EXAKTA FILMS

The V.P. Exaktas use the Standard Roll-film $2\frac{1}{2} \times 1\frac{5}{8}$ in. (4 × 6.5 cm.), which is known as "Vest-Pocket", "127", "27", or "A8" film for 8 exposures.

The $2\frac{1}{4} \times 2\frac{1}{4}$ in. Exakta uses the Standard $3\frac{1}{4} \times 2\frac{1}{4}$ in. Roll-film, which is known as "Brownie 2", "120", "20", or "B2" film, for 12 exposures $2\frac{1}{4} \times 2\frac{1}{4}$ in. (6 × 6 cm.).

The Kine-Exakta uses the standard perforated cine-film of 35 mm. width for 36 exposures $1\frac{1}{2} \times 1$ in. (24 × 36 mm.).

While the films for V.P. Exakta and $2\frac{1}{4} \times 2\frac{1}{4}$ *in. Exaktas are only obtainable as the above-mentioned Standard spools, there are different possibilities of obtaining* 35 *mm. film for the Kine-Exakta.* We shall devote most of this chapter to the latter subject.

DAYLIGHT FILM CARTRIDGE. The film is supplied in a cartridge of tin, cardboard or plastic material, which is light tight, so that it can be placed into the camera and removed in daylight. These daylight films are the same as used on *Leica*, *Contax*, *Retina* and similar cameras.

DAYLIGHT REFILL FILM. The film is supplied on a centre spool and covered with a front trailer to render it light tight. The daylight refills have to be used in an empty cartridge and can be loaded in daylight into the cartridge.

DARKROOM REFILL FILM. These are ready-cut film strips for 36 exposures, which must be loaded into an empty cartridge in the darkroom.

BULK FILM. Uncut 35 mm. film in lengths of 18 to 200 ft., from which lengths may be cut, trimmed, loaded into an empty cartridge (see p. 46).

While the insertion of the loaded cartridge is described on p. 20, we have to see how the cartridge itself is loaded with a suitable length of film in the darkroom.

Safelight

In the case of *panchromatic* films (p. 48) only the dark *green* "panchro-safelight" may be used, but it is safest to work in complete darkness. This is not difficult. It is,

however, advisable first to practise filling with a dummy film in daylight before starting darkroom work.

If *orthochromatic* films (p. 48) are used the *red* "ortho-safelight" may be employed.

In the case of *positive* film (p. 49) *amber* light will do.

Handling, Winding and Trimming the Film

When handling the actual film, particular care must be taken *not to touch its emulsion (matt) side.* It should only be handled and spooled on to the centre spool of the cartridge by holding the film on either side of its edge, preferably between thumb and index finger (p. 45). At the same time, it is of no less importance that the spot on which the loading is done should be perfectly dry, clean and dust free. Only a spotless, clean negative will produce the desired result!

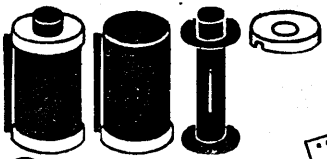
When using bulk film in loading cartridges, the edge of the work-bench can be marked with notches or drawing-pins to indicate various distances, let us say for 12, 24, 36 exposures of film. This considerably simplifies the measuring of film lengths in the darkroom.

The film ends need trimming. At the beginning of the roll of film make either a straight or wedge-shaped cut for the centre spool of the cartridge and measure off the required length of film (see table, p. 46). At the end of this make the curved cut for the take-up spool (p. 45). The curved cut should start between the ninth and tenth bottom perforation—when emulsion is towards you—and must not go through a perforation hole.

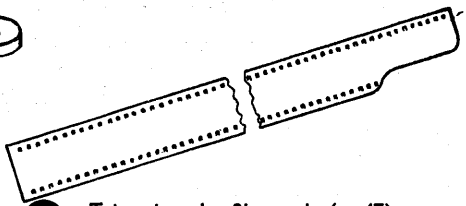
The ready-cut film is now spooled on the centre spool of the cartridge, as described on p. 47. One will have to make sure, while winding on, to hold the film only by its edges.

When winding the film on and off, care must be taken that no great pressure is put on the film, and that the film-ends are not squeezed when drawing through the hand. Failure to take the first precaution may result in fogging, while neglect of the latter precaution may give rise to peculiar kinds of exposure effects known as "lightning flashes". These are due to electrical discharges, and appear as dark,

HANDLING, WINDING, TRIMMING 35 mm. FILM (p. 43)

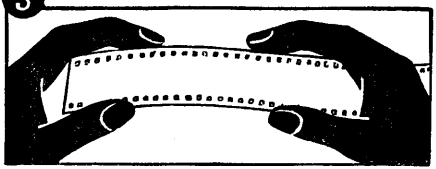


1 Complete cartridge (= cassette) shell, centre spool and top cover (p. 46)

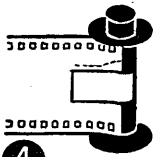


2 Trimming the film ends (p. 47).

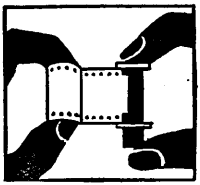
3



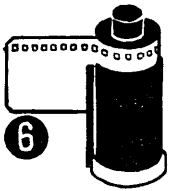
How to hold the miniature film (p. 47).



4 Fixing the inner film end on centre spool of cartridge (p. 47).

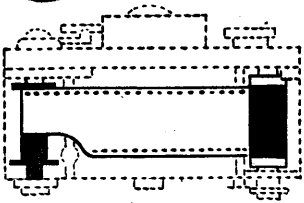


5 Winding film on centre spool (p. 47).



6 Inserting loaded centre spool into cartridge-shell (p. 47).

7



Inserting loaded cartridge into Kine Exakta (p. 20).

zigzag lines running from the edge of the film towards the centre of the picture.

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

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

Loading Cartridges

The majority of cartridges consist of a centre spool which is in a shell with top and bottom cover. The film leaves the shell by a light-trapped slot (the cartridge-mouth). The centre spool can be removed from the shell by removing either top or bottom of the cartridge, according to the construction of the particular container.

Most of the cartridges are actually intended by their makers to be used once only, and with the film originally supplied in it. This refers particularly to *Kodak* and *Agfa* cartridges. A number of cartridges made from plastic material—for example, *Ilford*, *Gevaert*, *Mimosa* and others—are designed to be reloaded. Up to some time ago the question of reloading of cartridges rarely arose, as Daylight films were plentiful.

But under present conditions we have to face the fact that metal, labour, and production for non-essentials is reduced to an absolute minimum, and the photographer,

too, has to economize to the limit in order to be able to carry on. When we suggest reloading cartridges, even if they are marked "not reloadable", it is for two reasons: (1) To overcome the present difficulties of supply, and (2) It is now an established fact that these cartridges *can* be reloaded many times, and will give perfectly satisfactory results—*if handled carefully*. The following table shows which daylight refills will fit the various cartridges.

RELOADABLE CARTRIDGES AND DAYLIGHT REFILLS

Make of Daylight Refills:	*Ilford Plastic Cartridge*	*Ilford Metal (Old) Cartridge*	*Kodak Metal Cartridge*	*Gevaert Plastic Cartridge*	*Mimosa Plastic Cartridge*	*Agfa Metal Cartridge*
Kodak	No	Yes	Yes	No	No	Yes
Ilford	Yes	Yes	No	Yes	Yes	Yes

Cartridges with Bulk film or Darkroom Refills

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

2. As described on p. 44.
3. As described on p. 46.
4. If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, as is the case with most *Kodak* and *Agfa* cartridges, it has been proved best to wind a 1½ in. (4 cm.) piece of Cellophane tape (for example, *Kodak* Cellophane Lantern Slide Binding Tape) round the centre spool, so that on either side about ½ in. tape is used to secure the film. (See p. 45).
7. When using *Agfa* cartridges, it is essential to fix top and bottom cover to the shell, preferably with a length of Cellophane tape.

Cartridges with Daylight Refills

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

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

The Choice of Material

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

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

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

ORDINARY FILM. Not made as roll-film, but only available as 35 mm. film for Kine-Exakta. For copying black and white objects (books, ledgers, etc.), a "positive film" of 3° to 10° Scheiner can be recommended. Besides its qualities of fine grain and high brilliancy, it possesses the further advantage that it can be handled in an amber darkroom light.

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

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

CONVERSION TABLE OF DIFFERENT SPEED DEGREES

Scheiner	*Din*	*Weston Scheiner*	*Weston Speed*	*G. E. Speed*	*H. & D.*
12	1/10	7	0.6	1	30
15	4/10	10	1.2	2	60
18	7/10	13	2.5	4	125
21	10/10	16	5	7.5	250
24	13/10	19	10	15	500
27	16/10	22	20	30	1000
30	19/10	25	40	60	2000
33	22/10	28	80	120	4000

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

ment unnecessary. Their disadvantage is in their inability to cope with live subjects in other than exceptionally favourable lighting conditions, lack of latitude and mostly hard gradation.

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

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

GRAIN. Silver grains themselves form the picture in the emulsion. To the naked eye they form a compact, dark mass, but under the magnifying glass or microscope the separate clumps of grains are visible. Obviously, if the grain of a small negative (V.P. and Kine-Exakta) is coarse, it will soon become visible by moderate enlarging, and the finer the structure of grain, the more enlarging will it allow without showing any unpleasant granular effect in the print. As a rule, it can be said that the grain size is in direct relation to the speed of the film (p. 49). The faster the film, the coarser the grain and vice-versa. It may be pointed out at the same time that the grain can to a certain extent be influenced by development (hence fine-grain development), correct exposure, choice of paper, etc.

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

 LATITUDE. Latitude is the ability of the film to yield

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

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

DIFFERENCE BETWEEN LARGER AND SMALLER FILMS. *While "120" size roll-films are sold under the same name as the "127" and 35 mm. films, they have as a rule somewhat modified emulsions. 35 mm. and "127" films are generally treated as "Miniature" material, which has to stand greater enlargement than the roll-film made for larger picture sizes. The $1\frac{1}{2} \times 1$ in. field of the Kine-Exakta is less than a quarter of that of the $2\frac{1}{4} \times 2\frac{1}{4}$ in. Exakta, and will have to be enlarged considerably more to result in the same size print, and the miniature emulsions are therefore of somewhat finer grain and lower contrast than the "120" size film.*

CHARACTERISTICS OF SOME FILMS

Make	*Type*	*Size*	*Speed in Scheiner*	*Grain*	*Resolving Power*	*Gradation*	*Field of application*
Kodak:							
Verichrome	O	R	29°	fg	50	n	A
Panatomic X	P	R–M	27°	ef	60	n	A
Plus X ...	P	M	29°	fg	50	n	A
Super XX ...	P	R–M	32°	mg	50	n/s	B
Microfile ...	P	M	19°	uf	135	v	C
Ilford:							
Selochrome	O	R	29°	fg	50	n	A
F.P.2 ...	P	R–M	27°	ef	60	n	A
H.P.2 ...	PR	R–M	31°	fg	50	n/s	B
H.P.3 ...	PR	R–M	32°	mf	48	n/s	B
Micro Neg....	P	M	21°	uf	135	v	C

Index of Abbreviations in Table, p. 51:

Type: O = orthochromatic, P = panchromatic, PR = panchromatic with increased red sensitivity. *Grain:* uf = ultra fine grain, ef = extra fine grain, fg = fine grain, mg = medium fine grain. *Size:* R = available in roll-film sizes, R–M = available both in roll-film sizes and as 35 mm. cine-film, M = available as 35 mm. cine-film only. *Resolving power:* Expressed here in lines per mm. These values are arrived at under "standard conditions" and development in D-76 Developer. *Gradation:* n = normal, n/s = normal tending to soft, v = vigorous. *Field of application:* A = universal material for all average photography, B = material for photography under unfavourable light conditions, theatrical work and where shortest exposure-times are more essential than finest grain, C = special low speed panchromatic material with utmost resolving power, of vigorous gradation, for copying documents, drawings, etc.

COLOUR FILM. There are two types of colour films suitable for roll-film and 35 mm. cameras. One is represented by *Kodachrome*, a film with three emulsion layers, between each pair of which is an extremely fine membrane. The top layer records the blue part of the image, the middle one the green, and the lowest layer the red. It is the combination of the three images that reproduces the picture in natural colour, and Kodachrome has in this country only been supplied as 35 mm. film. The second type, *Dufaycolor*, uses instead of the three separate layers one single panchromatic emulsion layer with a greasy ink resist printed on a dyed base, which produces in the finished diapositive a geometrical mosaic of blue and green squares separated by red lines. The single spots of colour are so extremely small that they appear to our eye to form an even-coloured surface. In either case, the exposed material, after processing, produces not the usual negative, but a positive film in its natural colours, which can be projected on to a screen, viewed in a colour-transparency viewer, or used to make colour-enlargements on paper. A new variation of the Kodachrome film is the *Kodacolor* giving a colour negative, that is to say, a film showing complementary colours to the actual ones. From this colour-negative colour-transparencies as well as colour or black-and-white enlargements can be made.

EXAKTA LENSES

A wide range of lenses has been fitted to the Exakta cameras. Practically any 7.5 cm. (3 in.) lens on the market could on application be had with the V.P. model. Some of these lenses were marketed by the manufacturers of the camera, some quite independently of them. For that reason one may find V.P. Exaktas with lenses not listed in this book. The author has come across: Steinheil-Cassars, Rodenstock-Trinars and Eurynars, Meyer-Plasmats, Friedrich-Coronars, Schneider-Radionars and others as "standard" lenses in the V.P. Exakta cameras.

The standard lenses of the Kine-Exakta are of 5 cm. (2 in.) focal length, those of the $2\frac{1}{4} \times 2\frac{1}{4}$ in. Exakta of 8 cm. ($3\frac{3}{16}$ in.). Here again more than one make will be found to appear as a "standard" lens.

Lenses of any focal length up to about 50 cm. and of any aperture can be interchanged with the "standard" lens in any of the Exakta cameras with the exception of the Exakta Junior, which is firmly fitted with a front cell focusing Exaktar *f* 4.5 7.5 cm. lens and does not allow of the use of other lenses.

A most important feature of the construction of the Exaktas is that, whatever lens may be employed, the correct image and perfect accurate focusing is obtained in the mirror reflex housing. Consequently no special finders are needed, as this at the same time does away with parallax (p. 7), no matter how short or how long the focal length of the lens.

This statement, of course, cannot hold good for the auxiliary *frame-finder* device. While the frame finder is correct only for the standard lenses it can be employed with a fair degree of accuracy when working with lenses of longer focal length by inserting masks into the front sight. These masks are in some cases supplied with the lenses in question.

The diaphragm on the Exaktas is adjusted by means of a milled ring engraved with the aperture figures on the lens mount.

The mounts of the lenses are arranged so that accessories (filters, supplementaries, lens hood) can be slipped on.

(3⅛ in.) focal length may be called a universal type suitable for all average exposures including landscapes, portraits, street scenes, etc., except in conditions of poor light. At full aperture the definition at the edges of the picture is still needle sharp.

XENAR *f* 3.5 for V.P. Exaktas of 7.5 cm. (3 in.) focal length (not supplied for Kine-Exakta and 2¼×2¼ in. Exakta) is of similar performance to the Tessar, and in quality no difference will be found for all practical purposes.

TESSAR *f* 2.8, of the same focal length as indicated for the Tessar *f* 3.5, is similar in design and quality to this lens. It passes over 50 per cent. more light at full aperture than the former. It has a particularly even illumination all over the negative. Its field of application is similar to that of the other Tessar and it is also suitable for more unfavourable light conditions.

XENAR *f* 2.8 of 7.5 cm. (3 in.) focal length is only available for the V.P. Exakta. It is of similar performance to the Tessar *f* 2.8, and in quality no difference will be found for all practical purposes.

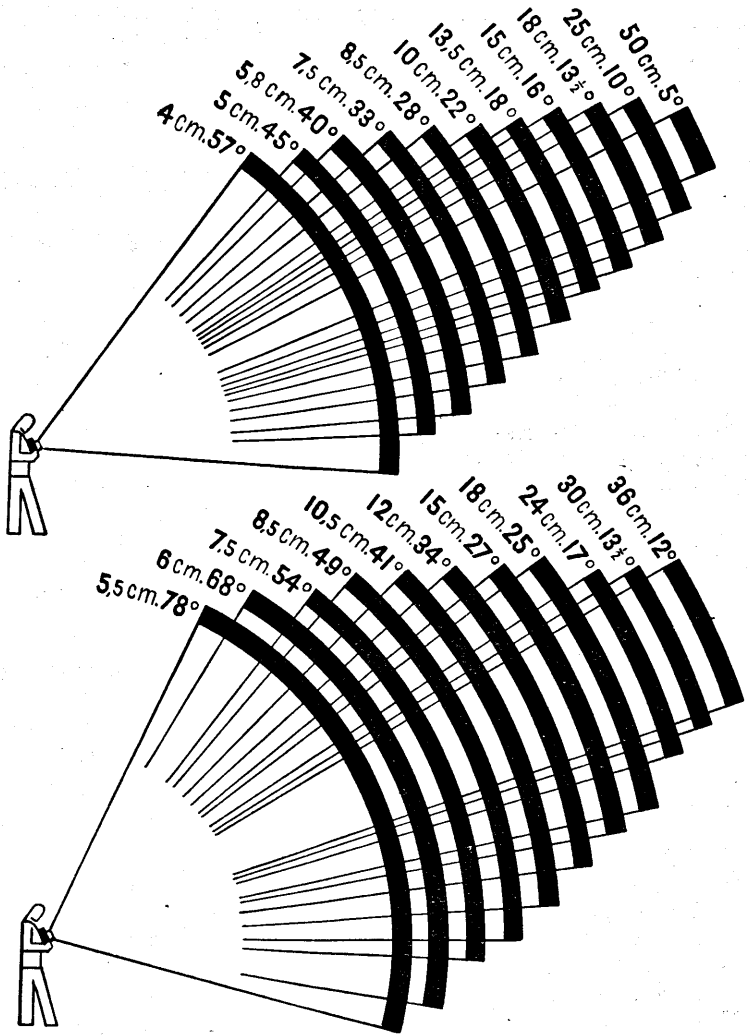
XENON *f* 2 of 8 cm. (3⅛ in.) focal length for V.P. Exakta, of 5 cm. (2 in.) for Kine-Exakta (not available for 2¼×2¼ in. Exakta) may be considered as the all-round lens of wide aperture for the Exaktas. Apart from average subjects of all types, the particular field of its application is in artificial light work, interiors, the theatre, as well as photography of rapid movements. The definition is to be considered as very good even with full aperture, and it has great brilliance and covering power. The correction remains undiminished at smaller apertures.

BIOTAR *f* 2 of 8 cm. (3⅛ in.) focal length for V.P. Exakta, of 5.8 cm. (2¼ in.) for Kine-Exakta (not available for 2¼×2¼ in. Exakta) is of similar performance to the Xenon *f* 2. The optical qualities are, if anything, slightly superior to the Xenon as regards even light distribution in the furthest corners of the image in the case of the V.P. Exakta and the retaining of fullest correction when fully stopped down.

PRIMOPLAN *f* 1.9 of 8 cm. (3⅛ in.) focal length for V.P. Exakta and of 5.8 cm. (2¼ in.) focal length for Kine-Exakta, has the largest aperture of all Exakta lenses. In spite of the increased aperture it has a good standard of definition. It tends to a very slight degree of softness at full aperture and is gradually improved when stopped down to *f* 6.3. It will be preferred by photographers who need fast shutter speeds in artificial light, e.g. for night and theatre work; it is also very suitable for portrait photography.

SUPER SIX *f* 1.9. Similar to "Primoplan".

EXAKTAR *f* 3.5 of 7.5 cm. (3 in.) focal length for the V.P. Exaktas, and of 5.4 cm. (2⅛ in.) focal length for the Kine-Exakta, is a three component lens (Cook type), with a similar field of application to the Tessar *f* 3.5. In spite of the lower cost one will find that this lens is of quite good definition at full aperture and can be gradually improved by stopping down, though it is not up to the standard of the Tessars.



The fields covered by the Exakta lenses (pp. 59-60) of various focal length. The lenses of the Kine Exakta are shown in the top drawing; the lenses of the V.P. Exaktas below.

IHAGEE ANASTIGMAT *f* 3.5 of 7.5 cm. (3 in.) focal length for the V.P. Exakta and of 8.5 cm. ($3\frac{3}{8}$ in.) focal length for the $2\frac{1}{4} \times 2\frac{1}{4}$ in. Exakta has an identical field of application to the "Exaktar" described before; their performances also are identical.

IHAGEE ANASTIGMAT *f* 4.5 of 7.5 cm. (3 in.) is built into the Exakta Junior. It is equal in quality to the "Exaktar", but passes about 50 per cent. less of the light at full aperture than the latter. Consequently its field of application under poor light condition is more limited.

Wide-Angle Lenses

Wide-angle lenses have shorter focal length and show a wider angle of view than the standard lenses. The increase in the field covered as compared with the standard Exakta lenses is indicated in the tables on p. 60.

Wide-angle lenses will be found particularly useful for taking interiors where as wide a field as possible should be reproduced, also for taking large groups, for photographing in narrow streets—in fact, everywhere where the distance subject-camera is restricted. Perspective, as depicted by a wide-angle lens, appears the more exaggerated the shorter the focal length of the lens. The exaggeration of perspective of the wide-angle lenses can be put to good use in special cases—for example, to enhance the foreground of a composition or to introduce some other deliberate distortion. One has to put up with the fact that the illumination towards the edges of negatives taken with wide-angle lenses is bound to fall off to a slight degree. This can be offset (to some degree) by giving generous exposure times.

For V.P. Exakta: Wide-Angle Tessar *f* 8 5.5 cm. ($2\frac{3}{16}$ in.).
Meyer Wide-Angle Anastigmat *f* 6.8 5.6 cm. ($2\frac{1}{4}$ in.).
Dallmeyer Wide-Angle *f* 11 6 cm. ($2\frac{3}{8}$ in.).

For Kine Exakta: Meyer Wide-Angle Anastigmat *f* 4.5 4 cm. ($1\frac{9}{16}$ in.),
Wide-Angle Tessar *f* 4.5 4 cm. ($1\frac{9}{16}$ in.).

Tele Lenses

Tele lenses for the Exakta are either just lenses of longer focal length than the standard lens, or special constructions giving a smaller angle of view than normal and reproducing this reduced field bigger on the negative. The decrease in field compared with the standard Exakta lens is shown in the tables on p. 60.

Given the same size negative and the same distance between camera and subject, the longer the focal length the larger is the reproduction of the subject. Tele lenses are thus particularly useful for far-distance work, such as photographing mountains or architectural details, where one cannot approach near to the object; this is also the case when taking animals, sports photographs and portraits, where the mellowed perspective which can be got with the longer focus lens from an increased working distance is pictorially advantageous. The disadvantage of long-focus lenses is that they yield less depth of focus than the standard lenses and thus should be focused more carefully. Also their size and weight have an adverse influence on our steady grip of the camera, making it advisable to operate longish exposure times with the camera fixed on a tripod.

For V.P. Exakta: Ihagee Anastigmat *f* 4.5 10.5 cm. (4¼ in.).
Telephoto Lens Dallon *f* 5.6 15 cm. (6 in.).
Tele Tessar *f* 6.3 12 cm. (4¾ in.).
Tele Megor *f* 5.5 15 cm. (6 in.).
Tele Megor *f* 5.5 18 cm. (7⅛ in.).
Tele Tessar *f* 6.3 18 cm. (7⅛ in.).
Tele Megor *f* 5.5 25 cm. (10 in.).
Tele Tessar *f* 6.3 25 cm. (10 in.).
Tele Xenar *f* 5.5 15 cm. (6 in.).
Tele Xenar *f* 5.5 18 cm. (7⅛ in.).
Tele Xenar *f* 4.5 24 cm. (9½ in.).
Tele Xenar *f* 5.5 30 cm. (11¾ in.).
Tele Xenar *f* 5.5 36 cm. (14¼ in.).

For Kine Exakta: Telephoto Lens Dallon *f* 5.6 10 cm. (4 in.).
Telephoto Lens Dallon *f* 5.6 15 cm. (6 in.).
Primoplan *f* 1.9 7.5 cm. (3 in.).
Triotar *f* 4 8.5 cm. (3⅜ in.).
Trioplan *f* 2.8 10.5 cm. (4¼ in.).
Trioplan *f* 4 12 cm. (4¾ in.).
Triotar *f* 4 13.5 cm. (5⅜ in.).
Tele Megor *f* 5.5 15 cm. (6 in.).
Tele Megor *f* 5.5 18 cm. (7⅛ in.).
Tele Tessar *f* 6.3 18 cm. (7⅛ in.).
Tele Megor *f* 5.5 25 cm. (10 in.).
Tele Tessar *f* 6.3 25 cm. (10 in.).
Zeiss Long Distance Lens *f* 8 50 cm. (20 in.).

Owing to the fact that the 2¼×2¼ in. Exakta appeared on the market just a few weeks prior to the outbreak of war, there have never been any auxiliary lenses or special attachments supplied for this model.

KINE-EXAKTA LENSES COMPARED

Name	Focal length cm.	Focal length in.	Full aperture	Lens speed value compared with f 3.5	Angle of field °	Magnification or reduction compared with 5 cm. lens
Meyer wide angle ...	4	1 9/16	4.5	0.6	57	0.8
Wide-angle Tessar ...	4	1 9/16	4.5	0.6	57	0.8
Tessar, Xenar ...	5	2	3.5	1	45	1
Tessar, Xenar ...	5	2	2.8	1.6	45	1
Xenon	5	2	2	3	45	1
Exaktar	5.4	2 1/8	3.5	1	42	1.1
Biotar...	5.8	2 1/4	2	3	40	1.2
Primoplan	5.8	2 1/4	1.9	3.4	40	1.2
Super Six	5.8	2 1/4	1.9	3.4	40	1.2
Primoplan	7.5	3	1.9	3.4	33	1.5
Triotar	8.5	3 3/8	4	0.8	28	1.6
Tele Dallon	10	4	5.6	0.39	22.5	2
Trioplan	10.5	4 1/8	2.8	1.6	22	2.1
Trioplan	12	4 3/4	4	0.8	21	2.4
Tele Dallon	15	5 7/8	5.6	0.39	16.4	3
Triotar	13.5	5 3/8	4	0.8	18.4	2.6
Tele Megor	15	5 7/8	5.5	0.4	16.4	3
Tele Megor	18	7 1/8	5.5	0.4	13.6	3.5
Tele Tessar	18	7 1/8	6.3	0.3	13.6	3.5
Tele Megor	25	10	5.5	0.4	10	5
Tele Tessar	25	10	6.3	0 3	10	5
Zeiss long distance ...	50	20	8	0.2	5	10

V.P. EXAKTA LENSES COMPARED

Name	Focal length cm.	Focal length in.	Full aperture	Lens speed value compared with f 3.5	Angle of field ° (approx.)	Magnification or reduction compared with 7.5 cm. lens (approx.)
Wide-angle Tessar ...	5.5	2 3/16	8	0.2	78	0.7
Meyer wide angle ...	5.6	2 1/4	6.8	0.26	76	0.75
Dellmeyer wide angle	6	2 3/8	11	0.1	68	0.8
Exaktar	7.5	3	3.5	1	54	1
Tessar, Xenar ...	7.5	3	3.5	1	54	1
Tessar, Xenar ...	7.5	3	2.8	1.6	54	1
Xenon	8	3 1/8	2	3	50	1
Biotar...	8	3 1/8	2	3	50	1
Primoplan	8	3 1/8	1.9	3.4	50	1
Super Six	8.5	3 1/4	1.9	3.4	49	1.1
Jhagee Anastigmat ...	10.5	4 1/2	4.5	0.6	41	1.4
Tele Tessar	12	4 3/4	6.3	0.3	34	1.6
Telephoto Dallon ...	15	5 7/8	5.6	0.39	27	2
Tele Megor	15	6	5.5	0.4	27	2
Tele Xenar	15	6	5.5	0.4	27	2
Tele Megor	18	7 1/8	5.5	0.4	25	2.4
Tele Tessar	18	7 1/8	6.3	0.3	25	2.4
Tele Xenar	18	7 1/8	5.5	0.4	25	2.4
Tele Xenar	24	9 1/8	4.5	0.6	17	3.2
Tele Megor	25	10	5·5	0.4	16	3.3
Tele Tessar	25	10	6.3	0.3	16	3.3
Tele Xenar	30	11 3/4	5.5	0.4	13.5	4
Tele Xenar	36	14 1/4	5.5	0.4	12	4.8

THE TECHNIQUE OF EXPOSURE

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

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

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

The correct exposure time can be ascertained by:—

EXPOSURE TABLES. These are based on mathematical calculations and practical experience. They tabulate all or most of the factors given above, and, if used with discretion, will give an exposure-figure which lies within the latitude of the film. The *Focal Exposure Chart* is the most up-to-date version of an exposure table. A simplified table is given on p. 89.

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

PHOTO-ELECTRIC EXPOSURE METERS. They are the most accurate and dependable means available for arriving at the right exposure time. They consist of a photo-electric cell which converts light-energy into electricity, which in turn moves an indicator over a table of light values.

The field covered by an electric exposure meter is wider than that covered by a standard lens in the Exakta (Weston meter = 60°; Sixtus over 102° vertically and 122° horizontally and 94° vertically; Helios 92°). By comparison with the tables on p. 60, where the angle of the various lenses is indicated, it will be found that the standard lenses

EXPOSURE TABLE FOR DAYLIGHT

1. *Subject and month value*

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

2. *Time and light value*

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

3. *Film speed and aperture value*

Film speed Scheiner	*Stop 2*	*Stop 2.8*	*Stop 4*	*Stop 5.6*	*Stop 8*	*Stop 11*	*Stop 16*
31°	—6	—4	—3	—2	—1	0	1
28°	—5	—3	—2	—1	0	1	2
25°	—4	—2	—1	0	1	2	3
22°	—3	—1	0	1	2	3	4
19°	—2	0	1	2	3	4	5

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

Value ...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds	1/1000	1/500	1/250	1/100	1/50	1/25	1/10	1/5	1/2	1	2	4	8	15	30	60

Value ...	17	18	19	20	21	22	23
Minutes ...	2	4	8	16	30	60	120

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

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

To the experienced Exakta photographer *the brightness of the image on the reflex focusing screen soon becomes a useful guide to the correct exposure.* It acts to some extent as an optical exposure meter. By using a standard exposure time, e.g. 1/50 sec. for average subjects, it can become a matter of habit to vary the aperture so that the screen has a standard intensity of illumination or to see how far into the corners of the screen details may be observed (but the latter only if the subject is of even illumination).

The Right Negative

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

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

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

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

EXAKTA ACCESSORIES

FINDER HOOD EXTENSION. A black folding finder hood extension, consisting of a collapsible leather box with a magnifier in its top, can be pushed over the reflex hood of Kine-Exakta and V.P. Exakta. It cuts out stray light which otherwise reaches the reflex screen, increases the brilliancy of the reflex image considerably, and makes image control and focusing much easier. A second version of this finder hood without a built-in magnifying glass may be had for the V.P. Exakta (p. 29).

EXAKTA LENS HOOD. Light coming from objects outside the actual picture area will touch the lens and reduce the brilliancy of the picture considerably. While this applies in the first place to pictures taken against the light and with side light, it remains also perfectly true for "ordinary" photographs, taken with the light, as well as indoors. To protect one's lens against these stray rays, a lens hood has to be used. This is a tube, as a rule from metal, which has to be placed over the front of the lens. *There is no picture which could not be improved in clarity and brilliancy by the use of a lens hood.* Various lens hoods are available for the different Exakta lenses. The Exakta lens hoods are slightly conical shaped tubes which are pushed on to the lens mount of our Exakta lenses (p. 101).

EXAKTA FOCUSING PIN. The helical focusing mount of the V.P. Exakta is provided with a small threaded hole for the reception of a pin with a milled handle which facilitates quick focusing (p. 101).

EXAKTA BUTTON RELEASE. A convex metal button can be screwed into the release knob, increasing its surface. It facilitates releasing the shutter while wearing gloves or working with cold, stiff fingers (p. 101).

CABLE RELEASE. A special cable release is supplied for the Exakta which screws into the screw thread in the centre of the release button. (Its push pin is rather stronger than that of the normal cable releases.)

EXAKTA FLASHLIGHT SYNCHRONIZER. The flash-powder of bygone days has been replaced by flash-bulbs which have almost incomparably greater advantages. Combustion takes place within the glass bulb, which allows the light to pass through it unimpeded while retaining all the by-products of combustion. Flash-bulbs are therefore smokeless, dustless, free of smell and noiseless. Their volume of light is about equal to that of sunlight on a summer day, a fact which enormously widens the scope of photography, enabling pictures to be taken indoors and outdoors, in snow and rain, of subjects in motion or subjects at rest.

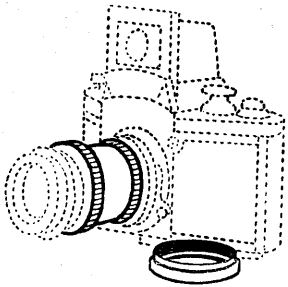
The simplest method of working with flash-bulbs indoors and without any special gadgets is: mount the Exakta on a tripod, set distance, shutter to "B" and the stop according to the distance between flash and subject. The instructions with the flash-bulbs sometimes include a table showing the correct aperture for various distances (see table on p. 102). Ordinary room light can be left switched on as long as it does not shine on to the lens. Press shutter release and keep it pressed down, while releasing the flash-bulb by means of a 4.5 volt pocket torch, then let go shutter release.

A better method consists in using a flash-bulb release "synchronizer", which automatically opens the shutter, releases the flash-bulb and closes the shutter again. Since these releases work with intervals of about 1/5 sec. between the actions it is possible to dispense with a tripod and to make action shots indoors.

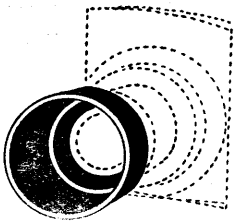
More exactly adapted to the camera are synchronizers such as the "Exakta flashlight synchronizer", which allows the Exakta shutter to be set to the slower instantaneous speeds up to 1/100 sec. The synchronization between attachment and shutter is such that immediately the shutter opens combustion occurs. The left-hand front wall of the Exakta is fitted with two metal sockets which are electrically connected with the Exakta shutter. The battery and lampholder, fitted with a flash-bulb of the Exakta flash outfit, is plugged with its two projecting pins into the sockets on the camera-body *after* the shutter has been wound and set. A cardboard reflector, silvered on the inside, is clipped round the bulb. When releasing the shutter, combustion is effected simultaneously. One should make sure that fresh batteries are used in the battery holder.

The makers of the Exakta also supply a variation of this flash outfit which allows of an increased flexibility in action. This "large outfit" consists of battery holder, reflector, a flexible cable and a camera connecting piece by means of which the battery holder with lamp can be placed some distance from the camera. Further, there is a flexible extension allowing for some distance between battery holder and lamp and a junction piece permitting the firing of several flashes at the same time. Finally, a simple clamping holder allows one to fix the battery holder to a table or other support. (This clamping holder may also be used with the camera for upright pictures, giving a firm support—p. 101.)

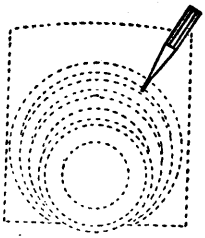
Pre-war a wide range of different types and makes of so-called "synchronizers" or "flash-guns" were produced on the continent. None of these guns could be synchronized



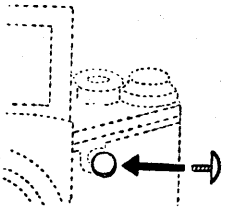
Extension rings (pp. 96, 98).



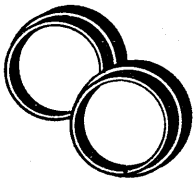
Lens hood (p. 99)



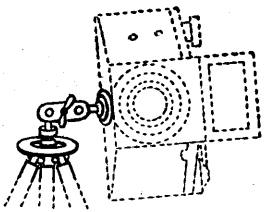
Focusing pin (p. 99).



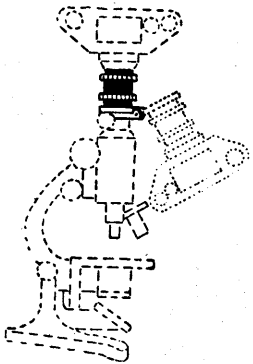
Button release (p. 99)



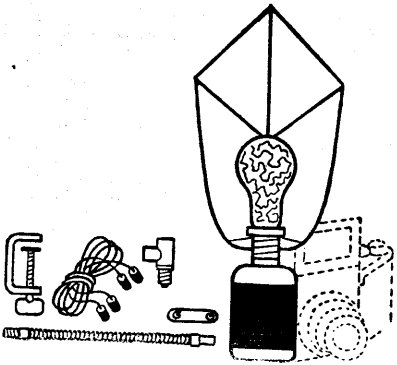
Filter and supplementary lens (p. 91).



Ball and socket head.



Micro attachment (p. 104).



Flashlight outfit (p. 99).

TABLE FOR SASHALITE FLASH-BULBS

(Shutter setting to "B", procedure as explained on p. 100)

Distance	Panfilm Speed	Sashalite Baby f	Sashalite Large f	Panfilm Speed ° Scheiner	Sashalite Baby	Sashalite Large
Up to 6 ft.	29°	12.5	—	32°	18	—
Up to 10 ft.	29°	9	18	32°	12.5	24
11 to 20 ft.	29°	6.3	12.5	32°	9	18
21 to 30 ft.	29°	4.5	9	32°	6.3	12.5
31 to 50 ft.	29°	—	6.3	32°	4.5	9

TABLE FOR LARGE SASHALITE FLASH-BULBS WITH SYNCHRONIZED SHUTTER

Panfilm Speed: / Distance	29° Sch. f	32° Sch. f	29° Sch. f	32° Sch. f	29° Sch. f	32° Sch. f	29° Sch. f	32° Sch. f	29° Sch. f	32° Sch. f
Up to 10 ft. ...	18	24	12.5	18	9	12.5	6.3	9	4.5	6.3
11 to120 ft. ...	12.5	18	9	12.5	6.3	9	4.5	6.3	3.5	4.5
21 to 30 ft. ...	9	12.5	6.3	9	4.5	6.3	3.5	4.5	2.8	3.5
31 to 50 ft. ...	6·3	8	4.5	6.3	3.5	4.5	2.8	3.5	2	2.8
Shutter Speed:	1/75	1/75	1/100	1/100	1/250	1/250	1/500	1/500	1/1000	1/1000

with a particular camera to such a degree as to allow faster shutter speeds than 1/25 sec. or 1/50 sec., at the utmost. The Exakta flashlight synchroniser is no exception to this rule although one or the other user of it may have been successful in using faster speeds. On the other hand, British (*Burvin*) and American made guns (*Kalart, Mendelson*, etc.) can be synchronized to the shutter movement of the various types of cameras as well as to the peak-output of light of the flash-bulb to such an extent that speeds as fast as 1/500 sec. and even 1/1000 sec. can be set, allowing one to arrest the fastest movements.

PHOTO-MICRO ATTACHMENT. The micro attachment (p. 101) of the Exakta consists simply of a metal tube which can be fitted to the microscope around the draw-tube holding the eye-piece; hinged to this is a second tube which fastens to the Exakta body. After connecting the Exakta by means of the hinged tubes to the microscope, the camera is swung to one side. The microscope can now be used in the usual way, set and focused. Now the Exakta is swung back into taking position. The ground-glass screen image of the Exakta shows the correct image and definition that will appear on the negative. Adjustments which may be found necessary, both as regards picture frame and focusing, can be corrected by observation through the reflex image. Particularly when taking living objects, following up the object on the reflex image by moving the mechanical stage of the microscope or the slide may prove invaluable. The degree of enlargement determined by objective and eye-piece may to some slight extent be enlarged by using extension tubes (see p. 96).

SHUTTER SPEEDS TO ARREST MOVEMENT

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

The values given are for PERPENDICULAR displacement to the optical axis.
MOTION 45° to optical axis increase time by 50 per cent.
MOTION parallel to optical axis increase time 300 per cent.

Focal length of LENS	Distance Between Camera and Object					
3.5 cm.	2 m. / 6½ ft.	3.5 m. / 12 ft.	5 m. / 17 ft.	9 m. / 30 ft.	18 m. / 60 ft.	35 m. / 115 ft.
5 cm.	3 m. / 10 ft.	5 m. / 17 ft.	7.5 m. / 25 ft.	12.5 m. / 42 ft.	25 m. / 83 ft.	50 m. / 165 ft.
8.5 cm.	5½ m. / 18 ft.	9 m. / 30 ft.	13.5 m. / 45 ft.	22 m. / 75 ft.	45 m. / 150 ft.	90 m. / 300 ft.
13.5 cm.	8 m. / 27 ft.	13.5 m. / 45 ft.	20 m. / 66 ft.	34 m. / 110 ft.	67 m. / 220 ft.	135 m. / 440 ft.
18 cm.	11 m. / 36 ft.	18 m. / 60 ft.	27 m. / 90 ft.	45 m. / 150 ft.	90 m. / 300 ft.	180 m. / 600 ft.

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