Never leave a film in the car in warm weather: glove compartments, side pockets, boot and shelf are heat danger spots.

Filters for Black-and-White Film

By its nature, a black-and-white film can only translate colour values of the subject into tones or 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 shade 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 and so making it record darker in the final print.

We can even go further and overemphasise the effect progressively with an orange or red filter – these can darken the blue so much that the sky looks almost black: 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

FILTERS FOR COLOUR AND BLACK-AND-WHITE PHOTOGRAPHY

Colour	Name	For Colour?	Exposure Factor* for Sunlight	Exposure Factor* for Tungsten	Effect
Colourless	UV	Yes	1	1	Absorbs only ultra violet rays. Used for colour photography since it produces no effects on colours. Also serves as a lens protector.
Light yellow	1	No	1.5	1.3	Absorbs ultra violet rays, purple and blue. For landscapes, portraits and snapshots. Assures proper contrast in brightness and dimensional effects. For black-and-white.
Yellow	1	No	2	1.5	
Dark yellow	3		2.5	2	
Orange		No	4	3	Produces powerful contrast due to its wide absorbing range. For mountains, distant scenes and architecture. For black-and-white.
Red	1	No	8	4	Extremely strong contrast. Daytime landscapes sometimes looks as if they were night scenes. Can be used with infra red film. For black-and-white.
Yellowish Green	0	No	2.5	2	Brings film characteristics closest to the human eyes. Shows colours naturally. For outdoor portraits as it has the same characteristics as the light yellow filter.
Light grey	ND 2	Yes	2	2	Absolutely no effect on colours but reduces light. Used with both colour and black-and-white. Light is reduced to 1/2 with ND 2, 1/4 with ND 4 and 1/8 with ND 8.
Grey	ND 2	Yes	4	4	
Dark grey	ND 8	Yes	8	8	
Light pink	SKY LIGHT	Yes	1	1	Like the UV filter, it absorbs ultra violet rays. Prevents distant scapes with sky and shades from becoming bluish in colour pictures. For colour film.
Light amber	2	Yes	1.2	1.2	Absorbs blue light from shadows; also from cloudy scenes. Used to reduce colour temperature for daylight type colour film.
Light blue	2	Yes	1.2	1.2	Absorbs red from scenes taken at sunrise and sunset. Raises colour temperature for daylight type colour film.
Blue	8	Yes	2	2	Used with flashbulbs (clear bulbs) and daylight-type colour film to reduce red tone and raise colour temperature.
Dark blue	12	Yes	3	3	Used with photo-reflector lamp (3200K) and daylight type colour film to reduce and tone and to raise colour temperature.

* When measuring the exposure on cameras with built-in TTL meter this factor is automatically allowed for.

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 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 are not intended for colour films; they would give the colour transparency a strong overall tint of the same colour as the filter.

In normal daylight and with daylight type film, only two filters are commonly used. One is the haze filter, 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. On dull days, a second filter, the so-called skylight filter, compensates for the excessive coldness of the colour rendering. Other filters change the colours to a greater extent. For example a 'morning and evening' filter in pale blue, and reduces the red colour in early or late pictures. Conversely, you may get improved colour rendering on a dull day, or in the shade with a stronger amber or pink filter.

CONVERSION FILTERS are used if a colour film, balanced for one type of light, should be used in another type of light, such as daylight film used in artificial light, and vice versa. The film manufacturers usually give specific recommendations in the instruction leaflet packed with the film.

The Polarising Screen

There are times when the judicious use of reflections will enhance the pictorial effect of the picture, but they are also frequently obtrusive and undesirable. Thus highly polished subjects are 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. This difficulty can be overcome by the use of the polarising screen.

It has the special property of suppressing 'polarised' light. From certain angles, light reflections from glass, china, enamel, polished wooden surfaces, and water (but not from metallic surfaces) are polarised to some extent and can, therefore, be almost extinguished by placing the polarising filter in proper position over the lens. This screen will prove particularly useful when taking shop windows, furniture, wet objects, etc.

The filter must be rotated to find out its best position on the lens. Single-lens reflex cameras are ideal for this observation. The filter is simply screwed into the front of the lens, and then by slowly rotating the filter front one can find the best or desired result on the reflex focusing screen. As the polarising filter absorbs a lot of the incident light, the exposure time should be increased, the factor being about three times.

The polarising screen is (in addition) particularly useful in colour photography where it acts similarly to the yellow filter in black-and-white photography, i.e. it darkens a 'milky' blue sky. The bluish colour cast obtained with diffused sky light is removed or at least appreciably reduced with the polarising filter. The reduction or elimination of reflections through this filter is, of course, just as useful in colour pictures as it is in black-and-white.