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EXAKTA 35mm GUIDE

**EXAKTA I, II
EXAKTA VAREX V, VX
EXAKTA VAREX IIa, IIb
EXAKTA VX500, VX1000**



**EXAKTA RTL 1000
EXAKTA I, Ia, II, IIa, IIb
EXA 500**

**COMPLETE
CORRECT
THE CAMERA GUIDE**



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EXAKTA 35 mm.

GUIDE

How to Use

The Exakta I, II,

Exakta Varex V, VX, Ila, I Ib,

VX500, VX1000, RTL1000

Also the Exa I, Ia, II, Ila, I Ib and 500

By **W. D. EMANUEL**

Twelfth Edition



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THE 35 mm. EXAKTA MODELS

The 35 mm. Exakta is a single-lens reflex camera. The actual taking lens serves both for focusing and taking the picture and is used to form the image on the film as well as to reflect the picture to be taken on to a ground-glass focusing screen. Film and focusing screen are for all intents and purposes at the same distance from the lens, but in different positions and at right angles to each other. The film runs along the back of the camera while the focusing screen is on the top of it. Thus, the light entering through the lens has to go alternately in two directions: once to the focusing screen and once to the film. This two-way traffic is controlled by a mirror on point-duty. By setting the shutter, the mirror is introduced into the path of the light-rays between lens and film, thus reflecting the image on to the focusing screen, showing exactly the same outlines, definition, depth of field and relative brightness of the subject as will appear on the negative. The screen is a plano-convex lens ground on the underside, and shows the image magnified and brilliant all over. It is the right way up and permits critical focusing (aided by a built-in magnifier), as well as adjustment of the extent of definition towards both the foreground and background and, lastly, composition of the photograph before the negative is exposed. With the release of the shutter for exposure, the mirror first snaps upwards and covers the focusing screen. Then the shutter goes across and the image is recorded on the film.

The shutter of the Exakta is a self-capping focal plane shutter (except RTL1000, see page 10) travelling from right to left. "Self-capping" means that it remains closed while being wound up; "focal plane" means that it moves right in front of the negative material, thus ensuring full protection to it. With this type of shutter, lenses can be changed while the camera is loaded. The Exakta shutter has the widest possible range of speeds. Besides the instantaneous speeds from 1/30 (early 1/25) to 1/1000 sec., automatic time exposures from 1/8 (early 1/10) to 12 secs. can be set.

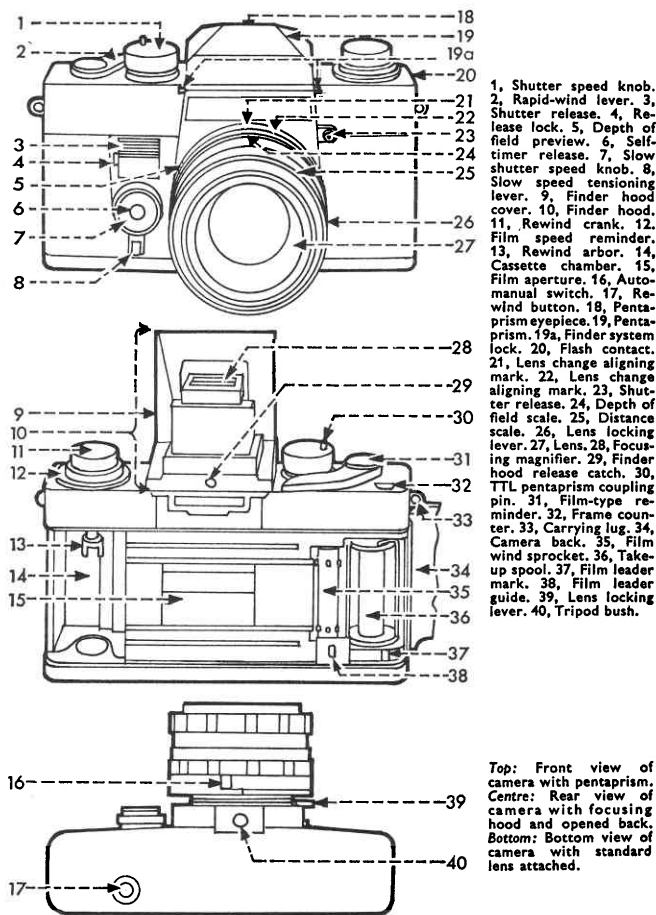
A delayed-action release (self-timer) is built-in and coupled to the shutter, allowing all speeds from 1/1000 to 6 secs. to be released with a delaying time of about 12 secs. This very wide choice of longer automatic shutter speeds is unique for miniature cameras and is useful for certain specialised work. On the other hand, this shutter is more complicated than those of most of the other miniature cameras and needs careful handling. Shutter winding is automatically coupled with film transport and the swing of the mirror into the focusing position.

Exakta lenses include the well-known Domiplan, Jena Tessar, Pancolar, Domiron, Orestegon as standard lenses, besides a wide range of more specialised lenses by other manufacturers. The lenses are *interchangeable*, allowing the use of telephoto, wide-angle and particularly fast lenses from 20 to 1000 mm. and apertures up to $f1.8$. One unique feature of the single-lens reflex type is that, whatever lens is used, *no special finders* are required, as the reflex finder shows in every case the correct image with the lens employed. The interchangeability of the lens permits the straightforward use of *extension tubes* for close-ups without the least complication of focusing. The same goes for using the camera in photomicrography, etc.

The reflex-finder hood permits normal reflex image viewing and focusing as well as eye-level viewing and focusing by means of a pentaprism in the Exakta V, VX, IIa, IIb, VX500, VX1000, RTL1000 and Exa I. It has a direct vision frame finder to be used for viewing only. A *magnifying glass* permits critical focusing.

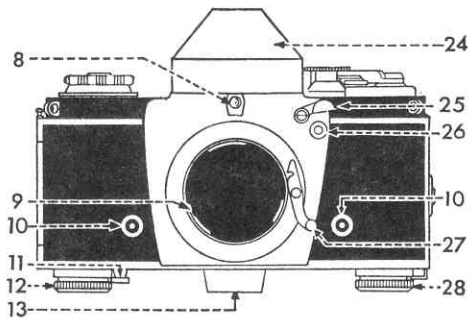
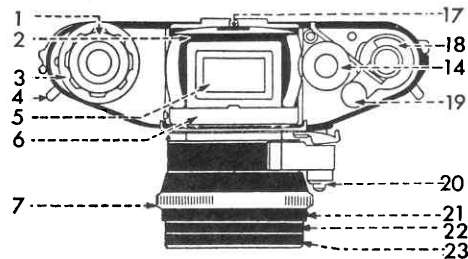
The waist-level reflex finder is interchangeable in Exakta models V, VX, IIa, IIb, VX500, VX1000 and RTL1000—as well as on the Exa I—against an eye-level pentaprism reflex finder.

The body of the Exaktas (except RTL1000) is of trapezoid shape, approximately $6 \times 3\frac{1}{2} \times 3$ in. It is die-cast aluminium alloy in one piece with the negative aperture, leather-covered, and has a hinged back. It is comparatively small

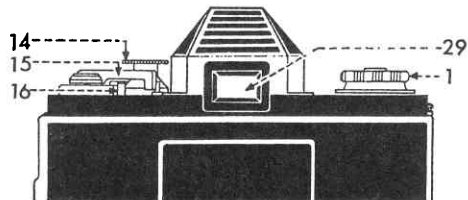


EXAKTA 11A, 11B, VX500 AND VX1000 CONTROLS

1, Slow speed and delayed action knob. 2, Focusing screen. 3, Film indicator. 4, Carrying lug. 5, Magnifier. 6, Focusing ring. 7, Aperture ring. 8, Hood pentaprism catch (not on 11b). 9, Bayonet lens mount. 10, Flash sockets. 11, Film cutting knife. 12, Rewind knob (crank on 11b). 13, Tripod bush. 14, Shutter speed knob. 15, Rapid lever wind. 16, Rewind button. 17, Eyepiece in hood. 18, Film counter. 19, Counter setting. 20, Release for preselector iris. 21, Depth of field scale. 22, Distance scale. 23, Focusing mount. 24, Pentaprism. 25, Release cover. 26, Shutter release. 27, Lens catch. 28, Back lock. 29, Eyepiece in pentaprism finder.



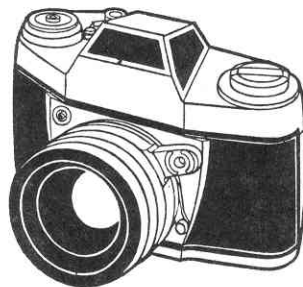
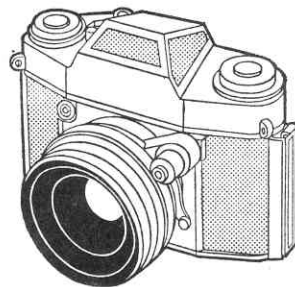
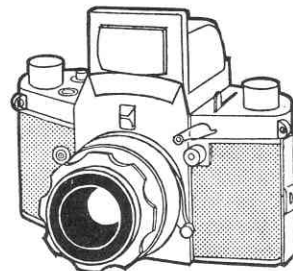
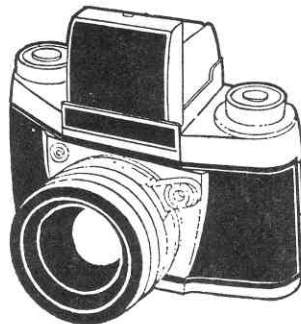
Top: Top view of camera with focusing hood. Centre: Front view without lens, with pentaprism. Bottom: Rear view of upper part with pentaprism.



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THE EXA MODELS

The Exa 1, introduced in 1963 (below), is basically the same as the models current up to 1961 (right). Its styling was improved, however, and the shutter speeds changed.

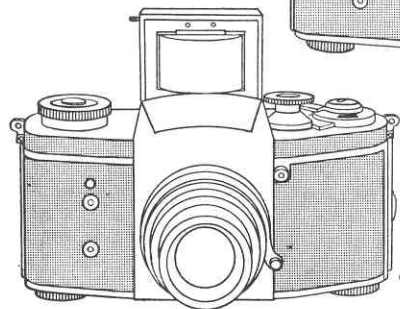
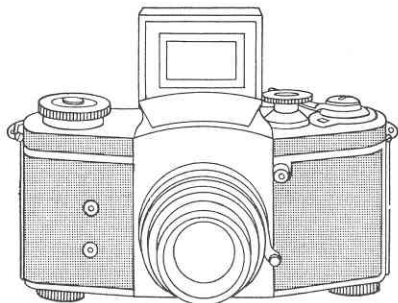


The 1964 Exa 11a (left) is similar to the Exa 11 (above), but has a detachable back and improved film transport. It can be supplied with standard ground glass screen or with a ground glass with fresnel screen and split-image rangefinder in the centre. The Exa 11b is as 11a, but with instant return mirror.

The 1967 Exa 500 (similar in appearance to the Exa 11a) is fitted with pentaprism and microprism rangefinder, extended shutter speed range and fully automatic diaphragm lens.

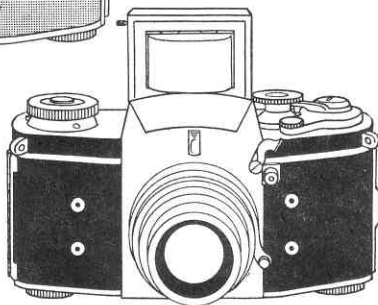
EARLIER 35 mm. EXAKTA MODELS

Right: Model I, the original Kine Exakta, has non-interchangeable focusing screen and is synchronized for bulbs only.



Left: Model II is similar to Model I, but has a different hood and film counter.

Right: Models V and VX have interchangeable screens and are M- and X-synchronized, having two sets of sockets. The 1956 model of the VX has a single concentric socket at each side.



in spite of housing the focal plane shutter, reflex arrangement and fast interchangeable lenses. It also has a tripod bush, internal flash synchronisation for electronic flash and flash bulbs and hooks for a neck-strap. The weight is approximately 33 oz. (950 grams).

Focusing is effected by a rapid helical focusing screw, which is part of the lens-mount. A focusing scale is found on all models indicating the distances from infinity down to 4 or 3 ft. There are also scales provided for reading off the depth of field.

The film is the standard 35 mm. miniature film for up to 36 exposures $1 \times 1\frac{1}{2}$ in. (24×36 mm.). A film cutting knife is built in (except RTL1000). In the latest model the film can be transported from cassette to cassette, making rewinding unnecessary, or to take-up spool with rewinding. A film type indicator and a film transport indicator complete the mechanism.

A *through-the-lens metering finder* (the Examat) has been marketed, made by Harwix, Berlin, which can be used with the Exakta or EXA I. This unit combines a pentaprism viewfinder and exposure meter converting the camera into a TTL model (details on page 65). For the model RTL1000 a TTL prism attachment for automatic exposure system with internal metering is available, made by Exakta (page 66).

Exakta Models

EXAKTA RTL1000 (1970). This model embodies all the refinements of the Exakta, but has been redesigned and incorporates significant advances in photographic technology. One of the three interchangeable viewfinder systems consists of a coupled TTL pentaprism for internal light measurement. It has a metal focal plane shutter from 8 sec. to 1/1000 sec. and B; the built-in delayed-action timer covers the speeds from 1 sec. to 1/1000 sec. Electronic flash is synchronised at 1/125 sec., bulbs at 1/30 sec. Shutter release on right and left-hand side. New range of lenses with internally controlled automatic apertures. The lenses of the earlier Exakta models can be used also for automatic aperture with an adapter on the release. It has self-setting frame counter, rewind pin remains depressed, rewind crank. The film cutting knife of the earlier models has been omitted.

EXAKTA VAREX IIa (1957). This model follows in general the above description. Its main differences compared with the earlier models are three co-axial flash sockets (X, M and F), a specially silent shutter mechanism and an improved film indicator. The 1961 model of the Vorex IIa is fitted with an improved reflex hood (with one-finger closing) which also accepts the interchangeable ground-glass screens for special purposes, e.g. with split image rangefinder (up to now only available for the pentaprism). This hood has no direct vision frame finder. The standard lenses have fully automatic preset iris.

EXAKTA IIB (1964) is similar to the model IIa of 1961, but has geometrical speed scales (1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 sec.). The rewind knob has a crank. The catch to secure the finder is not needed.

EXAKTA VX1000 (1967) is as the Exakta IIB, but with instant return mirror and minor mechanical improvements.

EXAKTA VAREX VX500 (1969) is a scaled-down version of the VX1000, with shutter speeds of 1/30 to 1/500 sec. and B only.

EXAKTA VAREX VX (1956) is similar to the model IIa, but has only two flash sockets.

EXAKTA VAREX VX (1951) has flash sockets for a two-pin flash plug instead of concentric sockets.

EXAKTA VAREX V (1950), the predecessor of the VX is similar to it except that it has no film type or transport indicators, it does not permit working from cassette to cassette and the back is not hinged.

EXAKTA II (1949) is as Exakta V but has no interchangeable reflex finder, so that the pentaprism attachment is not usable (but a special prismatic attachment can be placed on top of the reflex hood, see page 84). The flash contact is for flash bulbs only, and there is a minor change in the mechanical construction of the film transport.

EXAKTA I (1936), the original pre-war Kine Exakta, is similar to Exakta II with quite minor mechanical differences which do not affect its manipulation.

The Exakta cameras using 35 mm. film were originally called "Kine Exakta" to distinguish them from the roll film Exaktas then also produced. The prefix "Kine" was dropped in 1950, however.

Exa Models

The Exas are simplified versions of the Exakta. They retain many of its features, in particular the reflex focusing-viewing system and the interchangeable lens system. In addition to the lenses listed for the Exakta, an inexpensive standard lens, f2.9 50 mm. Meritar, 3 element with pre-set diaphragm, is available for the Exa models.

EXA II (1959) has shutter speeds from 1/2 to 1/250 sec. and B, single flash contact, but no delayed action. The eye-level pentaprism finder is permanently fitted. Most Exakta accessories, including all lenses, may be used in it.

EXA IIa (1963), similar to II, but has detachable back and improved film transport.

EXA IIB (1965), similar to IIa, but with instant return mirror (the image can be viewed before and after exposure), a warning signal in the viewfinder when the film has not been advanced, and general mechanical improvements.

EXA 500 (1967) is an improved version of the Exa IIB with fully automatic diaphragm lens, pentaprism with fresnel screen and micro-prism rangefinder, shutter speeds 1/2 sec. and 1/500 sec. and B, and XM flash synchronization.

EXA I (1953) has a shutter of different design with speeds of 1/25, 1/50, 1/100, 1/150 sec. and B only, two flash contacts, no delayed action. Film wind is by a transport knob; the film cutting device is omitted. Long focus lenses beyond 100 mm. are not usable (without undue cut-off) and similarly close-ups with longer extension tubes than 2 in. (5 cm.) cannot be made.

EXA I (1961), as I 1953 with improved reflex hood.

EXA I (1963) has improved styling, shutter speeds 1/30, 1/60, 1/125, 1/175 sec., B, single flash contact with symbol setting for electronic flash and bulbs.

EXA Ia (1965), similar to EXA I (1963), but with lever film transport.

In handling, the Exa cameras are substantially the same as the Exakta. Where differences occur which are not self-evident, these are pointed out in the text.

HANDLING THE EXAKTA

To start with, we take it for granted that we have our Exakta, together with a cassette of film, in front of us. Our first task is to load the camera with film.

Loading

The film should be loaded into the camera in subdued daylight, or at least in the shadow of your body. The procedure is as follows:

1. **Open camera-back.**
 2. **Insert film.**
 3. **Fix film on take-up spool.**
 4. **Close camera.**
 5. **Open finder hood.**
 6. **Transport film twice and release.**
 7. **Wind film-winder once more and set picture-counter.**
 8. **Set film indicator.**
1. **Open camera back** by pulling downwards and turning the milled camera opening knob on the camera base. On earlier models and some Exa models, press camera back lock. On RTL1000, pull up the rewind knob as far as it will go.
 2. **The rewind key** is pulled out as far as it will go, then place loaded film cassette into right-hand side film chamber (below slow speed and delayed action knob) with its hollow part towards rewind key. The mouth of the cassette with the film end has to point towards the take-up spool. The rewind knob is now fully pushed back, taking care that its centre plate is *not* pushed upwards.
The film chamber of the Exa has a cassette guide (a metal sheath which projects from the roller towards the chamber). The loaded cassette is inserted from beneath the camera, so that the mouth of the cassette lies against the edge of the guide.
 3. **Hold the cassette in position** with the left thumb, while pulling with the right hand 4 to 4½ in. (10 to 11 cm.) film from it. The free end of the film is pushed under the spring tongue of the take-up spool of the camera (below the film winder). The take-up spool can be turned on its axis to bring the spring tongue into the most convenient position for inserting the film. While fixing the film under the tongue the spool should be prevented from turning by

holding it still with one finger. Before closing the camera back, make sure that the perforations of the film engage in the teeth of the film transport sprockets.

On RTL1000, pull the beginning of the film to the green mark and push it with its lower perforation from above under the film rest and over the film transport sprocket. The wire frame on the take-up spool must *not* point upwards (but in any other position).

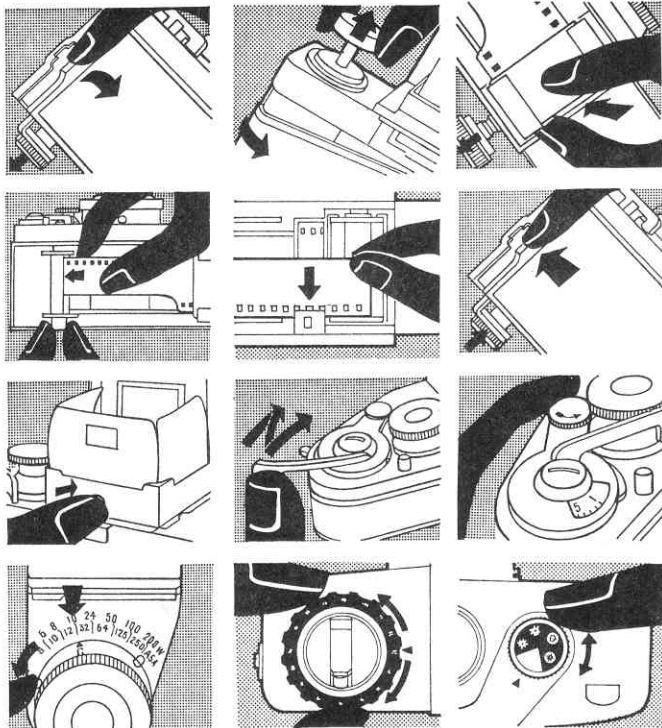
On the Exa I (1961) camera, remove the take-up spool from its chamber and push the film end under the spring of the take-up spool. The film is wound on to the take-up spool with the emulsion side *outwards* except on Exa I (1963) and later, where it winds inwards. Now insert the take-up spool into its chamber, ensuring that its top engages in the shaft of the film transport knob, and the perforation of the film in the film transport sprockets.

When working with two cassettes with the Exakta VX, Ila, b, VX500 and VX1000, trim the free film end square. Open the take-up cassette (page 37), remove any cut-off film end from the centre spool and attach the end of the fresh film to the centre spool of the take-up cassette (No. 4, page 37). Assemble the take-up cassette, and insert it in the take-up chamber. The slit of the take-up cassette must point towards the film aperture of the camera. Make sure that the perforations of the film engage in the teeth of the film transport sprockets, and close the camera back.

To work from cassette to cassette on Exa I (1961) cameras, simply replace the take-up spool by an empty cassette and adopt otherwise the same loading procedure as described for use of the take-up spool.

4. **Close the camera back.** With the Kine Exakta I and II, *take care that the circular peg inside the camera connected to the rewind key is pushed firmly into the interior of the camera.* This is best done with the ball of the left thumb. The camera back, held in the right hand with its locking-key upwards, is hooked with its lower end into the groove on the body of the camera, and the back itself pressed lightly towards the body until the locking-key snaps into position. The rewind key must be allowed to catch in the camera back so that it is clamped to the camera and cannot be pulled out when the back is closed.
On RTL1000 just press back gently home; it will lock automatically. Transport and release the film transport lever and repeat until the automatic frame counter points to No. 1. Ignore the points 5, 6, 7 below.
5. **The finder-hood springs open** by pressing its catch in the middle of the back base of the hood.
6. Wind and release the film transport twice with the shutter set to any speed except T (=Z). This action implies that the film has been moved forward the first two frames, which have been exposed to light while inserting the film into the camera. These two wasted leader-frames do *not* count as part of the 36 exposures.

LOADING THE EXAKTA



Top row: Open camera back (on RTL 1000, pull up rewind knob fully) and insert film cassette.
 Second row: Attach leader to take-up spool (on RTL 1000, lay leader across spool after passing under film guide). Close camera back.
 Third row: Open finder hood, where applicable. Make two 'blind' exposures. Wind on again and set film counter (except on RTL 1000).
 Bottom row: Set film speed indicator on earlier models (left), on RTL 1000 (centre). Set film type indicator.

7. The third film-wind brings the first unexposed piece of film into position, at the same time pulling the film tight. After winding on, the exposure counting disc is set to No. 1 by moving its setting knob (in earlier models the disc itself) in the direction of the engraved arrow until No. 1 points to the picture counting mark (small black triangle). On no account must the counting disc be turned backwards (against the arrow), as the subsequent exposure numbers would not be indicated correctly.

The Exa I (1961) film counter is a segment cut out in the top of the camera beside the film transport knob. Turn the knob in front of the segment (while pressing the top of one finger against it) in the direction of the arrow until No. 1 points to the index mark of the segment. On the subtractive counter of Exa I (1963) and Exa 500, set to 36 or 20 respectively.

On the Exakta VX, Iia, b, VX500 and VX1000 the film control disc, seen in the circular cut-out on the outside of the slow-speed knob, will rotate when the film is being transported.

8. The film indicator around the base of the slow-speed knob of the Exakta VX and Iia, b (on VX500, 1000 in its centre, on RTL1000 on the base of the transport lever) should be set in accordance with the speed of film loaded into the camera as a reminder. Early models have instead a film type indicator with the symbols S=black-and-white; black C=colour, daylight type; red C=colour, artificial light type. The Exa 500 has both types of reminder.

Carrying

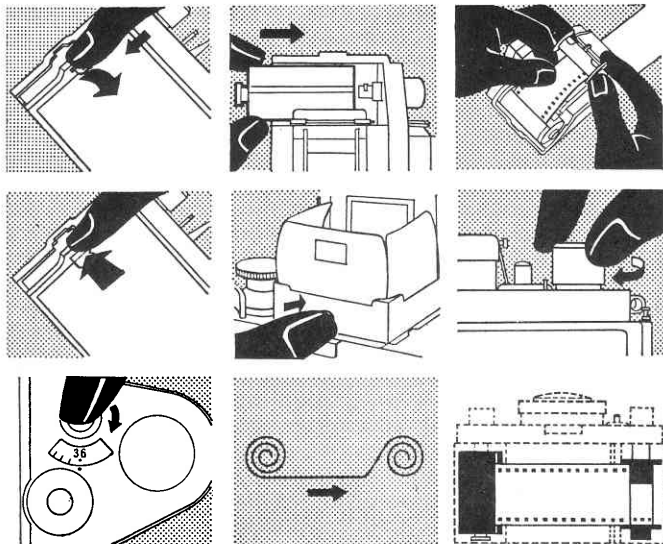
However elegant it may be to carry the camera on a long strap hanging from the shoulder, this position is quite unsuitable for quick action. Many a good shot has been lost in this way. A better method is to carry the Exakta on a short strap round the neck, so that it lies on one's chest—in the right position ready for work. Opening the case and finder hood or, when working with the pentaprism lifting the camera up to eye level, is then a matter of a split-second.

There are a number of different types of cases available for the Exaktas:

The ever-ready case carries the Exakta ready for use, and there is a holding screw which prevents the camera from falling out of the open case

Outfit cases in several variations are available to take the Exakta, together with auxiliary lenses, filters, films, etc. Also, separate cases for one lens or any of the other Exakta accessories are also on the market.

LOADING THE EXA



Top left: Open the camera back.

Top centre: Insert the film cassette.

Top right: Fix the film on the take-up spool.

Centre left: Close the camera back.

Centre: Open the finder hood (on Exa I only).

Centre right: Advance the film twice, pressing the release each time.

Bottom left: Set the film counter for the first exposure (slightly different on the two models).

Bottom centre: The path of the film inside the camera. It winds up emulsion side out on the take-up spool on the EXA I up to 1961, but emulsion side in on the EXA I (1963) and later.

Generally, it is of foremost importance to acquire sufficient experience in manipulating all parts that eventually lead to taking the picture by getting thoroughly acquainted with the ways in which to work them before actually setting out to make photographs. Surely one should try the gears, the accelerator, the brakes and even the horn of a new car before going “all out” with it. Going all out with a new camera without being able to do the “right thing” almost automatically is not less dangerous. It may be less wasteful of lives—but it is not less wasteful of live pictures, if not of the camera itself.

The following are the mechanical points that must be particularly watched when using the earlier Exakta: (1) Opening and closing the finder hood. (2) Winding the film and setting the shutter. (3) Releasing.

Viewing

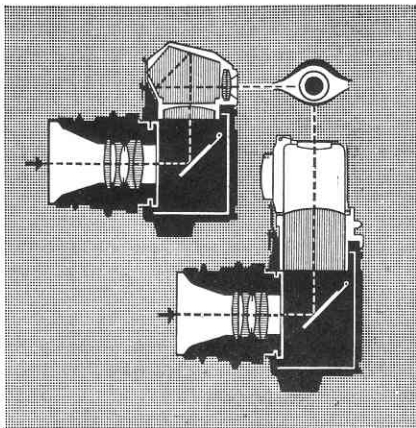
The reflex finder and the eye-level pentaprism are viewing-focusing devices. The frame finder is purely a viewing device.

REFLEX FINDER. To bring the finder hood of the Exakta into the working position, the catch on the back of the finder hood has to be pressed down, when the hood automatically opens up, permitting observation of the ground-glass screen image up to the moment of exposure. The screen of the Exakta is actually one side of the plano-convex lens, the lower side of which is matted to form a ground-glass screen; the lens also acts as a powerful magnifier. Therefore, the reflex image seen in the finder hood is bigger than the actual image on the negative while—naturally—the outlines and definition remain identical. For more critical focusing a built-in magnifier may be employed in addition to the magnifying ground glass. The magnifier is erect in the front wall of the finder hood; to bring it into position, it is simply pressed inward towards the reflex image, where it will be automatically held by a catch. Looking down, the reflex image appears further enlarged, so that it may be focused with ease and accuracy. While the first edition of the 35 mm. Exakta was fitted with a circular magnifier, showing only a comparatively small circular central section of the field, the later models have a bigger, rectangular-shaped magnifier, allowing almost the whole field to be viewed. The magnifier is released from its horizontal position by pressing the small stud on the right-hand bottom corner of the back of the finder hood.

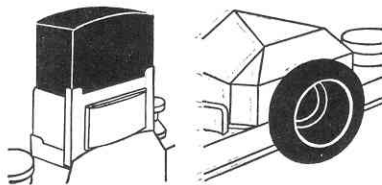
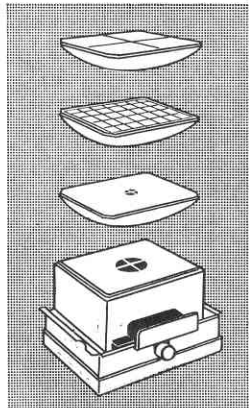
The magnifier has a protecting cover (except Exakta I) and shows the

REFLEX FINDER AND PENTAPRISM

Right: The standard reflex finder fitted to all models is used by looking down on the screen. With Models V, VX, IIa, IIb, VX and RTL 1000 as well as the Exa I and Ia, the viewing unit is interchangeable with a pentaprism type, which permits use at eye level. In the Exa II the eye-level finder is fixed.



Below: The normal ground screen of the pentaprism finder and also the reflex finder of the 1961 Exakta IIa and IIb may be readily interchanged with other types for special scientific purposes (see page 20).



An eye-level pentaprism attachment has been made for Model II and fits on top of the erected hood (left). An accessory for the pentaprism unit for Models V, VX, IIa, IIb, VX and RTL 1000 is an eyepiece to exclude stray light (right).

whole image, so that the camera can be used without lowering it after critical focusing.

The reflex finder image seen is the picture produced by the camera lens and reflected by the mirror on to the screen. The reflex image is only visible after the film has been wound on, and it disappears once the shutter is released. It has a twofold purpose: first to show the *outlines of the picture*, second to permit the best *definition* to be obtained.

The reflex finder of Exakta IIa (1961) and IIb accepts also the special condenser bases with split-image range finder, etc.

There should be no difficulty in getting the outlines as exact as required. It is advisable to *view the picture first with full-opened aperture* to ensure the brightest possible reflex-image. The finder hood extension (page 81), keeping stray light from the screen, gives additional brilliancy to the picture. In spite of the fact that one is likely automatically to hold the camera quite *level*, one should make sure that the vertical lines of the picture run parallel with the sides of the ground-glass frame, if intentional tilting is not aimed at.

The second purpose of the reflex image, obtaining the best definition, is at the same time one of the most important factors ensuring good results. The less experienced user of the reflex screen is apt to accept, all too hastily, a seemingly sharp impression of the image as best definition. There are, however, different degrees of sharpness even at full aperture, which one should make use of in determining the best possible definition. The best way to arrive at critical definition is to *turn the helical focusing mount to and fro* while observing how the main object at which one intends to focus accurately becomes more and more sharp up to a certain point, beyond which it will again lose definition. It is at this "beyond" stage that we reverse the movement of the focusing mount. The degree of movement of the focusing mount is slowly narrowed down until one unmistakably arrives at the point of the very best definition. It is a case of "encirclement" *from the sharp surrounding to the critical sharp point*. It must be repeated that, before and beyond the point of maximum definition, the image still appears sufficiently sharp, but no one should be deceived by this fact: it is not good enough for enlarging.

The built-in magnifying glass swung into position will assist in determining the critical focus. Having found this, the magnifier should be folded back and the whole image on the screen surveyed before release. The camera, which had to be raised when using the magnifier, should now be lowered again. Otherwise—with the magnifier in front of us—we may get excellent definition, but are bound to lose sight of the picture as a whole.

The picture on the ground-glass screen appears *upright but reversed left to right*. Similarly, movements are also shown reversed and *the camera will have to be turned against the apparent movement of the object to follow it*.

PENTAPRISM FINDER. This is for the Exakta RTL 1000, VX500, 1000, IIa, b, VX, V and EXA I; it is interchangeable against the normal reflex finder and is an extremely valuable alternative focusing-viewing method. To change from the reflex to the eye-level finder, the finder housing is lifted up bodily and replaced by the other finder housing, while on EXAKTA VX1000, IIa, VX or V the sliding catch on the front plate is depressed.

With the pentaprism in position, the image is viewed and focused at eye level and seen upright and the right way round. The bright image makes accurate focusing easy, and changing from the horizontal to the vertical position is straightforward.

The base of the pentaprism finder consists of a plano-convex lens, the flat side of which is a ground screen. This base is interchangeable for special ones, with split-image rangefinders available either on a normal ground-glass screen or on an extra-bright fresnel lens screen giving uniform brightness edge to edge. They give split-image range-finder focusing, in addition to normal screen focusing. Two small prisms are mounted in a clear spot in the centre of the screen, and the image in the spot appears disrupted; on turning the focusing ring, the two disrupted halves are brought into line so that one continuous image is seen, and in this position one has focused accurately.

For more specialised types of work, in particular for macrophotography and photomicrography, the ground-glass condenser may be changed for clear glass (to permit focusing on the more brilliant aerial image), or for ground-glass with a centre spot of 3 or 10 mm.

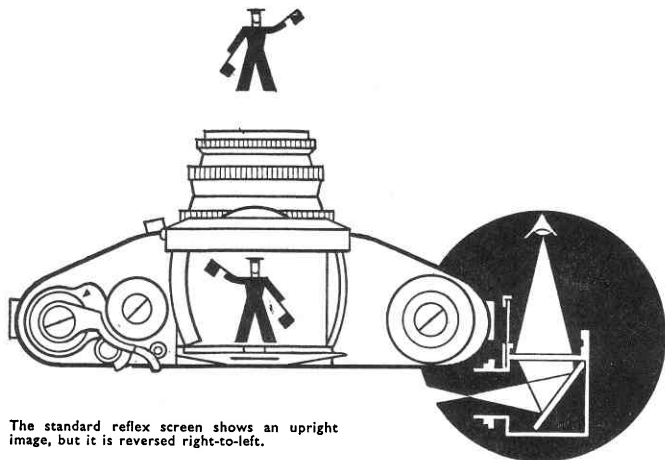
Prism finders combined with exposure meter are available: see page 65.

FRAME FINDER. The Exakta models prior to 1961 were fitted with a direct vision frame finder. This is brought into position by pressing inwards the magnifying glass in front of the finder hood. The rectangular aperture in the back wall of the finder hood, together with the open frame in the front wall, form a direct vision frame finder for eye level.

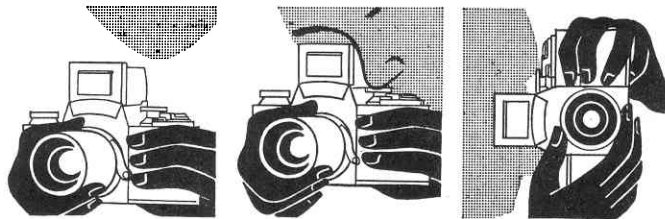
To use the frame finder of Exakta IIa, VX, V, II, lift up the magnifier and also the protective cover. The frame when viewed through the sight will define the outlines of the picture aimed at. When using the frame finder, one must not attempt to turn the camera to the right or the left, away from the eye, nor must the eye be moved from the centre of the back frame to find the limitations of the field of view. This *spying "round the corner" is deceptive*, as only the section seen in the finder, when holding the eye close to and in the centre of the opening while looking straight ahead, will appear on the negative. The frame finder gives the correct field only for the standard 5 cm. lenses, and it cannot be expected to be free of parallax.

The frame finder *cannot be used for focusing*, apart from guessing the distance of the subject as based on the size of its appearance within the frame and then setting the focusing scale of the lens mount accord-

HOLDING—REFLEX FINDER

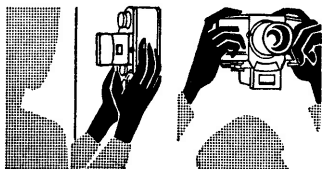


The standard reflex screen shows an upright image, but it is reversed right-to-left.

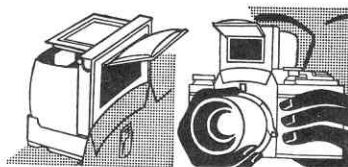


Using the reflex finder, the Exakta is held firmly against the chest; the right hand operates the helical focusing while the left hand grips the camera, the index finger on the release button (left). The magnifier in the hood is used to obtain critical focus (centre). To obtain vertical pictures, the operator may stand sideways and hold the camera at eye level (right); in this position the image is upside down.

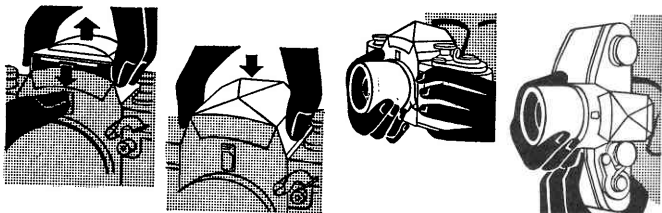
HOLDING—FRAME FINDER AND PENTAPRISM



Left: Pictures can be taken round a corner, using the reflex finder; or over the heads of a crowd by holding the camera inverted and looking upwards on to the focusing screen.



Right: The hood incorporates a range finder which can be used for normal eye-level work, in particular action shots.



The reflex finder of Models V—VX, IIa and VX1000 is removed by depressing the catch on the front plate and then lifting it off (left). On Model RTL 1000 the two locking knobs on either side of the Exakta engraved front plate are pressed down. The pentaprism finder may then be fitted in its place (left centre), and the camera used at eye level, held firmly against the face (right centre). The camera is turned through 90 degrees for vertical pictures, the image still remaining upright on the screen (right).

ingly; only very experienced photographers will be safe from serious errors when applying this method. It is safer first to use the reflex finder for focusing and then to change over to the frame finder for viewing. Both these procedures are unsuitable for photographing moving objects. The frame finder will more efficiently be used for distant photography where infinity setting only is required; or, with subjects nearer to the camera, by using "zone focusing" methods, which, by presetting the lens, ensure that a certain depth of field—within the limits of which the action is expected—will be recorded sharp all over (see page 52). This last method of viewing and focusing is, in fact, preferable to any other when dealing with rapidly moving subjects in front of a reflex camera. It is almost impossible to catch and shoot fast motion when one is looking down with one's attention fixed to the mirror that shows the direction of motion laterally reversed. With the frame finder it is easier to follow movement and keep the (other) eye on it, even before it becomes visible within the finder frame.

Holding

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

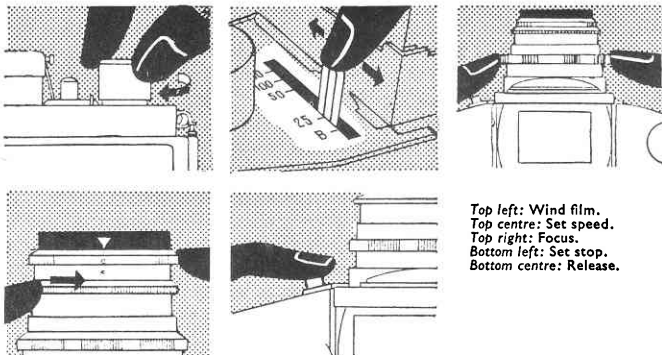
A particularly steady hold of the camera is necessary when working with long-focus lenses (page 52). In this case the centre of gravity is further forward and therefore it is desirable to hold the camera by grasping the helical focusing mount with the right hand, while the left hand steadies the camera and operates the shutter-release.

As the Exakta is horizontally built, it obviously lends itself most simply and naturally to photographs in this position.

When working with the reflex finder at chest level, the camera should be firmly held with the left hand, the index finger of which should be in position on the release knob, while the right hand supports the camera from underneath the camera-body, which should rest against the palm of the hand, while thumb and index finger support and handle the focusing mount.

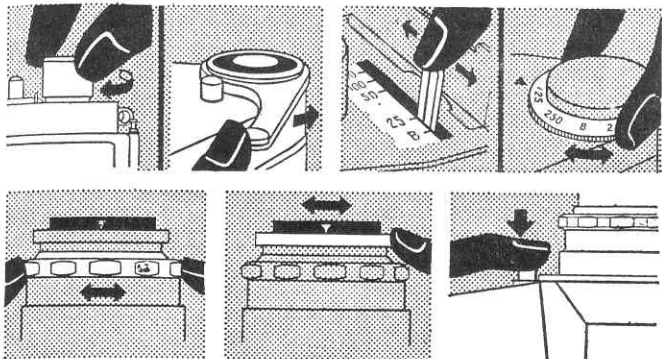
Vertical photographs cannot be taken at chest level. The normal procedure is: hold and focus the camera horizontally, as described before, then raise it to eye-level position, turning it at the same time,

SHOOTING WITH THE EXAKTA



Top left: Wind film.
Top centre: Set speed.
Top right: Focus.
Bottom left: Set stop.
Bottom centre: Release.

SHOOTING WITH THE EXA 1 (1961)



Top left: Advance the film (with knob or winding lever). Top right: Set the shutter speed. Bottom left: Focus. Bottom centre: Pre-set the aperture. Bottom right: Release.

so that the focusing screen is vertical and the eye examines the image on it at right angles to the object to be photographed. The lens rests in the fork between thumb and index finger of the left hand, while the right hand supports the camera body, so that its thumb comes to lie against the release knob. One actually works "round the corner".

When working horizontally at eye level, either with the pentaprism or the frame finder, the Exakta is grasped with both hands, the camera back rested against cheek, both elbows kept close to the body, and the index finger of the left hand on the shutter release button.

For taking vertical photographs at eye level either with the pentaprism or the frame finder, right and left hands are employed as advised for horizontal photographs, but the camera body is turned 90° to the left so that the right hand holds the Exakta from above and the camera is pressed against the forehead.

To release the shutter (page 26) the shutter-release button should be pressed with the ball of the left forefinger. Use finger pressure only, keep the hand and its grip steady on the camera. The actual pressing down will have to be done slowly and smoothly. The slower the exposure time, the smoother must be the release. Keep your hand clear of the speed knob while releasing!

For slow exposures in the hand it is advisable, when working at chest level, to inhale, hold the breath and release smoothly in order to avoid shake.

When using long exposures while holding the camera at eye level, rest the elbows against some support or at least lean against something stable. In this way, 1/10 sec. or more can be risked without incurring camera shake.

When using large aperture and long-focus lenses (pages 45, 48), stand the Exakta on a table or other flat surface.

Use of a tripod is necessary when taking time exposures and working with the delayed-action release, and it is recommended for speeds from 1/30 (1/25) to 1/2 sec. and instantaneous exposures of 1/60 (1/50) sec. with long-focus lenses.

Shooting

Practice the operations described here so that in time they will become practically automatic. After the camera

has been loaded with film, as instructed on page 13, proceed as follows:

1. **Wind film transport.**
 2. **Set shutter speed.**
 3. **Focus and determine picture frame**
 4. **Set stop.**
 5. **Release.**
1. **Wind film transport lever as far as it will go** and let it spring back with *brake*. If the camera has been reloaded with new film, it has already been wound for the first exposure.
- On the Exa I (1961) and Ia, turn the film transport knob in the direction of its engraved arrow as far as it will go. On the Exa II move the transport lever as far as it will go.
2. **The shutter speeds** of Exakta and Vorex models from 1/30 to 1/1000 sec., as well as B (brief time) and T or Z (time), are set on the shutter-speed knob (beside the film transport lever) by lifting it up, turning the speed required opposite to the index mark on the fixed centre of the speed knob and letting it down again. The numbers given on the knob indicate fractions of seconds, so that 30, 60, 125, etc., mean 1/30, 1/60, 1/125 sec. Short time exposures are made by setting B opposite the indicator, when the shutter will remain open as long as the release button is pressed. Long time exposures are made by setting T (Z in early cameras) to the indicator when a first pressure on the release button will open the shutter, and a second pressure will close it again.
- The slow speed and delayed action knob allows for automatic exposure of slow speeds from 1/4 to 12 seconds (on older models from 1/10 sec.) and use of a delayed action release for all shutter speeds from 1/1000 to 6 seconds. Its handling is slightly complicated and should be carefully studied and exercised.
- The RTL1000 shutter speed dial carries the range from 1 to 1/1000 sec. and B. It is set by turning the required speed to point to the orange triangle mark.

TO OPERATE THE SLOW SPEEDS:

- (a) Set shutter-speed knob to B (or T).
- (b) Wind slow-speed knob *as far as it will possibly turn* in a clockwise direction.
- (c) Lift slow-speed knob up, then turn it so that required time in black figures comes to lie opposite mark on knob and let knob drop back.* On the RTL1000 the slow-speed knob is turned until the required speed (2-8 sec.) points to the mark on its tensioning lever.
- (d) Release *smoothly*.

DELAYED ACTION RELEASE FOR SPEEDS FROM 1/30 TO 1/1000 SEC.:

- (a) Set shutter-speed knob to actual exposure time required.
- (b) Wind slow-speed knob as far as it will possibly turn in a clockwise direction.
- (c) Lift slow-speed knob up, turn it so that any red figure comes to lie against the mark on the knob and let knob drop back.*
- (d) Release *smoothly*.

DELAYED ACTION RELEASE FOR SPEEDS FROM 1/8 TO 6 SEC.:

- (a) Set shutter-speed knob to B (or Z).
- (b) Wind slow-speed knob *as far as it will turn* clockwise.
- (c) Lift slow-speed knob up, turn it so that the exposure time required in red comes to lie against the mark on the knob centre and let knob drop back.*
- (d) Release *smoothly*.

The delayed action time in all cases is about 12 sec.

The Exa Ia, b shutter speeds are set with the lever or ring moving past a scale of engraved shutter speeds on the top between the rewind knob and finder. The speed figures engraved (B) 30, 60, 125, 175 represent fractions of a second, namely 1/30, 1/60, 1/125, 1/175 sec. The mark on the lever has to point to the mark on the speed scale. At the B setting the shutter remains open as long as the shutter release is depressed.

The Exa IIa, b and 500 shutter is set by turning its milled outer ring until the desired speed points to the triangular mark.

The RTL1000 delayed action works with the speeds from 1 to 1/1000 sec. only:

- (a) Turn the shutter speed required to the orange triangular mark.
 - (b) Turn the slow-speed tensioning lever clockwise to its stop.
 - (c) Release on the preset timing device and the exposure will take place 8 sec. after release.
3. **Focusing is accomplished** by turning the second milled ring on the lens mount which bears the distance markings either until the distance required is opposite the distance mark, or by the usual reflex image control (page 18) until the subject appears fully sharp.
4. **The stop is set** on the lens mount, where the milled front ring with the indication mark can be turned in line with the aperture figure engraved on the lens. The purpose of the diaphragm is to adjust

*The slow-speed knob of the earlier 35 mm. Exakta models has a black *and* a red mark. In this case, the red figures (when working with delayed action) have to be placed against the *red* mark, and the black figures (when using the slow shutter speeds) against the black mark.

the effective opening of the lens. The smaller this opening, the greater the depth of field (page 52). At the same time, as less light can pass through the lens in any given time, the exposure time must be longer (page 52). The reduction in light means obviously a reduction in brightness of the reflex image with an increase of depth of field. *Both loss of light and increased depth of field make the accurate focusing on the ground-glass more difficult, therefore reflex focusing should always be done at full aperture.*

To facilitate focusing at full aperture with subsequent quick and correct stopping down, the later lenses have preselected aperture setting—those of the 1961 Exakta, the Ila, I Ib, VX500, VX1000 and RTL1000 have fully automatic iris preset.

Some of the early lenses have behind the aperture scale a milled ring, and this is pushed backwards towards the camera and turned until its index mark points to the aperture one wants to use. It is then released to spring back into its original position.

Having focused at full aperture, the aperture ring is turned, until it stops at the preselected setting. The exposure is then made without it being necessary to move the camera from the taking position.

Later lenses have an automatic iris preselecting mount. After selecting the aperture required, a tensioning lever on the mount is set, and when the shutter release is depressed the diaphragm is automatically set to the selected aperture just before the shutter starts moving.

The lenses of the 1961 Exakta, Ila, I Ib, VX500, VX1000, Exa 500 and RTL1000 do not require tensioning. The iris opens up again automatically when the shutter is released.

5. Release by pressing the shutter-release knob *gently*, without shaking the camera. The release knob is blocked as long as the finder hood is closed, to protect against accidental release. A release lock is fitted to the models with interchangeable finder hood in the form of a release knob cover—and on the RTL1000 a locking disc for the right-hand release.

Unloading

After all exposures on the film have been made, it has to be removed from the camera and replaced with a new one. When working from cassette to take-up spool, the procedure is as follows:

1. Depress rewind pin.
2. Rewind film into cassette
3. Open camera-back.
4. Remove cassette.
5. Close camera-back or reload with film.

1. After all exposures have been taken, press the rewind pin on RTL1000 in camera bottom plate; it will stay automatically depressed. On earlier models, press the pin situated on the camera top plate between the exposure counter and shutter-speed knob and keep it depressed while rewinding (No. 2). On the original 35 mm. Exakta models is a lever in this position which has to be folded up and left in this position while rewinding; while the original Exaktas have a reversing lever which has to be pushed sideways so that the letter R is visible.

On the Exa I (1961) and Exa 500 the rewind pin is behind the film counter. On Exa I, keep it depressed while rewinding.

2. Press the centre of the film rewind knob as far inwards towards the camera body as it will go; this engages the rewind key on the centre spool of the cassette. Then turn the rewind knob in a clockwise direction until the film is completely wound back into its cassette. Correct rewinding can be observed by the movement of the film transport indicator beside the slow-speed knob.

Incidentally, the centre screw securing the film transport lever turns in the opposite direction to the lever itself.

Exakta VX and RTL1000 rewind knob has a fold-over handle which has to be turned in the direction of the engraved arrow to rewind film.

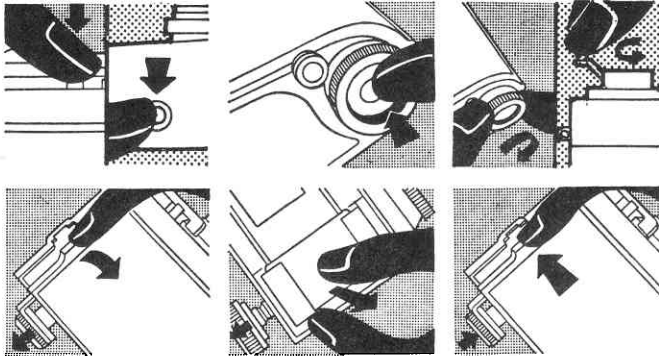
On earlier Exakta models, raise the rewinding key on the camera bottom and turn it clockwise with the thumb and index finger. On the Exa, turn in the direction of the arrow. Turn until a slight resistance is felt, wind over this resistance and give two or three more turns. The film end now comes off the spring of the take-up spool and is wound back into the cassette.

3. Open the camera back (see page 13, No. 1).
4. The cassette of exposed film is taken out by pulling the rewind key downwards as far as it will go.
5. Before closing the camera back, push the rewind knob back into its original position. While the rewind pin of the RTL1000, Ila, I Ib and VX and Exa will spring automatically back into its normal position, on the earlier models the rewind lever has to be folded down, and on the original models turned sideways so that the letter V is visible.

Unloading without Rewinding

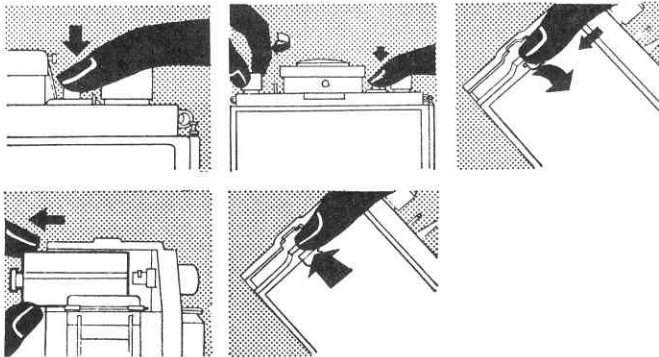
When working from cassette to cassette, the procedure for unloading the Exakta VX, Ila, I Ib, VX500 and VX1000 is as follows:

UNLOADING THE EXAKTA



Top left: Depress rewind pin on RTL1000. Top centre: Depress centre of rewind knob, not on RTL1000. Top right: Rewind film into cassette. Bottom left: Open camera back. Bottom centre: Remove cassette. Bottom right: Close camera back or reload.

UNLOADING THE EXA 1 (1961)



Left: Depress the reversing button. Centre: Rewind the film. Right: Open the camera and remove the cassette. The upper row refers to the Exa II, the lower row to the Exa I (1961).

1. Cut film with built-in cutting knife.
2. Make two blind exposures.
3. Open camera-back.
4. Remove cassettes.
5. Close camera-back or reload with film.

1. The knob of the film cutting knife (on the bottom of the camera body beside the rewind knob) is unscrewed by turning it in an anti-clockwise direction. This knob is fitted to the end of a long rod at the other end of which a knife is fitted. Pulling the knob out (about 2 in.) cuts the film right across. The knife rod is then pushed back and its knob screwed back by turning it clockwise.
2. Turn the film transport lever and release twice to wind the film fully into the cassette and so protect it from light.
3. Open camera back (see page 13, No. 1).
4. Remove cassette (see above, No. 4).
5. Close camera back (see above, No. 5).

Changing Partly Exposed Film

Replacing a partly exposed film by another one, as might happen if a few colour photographs were made in between some black-and-white pictures, or a slow-speed film used instead of a fast one, is an easy matter with the Exakta. First note the number of exposed frames on the film counter and then rewind the film back into its original cassette (see page 30, No. 2). One has to be *careful to wind only until a little resistance is felt*. (In the ordinary way, this resistance would have to be overcome in order to pull the film end from the take-up spool, but to do so in this instance would be to run the risk of rewinding the whole film into the cassette, when the film would have to be extricated in the darkroom in order to be able to reload it later on.) The rewound film has to be taken out of the camera. On the beginning of the film, note the number of exposures taken and then put it into a container or wrap it up. Now the camera can be loaded with another type of film.

To use the partly exposed film again, it has to be loaded into the camera in the usual way (see page 13). It is then run through the camera with the lens cap on—winding on and pressing the release until all the exposed frames have been wound off. To be on the safe side, it is

advisable to wind off one frame more than actually exposed. When making "blind" exposures it is wise—in addition to covering the lens—to stop it right down and to set the shutter to the highest speed.

Cutting Off Exposed Film Parts

The desire to process some of the 36 exposures of the Exakta without shooting or wasting the whole of the load in the camera might easily arise. For that reason all models have been fitted with the built-in film cutting knife described on page 32. This can be used for cutting off the exposed frames; the cut is made about 1 in. behind the last exposure. If more space is required—for example, when film clips are used in processing—it is advisable to make one blind exposure before bringing the knife into action, which gives about 2½ in. handling space after the last frame. The camera must now be opened in the darkroom, as the exposed film is not protected when opening the camera back to remove it. To remove the film, it is simply drawn from the take-up spool, rolled and wrapped up light-tight ready for processing.

The procedure is simplified when using a take-up cassette in the Exakta IIa, IIb and VX. Make two blind exposures (wind the film and release the shutter twice), open the camera, and cut off the film close to the take-up cassette, which can then be removed.

EXAKTA FILMS

The Exakta uses standard perforated 35 mm. film giving up to 36 exposures 1 × 1½ in. (24 × 36 mm.) at one loading.

DAYLIGHT FILM CASSETTE. The film is supplied in a metal or plastic cassette, which is light tight, so that it can be placed into the camera and removed in daylight.

DAYLIGHT REFILL FILM. The film is supplied on a centre spool and covered with an opaque leader to render it light tight. The daylight refills have to be used in empty cassettes and can be loaded into them in daylight.

DARKROOM REFILL FILM. These are ready-cut lengths, generally for 36 exposures, which must be loaded into empty cassettes in the darkroom.

BULK FILM. Uncut 35 mm. film in lengths of 16 to 100 ft. (5 to 30 m.), from which lengths may be cut, trimmed and loaded into an empty cassette (see page 37).

While the insertion of the loaded cassette is described on page 13, we have to see how the cassette itself is loaded with a suitable length of film in the darkroom.

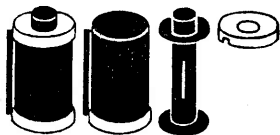
Safelight

In the case of black-and-white films 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 to first practise filling with a dummy film in daylight before starting darkroom work.

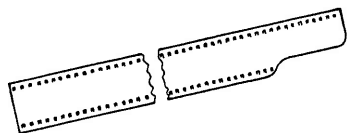
Handling, Winding and Trimming the Film

When handling the actual film, particular care must be taken *not to touch its emulsion (matt) side*. It should only be handled and spooled on to the centre spool of the cassette by holding the film by its edges, preferably between thumb and index finger (page 35). At the same time, it is of no less importance that the spot on which the loading is done

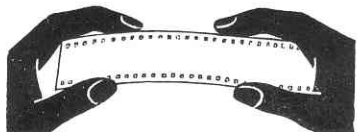
HANDLING, WINDING, TRIMMING 35 mm. FILM



Above: Complete cassette (left) and its component parts.
(Below: Handle the film by its edges.



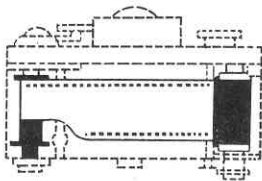
Above: The film ends have to be trimmed to shape.



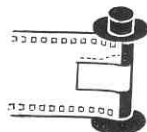
Right: Winding the film on the spool.



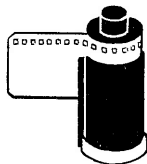
Below: Cassette inserted in Model IIa, IIb and VX for cassette-to-cassette use.
(Exa is similar, but with feed cassette on the left.)



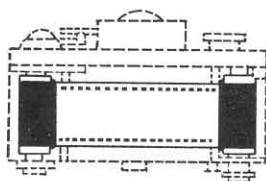
Right: How to attach the film to the spool.



Right: Inserting the loaded spool into the cassette.



Below: Cassette inserted in the Exakta for cassette-to-spool use.
(Exa is similar, but with feed cassette on the left.)



should be perfectly dry, clean and dust free. Only a spotless, clean negative will produce the desired result!

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

The film ends need trimming. At the beginning of the roll of film, make either a straight or wedge-shaped cut for the centre spool of the cassette and measure off the required length of film (see table below). At the end of this, make the curved cut for the take-up spool (page 35). 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 cassette, as described on page 37. One will have to

LENGTH OF FILM REQUIRED FOR ANY NUMBER OF EXPOSURES

Number of Exposures	Length of Film Required		Number of Exposures	Length of Film Required		Number of Exposures	Length of Film Required	
	in.	cm.		in.	cm.		in.	cm.
1	11 $\frac{3}{8}$	30	14	31 $\frac{3}{8}$	80	27	51	130
2	13 $\frac{1}{2}$	34	15	33	84	28	52 $\frac{1}{2}$	133
3	15	38	16	34 $\frac{1}{2}$	88	29	54	137
4	16 $\frac{1}{4}$	41	17	36 $\frac{1}{4}$	92	30	55 $\frac{1}{4}$	141
5	17 $\frac{3}{8}$	45	18	37 $\frac{3}{8}$	96	31	57	145
6	19 $\frac{1}{4}$	49	19	39 $\frac{1}{4}$	100	32	58 $\frac{1}{2}$	148
7	20 $\frac{3}{8}$	53	20	40 $\frac{3}{8}$	103	33	60	152
8	22	56	21	42	107	34	61 $\frac{1}{2}$	156
9	23 $\frac{3}{8}$	60	22	43 $\frac{3}{8}$	111	35	63	160
10	25 $\frac{1}{4}$	64	23	45	114	36	64 $\frac{1}{2}$	164
11	26 $\frac{3}{8}$	68	24	46 $\frac{3}{8}$	118	37	66	167
12	28 $\frac{1}{2}$	72	25	48	122	38	67 $\frac{1}{2}$	171
13	30	76	26	49 $\frac{1}{2}$	126	Including trimming		

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

Loading Cassettes

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

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

Cassettes with Bulk Film or Darkroom Refills

1. Work in the darkroom in appropriate safelight.
 2. Prepare film.
 3. Open cassette.
 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 project from the light-trap.
 7. Close cassette.
2. As described on page 34.
3. As described above.

4. If the centre spool is fitted with a film catch, thread the tapered end of the film into it. In cases where the centre spool is fitted with a spring, thread the end under it and fold it sharply back. If the centre spool is without any suitable fitting to hold the film, it has been proved best to wind a 1½ in. (4 cm.) piece of cellulose tape round the centre spool, so that on either side about ½ in. tape is used to secure the film (see page 35).
7. Where both top and bottom covers are loose, it is essential to fix them to the shell, preferably with a length of adhesive cellulose tape.

Cassettes with Daylight Refills

1. No darkroom is necessary.
 2. Remove film wrappings and label of refill.
 3. Open cassette.
 4. Introduce refill into shell of cassette; the first 2 in. of paper leader has to project from light-trap.
 5. Close cassette.
 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.
5. See No. 7 above.

The Choice of Black-and-White Material

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

COLOUR SENSITIVITY. Practically all 35 mm. films that can be used in the Exakta are sensitive to all colours. They are what is known as *panchromatic*.

INFRA-RED FILM. Infra-red film is a negative material which, unlike the 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, mist penetration, scientific copying and research work. It must be used with an infra-red filter to cut out blue light, to which it is also very sensitive.

COPYING FILM. For copying black-and-white objects (books, ledgers, etc.), a micro-copying film can be recommended. It has fine grain, high resolution and contrast. For coloured originals there is a panchromatic type.

SPEED. The sensitivity of film materials to light in general is expressed as a number of degrees, or as just a number, according to the system used. The principal systems are the American standard (ASA) and the German standard (DIN). Speed is an asset, but it is 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.

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

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

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

Ultra fast films are primarily intended for high-speed sports shots in dull weather, interior snapshots in poor light, night photography and ill-lit stage pictures. These films are specialist types for conditions where normal materials are totally inadequate. They should not be used for general photography. The high speed is achieved at some cost in definition and graininess. Speed ratings range from 500-1600 ASA or 28-33 DIN.

Make	Speed in ASA and BS Arithmetic	Make	Speed in ASA and BS Arithmetic
Adox—		Kodak—	
Adox KB 14	40	Panatomic X	40
Adox KB 17	80	Plus X	125
Adox KB 21	200	Tri-X Pan	400
Adox KB 25	500		
Adox UKB-17 Reversal	80	Konica—	
Agfa—		Konipan S	100
Agfapan	25	Konipan SS... ..	200
Isopan IF	80	Konipan SSS	400
Isopan ISS	400		
Agfapan 1000	1000	Orwo, Wolfen—	
Dia Direct 26 Reversal	50	NP 15	8
		NP 20	80
Ansc—		NP 27	400
Super Hypan	500		
Ferrania—		Perutz—	
P 24	40	P 14	40
P 30	160	P 17	80
P 33	320	P 21	200
P 36	640	P 25	500
		Miniature Reversal	50
Ilford—		Tura—	
Pan F	50	Pan 14	40
F.P.4	125	Pan 17	80
H.P.4	400	Pan 21	200
		Pan 24	400

The above speed figures are based on the latest ASA Standard for film speeds. These figures, when used on the exposure meter, give minimum correct exposures, to make the most of the versatility of the film and of the image quality. They are also the figures quoted by most film manufacturers. Sometimes, films are, however, still rated according to earlier standards which in effect incorporated a generous safety factor against under-exposure—by the simple process of overexposing films about 100 per cent (well within the exposure latitude of most black-and-white films). So you may come across films apparently only half as fast as others of similar type, because of this difference in ratings. The table on this page indicates the current film speeds to be used with the exposure meter, even if the film packing gives a lower rating.

This applies to *black-and-white negative* materials only; speed rating methods have not changed for colour films.

CONVERSION OF FILM SPEED SYSTEMS

ASA & BS Arith. (New) *	ASA Log (New)	DIN	BS Log
3		6	16°
6	1°	9	19°
12	2°	12	22°
25	3°	15	25°
50	4°	18	28°
100	5°	21	31°
200	6°	21	34°
400	7°	27	37°
800	8°	30	40°
1600	9°	33	43°

*Also Weston Master III and later meters.

In this table each value represents twice as fast a film speed as the one immediately above it.

In some systems this doubling of film speed means increasing the speed number by 3 each time (B.S. Log. DIN), while in others the film speed itself is proportional to the exposure required (ASA).

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 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 (page 40). 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 film can reproduce only a short tone range in the subject, we speak of a "high contrast" or hard negative material. If it is able to reproduce a wide range of tones in the subject, 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) overexposure. 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 it against scratches. The base has been coloured, as a rule grey, in order to avoid reflection of the light coming through the emulsion and thus causing halation.

Colour Film

There are two types of colour film for the Exakta. The first type is negative colour film and produces negatives in colour. These negatives resemble ordinary negatives—the dark parts of the subject are light and vice versa—and in addition the colours are reversed. Thus, blues are yellow or brownish, reds are blue-green, and greens are reddish.

These colour negatives are then printed on a similar kind of material to give colour prints or colour enlargements. You can also use these negatives to obtain black-and-white prints in the normal way.

The second type of colour material is reversal film and produces positive colour transparencies on the film which was exposed in the camera. These transparencies can then be viewed by transmitted light or projected through a projector and colour prints can also be made from them.

Both kinds of colour film are available in two types, balanced for daylight or one of several artificial light sources.

EXPOSING COLOUR FILM. The exposure latitude of colour film is very small. It is therefore important to ascertain the exposure time accurately with a reliable photo-electric meter. Underexposed and overexposed films not only produce dense or weak transparencies, but also the colour values are distorted. Overexposure produces pale, diluted colours; underexposure gives hard, degraded colours.

Avoid great contrast such as deep shadows; preferably have the light coming from behind you.

For photographs by daylight, use daylight type film. Load your camera with artificial light film when taking pictures indoors by the light of high-power electric bulbs or Photofloods. Daylight film may be used in artificial light and vice versa with the special conversion filters recom-

35 mm. COLOUR FILMS

Film	Type	Speed in ASA and BS Arithmetic	Processing
<i>Negative Emulsions</i>			
Agfacolor CNS	Universal	80	U
Ferranicolor N27	Universal	40	U
Fujicolor N 100	Universal	100	M
Kodacolor X	Universal	64	U
Orwo Color NC16	Universal	32	L
Perucolor	Universal	90	U
<i>Reversal Emulsions</i>			
Agfacolor CT18	Daylight	50	M
Agfacolor CK20	Artificial light	80	M
Ansochrome 64	Daylight	64	M
Ansochrome 100	Daylight	100	M
Ansochrome T 100	Artificial light	100	M
Ansochrome 200	Daylight	200	M
Ansochrome 500	Daylight	500	M
Ektachrome X	Daylight	64	U
H.S. Ektachrome	Daylight	160	U
H.S. Ektachrome B	Artificial light	25	U
Ferranicolor CR 50	Daylight	50	U
Ferranicolor Dia A	Artificial light	40	U
Ferranicolor Dia. 28	Daylight	50	L
Fujichrome R100	Daylight	00	M
Kodachrome II	Daylight	25	M
Kodachrome IIA	Artificial light	40	M
Kodachrome X	Daylight	64	M
Perutz Color C18	Daylight	50	M

PROCESSING: M — films can be processed only by the maker; L — films can be processed only by an approved laboratory through a photographic dealer; U — films can be processed by means of special processing kits.

mended by the manufacturers. For flash pictures, use daylight colour film with blue-tinted flash bulbs.

For distant landscapes, scenes on hazy days and at high altitudes, a haze filter should be used to prevent a bluish cast. This filter is also useful when using electronic flash to produce warmer tones. The filter does not call for any increase in exposure.

DISPLAYING THE COLOUR PICTURE. The colour transparency can be viewed in a variety of transparency viewers. The simplest consist of a magnifying glass set in a frame into which the picture can be inserted. If the viewer is held against a lighted background, the picture appears enlarged and well illuminated. More elaborate viewers have an artificial light source of their own.

The most satisfactory way is to project the transparency in a slide projector which will throw a large picture on to a projection screen. Transparencies will also yield colour enlargements.

The colour negative can be printed or enlarged directly on colour paper to produce a colour print of any size. Alternatively, the colour negatives can be printed on positive transparency film to produce colour transparencies for viewing or projection in exactly the same way as explained above.

EXAKTA LENSES

A wide range of lenses has been mounted for the 35 mm. Exakta cameras. The standard lenses are 2 in. (5 cm.) or $2\frac{1}{4}$ in. (5.8 cm.).

Some of these lenses were, or are, marketed by the manufacturers of the camera, some quite independently of them. For that reason one may find Exaktas with lenses not listed in this book.

Lenses of any focal length from 20 mm. to 1000 mm. and of apertures up to $f1.5$ can be interchanged with the "standard" lens in any of the 35 mm. Exakta cameras.

A most important feature of the construction of the Exaktas is that, whatever lens may be employed, the correct image and 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, no matter how short or how long the focal length of the lens.

This does not hold good for the auxiliary *frame finder* device. The frame finder is correct only for the standard lenses.

The diaphragm on the Exaktas is adjusted by means of a milled ring engraved with the aperture figures on the lens mount. Pre-set or automatic aperture setting lenses are supplied with recent models; their manipulation is described on page 29, No. 4.

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

Setting and Changing Lenses

The 35 mm. Exaktas use lenses in a focusing mount. That is to say, the lens itself is fitted with a helical focusing mount. When screwed right back, it is in the infinity position.

Focusing for nearer distances is done simply by turning the lens mount to screw it forward.

The focusing mount bears a distance scale, as a rule in feet, sometimes in metres, with an index indicating the distance to which the lens has been set.

To remove the lens, it has to be held firmly in the left hand, while at the same time pressing the lens catch lightly with the right hand and simultaneously turning the lens firmly to the left. After turning a few degrees, it will be found that the lens disengages and can be lifted from the camera body.

To insert a lens, this procedure is reversed. The lens is held into the tubular mount of the camera body, care being taken that the red dot on the lens comes to lie opposite the red dot on the camera body. Now the lens and mount are turned firmly to the right until the lens catch is heard and seen to slip into the catch on the lens mount.

A *depth of field calculator* is engraved on the lens mount. On either side of the distance indicator the aperture values will be found engraved. After focusing with the mirror reflex arrangement or by setting the index mark to the distance required, one can read off opposite the left-hand stop the depth of field to the foreground and the right-hand stop the depth of field to the background (see page 53).

The treatment and care of lenses is a matter of importance. On account of its chemical composition, optical glass of high quality is susceptible to the influence of moisture, and for this reason touching the glass with the fingers should be avoided. When not in use, the lens should be protected by putting on the lens cover or at least by a lined case. Since complete protection is impossible, the lens surface should be cleaned occasionally with a clean, soft chamois leather.

The Choice of Lenses

The Domiplan f2.8 50 mm., Tessar f2.8 50 mm. and Oreston f1.8 50 mm. can be regarded as "standard" lenses for the Exakta and the most suitable for general use.

It is wrong to assume that the high correction of the large aperture lenses enables one to use them invariably at their full opening. It will be appreciated that the depth of field can only be comparatively small, so that more often than not stopping down becomes necessary. *Large apertures are, however, useful in adverse lighting conditions and they also ensure a bright focusing image on the ground-glass.*

The possession of one or more of the longer focal length

lenses may tempt the owner to use them more frequently than necessary. It must be remembered that focusing a lens of long focal length has to be done more accurately, as, again, the depth of focus is considerably more limited than with lenses of shorter focal length. At the same time, owing to the longer axis, slow exposure speeds of 1/50 or 1/25 with these lenses tend more easily to camera shake—if a rigid tripod is not used—than with lenses of normal focal length.

All Exakta lenses may be used in enlargers fitted with an appropriate bayonet flange.

All modern lenses are coated. This consists of the application of a microscopically fine deposit of some inorganic substance on the glass surfaces, which reduces considerably the light reflection between glass to air surfaces in the lens. The scatter of light which impairs the contrast of the image is eliminated, giving a more brilliant negative, especially in the regions where the tones are most subdued and where consequently brilliance and contrast are most needed.

Standard Lenses

2 in. *f*2.8 DOMIPLAN: a three-element triplet construction, of good performance and colour-correction suitable for all general photographic work of the amateur photographer.

2 in. (5 cm.) TESSAR *f*2.8: a universal four-element lens suitable for all average exposures, including landscapes, portraits, street scenes, etc., even in unfavourable light conditions. It has particularly even illumination all over the negative and good colour correction.

2 in. (5 cm.) ORESTON *f*1.8: a six-element lens 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.

● 2 in. *f*2 DOMIRON: a six-element Gauss-type construction, of high definition and of similar performance to the Pancolar, but with unusual long extension permitting ultra-close focusing down to 34 cm. = 13½ in.

Earlier Exakta models were fitted with other lenses, such as 58 mm. *f*2 Biotar (similar to Pancolar), 58 mm. *f*1.9 Primoplan, and others.

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 table on page 66.

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 extent) by giving generous exposure times.

Wide-angle lenses for the 35 mm. Exaktas:

Flektogon *f*4 20 mm.
Flektogon *f*4 25 mm.
Orestegon *f*2.8 29 mm.
Lydith *f*3.5 30 mm.
Flektogon *f*2.8 35 mm.
Primagon *f*4.5 35 mm.

Long-focus Lenses

Long-focus lenses for the 35 mm. Exakta are either lenses of normal construction, having a correspondingly long barrel; or telephoto construction, which permits a much shorter mount. The decrease in field compared with the standard Exakta lens is shown in the table on page 50.

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. Long-focus 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