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MINOX

Guide

3rd EDITION REVISED

by W. D. Emanuel

HOW TO GET THE BEST OUT OF THE MINOX B AND MINOX IIIS

AN EXTREME MINIATURE

The Minox camera is probably the most original and unusual camera ever designed. At first sight it seems so small and in appearance so unlike a camera that one is hardly inclined to take it seriously. One has to examine the results to be convinced that it is not a good looking toy, but an efficient precision camera in its own right.

As long ago as 1934 its designer, Walter Zapp, set himself the task of producing an instrument so small and light that it could be a constant companion like a pocket lighter or fountain pen. He envisaged a camera that would be easy to handle and could produce results equal to its bigger conventional counterparts.

In 1936 the result of his work, the Minox, was produced by a large electro-technical manufacturer in Riga, Latvia, and up to 1939 over 17,000 were sold.

Since 1945 the Minox has been produced in Wetzlar in Western Germany.

The Camera

The Minox is a sub-miniature camera measuring 3⅞ X 1⅛ X ⅝ inches (9.8 X 2.8 x 1.6 cm.) and weighs 3¼ ounces (92 grams).

The lens is a 4-component 5/8 inch (15 mm.) Complan anastigmat *f* 3.5 with a focusing range from 8 inches (20 cm.) to infinity.

The built-in shutter has speeds of 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500 and 1/1000 second, as well as B and T settings and has a built-in flash contact.

The negative size is 8 X 11 mm. (5/16 X 7/16 in.). The camera takes daylight loading cassettes holding 50 exposures (36 exposures in the case of certain films including color). The film transport is coupled with the shutter tensioning mechanism.

The optical direct vision finder features a suspended frame system, and incorporates automatic parallax compensation.

Two filters, a green and grey (10X neutral density) are built into the Minox B; the III S has green and orange filters built in. A depth of field indicator is engraved on the camera body next to the distance scale on the focusing knob.

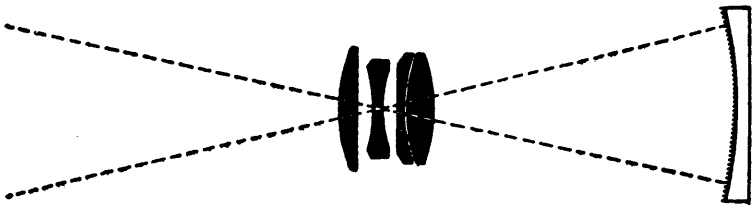
The Minox B has a built-in exposure meter coupled to the shutter speed setting control; the III S does not have this feature.

The Lens Features

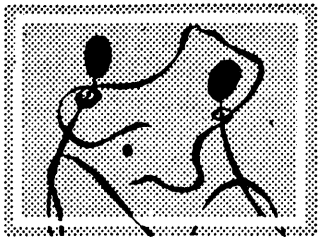
The aperture of *f* 3.5 was chosen because at this opening the maximum image quality is obtained and an adjustable aperture could be dispensed with. The adjustable aperture normally has the functions of increasing the depth of field and removing residual faults in the lens. In the Minox depth of field extends already from 6 feet to infinity.

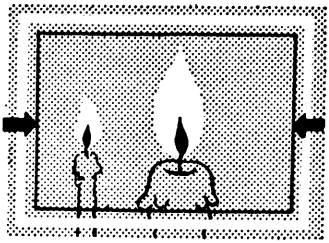
The curvature of field has been turned to advantage in the mechanical construction of the camera. The film does not lie flat but in a slight bowl shape where it is held by a slightly bowl shaped pressure plate. This is machined to the same high degree of accuracy as the lens. While the film is being advanced, the film transport system lifts the pressure plate clear of the film, so that the film does not touch anything during transport. When the camera is ready for the next exposure, the pressure plate again holds the film firmly against the curved film track.

This measure permits big enlargements of Minox negatives without stopping down, particularly as the Minox enlarger (page 78) also has a curved film track in the negative carrier. With an ordinary enlarger which holds the Minox negative flat enlargements of more than 12 diameters should not, however, be attempted.



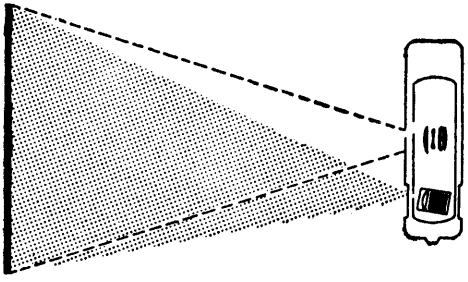
The lens of the Minox is a $\frac{1}{2}$ in. (15 mm.) Complan *f* 3.5, a 4-component coated anastigmat which has been designed to give its maximum definition in the curved film plane.





The viewfinder shows the subject within a clearly defined white frame which appears projected into the view. The frame permits at the same time observation of the surroundings. For extreme close-ups at 10 to 8 inches the limits of the subject field covered on the film lie a frame width within the white line.

The finder is automatically corrected for parallax by means of a coupling to the distance setting knob, and pivots laterally in the direction of the lens when adjusting the distance from infinity towards 8 inches.



The Minox lens is recessed into the camera body so that the part of the body shell in front of it acts as an efficient lens hood. Two filters are fitted to a sliding rod and built in front of the lens and can be brought into action at will. An ultra-violet filter in the front protects the camera lens and filters from dust and atmospheric influences. Both the lens and this protective glass are coated.

The viewfinder shows the subject within a clearly defined white frame which appears projected into the view. The frame permits observation of the surroundings at the same time, thus enabling the photographer to watch the view immediately outside the actual picture area. The finder is coupled with the distance setting, thus yielding a parallax-free image; the field shown is correct at all except the closest settings. Spectacle wearers will find that they can see the bright image easily and clearly. The illustrations on p. 7 show framing for all distances from Inf. to 8 in.

The Mechanical Features

All scales of the Minox are grouped side by side on the top of the camera and are easily operated with the tip of a finger, even with cold fingers or when wearing gloves.

The shutter of the Minox operates in front of the lens and opens fully at every speed. The shutter blades are only about 1/750 inch thick. All speeds from 1/2 to 1/1000 second as well as B and T are set by a single knob.

Closing and opening the camera automatically winds the film, tensions the shutter and advances the film counter. This prevents double exposures.

The carrying chain supplied with the camera is provided with suitably spaced beads for the accurate measurement of the more critical close distances (8 inches to 2 feet).

The Minox Models

The original Minox was introduced in 1936. Basically, it was of the same design as the present model, but it had a steel body,

direct vision finder, and only one built-in filter. The multi-sprocket film transport was replaced by a three-sprocket wheel in 1938.

The completely redesigned post-war Minox, made of special light-weight alloys, was put on the market in 1949. It had an improved lens and shutter mechanism, better viewfinder, two built-in filters, and a measuring chain.

In 1951, the optical system of the Minox was brought to its present perfection in a new model which also has further refinements of the shutter, the extremely brilliant new viewfinder with parallax correction, and automatic filter return.

The Minox III S, with internal flash-synchronization, was introduced in 1954.

In 1957 a "Private Eye" model of the standard Minox with body finished in black was announced.

Many Minox users prefer this unobtrusive finish for candid work.

In 1958 the current standard model, the Minox B, appeared with a photo-electric exposure meter built into the camera body, and coupled to the shutter speed setting. The orange filter of the III S was replaced by a 10X neutral density filter. The exposure meter of the Minox B automatically compensates for this filter when it is put into place. It is available in both chrome and black models.

HANDLING THE MINOX

Let us take it for granted that we have a Minox camera and a Minox film in front of us. Our first task is to load the camera. This should be done in subdued light; even the shadow of one's own body will do.

Loading the Standard Model

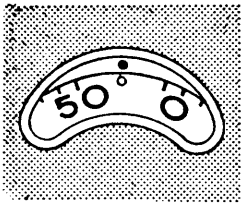
1. Set film counter to red dot.
2. Pull out camera.
3. Slide open back cover.
4. Push back camera 1/8 inch.
5. Drop cassette into film chambers.
6. Close back cover.
7. Push in and pull out camera twice.

1. Before inserting the film, the film counter has to be set to the red dot, which is situated between 50 and 0. To do this, repeatedly open and close the camera with a pull-push movement (a "pumping" action), until the red dot comes to lie opposite the black indicator mark in the film counter window.

2 and 3. Pull out the camera shell and turn it upside down. Depress the crescent shaped lock with the finger-nail of your left thumb, while pulling open the back cover slide with the right hand, until both film chambers are uncovered.

4. Now push back the camera body by about 1/8 inch. The lock will just start to disappear but the film chambers must be still fully uncovered. This action will open the film gate.

5. Place the Minox film in its cassette over the film chambers with the film towards the back of the camera and the hollow part over the transport spindle. It will then drop into the camera easily.



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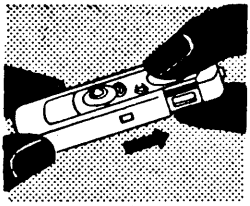

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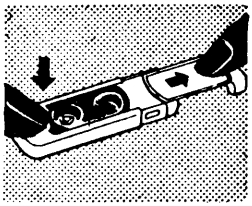

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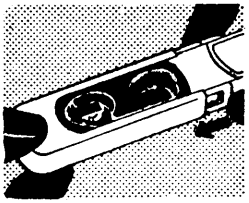

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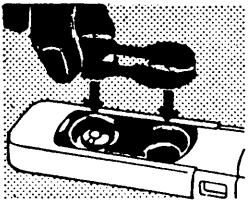

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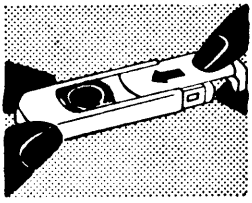

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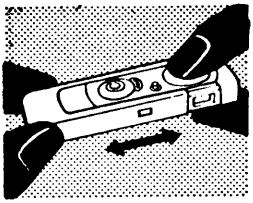


7.

Top row: **1. Set film counter to red dot. 2. Pull out camera. 3. Slide open back cover.**

Center row: **4. Push back camera $\frac{1}{8}$ in. 5. Drop cassette into film chamber. 6. Close back cover.**

Bottom: **7. Push in and pull out camera twice.**

6. Fully push back the back cover.
7. Open and close the camera (pull out the body and push it back again into its shell twice). This will wind off the first fogged and trimmed piece of film and advance the film counter to 0.

In the rare event of the film take-up core resting on the teeth of the transport spindle, the back of the camera will not close. In this case open the camera again fully, and push back until the film gate opens. The cassette is now re-inserted; then proceed as under 6 and 7 above.

When unwrapping the film cassette from its packing, care should be taken not to bend the bridge connecting the two parts of the cassette, otherwise it might cause loading or transport difficulties.

For 36 exposure rolls loading is the same as for steps 1 through 7 described above.

Loading the Minox B

1. With camera closed set the A.S.A. index by turning the shutter speed dial until the A.S.A. index for the film in use is opposite the film speed pointer (solid triangle ▲).
2. Open the camera back.
3. Turn the shutter speed dial to 100 (red dot).

Now proceed with loading in the same manner as for the stand and Minox (see p. 10).

Holding the Minox

The beginner with the Minox is likely to lose more pictures because of incorrect holding of the camera than through any other single cause! Time and again, when examining Minox negatives one can observe that part or even the whole image has been ob scured by a finger placed in front of the lens, or the brim of a hat covering part of the camera front.

The first and foremost rule in holding the Minox is therefore keep the front of the camera clear.

For horizontal photographs hold the camera with both hands. The thumbs of both the right and the left hand support the camera from underneath, the index finger of the right hand is placed over the release button, while the remaining fingers of the right hand and the left index finger hold the top of the camera. If they are allowed to wander away from the top there is a very good chance that one of them may obstruct the lens. The other fingers of the left hand are folded in towards the palm of the hand.

For vertical photographs use the same hand position, only with the camera turned upright.

Practice holding the camera in front of a mirror, which will soon reveal if and when the lens is obstructed.

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

A particularly steady hold of the camera is necessary when working with speeds of 1/20 second and longer.

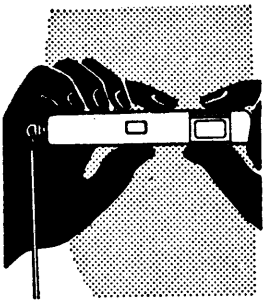
To reduce the risk of shake it is advisable to steady the Minox against your face and to stand with your legs apart. The shutter release of the camera is exceptionally smooth, so that only a gentle squeeze of the release button is required. The grip on the camera should remain steady, but not cramped.

For slow exposures with the camera held in the hand rest the elbows, or at least lean the body, against some support in order to avoid shake. In this way 1/10 second and, with a very steady hand, even 1/5 second can be exposed without noticeable camera shake.

Use of a tripod is necessary when taking time exposures, and is also recommended for speeds from 1/10 to 1/2 second.

A special tripod adapter and pocket tripod have been designed for the Minox (pages 65 and 66).

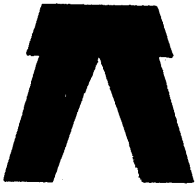
When making time exposures and also when working with slow speeds of 1/10 second and slower, a tripod, and cable release should be used. This is part of the Minox table tripod and screws into the cable release holding arm of the Minox tripod adaptor (page 65).



Left: For horizontal pictures the thumbs of both hands support the camera from underneath, the index finger of the right hand is placed over the release, the remaining fingers are folded in towards the palm. The fingers of the left hand hold the top of the camera.

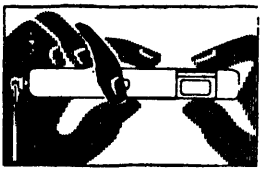
Steady the Minox against your face,

tuck both elbows well into your side,

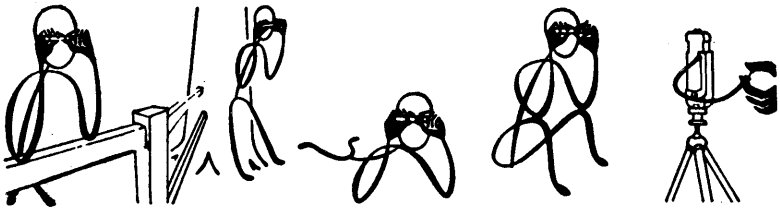


and stand with your feet slightly apart.

Right: For vertical photographs retain the same hand position as for horizontal ones but with the camera turned upright. *Below:* When holding the Minox take care not to obscure the lens with a finger or the brim of the hat.



Below: Whenever possible support your body against something solid such as a fence, wall, tree or prop your elbows against your knees, particularly with slow speeds. Use a cable release for time exposures from a tripod.



Shooting with the Minox

Practice the steps described here, first without film in the camera, so that in time they will become practically automatic.

Load camera with film.

1. Pull camera open.
2. Set distance.
3. Set exposure time.
4. Determine picture in viewfinder.
5. Release.
6. Close camera.

The loading of the camera is described on page 10.

1. To pull the camera open, hold it with the thumb of your left hand on the speed setting knob and the middle finger underneath. The thumb and index finger of the right hand holds the movable outer shell similarly. Pull the shell away from the main body as far as it will go.

2. The distance is set on the knob in the center of the camera top. Place one finger on the milled center of the knob and turn it, to set the distance required opposite the index mark. This is a black spot in the center of a short line (on the opposide side to the film counter). The distance scale carries the following settings: ∞ (infinity), 6, 3, 2 and 1½ feet, 1 foot, 10 and 8 inches. Minox cameras calibrated in meters carry settings of ∞, 2, 1, 0.6, 0.4, 0.3, 0.24, and 0.2 meters.

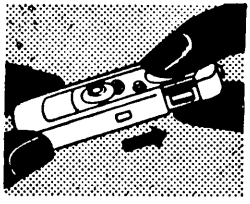
   Between the settings for infinity and for 6 feet (2 meters on metric cameras) is a red dot which represents a distance setting of 12 feet (4 meters) intended for zone focusing or snapshot setting (see page 28).

   While the distance is normally estimated, for short distances between 8 inches and 2 feet the Minox measuring chain can be used. This carries beads at distances which correspond exactly to those engraved on the distance scale of the camera. With the chain locked in the camera and stretched tight, accurate meas-

urements at 8 and 10 inches, and 1½ and 2 feet can be made. This last distance is represented by the full length of the chain. On cameras with a metric scale the corresponding figures are 0.2, 0.24, 0.3, 0.4, and 0.6 meters.

3. The shutter controls the length of time during which the light is permitted to act on the film (see page 33). The shutter speed dial is situated on top of the camera above the viewfinder. It is most conveniently set by placing the thumb on the knurled surface of the knob and turning the camera until the required exposure time is opposite the black dot on the rim of the knob.

The engraved figures 2, 5, 10, 20, 50, 100, 200, 500, 1000 stand for fractions of a second, and therefore mean 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500 and 1/1000 second respectively. Intermediate speeds may be set, for instance: 1/75 second is obtained by setting the shutter speed knob so that the black index mark is halfway between 50 and 100.



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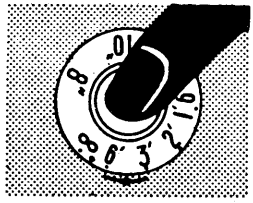

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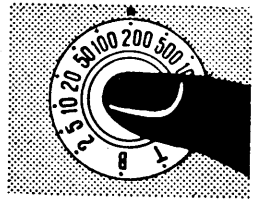

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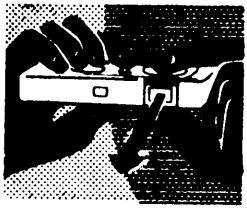

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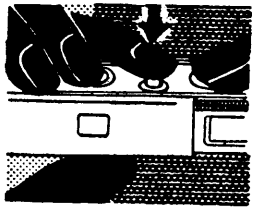

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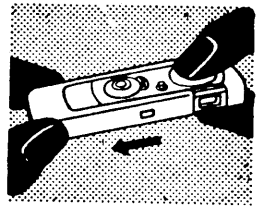


6.

***Top row:* 1. Pull camera open. 2. Set distance. 3. Set exposure time.**

***Bottom row:* 4. Determine picture in viewfinder. 5. Release gently. 6. Close camera and open again to be ready for the next exposure.**

For longer exposure times than 1/2 second, the B setting on the knob is used. In this position the shutter remains open as long as the release button is depressed and closes 1/2 second after you let it go. For long time exposures of several seconds, the T setting is employed. Here, pressing the release button and letting it go opens the shutter; to close the shutter again the release has to be pressed a second time. These long exposure times are best made with the camera on a tripod and with the aid of a cable release (see page 13).

4. The viewfinder is a direct vision optical suspended frame finder. It shows a white outline framing of the subject area covered. This white frame is fully visible even if you wear glasses. The finder is automatically corrected for parallax by means of a coupling to the distance setting knob, and pivots laterally in the direction of the lens when adjusting the distance from infinity towards 8 inches.

   The picture area remains correct for distances from ∞ down to 1 foot. For extreme close-ups at 10 to 8 inches, the subject field covered on the film lies a frame-width within the white frame.

5. The release is effected by gently pressing the release button on top of the camera. Speeds from 1/20 to 1/1000 second are instantaneous and can be taken hand held. However it is advisable to take great care to release particularly gently and hold the camera really steady when using speeds slower than 1/100 second.

6. To close the camera, push the shell fully back into the camera body. If the camera is in the pulled-out position and you are not certain whether the frame behind the lens has been exposed, look into the lens window. If a small white circle is visible there, this indicates that the shutter is set and the camera ready for exposure. If no circle is visible, close and open the camera to advance the film for the next picture. (Earlier cameras have a black circle.)

Shooting Action

Fast action subjects such as sports call for high shutter speeds, otherwise the picture may be blurred. Under unfavorable light conditions—when slower speeds are called for—fast motion can be arrested by applying some professional tricks.

It is easier to stop motion of a subject moving straight towards the camera or at an acute angle than it is to stop a moving subject taken at right angles to the camera.

In many sports and other activities the movements include a "dead point" with the subject stationary for an instant just before reversing its direction of motion. Watch out for this: for example, a swing at its highest point before it swings back, or a tennis player during serving when the ball is at the peak of the toss. Even 1/20 second will stop such a movement, if the shutter is released at the right moment!

For sharp pictures of fast movement of races—car, speedboat, skiing—use this trick: keep the car, boat, etc., in the viewfinder, follow its movement, releasing the shutter while moving the camera when the subject is nicely in the center of the finder. The background will be blurred—enhancing the impression of fast movement—but the subject will stay sharp even with exposures of 1/50 second. Needless to say, some practice is required to get good results every time.

Sequence Shots

Action sequences of shots in rapid succession are quite easy to take while holding the camera at eye-level. After each shot close and open the camera with the right hand and then release with the left index finger. In this way up to 2 exposures a second can be made to show changing expressions on a child's face, arrest the various stages of objects in motion, etc.

Unloading the Minox

As already mentioned, the Minox takes 50 exposures on a film, or 36 exposures per cassette depending on film type. The film counter

automatically indicates the number of exposures. After having taken all exposures, the Minox cassette is removed from the camera and replaced by a new film. Both these operations should be carried out in subdued light.

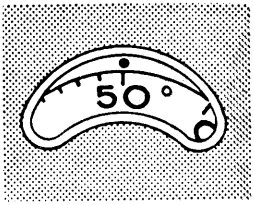
1. Watch the film counter; No. 50 or No. 36 in some cases is the last exposure.
2. Close and open camera twice.
3. Pull out camera again.
4. Slide open back cover.
5. Push back camera 1/8 inch.
6. Remove cassette.
7. Reload or close camera.

1. Do not advance the film beyond the red dot (or No. 38 for 36 exposure film), as the film might be pulled entirely into the take-up chamber of the cassette. This could result in fogging the film end by light entering through the light trap of the cassette.
2. See under loading, No. 7, page 12.
3. See under loading, No. 2, page 10.
4. See under loading, No. 3, page 10.
5. See under loading, No. 4, page 10.
6. Turn over the opened camera. The cassette will drop out on slight tapping. Alternatively the cassette may be lifted out of the camera by its bridge.
7. Reload the camera as instructed under loading, page 10. After a 50-exposure film the film counter should at this stage of the proceedings point automatically at the red dot.

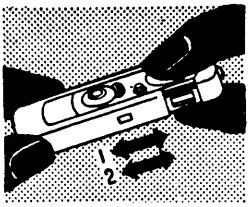
Changing Partly Exposed Films

Occasionally you may want to change a partly exposed film, for example when you would like to take some color shots while you have a black-and-white film in the camera. Or in poor light a fast film may be required, while a slow one is in use.

To change partly exposed films proceed as follows.



1.



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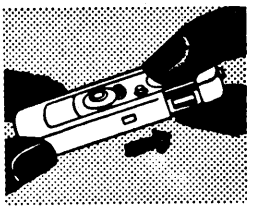

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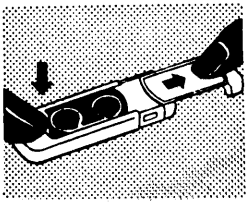

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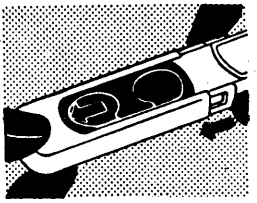

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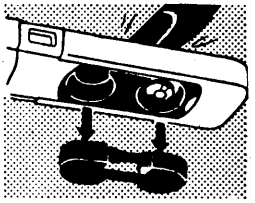

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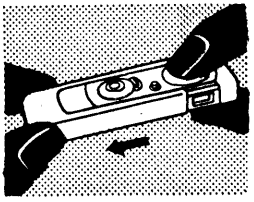


7.

Top row: 1. Watch the film counter, No. 50 is the last exposure—or 36 in the case of certain films. 2. Open and close camera twice. 3. Pull out camera again.

Center row: 4. Slide open back cover. 5. Push back camera $\frac{1}{8}$ in. 6. Tip out cassette.

Bottom: 7. Close camera or reload.

1. Close and open camera once after the last exposure taken on the film to be removed.
2. Remove the cassette as when unloading.
3. Note number now shown on film counter.
4. Insert a fresh film into camera.

2. See unloading, Nos. 3, 4, 5, and 6, on page 18.

3. Make a note of the number on the cassette for future reference.

4. See loading, Nos. 1 to 7 on page 10 (including resetting the film counter to the red dot).

The camera is now ready to be used with the new film in it.

To reload the partly exposed film:

1. Set film counter.
2. Load cassette and advance film.

1. Set the film counter three numbers *below* the number noted on the cassette as exposed. If, for example, the cassette had been removed at No. 30, set the counter to 27.

2. Insert the cassette as instructed under loading Nos. 2 to 6. Then close and open the camera three times to take up the film slack.

The camera is now ready for the next exposure.

Occasionally the question arises of cutting off exposed portions of the film. In our considered opinion this is, for all practical purposes, *not advisable.*

The reason for this is the appreciable risk of finger-marking and otherwise damaging the exposed part of the film, even when handling it with the greatest care. Leaving an end sufficiently long to handle the film in processing, in addition to the leader required for the remaining film, accounts for the loss of about 6 picture frames. On top of all that, the very intricate work required in opening the take-up chamber of the cassette in complete darkness, disengaging the film from the center spool, reattaching the remaining film correctly to the center spool, closing the cassette chamber and re-sealing it, should provide a sufficient deterrent to the most economically minded—even against attempting it just once.

MINOX FILMS

The Minox takes a 9.5 mm. wide unperforated film up to 75 cm. (29½ inches) long, in a special double cassette. One compartment acts as the feed cassette, the other as a take-up cassette. The two sections are joined by a bridge.

This Minox cassette can be loaded into and unloaded from the camera in subdued daylight. The cassette is not designed for reloading. The film is supplied in light-metal, tape-sealed boxes about half the size of a match box, containing two cassettes of negative film (or one of color film), individually packed and labelled.

A range of black-and-white and color films are available in Minox cassettes.

The normal black-and-white films are panchromatic emulsions which are sensitive to practically all the colors of the spectrum from violet to red. They produce a fairly true rendering in black-and-white of the tone values of the subject. Some particularly fast panchromatic films are oversensitive to red and will render this color too light.

The orthochromatic document film is a slow-speed emulsion, not sensitive to red, of high brilliance and contrast, and of particularly fine grain. This is intended for copying black-and-white line subjects, books, drawings, ledgers, etc., but is unsuitable for anything containing half-tones.

Film Speed

The overall sensitivity of films to light is expressed in various scales, such as Exposure Index numbers (also referred to as ASA or BS Index), Weston, Scheiner, DIN degrees, etc. Scientists and manufacturers all agree that none of the methods employed to determine the speed of films is entirely satisfactory, and continue to give preference to one or the other of them.

The films supplied in Minox cassettes are labelled with their speed expressed in A.S.A. Exposure Indexes.

It has to be borne in mind that, although speed is a very obvious asset, it is also a quality which has to be paid for by possible disadvantages of the material in other respects. To call the fastest film the best would be just as foolish as to select a racing car for daily driving.

Grain

Silver grains themselves form the picture in the emulsion. To the naked eye they form a compact, dark mass, but under the magnifying glass or microscope the separate clumps of grains are visible. Obviously, if the grain of our film is coarse, it will soon become visible on moderate enlarging. The finer the structure of grain, the more enlarging it will allow without showing any unpleasant granular effect in the print. In view of the high degrees of enlargement required of Minox negatives to yield reasonably large prints, fine grain is therefore important. As a rule, the grain size is more or less in direct relation to the speed of the film. The faster the film, the coarser the grain and vice versa.

It may be pointed out at the same time that the grain can, to a certain extent, be influenced by development (hence fine grain development), correct exposure (overexposure increases grain), choice of paper, when making enlargements, and processing and enlarging technique in general.

Gradation

Each film has its characteristic way of reproducing various degrees of brightness of the subject. If a film yields an image consisting of only a few sharp steps of gray between black-and-white. we speak of a high contrast or hard negative material. If it is able to reproduce many delicate shades of gray between black-and-white, it is known as a low contrast, or soft film. Generally speaking, low speed films of fine grain possess a higher contrast than fast films, which are softer.

Latitude

Latitude is the ability of the film to yield usable negatives, even with a certain amount of under- or (more often) over-exposure. Films praised for particularly wide latitude may facilitate exposure, but are likely to have less revolving power, causing loss of definition which in big enlargements is just as unpleasant as graininess.

Negative materials have a number of additional properties which help towards good results. There is a special protective coating—a hardened gelatin layer on top of the actual sensitive layer which protects against scratches. The base is colored, as a rule gray, in order to avoid reflection of the light coming through the emulsion and thus causing halation.

The Minox Film to Choose

As the Minox negative is extremely small it is best to use slow speed films of fine grain and high resolution. Remember also that the Minox camera always works at the fixed aperture of *f* 3.5, so that with a fast film in brilliant light you might need to use the 10X neutral density filter to cut the light entering the camera sufficiently to use the shutter.

Finally a slower speed film has a greater acutance as compared with a faster one, which will almost regularly result in a sharper appearance of the picture.

Slow speed film, 25 A.S.A., is to be recommended as a general purpose film in the Minox under good light conditions. It combines fine grain and good gradation with a speed which even on a cloudy day permits instantaneous shots.

Medium speed film, 50 A.S.A., is a material for any type of photograph and most light conditions. It is the fastest material advised for obtaining really sharp enlargements to postcard size without too disturbing grain.

Fast films, Plus-X (ASA 200) and Tri-X (ASA 400), are

MINOX FILMS ON THE AMERICAN MARKET

Film	Exposure Index	No. of Exposures
ASA 5	5*	50
ASA 25	25	50
ASA 50	50	50
Plus-X	200	50
Tri-X	400	36
Ansochrome	32	36
Agfa CN 14	20	36
Agfachrome CT 18	50	36

*Doku-Ortho—for line copying.

rather grainy and should only be employed when the light is too weak for a slower film and when flash is not convenient.

Color Films

The first color material generally supplied in Minox cassettes was Anscochrome, a reversal film. It produces positive color transparencies on the film which was exposed in the camera. These transparencies can be viewed in a magnifying viewer or projected on a screen. While it is possible to make color prints from these color transparencies, such prints are poor when compared with the transparency. They show neither the color quality nor the sharpness of the original.

The films currently available in Minox cassettes are Anscochrome (32 A.S.A.), Agfa CN-14 (20 A.S.A.) and Agfacolor CT-18 (50 A.S.A.).

Exposing Color Film

The exposure latitude of color film is very small. It is therefore important to ascertain the exposure time accurately with a photo-electric meter (see page 40). Underexposed shots will produce dense results with colors distorted, while overexposed films are weak and pale with highlights devoid of color.

Avoid great contrast such as deep shadows. Watch for strong color reflections, which, while being faithfully recorded, may produce displeasing results in the final picture.

When you are using your Minox for photographs in daylight, or with electronic flash indoors, you can use any of the color films listed. When you use a flashgun, use blue bulbs for Anscochrome and Agfachrome CT-18, white bulbs for Agfa CN-14.

Displaying the Color Picture

The color transparency is in the first instance intended to be viewed by projection in the Minox projector (see page 83) which will throw a large picture on a screen. It may also be viewed in the Minox magnifying viewer (see page 74). Finally, the Minox color transparency can be mounted into a 2 X 2 inch transparency binder, to be viewed in a variety of normal miniature transparency viewers or projectors.

Agfa CN-14 can be developed into black-and-white or color prints. Because color prints are more expensive, the usual procedure is to make black-and-white proof prints of the entire roll and to choose from these the shots to be printed in color.

THE TECHNIQUE OF FOCUS

When you take a picture, the lens is focused at some definite distance. That means, that its position relative to the film is adjusted in such a way that whatever is exactly at the focused distance will be represented by a sharp image on the film. Everything else—everything nearer to the camera or farther away from it—will be, strictly speaking, unsharp.

In practice the decline of definition is, of course, gradual. Thus there is a zone—stretching from somewhere in front of the focused distance to somewhere behind it—which will appear sufficiently sharp to the human eye. This is called depth of field.

Now, what should or should not be accepted as sufficiently sharp is debatable. Certain standards, however, have been agreed upon. Thus a "pin point" represented on the 8 X 11 mm. Minox negative by a "dot", the diameter of which does not exceed 1/60 mm., is regarded as sharp for average standards. The technical term for that "dot" is "circle of confusion."

The limits defined by the circle of confusion are reached more quickly with one type of lens than with others. Thus from the same point of view short focus lenses yield more depth of field than longer focus lenses, and far focusing distances yield more depth than near focusing distances. Further small apertures yield more depth of field than large ones.

Viewed in this light the case of the Minox is unique. The focal length of its lens is only 15 mm., that is about 1/3 of that of the normal lens of a 35 mm. camera. In consequence the depth of field is so high even at its full opening of *f* 3.5, that an adjustable aperture has been dispensed with and the lens opening remains fixed at *f* 3.5.

The near and far limits of the depth of field for any distance setting are indicated on the Minox camera as extension lines to the right and left from the distance-indicating dot. If you set, for ex-

ample, the distance on the camera to 6 feet the line to the right extends to 4 feet, and the one to the left to 11 feet. This means that the depth of field with this setting covers a range from 4 to 11 feet and everything between these distance limits will be reproduced sharply on the film. If you set the distance to 4 feet the lines extend to 3 feet on one side and 6 feet on the other, and subjects between these distances in front of the camera will be sharp on the film.

Snapshot Setting—Zone Focusing

Half-way between the 6 feet and ∞ marks the distance scale carries a red dot. This mark corresponds to 12 feet, and the depth of field at this setting extends from 6 feet to infinity.

This setting will be found particularly convenient when it comes to seizing a situation where there is no time for many preliminaries and which requires instant readiness to shoot. If you leave the camera on this setting you are ready for sports, street scenes, candid groups, etc., as long as you keep in mind that the nearest object must not be closer than 6 feet from the camera.

On the other hand it should not be overlooked that scenes without important foreground interest should rather be taken at the infinity setting, as the best and most critical pin-point sharpness is always at the actual distance set.

Intermediate Distance Settings

In addition to the distance settings engraved on the distance scale of the Minox you can of course also set in-between values to obtain maximum pin-point sharpness on a particular distance required. If the camera is set exactly half-way between the two engraved settings the distances are as indicated in the table on p. 29.

The distance between camera and subject has to be estimated. Owing to the large depth of field there is a very reasonable latitude at distances from 3 feet and farther, so that there is little chance of inaccurate focusing. The short ranges from 8 in. to 2 feet have to be set accurately. Here the measuring chain should always be used.

INTERMEDIATE MINOX DISTANCES

Feet Scale		Metric Scale	
Marked Values	Intermediate Values	Marked Values	Intermediate Values
∞		∞	
(red dot)	12 ft.	(red dot)	4 m.
6 ft.		2 m.	
	4 ft.		1.33 m.
3 ft.		1 m.	
	2 ft. 5 in.		0.75 m.
2 ft.		0.6 m.	
	1 ft. 8¾ in.		8 m.
1½ ft.		0.4 m.	
	1 ft. 2⅜ in.		0.34 m.
1 ft.		0.3 m.	
	10⅞ in.		0.27 m.
10 in.		0.24 m.	
	8⅞ in.		0.22 m.
8 in.		0.2 m.	

Depth of Field Tables

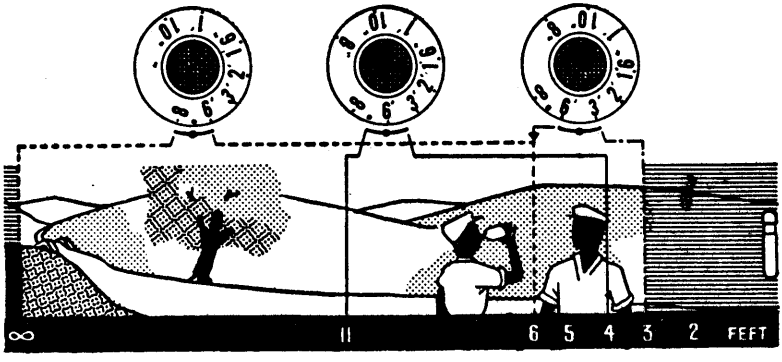
These tables have been included in this book, in spite of the fact that the Minox is fitted with a depth of field indicator. The tables supply more accurate figures, which cannot be so readily read off the indicator as the distance scale is not calibrated in sufficient detail.

All distances given are from the front of the camera.

The first column gives the distance to which the camera is to be set. In addition to the distance values engraved on the distance scale of the camera, in between settings are also shown in brackets.

The second column shows the field covered at any distance setting with the Minox.

The third column gives the depth of field covered with the Minox at each camera distance (as indicated in the first column) for a standard circle of confusion of 1/60 mm.



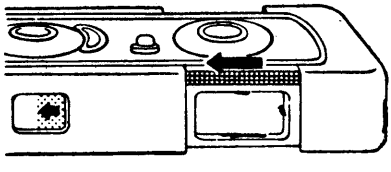
The near and far limits of the depth of field are indicated on the Minox as extension lines to the right and left of the distance index. If the distance is for example set to 6 ft. (*above center*), the line extends to 4 ft. on the right and to 11 ft. on the left, and everything between these limits will be reproduced sharply on the film. At closer settings the depth is less (*above right*), at more distant settings it is greater (*above left*); thus setting the distance to the red dot (12 ft.) renders everything sharp from 6 ft. to infinity.

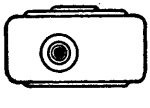
THE BUILT-IN MINOX FILTERS

Two filters are built in and placed in position in front of the lens by simply sliding the knurled bar on top of the view finder front window to the left. In the standard model pushing the first $\frac{1}{4}$ in. places the orange filter (3×) in position, pushing fully, the green filter (2×).

The filters for the Minor B are green (2×) and grey (10×).

In the standard Minox, closing the camera automatically pushes the filter back. This is not the case in the Model B.





Flash outlet will be found at end of Minox camera.

For illustrations of Minox B.C. Flash and Electronic Flash units see page 53.

DEPTH OF FIELD AND SUBJECT AREAS (FEET)

Focused Distance	Field Size	Depth of Field From	To
∞	—	12 ft. 8 in.	∞
(12 ft.)	6 ft. 5 in. × 8 ft. 9 in.	6 ft. 1½ in.	∞
6 ft.	3 ft. 2 in. × 4 ft. 5 in.	4 ft. 0 in.	11 ft. 4 in.
(4 ft.)	2 ft. 1½ in. × 2 ft. 11 in.	3 ft. 0½ in.	5 ft. 11 in.
3 ft.	1 ft. 7 in. × 2 ft. 2 in.	2 ft. 5⅞ in.	3 ft. 9½ in.
(2 ft. 5 in.)	1 ft. 3 in. × 1 ft. 8¾ in.	1 ft. 11⅞ in.	2 ft. 11¼ in.
2 ft.	1 ft. 0½ in. × 1 ft. 5⅛ in.	1 ft. 8¾ in.	2 ft. 4½ in.
(1 ft. 8¾ in.)	10⅞ in. × 1 ft. 2⅞ in.	1 ft. 6⅜ in.	2 ft. 0 in.
1 ft. 6 in.	9¾ in. × 1 ft. 0¾ in.	1 ft. 4⅛ in.	1 ft. 8½ in.
(1 ft. 2⅜ in.)	7⅛ in. × 10½ in.	1 ft. 1⅛ in.	1 ft. 3⅞ in.
1 ft.	6 in. × 8⅞ in.	11⅛ in.	1 ft. 1 in.
(10¼ in.)	5⅜ in. × 7½ in.	10⅛ in.	11¾ in.
10 in.	4⅞ in. × 6¾ in.	9¼ in.	10¾ in.
(8⅜ in.)	4⅜ in. × 6 in.	8⅜ in.	9½ in.
8 in.	3⅞ in. × 5⅜ in.	7⅝ in.	8½ in.

DEPTH OF FIELD AND SUBJECT AREAS (METERS)

Focused Distance	Field Size	Depth of Field From	To
∞	—	3.85 m.	∞
(4 m.)	212 × 292 cm.	1.97 m.	∞
2 m.	105 × 145 cm.	1.32 m.	4.11 m.
(1.33 m.)	70.0 × 96.4 cm.	0.99 m.	2.03 m.
1 m.	52.6 × 72.2 cm.	0.80 m.	1.34 m.
(0.75 m.)	39.1 × 53.7 cm.	0.62 m.	0.92 m.
0.6 m.	30.0 × 40.0 cm.	0.52 m.	0.71 m.
(0.48 m.)	24.7 × 33.8 cm.	0.43 m.	0.55 m.
0.4 m.	20.5 × 26.4 cm.	0.36 m.	0.45 m.
(0.34 m.)	17.2 × 23.7 cm.	0.31 m.	0.37 m.
0.3 m.	15.2 × 20.0 cm.	0.28 m.	0.32 m.
(0.27 m.)	13.4 × 18.4 cm.	0.25 m.	0.29 m.
0.24 m.	12.0 × 16.5 cm.	0.23 m.	0.26 m.
(0.22 m.)	10.8 × 14.8 cm.	0.21 m.	0.24 m.
0.2 m.	9.8 × 13.5 cm.	0.19 m.	0.21 m.

THE TECHNIQUE OF EXPOSURE

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

1. The amount and color of light reflected from the subject to be photographed. This in turn depends on the season of the year, the time of day, situation, weather, etc.

2. The speed of film, kind of filter used, the lens aperture, which is fixed at *f* 3.5 in the Minox and possibly an allowance for an increase in exposure if certain fine grain developers are used.

Exposure Tables

These are based on practical experience and mathematical calculations. They tabulate all or most of the factors given above, and, if used with discretion, will give an exposure figure which lies well within the latitude of the film. Such a table, designed for the Minox, is given at right.

Available Light Photography with the Minox

The Minox camera with its tiny size and extremely quiet shutter is ideally suited to unobtrusive photography by available or existing light.

In very poor light super-fast film such as the 400 ASA Tri-X will prove invaluable, while under better conditions the slower and finer-grained Plus-X (ASA 200) will be found satisfactory.

The available light exposure table (p. 34) should only be used as a guide. After a few trials your own experience will tell you how to expose under conditions similar to those previously encountered.

For very important subjects, or when in doubt, bracket your exposures—that is, make one extra exposure at the next faster shutter speed and one extra exposure at the next slower shutter speed, in addition to the regular exposure.

SHUTTER SETTINGS FOR OUTDOOR PICTURES

Use shutter setting shown opposite subject, under prevailing light conditions. Subject types are: **average** – Nearby people, gardens, houses. **light** – People in beach and snow scenes; distant scenery. **dark** – People in dark clothing, dark flowers, streets, houses. When in doubt use "Average" settings.

NOTE: The settings in this simple guide do not necessarily agree with settings obtained by careful measurement with an exposure meter.

BLACK & WHITE		Bright Sun	Hazy Sun	Cloudy Bright	Cloudy Dull
ASA 25	Average	200	100	50	20
	Light	500	200	100	50
	Dark	100	50	20	10
ASA 50	Average	500	200	100	50
	Light	1000	500	200	100
	Dark	200	100	50	20
Plus-X	Average	*1000	1000	500	200
ASA 200	Light		*1000	1000	500
*green filter	Dark	1000	500	200	100
Tri-X	Open Shade		500		
	Light Overcast		1000 with orange filter		
ASA 400	Heavy Overcast		1000 with green filter		

COLOR		Bright Sun	Hazy Sun	Cloudy Bright	Cloudy Dull
Agfa	Average	150	75	50	20
CN-14	Light	300	150	75	30
ASA 20	Dark	75	30	20	10
Anscochrome	Average	500	250	60	30
Hi-Speed	Light	800	400	100	50
Daylight	Dark	300	150	40	20
Agfacolor	Average	500	200	100	50
CT 18	Light	1000	500	200	100
ASA 50	Dark	200	100	50	20

For best exposure accuracy use your Minox Exposure Meter whenever possible.

Photo-Electric Exposure Meters

A photo-electric exposure meter is the most accurate and dependable means available for arriving at the correct exposure.

The Minox exposure meter, no longer manufactured, was specially made for the Minox. It has a built-in viewfinder which

AVAILABLE LIGHT EXPOSURE TABLE

Shutter settings. While shutter settings vary with the amount of available illumination, type of subject, color of walls or furnishings, etc., the following approximate settings have been found adequate under average conditions.

For existing light:	Tri-X ASA 400	Plus-X ASA 200
Home interiors, bright artificial light	1/20	1/10*
Home interiors, daylight	1/100	1/50
Television pictures	1/20	1/10
Brightly lighted offices, daylight	1/200	1/100
Offices, bright artificial light	1/50	1/25
Museums, Exhibitions, School Rooms, Stores, Commercial and Industrial Interiors	1/50-1/100	1/25-1/50
Spot-lighted athletic, stage, and ice shows	1/100	1/50
Brightly lighted downtown areas at night	1/20	1/10*

*** For exposures longer than 1/20 a tripod, or firm support, is advisable.**

helps in pointing the meter at the exact subject area to be measured. The exposure times can be read off at a glance without further settings or conversions. The reading is retained until the instrument is used again. The needle remains locked and is only free during the actual operation of taking a reading.

The Minox meter is shock-proof, as the whole measuring unit is mounted in jewelled bearings. Its light-metal casing is specially treated against corrosion.

The back of the Minox meter carries a conversion table, making this instrument also suitable for use with conventional cameras with adjustable aperture. The meter is supplied with a chrome-plated chain, in a leather case. In smallness and minimum weight it corresponds to the design of the camera itself.

The viewfinder of the Minox meter can be used to determine beforehand whether a subject is worth photographing at all. To do this with the camera finder would mean opening the camera —with a possible loss of a frame if no exposure is made.

On the Minox B a complete photo-electric meter is built into the camera. Here the camera viewfinder helps to point the meter in the right direction.

How to Use the Separate Minox Meter

1. Set film speed.

OUTDOOR EXPOSURE TABLE FOR ANSCOCHROME

	Bright Sunlight					
	Front Lighted	Side Lighted	Back Lighted	Hazy Sun	Cloudy Bright	Cloudy Dull
AVERAGE	500	300	250	250	60	30
LIGHT	800	500	400	400	100	50
DARK	300	200	150	150	40	20

—When in doubt, use setting for "Average Subjects"—

To obtain intermediate speeds not shown on your Minox, but shown here, set shutter speed dial between speeds engraved on scale. Example: To get speed of 300 (1/300 sec), set dial between 200 and 500.

2. Look through meter finder.
3. Press meter button.
4. Read off exposure time.

1. The back of the meter carries in the top right hand corner a movable round disc. To its left a chart gives ASA Exposure Index ratings of Minox films, opposite a set of symbols.

   Place the thumb of one hand against the movable round disc and turn it until the symbol identifying the speed of the film appears on the end of the speed indicator cylinder seen through the window on the front of the meter. For example: if a film with an Exposure Index of 200 A.S.A. is in the camera, turn the movable disc on the back of the instrument until the cylinder (seen through the front window) shows on top the symbol for that speed, a black triangle.

2. Hold the instrument up to the eye and look through the viewfinder at the scene to be photographed.

3. While viewing, press the button on top of the instrument for about 2-3 seconds and let go again. Depressing the button releases the meter pointer, which will move to the position indicating the exposure time required, and stay locked at this position until the button is depressed for another reading.

4. The correct exposure time can now be read off in the meter window. The indicator needle will point to a segment, which shows at its end the shutter speed required.

The black figures on white (2, 5, 10, 20, 50, 100, 200, 500, 1000) stand for fractions of seconds and therefore indicate 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500, and 1/1000 second respectively. The white figures on black (1, 2, 5, etc.) indicate full seconds.

If the film in use is intermediate in speed between those given on the Minox meter, set the meter to the next higher (or lower) speed and use the corresponding intermediate exposure value on the camera.

Similarly, if the needle points exactly to the line dividing two fields, the intermediate exposure time may be set.

The Built-in Meter of the Minox B

The Minox B has a photo-electric exposure meter built into the camera body. The meter is coupled to the shutter speed setting. Before using the camera, the film speed must be set. This is done before the film is inserted into the camera, and requires no further attention even when changing films as long as films of the same speed are used.

1. On loading the camera, set the film counter to the red dot (see page 11, No. 1). While the camera is closed turn the shutter speed dial until the ASA speed indicator (a solid black triangle ▲) points to the speed of the film to be used, e.g. 25, 50 or 200 ASA etc.

Intermediate speeds may also be set by utilizing the shorter pointers to the right or left of the solid triangle. Setting the line to the *left* of the solid arrow to the engraved ASA number reduces the film speed. Thus an ASA exposure

setting of 25 becomes ASA 16, 50 becomes ASA 32, 100 becomes ASA 64, 200 becomes ASA 125, 400 becomes ASA 250.

Setting the line to the right of the solid arrow to the engraved ASA number increases the film speed by two steps. Thus an ASA setting of 25 becomes ASA 42, 50 becomes ASA 80, 100 becomes ASA 160, 200 becomes ASA 320, and 400 becomes ASA 640.

2. Open the camera back (see page 11 Nos. 2 and 3).
3. Turn the shutter speed dial to 100 (1/100 sec.) which is marked with a red dot.
4. Now proceed with loading the camera with film as instructed on page 11, Nos. 4-7.

Notes on Using the Meter

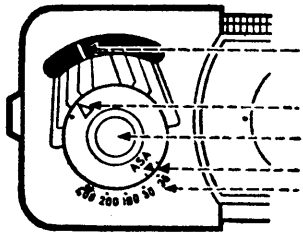
The photo-electric cell is located behind the honeycomb window in the front plate of the meter. Take care therefore not to obstruct this window with your fingers, the brim of a hat, etc., while taking a reading.

Normally, measure the light reflected from the subject to be photographed from the camera position. This covers most occasions, but there are important exceptions.

If there is a great range of contrasts in the scene to be measured, point the instrument in the direction of the darkest parts which should be fully exposed and which play a major part within the picture.

In the same way if, for example, a portrait is to be taken against a light sky, take the meter reading at close range, so that the figure fills the viewfinder of the meter. In this way the exposure time indicated is based on the light reflected by the subject only and this will be correctly exposed. With a reading taken from the camera's viewpoint the much brighter sky would influence the measurement and indicate too short an exposure time as far as the actual subject is concerned.

MINOX B EXPOSURE METER



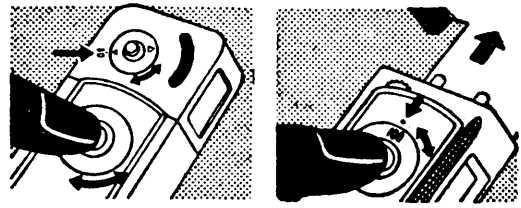
a) Exposure meter needle.

b) Setting pointer

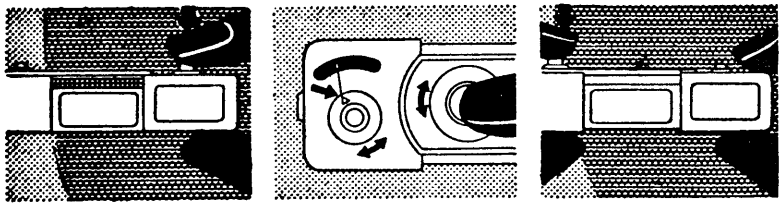
c) Operating button

d) Film speed index

e) Film speed scale



f) Set the film speed before loading. Rotate the shutter speed wheel until the film speed index is opposite the required number (*left*). Open the Minox and set the shutter speed dial to 100 (*right*). Then proceed with loading.



g) To take a reading, sight the subject (*left*), and press the operating button for 2 to 3 seconds. Rotate the shutter speed dial until the setting pointer is aligned with the meter needle (*center*). Then take the picture (*right*).

When photographing landscapes with a large expanse of sky, tilt the exposure meter slightly towards the foreground. This ensures that this part of the picture is not underexposed.

In photography against the light where the shadow areas should show full detail, it is particularly important to point the meter at these shadow areas at close range.

When not in use, protect the Minox meter by keeping it in its leather case. The case has a slot on one side to accommodate the

release button. A carrying chain is provided for the meter, which can be detached in the same way as described for the camera itself.

Using the Minox B Meter

1. To take a reading, look through the viewfinder, and press down the button in the center of the exposure meter. Take care not to obstruct the exposure meter window with your fingers.
2. After 2-3 seconds let go of the button. The camera can now be removed from the eye.
3. Turn the shutter speed setting dial until the open triangle (△) setting of 25 in front of the meter button is opposite the black line leading to the position of the white meter needle in the cut-out window. If the white meter needle comes to rest between two connecting lines set the triangle similarly between two adjacent lines.

   Now the camera is set to the correct exposure time.

   It will frequently happen that the shutter speed setting is in between two engraved speeds, e.g. between 100 and 200. That need cause no worry, as the shutter speeds run continuously from 1/2 to 1/1000 sec. and it only means that you have set an intermediate speed. In our example above this would be 1/150 sec.

   Exposure times longer than 1/2 sec. can not be set by turning the shutter speed dial; the B or T setting on the shutter has to be employed (see page 16, No. 3). If the shutter speed scale points to the blue dot between 2 and B this stands for an exposure of 1 second and if it points to B, the required exposure is 2 seconds. Intermediate positions have to be estimated.

   Exposures at speeds slower than 1/50 sec. should not normally be made with the camera held in the hand (use the Minox tripod, see page 66).

   If you do not know, or have forgotten to what film speed the exposure meter is set, simply turn the shutter speed dial to 100, and read off the ASA speed on the meter opposite the solid triangle.

Using the Minox Meter for Color

Set the color film speed on the meter. For 32 A.S.A. films use a meter setting halfway between the 25 and 50 ASA settings. Take close-up readings wherever possible.

If the main subject is in the shade, but the surroundings in sunshine: double the exposure indicated by the meter, e.g. if the meter shows 1/100 second use 1/50 second.

Against the light use half as much again as indicated by the meter.

In dull lighting on overcast days double the exposure time indicated by the meter.

See the general advice given for color work on page 25.

The Separate Minox Meter with Conventional Cameras

The separate Minox meter is designed for an aperture of *f* 3.5, which is the fixed opening at which the Minox works. To employ the meter with cameras which have adjustable apertures use the conversion scale to be found on the back of the meter.

The vertical center column of the scale indicates the exposure figures for *f* 3.5 as indicated on the Minox meter front. The corresponding exposure times for other apertures can be read off the left of the center column for *f* 2 and *f* 2.8 and to the right for *f* 5.6 and *f* 8. Thus a reading of 1/100 second on the Minox meter corresponds on the scale to 1/500 second at *f* 2, or 1/25 second at *f* 8, and so on.

Meter Calibration

To obtain best results it is very advisable to make a number of tests as the methods of handling the meter, of developing the film, density of negatives required, etc. vary greatly. Consequently you may get better results when setting the meter to a different ASA index than that suggested by the film manufacturer.

We suggest that you treat your first film as a test film and expose subjects in the sun, in shade etc. each with:

(a) twice the exposure indicated

(b) the exposure as indicated

(c) half the exposure indicated, and

(d) one-quarter of the exposure indicated by the meter.

Examination of the resulting negatives (preferably with an expert) will show the best overall result. If, for instance, half the exposure time indicated gives the best results, compensate for this by using the corresponding higher film speed setting on the meter (e.g. if the film is officially rated at 25 ASA, use 50 ASA).

The writer has made extensive tests with his own camera and found for his purposes he gets consistently good results for his (straightforward) method of taking and processing when using his film (rated at 25 ASA) with a setting of 75 ASA on the meter.

Filters with the Minox B Meter

When the green filter is brought into action (see page 44) you can still set the correct exposure time with the aid of the built-in meter. Simply turn the small green dot beside the open triangle (instead of the open triangle itself) to the appropriate line leading to the needle position.

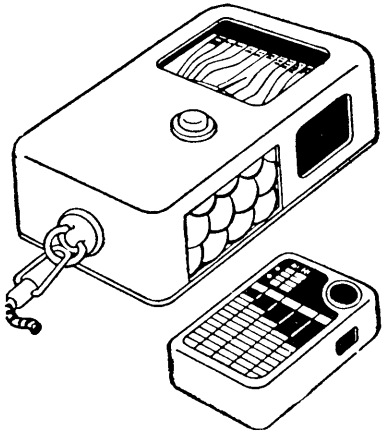
When the neutral density filter is brought into action (see page 45) the built-in meter automatically compensates for the exposure increase necessary and the reading obtained with this filter in position is correct.

Exposure in Practice

The employment of some exposure aid is strongly recommended in order to secure negatives suitable for enlarging. Minox negatives must be sharp, have fine grain and show a well balanced gradation between black and white.

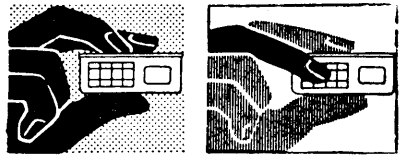
The beginner will particularly be well advised to *use the exact time of exposure* indicated by his meter or chart and to employ straightforward methods of development: that is to say the developer recommended by the makers (see page 75) or one which gives

THE SEPARATE MINOX EXPOSURE METER

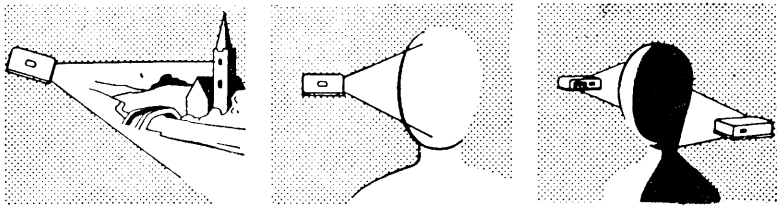


Left: The Minox photo-electric exposure meter is especially made for the Minox camera. It has a built-in viewfinder which helps in pointing the meter at the exact subject area to be measured. The exposure time can be read off at a glance; a table on the back gives corresponding values for cameras with adjustable apertures. The reading is retained until the instrument is used again. The needle remains locked and is only free during the actual operation of taking a reading.

Right: Always keep the meter front unobstructed while measuring to ensure correct readings. It is all too easy to place a finger in front of the photocell!



Below: Normally measure the light reflected from the subject from the camera position (*left*). When shooting against the light where the shadow areas should show full detail it is particularly important to point the meter at these shadow areas at close range (*center*). If the subject has a great contrast range, particularly in portrait photography, take a close-up reading (*right*).



a good fine grain without loss of emulsion speed. This will yield negatives with the best definition for the average degree of enlargement. The grain, with a medium speed film, will not show unpleasantly.

It should be borne in mind that the latitude towards underexposure of any film is small indeed. At the same time *the popular rule rather to overexpose does certainly not hold good for the sub-*

miniature Minox negative either. The over-exposed negative will regularly show much more grain with loss of definition, making such negatives virtually unsuitable even for a reasonable degree of enlargement. Therefore: accurate exposure is essential!

The advanced worker who aims at particularly fine grained negatives and intends to use ultra-fine-grain developers must be aware of the loss of speed caused by them, and will, therefore, compensate for that by increasing the exposure time. However, the negatives will then stand a high degree of enlargement without showing unpleasant grain.

Alternatively, it is equally feasible to use the next slower speed film with normal fine grain development and without loss of speed. The grain is likely to be equally fine, while the exposure time—as normal development calls for no increase—would be practically the same as for the faster film, giving ultra-fine-grain development.

This consideration will make it doubly clear why use of slower speed films is so strongly recommended.

The Use of Filters

Black-and-white film, even when panchromatic, fails to render colors in their true gray tone values, so that the photograph often gives a false impression of the real scene. The following is the explanation of this discrepancy.

Scientifically speaking, to the human eye yellow appears to be approximately over ten times as bright as blue, three times as bright as red, and one and a half times as bright as green. The average panchromatic film (page 22), however, registers blue with a brilliance of about four-fifths that of yellow, green with one-third, and red with two-thirds of the brightness of yellow.

It is therefore evident that in order to obtain a color rendering which will correspond with some degree of accuracy to impression of colors as perceived by the eye, the photographic sensitivity of the various colors compared with each other will have to be corrected. This can be achieved by the use of filters.

Filters control the tone rendering on the negative material.

They lighten objects of their own color and darken those of their complementary color (for example an orange filter will darken the blue of the sky). They may be used to obtain a color rendering in the picture which corresponds more closely to the impression made upon the eye by the object: so we speak of *correction filters.*

Filters may also be employed to emphasize certain effects regardless of whether such emphasis is scientifically correct or not. For instance, a picture can be made to show heavy clouds against a particularly dark sky, whereas the actual landscape revealed only light clouds in a blue sky. Filters used for such ends are termed *contrast* or *effect filters.*

All filters cut out some part of the light and thus an increase in exposure time is necessary to compensate when using them. Exact figures can only be given for each particular case, for the exposure ratio depends not only on the nature of the filter but also on the color sensitivity of the film and on the color of the prevailing light.

The Minox camera has two filters built-in. These are placed in position in front of the lens by simply sliding the knurled bar on top of the viewfinder front window towards the lens. Pushing the bar the first 1/4 inch places the orange filter in position; pushing the bar as far as it will go places the green filter in front of the lens. Make sure the filter required covers the lens opening fully.

When the camera is being closed, the filters are automatically pushed back, to ensure that a filter does not remain in position accidentally. If the filter is used on subsequent exposures it has to be pushed in front of the lens every time it is required.

The green filter is a correction filter and holds back the blue, rendering it darker. It is therefore particularly suitable in landscape photography in order to obtain clearly defined cloud effects on a normal blue sky. It also holds back red (renders it darker) to which some panchromatic films are over-sensitive (reproducing it too light). Finally it offers a better differentiation in the various shades of green than the unaided film can do. The exposure time

when using the green filter has to be doubled; e.g. if 1/100 second is correct without a filter, use 1/50 second with the filter.

The orange filter is an effect filter and over-corrects. It serves therefore to depict heavy cloud effects against a dark sky when in fact normal clouds were present on a blue sky. It strongly reduces haze, giving very clear distant views even when some haze is present. In general the orange filter dramatizes the scene. The exposure time when using the orange filter has to be trebled, e.g. if 1/100 second is correct without a filter, use approx. 1/30 second with the filter. This is set on the Minox between 50 and 20.

Do not use these filters with color film.

The Filters of the Minox B

The Minox B camera has a built-in green filter which has the same characteristics as the one described for the Minox III S.

In addition it has a 10x neutral density filter which is intended to cut down the light without having any effect on color rendition. This is useful on occasions when even a shutter speed of 1/1000 sec. would give over-exposed negatives. Examples are brilliantly lit subjects such as beach scenes, snow scenes, etc. in bright sunshine taken with a medium speed or fast film in the camera.

Either filter is placed in position in the same way as explained for the Minox standard but the filter is *not* automatically pushed back on closing the camera. Therefore push the bar which brings the filter in position back when it is no longer required.

The exposure increase in the case of the green filter can be allowed for on the built-in meter as explained on page 41.

The 10X exposure of the neutral density filter is automatically compensated for on the exposure meter when the filter is in front of the lens. In effect, the exposure meter has a high and a low range sensitivity. When the light is bright, and the 10X filter is not used, readings are made on the high range. When light is so bright that 10X filter must be used, readings are made on low range.

FLASH AND ELECTRONIC FLASH WITH THE MINOX

Flash and electronic flash are efficient light sources where insufficient light is available such as at night, indoors, etc. In the flash unit you carry your own private "sun" with which you can illuminate your subject or scene at any time and place.

The flash bulb is similar to a small electric bulb. However, when current passes through it, it lights up in an intense flash lasting usually about 1/100 second.

Each bulb will flash only once and has to be discarded afterwards.

The flash bulb is inserted in a battery case, the current of the battery is used to set off the bulb, a reflector behind the bulb makes sure that all the light is directed towards the subject. The shutter speed—provided it is slower than 1/20-1/50 second—has no effect on exposure since the flash is shorter than the exposure time. A diffusion screen which may be placed in front of the bulb has a two-fold action: it softens the light and acts as a safety shield in the very rare event of a bulb bursting.

In the Minox Electronic Flash unit * current is discharged from a power pack through a flash tube filled with a rare gas such as Xenon.

This causes the tube to emit a brilliant flash of short duration.

Unlike flash bulbs, the flash tube does not have to be renewed after each flash. It is good for over 10,000 flashes.

This makes electronic flash ideally suited where a number of pictures must be made in succession and operations (bulb changing, reinsertion, etc.) must be reduced to a minimum.

The color quality of the light emitted by the flash tube in the Minox Electronic Flash unit is quite similar to daylight, making it eminently suitable for exposing daylight type Minox Color Films.

* Discontinued

Minox Synchronization

The Minox cameras made since 1954 are internally synchronized.

The Minox synchronization contacts fire the flash at the moment when the shutter is fully open. The technical term for this is "X" synchronization.

Releasing the shutter closes the contacts firing the bulb the moment the shutter blades are fully open.

The shutter setting when using AG-1 flash bulbs in the Minox B-C Flash unit should be 1/20 sec.

For electronic flash any shutter speed up to and including 1/500 may be employed.

When using flashguns of other than Minox make a setting of 1/20 second should be used.

Minox B-C Flash

The new Minox B-C Flash is the world's smallest and lightest unit, measuring just 2 X 1 X 1/2" and weighing a feather-light 1½ oz.

Three models are available: Model B for the Minox B, Model A for the Minox III S, and Model U to fit the accessory shoe of 35mm or larger cameras.

Models A and B fit directly onto the Minox without any connecting cords or wires.

Model U has a connecting cord to fit the flash plug of the camera shutter.

The Minox B-C Flash comes complete with its own leather belt case. The case has a flat leather loop through which it can be attached to a belt or to the camera chain.

Like the Minox itself, the flash unit has an anodized satin chrome finish, so it is fully in keeping with the design and spirit of the camera.

The Minox B-C Flash houses a built-in telescoping reflector, which gives full, concentrated illumination without the need for a larger fan-shaped reflector.

For flash pictures, no matter what type of film is in the camera, set the shutter speed at 1/20.

When you want to take flash pictures, all you do is push up the button on the back of the flash unit. This draws the spoon-shaped reflector out of the unit housing.

After you have taken a picture, push the button down.

The reflector returns to its place in the unit housing, and, at the same time, the used bulb is automatically ejected.

Besides concentrating the light on the subject, the reflector shields the picture-taker from the heat and flash of the bulb.

Always be certain, therefore, that the reflector is fully extended before you fire a flash picture.

The reflector becomes quite hot as soon as the flash is fired, so be sure to use a camera hold that keeps your hands and fingers off the reflector.

The Minox B-C Flash is powered by a battery-condenser arrangement; hence the abbreviation "B-C."

Current from a 15 volt Eveready 504 or similar battery charges the condenser. At the moment of exposure, the condenser discharges its power to flash the bulb in a tiny fraction of a second.

The condenser's life is practically unlimited.

The battery maintains its power for an indefinite period. It should be replaced, though, after about two years.

With the Minox B-C Flash, use the tiny, all glass AG-1 "jelly bean" flash bulbs.

Though these bulbs are about the size of the smallest digit of your little finger, they pack tremendous power.

The AG-1 bulb has a rated output of 7000 lumen seconds, which is equal to or slightly more than the output of the most modern compact electronic flash units weighing ten times more than the Minox B-C Flash.

Correct exposure settings for flash with both the current and discontinued models of the Minox B-C Flash will be found on page 50.

Correct exposure settings for the Minox Electronic Flash will be found on page 51.

The Flash Distance

The table shows correct working distances for the recommended flash bulbs. Flash distances are for rooms of average brightness.

In bright rooms (bathroom or kitchen) double the distance; while in very large rooms, at night outdoors or particularly dark interiors, the distance should be halved.

Bounce flash may be employed to obtain a diffused light and at the same time to take close up photographs without overexposure. With the Minox the light of the flash is directed against the ceiling by detaching the gun from the camera and holding it in the hand. This requires the use of an extension cord and Minox flash adapter if Minox flash units are used. The effective flash distance is the sum of the distances from flash to ceiling and from ceiling to subject. This method gives a result equal to diffused room lighting, preventing harsh shadows.

RECOMMENDED FLASH TO SUBJECT DISTANCES

set speed dial at 1/20 for all film types

	Without Filter	Green Filter	Neutral Density
ASA 25	3-14 ft.	2-10 ft.	1 - 5 ft.
ASA 50	4-20 ft.	3-14 ft.	1½- 7 ft.
Plus-X Pan ASA 200	8-32 ft.	5-22 ft.	2½-12 ft.
Tri-X Pan ASA 400	9-40 ft.	6-28 ft.	3 -14 ft.
Agfa CN-14 Color Neg. ASA 20	3-14 ft.	———	1 - 5 ft.
Anscochrome Color Pos. ASA 32	6-10 ft.	———	2-3½ ft.
Agfacolor CT 18 ASA 50	5-12 ft.	———	1½- 3 ft.

1. Agfa CN-14 and all black & white film use clear flash bulbs

2. Anscochrome ASA 32 – use blue bulbs

FLASH DISTANCES WITH OLD STYLE MINOX B-C FLASH M2

M2 Flashbulbs at 1/20 sec.

	Without Reflector	Fan Reflector Only	Fan with One Thickness of Handkerchief	Fan with Two Thicknesses of Handkerchief	Polished Reflector
MINOX ASA 25	6 ft.	15 ft.	10 ft.	8 ft.	20 ft.
ASA 50		25 ft.	18 ft.	14 ft.	35 ft.
ASA 200		50 ft.	35 ft.	25 ft.	60 ft.
DAYLIGHT COLOR ASA 32* ANSCOCHROME	7½ ft.	18 ft.	14 ft.	10 ft.	25 ft.
Agfa CN-14	6 ft.	14 ft.	9 ft.	7 ft.	18 ft.
Agfachrome CT-18		25 ft.	18 ft.	14 ft.	35 ft.

***Use blue-tinted M2B bulbs; clear white bulbs that have been treated in Jen-Din, or use a blue flash shield with clear white bulbs.**

FLASH DISTANCES – MINOX ELECTRONIC FLASH

Battery Operation

FILM	FAN REFLECTOR	POLISHED COLOR REFLECTOR
ASA 25	3 ft. to 8 ft. from subject	7 ft. to 15 ft. from subject
ASA 50	5 ft. to 12 ft. from subject	9 ft. to 20 ft. from subject
TRI-X	9 ft. to 20 ft. from subject	15 ft. to 30 ft. from subject
ANSCOCHROME DAYLIGHT– ASA 32	3 to 5 ft.	6 to 8 ft.
AGFA CN-14	2½ to 7 ft.	6 to 13 ft.
AGFACHROME CT-18	5 to 12 ft.	9 to 20 ft.

Recommended average shutter setting is 1/200 sec., although all other speeds may be used. Flash duration is 1/1000 sec.

A.C. Power Supply

FILM	FAN REFLECTOR	POLISHED COLOR REFLECTOR
ASA 25	5 ft. to 9 ft. from subject	8 ft. to 15 ft. from subject
ASA 50	8 ft. to 15 ft. from subject	10 ft. to 20 ft. from subject
PLUS-X	10 ft. to 20 ft. from subject	15 ft. to 25 ft. from subject
TRI-X	15 ft. to 25 ft. from subject	20 ft. to 40 ft. from subject
ANSCOCHROME DAYLIGHT– ASA 32	6 ft. to 8 ft.	9 ft. to 11 ft.
AGFA CN-14	4 ft. to 8 ft.	7 ft. to 13 ft.
AGFACHROME CT 18	8 ft. to 15 ft.	10 ft. to 20 ft.

NOTE: When using color film in room with dark colored walls reduce distance from camera to subject by 1 ft.

Recommended average shutter setting is 1/200 sec., although all other speeds may be used. Flash duration is 1/800 sec.

To assure full exposure with electronic flash wait till the neon tube at the side of the flash head lights up. At least five seconds should be allowed between flashes to guarantee full power.

A very slow blinking of the neon tube is a sign that the battery should be replaced.

EXPOSURE GUIDE NUMBERS WHEN USING MINOX ELECTRONIC FLASH WITH ALL OTHER CAMERAS

	Kodachrome Daylight	Anscochrome 32, Ektachrome Daylight, Universal Kodacolor*	Tri-X ASA 400	Plus-X ASA 200	ASA 50	ASA 25
FAN REFLECTOR	**14**	**24**	**80**	**56**	**40**	**28**
POLISHED REFLECTOR	**20**	**36**	**110**	**80**	**56**	**40**

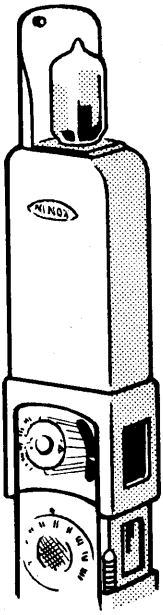
***Kodacolor requires an 85 conversion filter**

USING THE NEUTRAL DENSITY FOR CLOSE-UP FLASH SHOTS

By shifting the neutral density filter in front of the lens, you can take flash-shots at the following closer camera-to-subject distances:

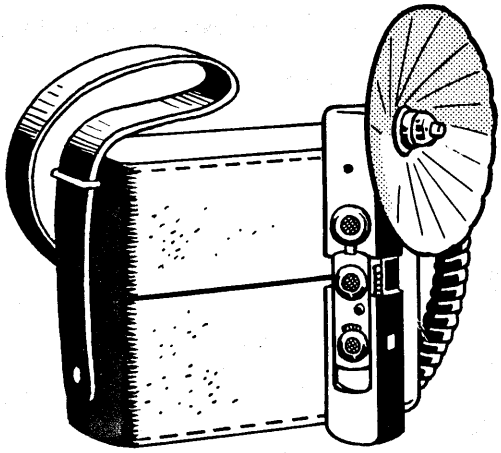
	Minox B/C Flash with AG-1 Bulb (built-in reflector)	Minox B/C Flash with M-2 Bulb (fan reflector)	Minox Electronic Flash Unit (fan reflector)
ASA 25	1 – 5 ft.	5 – 7 ft.	2½ – 3 ft.
ASA 50	1½ – 7 ft.	8 – 10 ft.	3½ – 4½ ft.
PLUS-X	2½ – 12 ft.	10 – 12 ft.	5 – 7 ft.
TRI-X	3 – 14 ft.	14 – 18 ft.	7 – 9 ft.

The above distances apply in room with light colored walls.



The current Minox B-C Flash weighs 1½ oz. It uses AG-1 "jellybean" bulbs.

The Minox Electronic Flash, shown below, is now discontinued. The old-style B-C Flash shown with it used miniature M-2 bulbs.



EXPOSURE INFORMATION WHEN USING MINOX B/C FLASH WITH ALL OTHER CAMERAS. In combination with Minox Flash Adapter, use F or X synchronization of camera with shutter speed of 1/50 sec. or slower.

Bl/Wh Tungsten Rating	16	25	50	64	160	Daylight Kodachrome	Daylight Anscochrome ASA 32, Ektachrome,
FAN REFLECTOR *Guide No.	55	70	105	110	170	35	60
POLISHED REFLECTOR *Guide No.	70	90	130	140	200	50	90

For black and white films, use M-2 bulbs. For Daylight color films, use M-2B bulbs. For Kodacolor film use the Tungsten 25 rating and clear wire-filled (M-2) bulbs.

* Guide Numbers: To find correct lens setting (f-stop), divide Guide Number by the distance from flash unit to subject. Example: Guide Number 60, Distance 10 ft. Use f:6.

CLOSE-UP WORK WITH THE MINOX

For close-up work the Minox requires no special lens attachments as its focusing range extends down to 8 inches. At this distance a field of 3⅞ X 5⅜ inches is covered. In consequence documents, book pages, illustrations, as well as small objects, can be photographed without difficulty. The field covered at the various distance settings is given in the table on page 31.

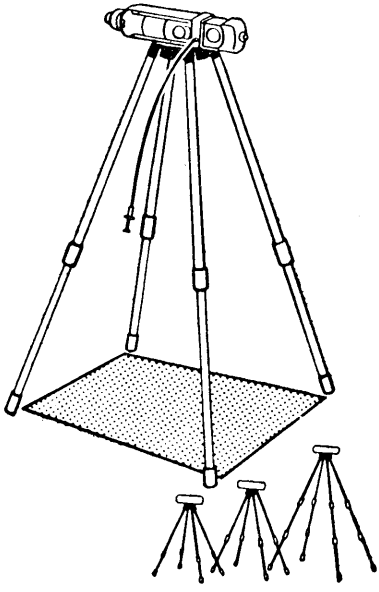
The Minox Copying Stand

To facilitate efficient, quick and fully accurate copying work, an adjustable copying stand has been made for the Minox, which allows copying of originals between 3½ X 5½ inches and 9½ X 12½ inches in size.

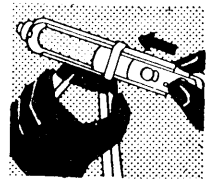
The Minox copying stand consists of a camera clamp with cable release socket and four adjustable three-section legs. The legs are calibrated to correspond with the various distance settings of the camera between 8 and 18 inches. The camera clamp can be removed from the copying stand and may be used separately to attach the camera to the Minox tripod or any other tripod.

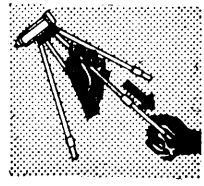
Using the Copying Stand

1. Attach legs to clamp adapter.
2. Position lug of clamp.
3. Attach camera to clamp.
4. Extend legs.
5. Check camera and image.
6. Expose.



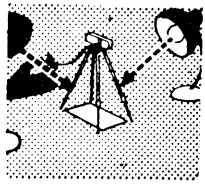
Left: The adjustable Minox copying stand allows copying originals between $3\frac{1}{2} \times 5\frac{1}{2}$ inches and $9\frac{1}{2} \times 12\frac{1}{2}$ inches in size. It consists of a camera clamp with cable release socket and four adjustable three-section legs. The latter are calibrated to correspond with the various camera distance settings between 8 and 18 inches. See page 57.

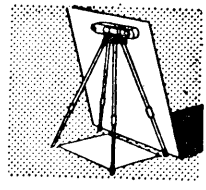




Above left: Three extension positions corresponding to distance settings of 8, 12, 18 in. *Above right:* To set up the stand, slide the camera into the clamp. *Center:* Extend the legs by loosening the ribbed collars on their base.

Illumination is usefully obtained with two table lamps arranged on opposite sides to avoid shadows (*bottom left*). When working in daylight or with one lamp a piece of white card (*bottom right*) will avoid shadows.





1. Screw the legs into the ring-shaped clamp adapter after aligning dots on legs with dots on adapter.

2. The polished lug inside the closed end of the clamp has to be in a vertical position; if it is not, turn the knurled knob of the clamp to position the lug vertically.

3. Slide the camera—with the lens downwards—into the clamp, so that the rectangular slot at the end of the camera engages the lug of the clamp. Then turn the knurled knob of the clamp clock-wise to lock the camera into place. When the camera is in the picture taking position (pulled out), the cable release socket of the clamp will line up with the camera release button. The camera can remain in position in the clamp during the "push-pull" movement to reset the camera for successive exposures.

4. To extend the legs, loosen the ribbed collars at the base of each leg and pull out to the required position. Lock each leg by tightening its collar. The following distances are indicated and can therefore be quickly set to match the distance scale on the camera:

   8 *inches*: legs fully pushed in.

   10 *inches*: loosen upper (larger) collars, pull out by gripping lower collar until the first click is felt.

   12 *inches*: as for 10 inches but pull to second click.

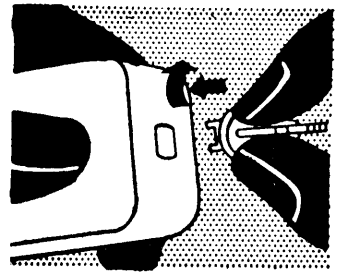
   18 *inches*: loosen large and small collars, pull out fully.

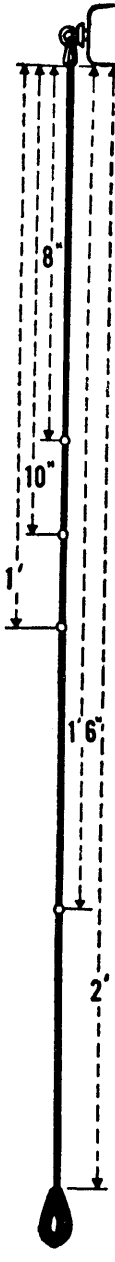
5. Check that the camera has been set to the distance corresponding to the leg extension (see above). The approximate area covered is the rectangle formed by the four legs.

6. Expose, with the cable release. The Minox release or any other type with the standard tapered thread will fit into the cable release socket of the clamp.

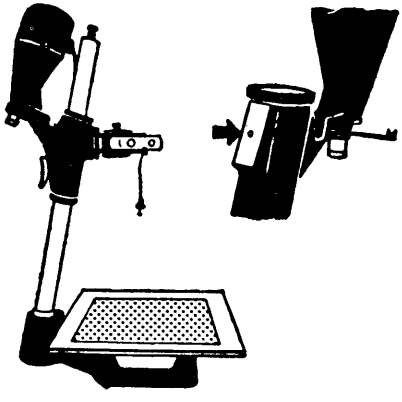
CLOSE-UPS WITH THE MINOX

The Minox safety chain is fitted to the camera (or exposure meter) by inserting the rectangular plug at the end to the chain into the corresponding chain socket on the camera. The socket will retract on pushing the plug into position. Use the D-shaped ring to turn the pressed in plug by 90° to lock it. (See page 65.)

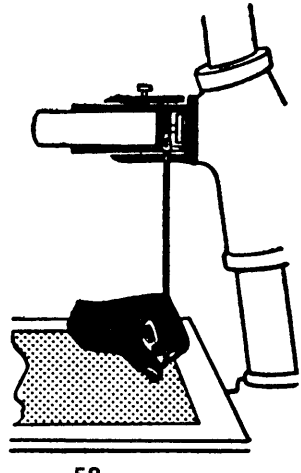




Right: The chain is fitted with beads to indicate distances of 8 in., 10 in., 1 ft., 1½ ft. and 2 ft. when it is pulled taut, thus permitting accurate measurement of near distances. (See page 65.)



The Minox enlarger may be utilized for copying. The Minox enlarger copying attachment has a holding bracket for the camera. It screws to the flange of the sliding barrel opposite the lamphouse. On rotating lamphouse by 180° the camera is in correct position. (See page 59.)



The distance is set on the camera corresponding to the camera-object distance and can be determined with the camera chain.

Minox Films for Copying

Use the Doku-Ortho micro copy film (ASA Exposure Index 5) for copying drawings, book pages, or other line illustrations.

Use the slow fine grain film (ASA Exposure Index 25) for copying photographs or other continuous tone illustrations.

Use the appropriate color film for copying in color.

Lighting

The original to be copied should be lit evenly for best results. Two lamps, of the same wattage, may be placed to the left and right of the copying stand so that they light the subject at an angle of 45°. In daylight, or when only one lamp is available, a white reflector (cardboard, towel, napkin) should be placed on the opposite side of the copying stand to assure fairly even lighting.

Take care that the copying stand legs do not cast shadows into the picture area.

Using the Enlarger for Copying

The Minox enlarger is provided with a support on the movable enlarger arm to accept the Minox holder. Moving the arm up or down the column will keep the camera parallel to the baseboard and allow the object to be copied to be placed on the enlarger baseboard.

The Minox enlarger copying attachment consists of a supporting bracket to hold the camera and acts as an accurate position control for copying. It screws to the flange of the sliding barrel opposite to the lamphouse (see also page 58).

To attach it, slide the barrel up on the column to the point where the lower rim of the barrel disengages from the guide rail. Swing the lamphouse to the rear. The barrel can now be set to any level after having introduced the guide rail into the second groove, which is now in front.

Pull the cover plate over the flange off the sliding barrel, to reveal the holes in the second screw flange. Fasten the attachment to the flange by means of the large dial in its recess. The two pins must engage in the holes in the flange. The milled screw is situated on top.

Lock the camera and the adapter in the fork of the copying attachment with the screw with a milled head located on top of the flange.

The distance is set on the camera and the corresponding distance between camera and baseboard (or object) can be measured with the camera measuring chain. The chain is fitted with its oblong ear to the suspension pin of the attachment flange. Raising or lowering the barrel until the required bead touches the baseboard (or object) locates the camera at the correct working distance.

The size of the picture field can be determined from the table on page 31 and also through the viewfinder. To avoid vibration the shutter should only be released with the cable release, which fits into the screw head of the small angle iron of the attachment flange.

The Universal Copying Arm can be attached to any vertical column up to 1¾" in diameter, but is designed especially to fit the Minox Table Stand.

The Copying Arm and Table Stand provide an excellent set up for reproducing diagrams, text, photographs, advertisements, notes, letters, and so forth.

TELE-PHOTOGRAPHY

Telephoto shots with the Minox are possible with the aid of binoculars in conjunction with the Minox binocular attachment. One half of the binoculars serves as a supplementary lens to the camera lens, while the other half is used to observe the scene, acts as viewfinder and permits focusing.

The magnification obtained is that of the binoculars used and the quality of the image depends on the optical quality of the binoculars.

Both central screw focusing and single eyepiece focusing binoculars are usable.

For long time exposures the whole binocular assembly should be mounted on a tripod. Whenever possible, this is strongly advised even for instantaneous exposures to minimize camera shake.

How to Use the Binocular Attachment

1. Unscrew eyecup.
2. Set camera to infinity.
3. Fix camera in adapter.
4. Fix binocular attachment clamp to eyepiece.
5. Attach cable release holder to binoculars.
6. Fit cable release.
7. Focus through the second eyepiece.
8. Set exposure time.
9. Release.

1. On central screw focusing binoculars attach the camera to the fixed eyepiece. Any cup in this eyepiece therefore has to be removed. On binoculars with individual eyepiece focusing either eyepiece may be used and its eyecup removed.

2. Set the focusing knob of the camera to ∞ (infinity).

3. Place the camera—lens pointing to the clamp—into the camera-holder and fasten it in position by turning the milled ring at the outside end of the holder one quarter turn to the right.

4. Attach the clamp to the eyepiece by means of the milled clamping screw, which opens or tightens the claws of the clamp. Take care that the two metal mounting plates on the inside of the clamp rest on the outside rim of the eyepiece. If they do not, remove the thin black metal washers by loosening their holding screws. The blades are 0.5 and 1 mm. thick, so that three thicknesses of 0.5, 1 and 1.5 mm. are available according to the shape of the eyepiece. In any case, the frame of the camera holder has to touch the eyepiece lens of the binoculars. After correct positioning tighten the clamping screw.

5. Attach the cable release holder by placing both sections round the center pillar of the binoculars and fasten it by tightening its clamping screw.

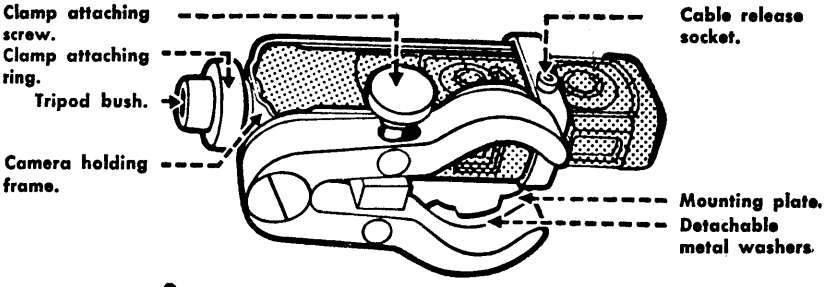
6. Screw the cable release into the cable release socket of the camera adapter, and thread the release through and under the cross bar of the binoculars. Place its head into the slot provided on the cable release holder.

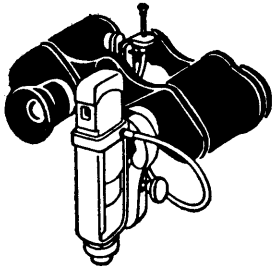
7. To focus, put the one eyepiece of the binocular to be used as the viewfinder in front of the eye in such a way that the other eyepiece used with the camera is not placed before the other eye but upright to the head.

In case of myopia the visual defect of the observing eye (for instance—3 diopters) must be adjusted on the movable eyepiece for all occasions. For normal vision leave on zero (0).

To focus with central wheel focusing binoculars look through the available eyepiece and turn the central screw focusing wheel until the image appears perfectly sharp.

To focus with independent eyepiece focusing binoculars at infinity—that is distances of more than 100-yards—set the eyepiece fitted to the camera to zero. To focus at shorter distances observe the subject and focus it by turning the eyepiece. Check

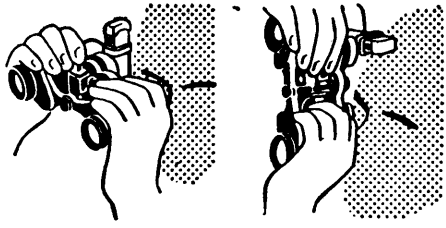


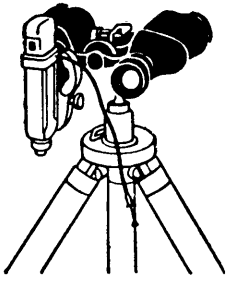


With the Minox telephotography is possible with the aid of binoculars mounted in the Minox binocular attachment (see page 61).

One half of the binocular serves as supplementary lens to the camera lens, while the other half is used to observe the scene, acts as viewfinder and permits focusing.

For long exposure times the tripod is fitted to the lower end of the cable release clamp. To avoid jerking, the release should be removed from the clamp and operated independently.





Above left: When taking vertical pictures the one ocular of the binocular which serves for the exposure is placed to the side of the head. Observe the scene with the right eye placed next to left ocular, alternatively with the left eye to the right ocular. *Above right:* For horizontal pictures turn the binocular through 90°, so that the camera lies against the forehead.

the eyepiece setting indicated by the scale at which the image appears sharp. Then adjust the camera eyepiece by the corresponding amount.

It is the actual adjustment which must be transferred from the focusing eyepiece to the camera eyepiece, not the setting itself. For example, for a subject at infinity the camera eyepiece should be set to 0, but the focusing eyepiece may be at —3 to suit the user. For a closer distance, the focusing eyepiece setting may then be +1. In that case, the camera eyepiece must be set to +2; so that both eyepieces have been turned by +2 divisions.

8. When taking photographs through binoculars the exposure time has generally to be somewhat longer. In most cases it has to be doubled: e.g. intsead of 1/200 second use 1/100 second. The actual increase of exposure depends on the light-transmission of the glasses used and is best determined by actual tests.

9. It is most important to hold the binoculars very steady *and* support them by steadying your elbows against a support (table, wall, etc.), or at least to lean against a tree or wall. Release by gently pressing the cable release.

The binocular attachment may be employed as a tripod head only, without binoculars, and is then used as described on page 65 and page 66. It may also be used as a microscopic clamp as well, and all technical details on using binocular clamp for telephotography apply.