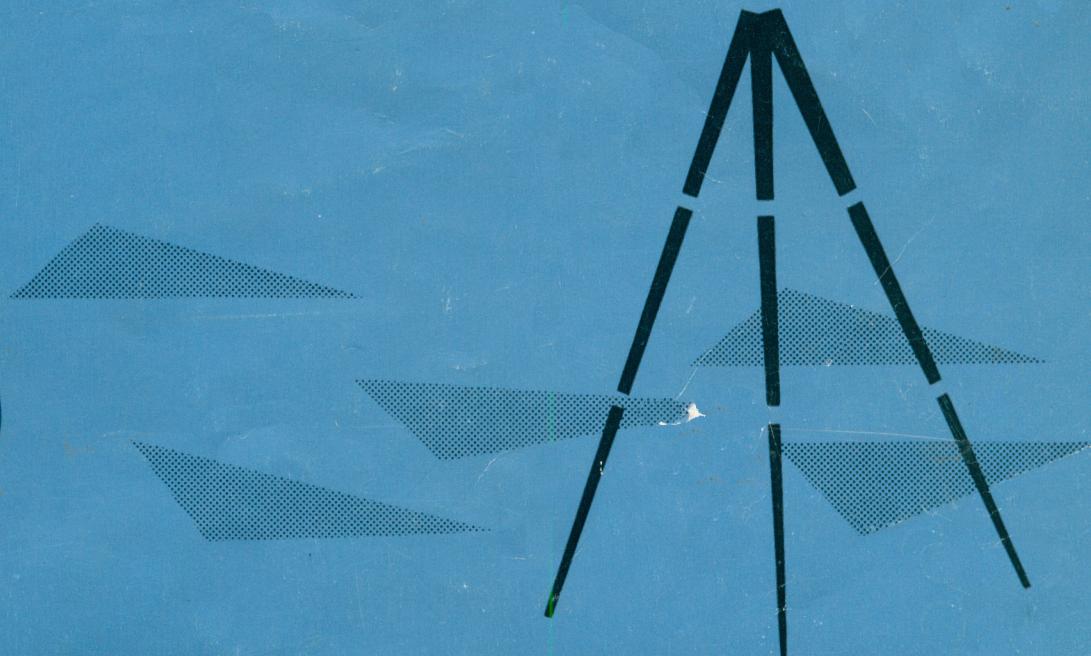


H 16 REX CAMERA



Instructions for use



PROCAM

22048 Sherman Way Suite 105
Canoga Park, CA 91303
(818) 346-1292

Your camera has been supplied with:

- At least one lens
- 1 rewind crank
- 2 turret plugs
- 2 empty spools (100 and 50 ft.)
- 5 filter-holders in case
- 1 auxiliary viewfinder
- 5 gelatine filters

Paillard-Bolex cameras achieved the same reputation all over the world for being first-class instruments.

The H 16 Rex model is the most complete of them all, and is highly appreciated by not only demanding amateur movie makers and explorers, but also by professionals, scientists, businessmen, teachers, etc. Its sturdy construction is your guarantee that it will function perfectly under any conditions. Thanks to their world-wide network of agents, Paillard is able to offer you a faultless after-sales service practically anywhere on the globe. Only Paillard-Bolex agents are capable of giving you perfect service, and through them you can take advantage of our guarantee. If you write to us or our agents about your camera, please remember to quote its serial number, which is engraved on the base by the side of the tripod bush.

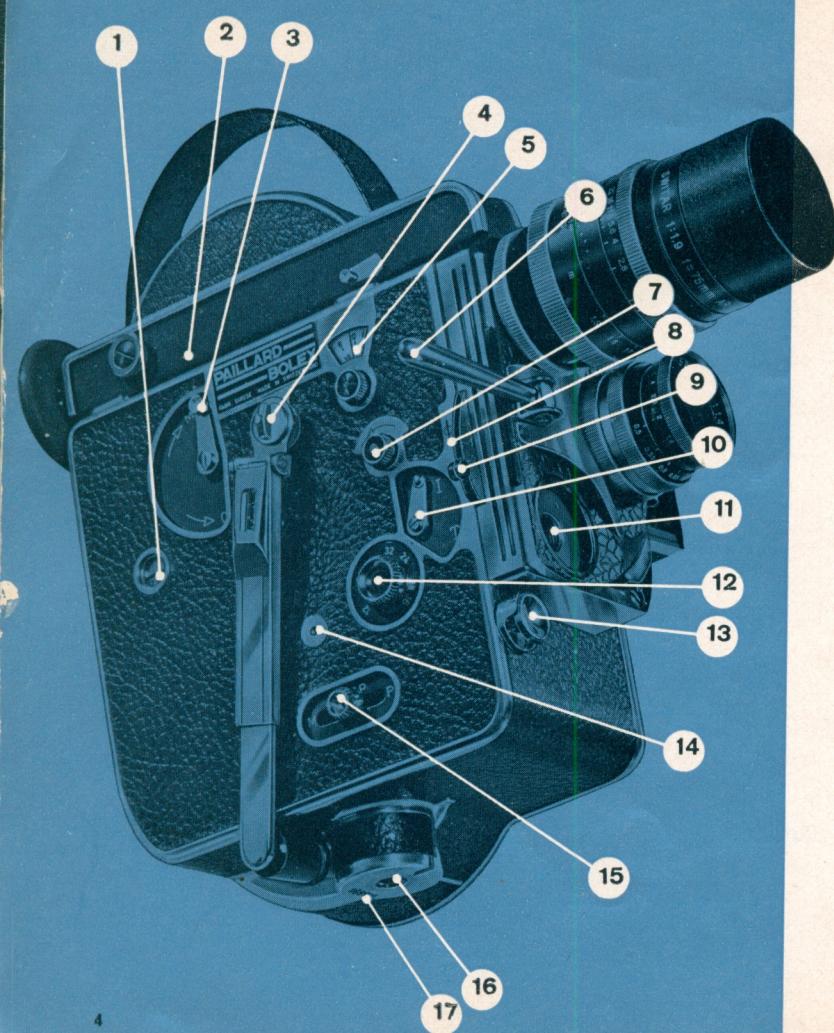
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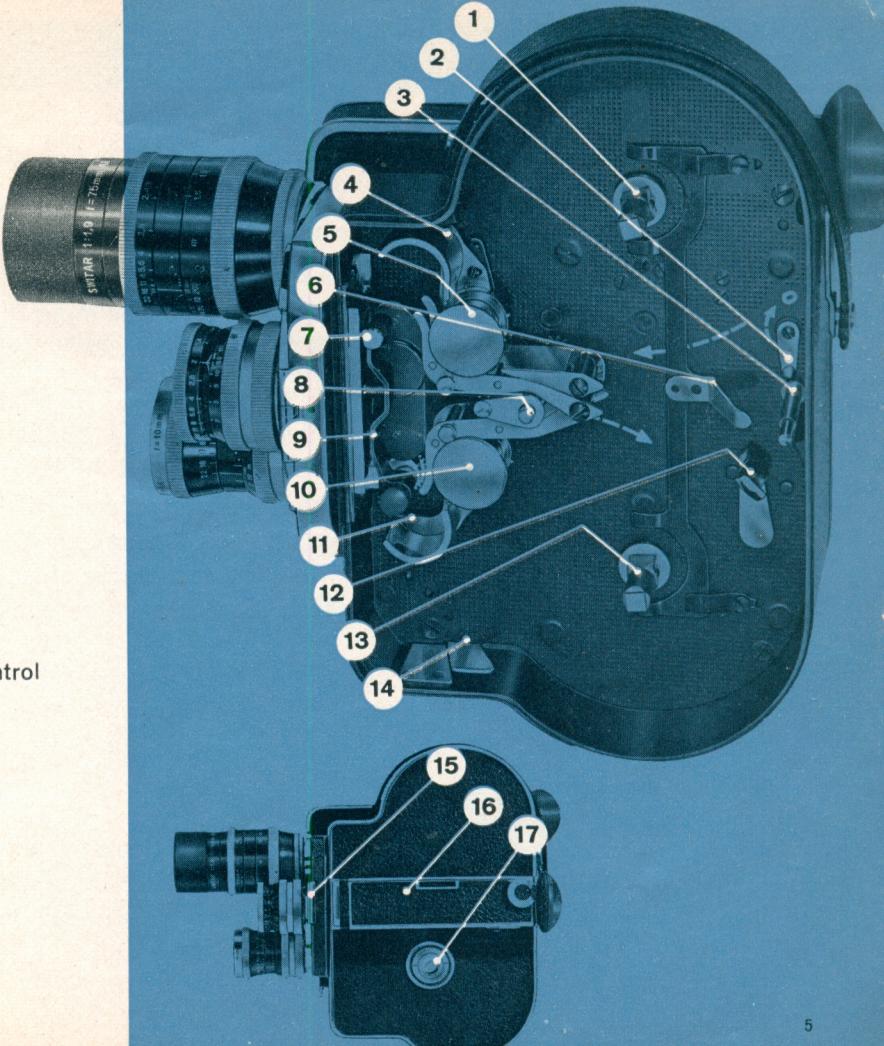
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YOUR CAMERA

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16 mm FILMS

The H 16 Rex camera takes 50 and 100 ft. spools of single or double perforated 16 mm film. Film having only one row of perforations is intended for a magnetic sound track.

A 100 ft. spool of film runs for approximately 3½ minutes at a rate of 18 frames per second. A little more than 6 seconds is necessary therefore to expose the 120 frames on 3 ft. of film.

Films have a leader on each end, roughly 3'9" long, so that the sensitive film will not be exposed to light during loading or unloading. This leader is generally cut off by the processing laboratory.

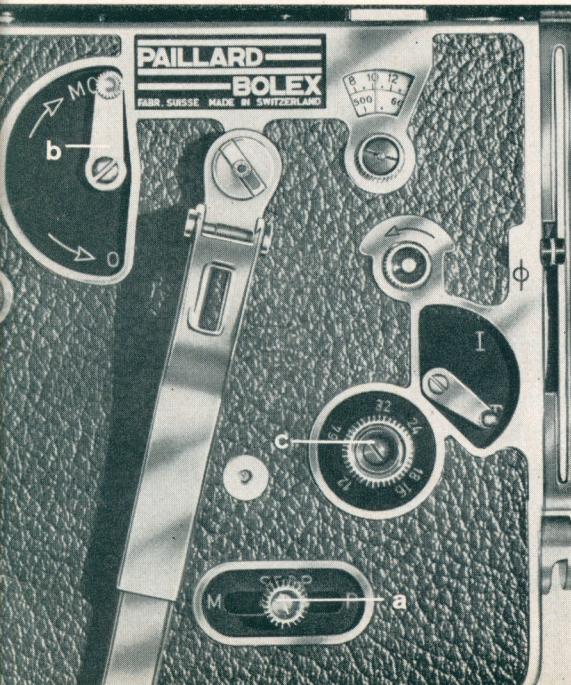
There are many films available, in black-and-white and colour, and of different sensitivities. These sensitivities are expressed in ASA, and the rating of the film is printed on the sheet that accompanies it. The packing shows the date when the film must be considered outdated.



LOADING YOUR CAMERA

IMPORTANT : Do not run your camera without film at speeds above 32 f.p.s., as this might damage the mechanism.

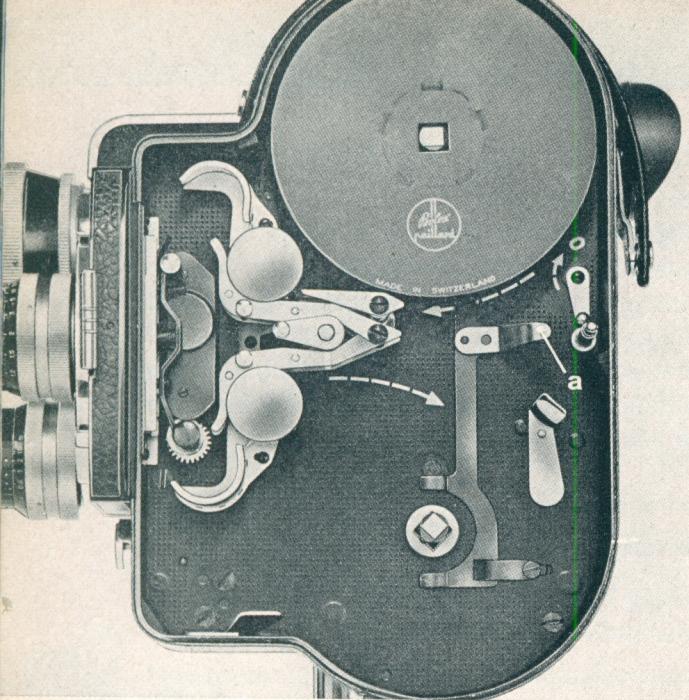
Before loading your camera, practise using the main controls: winding the motor (p. 12), operating the front and side releases (p. 13), using the cable release (p. 13), the different speeds (p. 12), the variable shutter (p. 35), the control lever for time and instantaneous shots (p. 13), disengaging the motor (p. 22), hand cranking (p. 22), and adjusting the frame counter (p. 10). If you familiarize yourself with the camera beforehand, you will avoid spoiling footage, for your camera, although not complicated, does require some experience to give best results.



To load your camera, you must:

1. Set the side release to STOP.
2. Set the motor declutch lever to MOT.
3. Set the speed control knob to 16 or 24 f.p.s. (figures against red dot).
4. Wind the camera as shown on page 12.

To avoid exposing the edges of the sensitive film to light, the loading of the camera should be carried out in the shade, preferably in a room or place with little light.



INSERTING THE FILM IN THE CAMERA

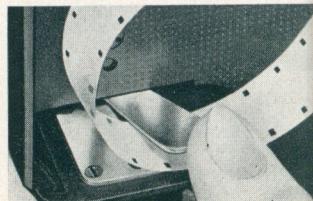
Raise the lid lock ring and turn it to the left (in the direction of the arrow 0), then remove the lid and put it in a dry, clean place. The inside of the camera will be seen as illustrated.

Make sure that the pressure pad pin is firmly in place and that the pressure pad cannot open.

Remove the empty spool from the camera by pressing on lever (a) of the spool ejector and then place the loaded feed spool onto the upper spool shaft. The film should run in the direction indicated by the engraved arrow.

The dark, shiny side of the film should be towards you and the light (emulsion) side towards the lens.

Using the film knife, place the end of the film squarely *between the blades* and *cut off the end between two perforations* as shown in the illustration. The cut is automatically achieved slantwise.



Close the loop formers by moving their control lever (b) into a position parallel with the pressure pad.

Insert the end of the film into the funnel guide and push it until it gently touches the sprocket wheel. Hold it in this position and press the front release with the index finger of the left hand.

Stop the camera when 10" to 12" of film have passed through the drive mechanism. Open the loop formers again by pressing on knob (c) of their control lever. If, by error, you leave the loop formers closed, they will automatically open when you replace the camera lid.

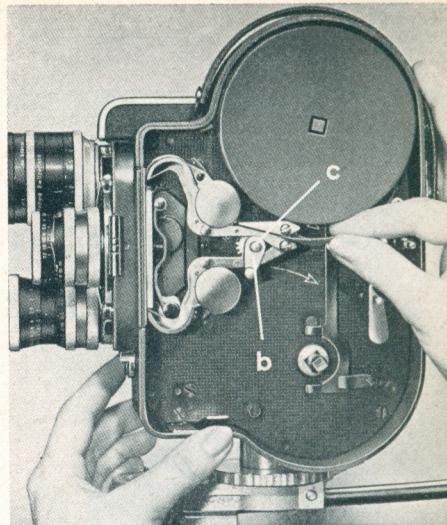
Insert the beginning of the film into the slot in the core of the take-up spool, rotate the latter until about three turns of film have been taken up and then place it on the lower spool shaft. It is most important that the film is secured tightly on the spool.

Final check

Turn the take-up spool by hand, clockwise, to take up any slack film.

Run the camera for 1 or 2 seconds to make sure that the film is driven normally and that the loops are not lost. Replace and lock the camera lid by turning the locking ring to the right (direction indicated by arrow F). If it does not lock correctly at the first try, do not force it! This means that the spools or the pressure pad are not correctly positioned.

Run the camera to take up the film leader (see following page).



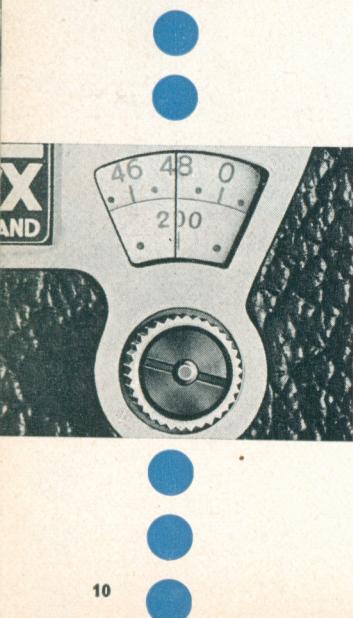
THE FOOTAGE COUNTER



The footage counter shows the number of feet of film that has been exposed.

Once the camera is loaded, this counter shows the letters **ft.** Run the camera until the figure 0 comes in front of the white line on the red mask of the footage counter. The leader of 3' 9" of film has now been taken up and you can start filming. The counter automatically returns to **ft.** when the camera lid is removed for loading or unloading film.

The footage counter is sufficiently accurate for ordinary shots, but it is better to use *the frame counter* for double exposures that need absolute precision.



THE FRAME COUNTER

This shows the exact number of frames exposed and so makes possible scientific motion picture studies, as well as various trick effects such as fades, lap dissolves, etc. It is also very useful for single frame exposures (Animation technique, see page 42).

The upper dial adds the frames in forward run and subtracts them in reverse run, from 0 to 50 frames.

The lower dial totalizes the frames in forward run and subtracts them in reverse run, in cycles of 50, up to 1000 frames.

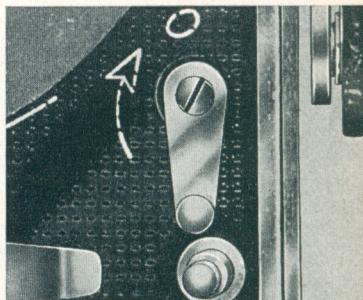
Beyond this figure, the cycle starts again and the totals shown by both dials must be added to the 1000 frames already shot. Do not take into account the positions of the dials with respect to one another, but only the figures shown on the dials.

You can easily check at any time whether the frame counter refers to a first or second cycle by consulting the footage counter. 1000 frames of 16 mm film equal 25 ft.

To set the frame counter to zero, use both the knob on the hand cranking shaft, which controls the single frame dial, and the knob just below the frame counter window, controlling the "totalizer" dial.

A CLICKING SOUND

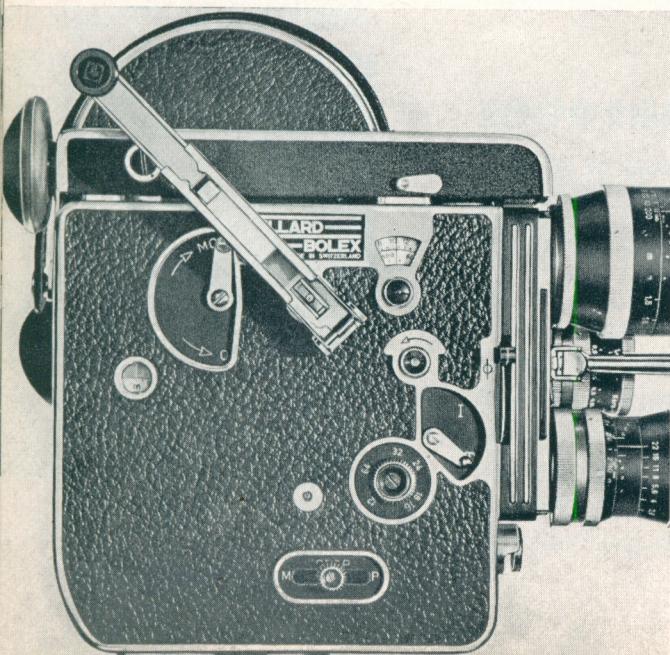
marks the passage of each 8" of film, every 1 1/2 seconds at the speed of 16 f.p.s. Thus, the operator can easily estimate the length of a scene while filming. To reduce the sound of the audible signal or eliminate it altogether, push to zero the small lever located inside the camera next to the counter pin.



OPERATING THE CAMERA

WINDING THE MOTOR

Put the side release to STOP and the motor disengaging lever to MOT. Then raise the winding handle and turn it counter-clockwise: it will engage itself on its axle. Wind the spring motor fully but without forcing it, then lower the handle and secure it with its locking axle. Unless this is done, there is a risk that the handle will rotate with the motor during filming.



The fully wound motor will drive about 16 ft. 9 in. of film, i.e. 37 seconds of filming time at the speed of 18 f.p.s.

We suggest that the motor is wound after each scene.

FILMING SPEED

The speed control knob has 6 positions, which correspond to 12, 16, 18, 24, 32, and 64 frames per second.

- a) The usual speed for taking silent films is 16 f.p.s. However, the speed of 18 f.p.s. is replacing 16 f.p.s. as the normal projection speed for silent films.
- b) The speed of 18 f.p.s. has the double advantage of giving flickerless pictures when projecting with high light output projectors and a sufficiently good recording of magnetic sound.
- c) The speed of 24 f.p.s. gives a better reproduction of movements and a better sound quality. This speed must be used for commercial films (for television, enlargements up to 35 mm and for films to be equipped with optical sound).

It is understood that the projector should run at the same speed as the camera.

For accelerated and slow motion sequences, please see page 30.

OPERATING CONTROLS

The H 16 Rex camera can be used to take normal, continuous or single frame shots. These different operations are controlled by the **side release**.

Normal shots

for ordinary filming. The camera runs as long as the operator presses on the front release or pushes the side release towards M. The latter operation is usually done with a cable release.

Push the side release right down on P.

Instantaneous: lever in position I. **Time:** lever in position T (for use in poor lighting conditions, indoors for example).

Open wide the variable shutter when making time shots so that none of its blades can cut off a part of the subject.

Single frame exposures are used for titles, cartoons, scientific films and various trick effects, such as ultra-accelerated motion (clouds, sunsets, humorous effects, etc.). To avoid any movement of the camera, use a cable release.

Continuous running

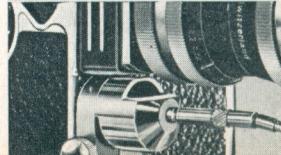
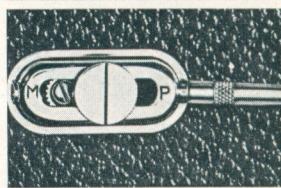
Push the side release right down on M.

The camera will run for as long as the motor is wound. Continuous running is used mainly so that the operator himself can get into the sequence.

The camera stops running when the release is put in the STOP position.

CAMERA OPERATION BY CABLE RELEASE

It is better to use a cable release when shooting in order to avoid any "jump" that may occur when hand releasing the camera. The cable release fits over the knob of the side release or on the front release (see page 46).



THE VIEWING EQUIPMENT

THE REFLEX VIEWFINDER

The advanced optical system of the H16 Rex camera allows the operator to view through the taking lens both while filming and when the camera is not running. The picture seen on the ground glass screen of the Reflex prism has no flicker.

The Reflex viewfinder gives exact framing of the subject with precise distance setting. In addition, one can check the depth-of-field, the focal length of the taking lens, the filter used, and the exposure.

The Reflex prism absorbs only a small amount of light (see "Diaphragm adjustment", page 28).

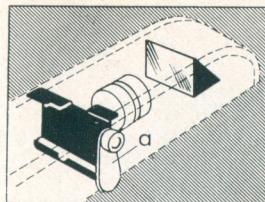
Preliminary adjustment of the viewfinder eyepiece to the operator's eyes

This adjustment is made to adapt the Reflex finder to the operator's eyesight, whether he wears glasses or not, and is the same for all lenses used with the camera. Checking this adjustment regularly is advisable.

1. Remove the taking lens from the camera.
2. Sight on a well lighted subject.
3. Turn the side knob in either direction until the grains of the ground glass screen are perfectly sharp.

The Reflex viewfinder is now adjusted for filming. The red dot (p) on the side knob is for quick checking of the position of the knob once the eyepiece has been adjusted.





Obscuring the viewfinder

If the Reflex viewfinder is not used during filming, it is advisable to close it by pushing the safety lever (a) up. If this is not done, there is the risk that a back light (lamp or sun) will enter the camera through the eyepiece and fog your film.

Distance adjustment

Open the diaphragm wide, then bring the subject into sharp focus on the ground glass by turning the distance setting ring. Close the diaphragm afterwards to the correct setting.

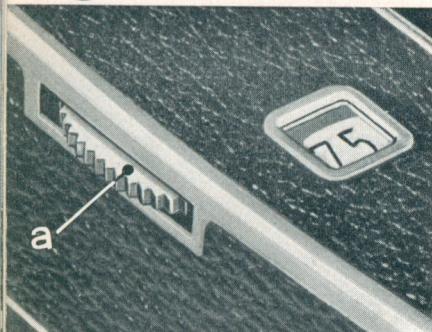
THE AUXILIARY VIEWFINDER

A clear, removable viewfinder for 8 focal lengths, equipped with parallax correction for distances from $1\frac{1}{2}'$ to infinity, is a most useful addition to the viewing equipment of the H 16 Rex camera. The field of this viewfinder can be adapted instantaneously and continuously to lenses of focal lengths of 16, 25, 35, 50, 75, 100, and 150 mm.

An additional lens (field adapter) and viewfinder masks, sold separately, modify the viewfinder for 10 mm focal length or an anamorphic lens (see page 47).

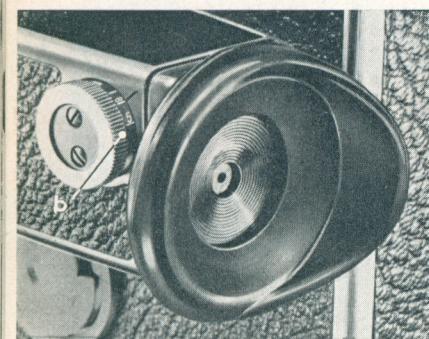
The auxiliary viewfinder can be fitted onto or removed from the camera by one simple movement of the retaining lever. It is therefore highly useful for "previewing" the subject, framing and determining the lens to use, without having to move the whole camera.





ADJUSTMENT OF THE VIEWFINDER FIELD

This adjustment is made by rotating the milled knob (a). The focal lengths can be seen in the upper window and also appear in luminous figures in the viewfinder itself, thus giving a permanent check on the focal length in use. The arrow indicators in the finder window are to facilitate horizontal and vertical centering of the subject.



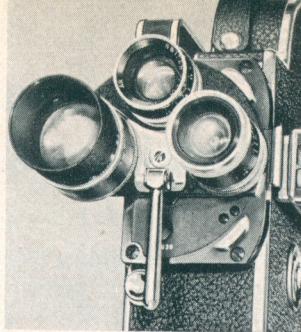
PARALLAX CORRECTION

The viewfinder is situated at the same height as the taking lens so as to eliminate any vertical parallax. Horizontal parallax is compensated for by turning the scaled knob (b) until the number corresponding to the filming distance is facing the index mark. This distance is measured from the film plane. Set the infinity sign (∞) against the index when filming is over.

For precise framing of close-ups at less than $1\frac{1}{2}'$ it is advisable to use the Reflex viewfinder.

ADJUSTING THE VIEWFINDER TO THE OPERATOR'S SIGHT

Every viewfinder is adjusted at the factory for the camera on which it is to be used. For eyeglass-wearing movie makers, corrective lenses of different diopter power can be supplied. Your Paillard-Bolex distributor will fit these corrective lenses to the viewfinder if you let him know the lens power required.



THE OPTICAL EQUIPMENT

THE TURRET

The advantage of the turret is the possibility of switching rapidly from one focal length lens to another by simply moving a lever. Use this turret lever and not the lenses when turning the turret, in order to avoid any accidental altering of the lens distance or diaphragm setting. Three click stops ensure that the lenses are correctly positioned in front of the filming window.

The H 16 Rex camera can take any "C" mount lens, all of which have the following characteristics:

Thread diameter: 1" (25.4 mm)

Max. thread length: 160" (4.06 mm)

Film plane/lens seat distance: 690" (17.52 mm)

It is advisable to hold the lenses by their tightening rings A when screwing them into the turret.

A distinction is made between: **Standard lenses** ($f = 25$ and 26 mm) for general use.

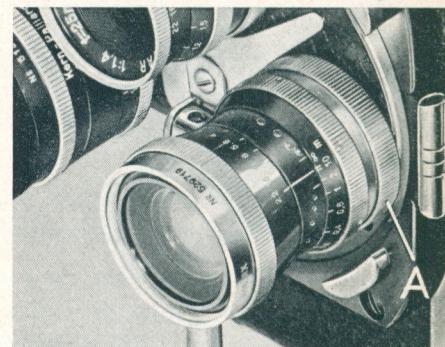
Wide-angle lenses ($f = 10$ and 16 mm) for getting a wide shot or for use when the operator cannot get far enough back from the subject, such as shots of monuments, indoor scenes, etc. These lenses give a wider field.

Tele lenses ($f = 50$ to 150 mm) for long distance shots, scenes of animals, and children and sporting events, etc.

Lenses are supplied with protection caps that should be screwed on when the camera is not being used, so as to keep dust and dirt from gathering on the glass. **Do not forget to remove this cap before filming.**

Important !

Special 10, 16, 25, and 50 mm lenses have been made exclusively for the H 16 Rex camera. Lenses with a focal length of more than 50 mm can, in general, be used indiscriminately on the H 16 Rex or other H 16 cameras without the Reflex viewfinder.



THE FILTERS

The H 16 Rex camera has a filter slot between the taking lens and the Reflex prism. Filters placed in this slot are always in position whatever the lens used.

Leave the filter holder in the filter slot when no filter is to be employed—this prevent lights from entering through the slot to fog the film.

See that the filter holder is firmly in the slot.

The set of filters for the H 16 Rex camera is made up of 5 filter holders and a filter cutting frame in a case and 5 small envelopes each containing one 2" x 2" gelatine filter, i.e.

- 1 Skylight Kodak Wratten 1A filter
- 1 Daylight Kodak Wratten 85 filter
- 1 yellow Kodak Wratten 8K2 filter
- 1 orange-yellow Kodak Wratten 15G filter
- 1 red Kodak Wratten 25A filter

Colour filters for black-and-white films

The Kodak Wratten 8K2, 15G and 25A filters are used for increased contrast of black-and-white films. A larger diaphragm opening is necessary when they are used, i.e.:

- 1 stop more for the Kodak Wratten yellow 8K2 filter
- 1 $\frac{1}{2}$ stops more for the Kodak Wratten orange-yellow 15G filter
- 2 $\frac{1}{2}$ stops more for the Kodak Wratten red 25A filter

The effect of a filter varies according to the make of the film, its sensitivity and the lighting conditions, and so the above corrections must be considered as approximate only.

Filters for colour films

The " Skylight " filter is used for absorbing excessive ultra violet light which tends to reproduce as a strong blue cast. Ultra violet light is most prevalent in the shadows under a blue sky, at high altitudes (3,000 ft. and over) such as in the mountains, and when filming from an aircraft. When using this filter it is not necessary to correct the diaphragm setting.

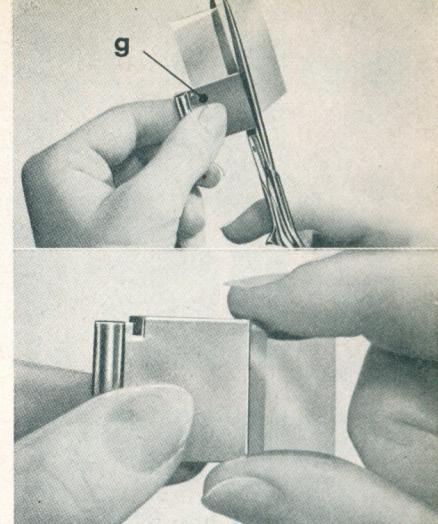
The " Daylight " filter is a conversion filter for filming in daylight with a Kodachrome Type A artificial light film. When setting the diaphragm, remember that artificial light colour film used with a daylight filter **has the same sensitivity** as a daylight colour film used without a filter.

MOUNTING THE GELATINE FILTERS

This is done as follows:

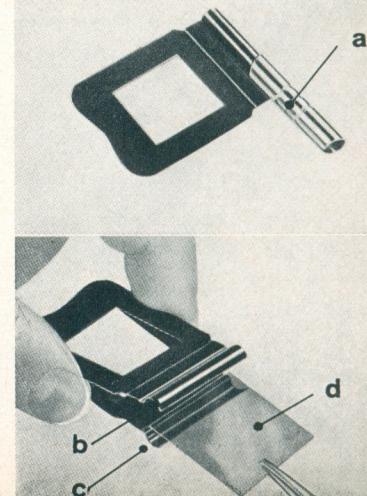
1. Turn the longest face of the filter cutting frame (g) towards you.
2. Insert the filter with its protection papers well into the frame.
3. Hold the frame firmly and cut around it with a pair of sharp scissors.
4. Take out the filter, holding it by its edge. Fingerprints once made cannot be removed.
5. Remove the fastening clamp (a) from the filter holder.
6. Open the spring blades (b) and (c).
7. Place the cut filter (d) between these blades.
8. Press the spring blades (b) and (c) together with the thumb and index finger.
9. Replace the fastening clamp (a).

Put the filter holders in the case when finished in order to protect them from dust.



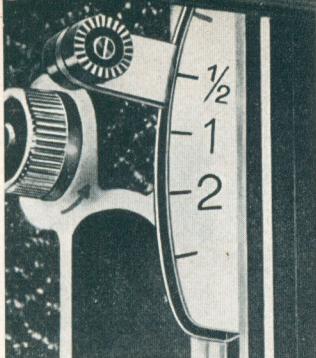
DISTANCE SETTING ADJUSTMENT

Situating a filter behind the lens slightly alters the lens distance setting. However, the necessary correction is made automatically when using the Reflex viewfinder.



IMPORTANT !

In view of the great distance between the filter holder and the film plane, the filter slot cannot be used as a mask holder for trick effects (key-hole and binocular cut-outs, split frame scenes, etc.). The shape of the mask will not appear on the film; it will only darken the scene filmed.



THE VARIABLE SHUTTER

Your H 16 Rex camera is fitted with a shutter having a variable aperture opening, and by decreasing its angle of opening you can reduce the exposure time without having to change the filming speed.

The variable shutter allows the following effects:

1. Fade-in, i.e. beginning a sequence by gradually letting it appear on the screen.
2. Fade-out, i.e. ending a sequence by gradually making it disappear from the screen.
3. Lap dissolve, i.e. combining and superimposing a fade-in with a fade-out, so that the first sequence gradually disappears from the screen while the second sequence appears. This is an effect often seen in professional movies and is easily accomplished with an H 16 Rex camera.
4. For very bright subjects (snow and water scenes) you can use the variable shutter to reduce the exposure time to eliminate the need for a grey filter.
5. Opening the diaphragm wide throws unwanted backgrounds out of focus while maintaining the correct exposure time.
6. The variable shutter gives the possibility, by reducing the exposure time, of getting sharp definition in shots of moving objects. This is especially useful for frame by frame studies of fast action.

See page 35 and after for advice on how to realize the above effects.

HAND CRANKING

The mechanism of the H 16 Rex camera can operate in either forward or reverse by means of a small auxiliary rewind crank that fits over the cranking shaft (e).

Film can be fully rewound by the hand crank, to enable the operator to remove a partly exposed film from the camera. This crank can also be used for special effects such as lap dissolves, double exposures, etc.

Rewinding partly exposed film

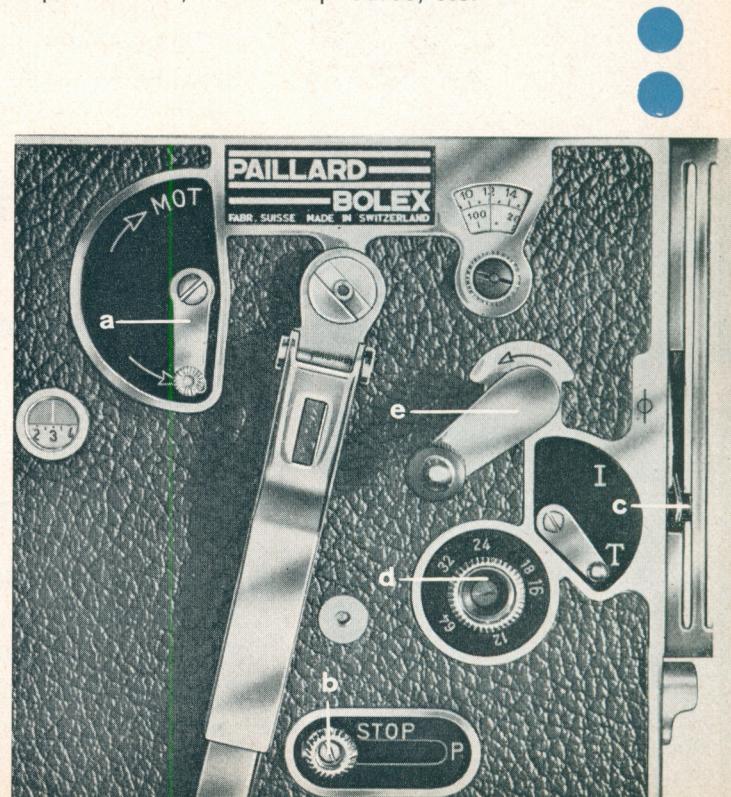
1. Disengage the motor by setting the clutch lever (a) to 0. If one feels a slight resistance when nearing point 0, do not force it but depress the front release while continuing to push the lever.
2. Set the side camera release (b) to M (continuous running).
3. **Close the variable shutter** by means of the lever (c) so as not to fog the film (see page 34).
4. Set the speed control knob (d) to 16 f.p.s.
5. Turn the hand crank (e) in the direction of the engraved arrow, but without attempting to rewind the film faster than the governor will allow.

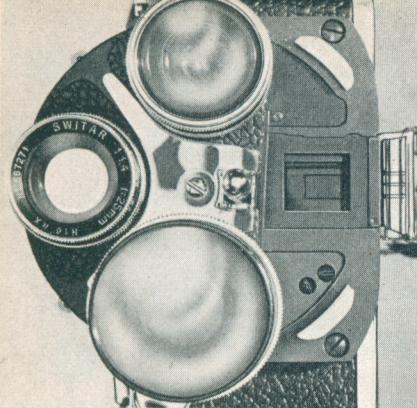
To return to normal operation, set the side release to STOP and the declutch lever to MOT.

Do not forget to open the variable shutter.

IMPORTANT !

The hand cranking lever does not replace the motor and cannot be used for "hand" filming, neither in forward nor reverse run.





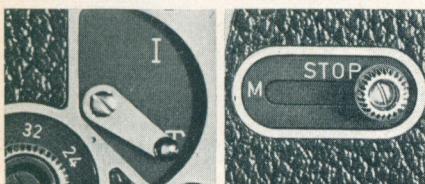
UNLOADING THE CAMERA

WHEN THE FILM IS FULLY EXPOSED

Once your spool of film is entirely exposed—shown by the footage counter—run the camera for about another 10 seconds (6 stops of the scene length signal) to wind the trailer onto the take-up spool. Before opening the camera, make sure all the film has run through the camera.

Lower the operating control lever to T, turn the turret so you can see the aperture, and then push the side release to P to open the shutter. If any film remains, it will show in ivory in the aperture. Only one frame will be exposed by making this check.

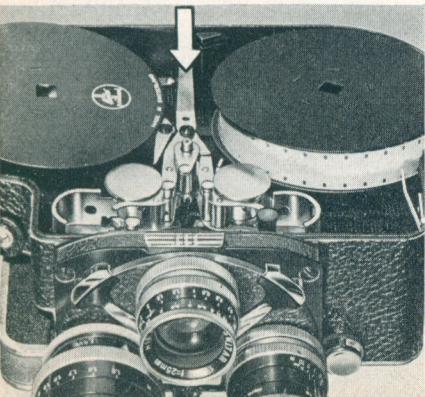
Do not open the camera in a well lighted location, in order to avoid fogging the film.



SPOOL EJECTOR

This device simplifies changing spools.

A slight pressure on the ejector lever frees both spools, which can then be removed from the camera without difficulty. Place the full spool in its metal container, holding it in such a way that the film cannot unwind.



WHEN THE FILM IS ONLY PARTLY EXPOSED

A partly exposed film is removed as follows:

1. Note the figure on the footage counter.
2. Set the frame counter to zero.
3. Close the variable shutter.
4. Disengage the motor and rewind the film until the figure 0 of the footage counter is in front of the white index on the red mask.
5. Give the turret a half turn.
6. Remove the filter holder and swing the Reflex prism out of the aperture.



7. Set the side release in the STOP position.

8. Set the control lever for time and instantaneous shots to T (time).

9. Engage the motor by setting its control lever to MOT.

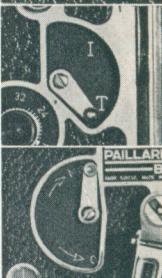
10. Push the side release to P and hold it there.

11. Open the variable shutter.

12. Make an ink mark on the frame seen in the aperture.

13. Note the figure shown on the frame counter.

14. Swing back the Reflex prism.



15. Put the filter holder and turret back into place.

16. Disengage the motor.

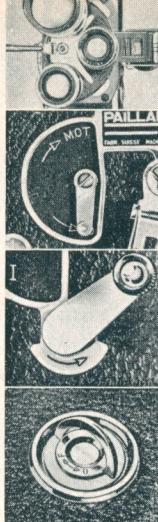
17. Rewind the rest of the film.

18. Open the camera lid and unload the camera.

To put the film back in the camera at the exact point where your last exposure was made, proceed as follows:

19. Load your camera as shown on pages 7 to 9.

20. Run the camera with the front release while checking the footage counter. Stop the camera when the figure 0 of the counter is slightly to the right of the white index line.



21. Free the filming window.

22. Run the film frame by frame (lever in the T position) until the ink mark previously made appears in the filming window.

23. Adjust the frame counter to the figure noted above under 13.

24. Put the turret back into place.

25. Close the variable shutter.

26. Run the camera until the footage counter shows again the figure noted under 1,

27. and the frame counter indicates 0.



Filming can now begin again.

THE ABC OF THE AMATEUR MOVIE MAKER

Do not start filming before having thoroughly read through this booklet and studied the operating controls and adjustments of your camera.

Here are several rules we suggest you follow when making your first films.

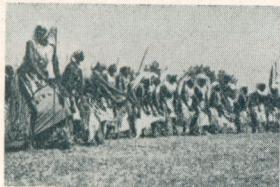
CAMERA STABILITY

It is most important that your camera be held firmly and steadily, for the slightest jerk while filming is amplified on the screen and makes your picture jump.

Rest the camera against the forehead or cheek, stand with the legs wide apart and the elbows tucked well into the sides. Where possible, lean against a firm support such as a wall or tree trunk.

We recommend you to use a grip or handle, or, if possible, a tripod. This latter can be considered a must when filming with a telephoto or Pan Cinor zoom lens.





COMPOSING THE FILM



The first and foremost rule for making films is that they should MOVE. Every film should tell a story, for after all, you would not expect to visit the movie theatre and see a lot of disjointed shots that had no continuity. Always remember that the sequences which succeed one another are made up from short individual shots, and they must be edited finally so that the whole film runs with a smooth continuity. The average length of a scene varies from 5 to 10 seconds, according to the subject. If the action to be filmed lasts longer, cut it into several shots taken from different angles and at different distances, i.e. long shots, medium shots and close-ups. If filmed in this manner, i.e. if you approach the subject in a zigzag line, your scene will be more effective: a straight line gives the illusion that the camera is advancing by jumps.

Never film rapidly moving objects from a right angle. A three-quarters (45°) angle shot or head-on is best.

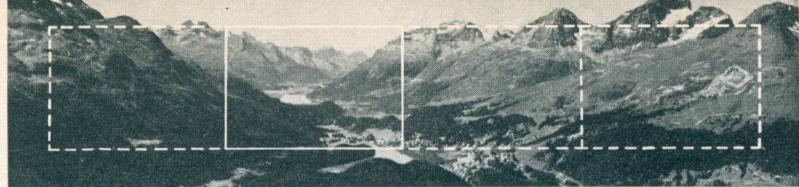
A Pan Cinor variable focal length (zoom) lens can be used to give the impression that the camera is approaching or retreating from the subject (called an optical travelling effect), or following a moving subject (the follow-on travelling effect). These effects are realized by moving the focal length control of the Pan Cinor.

If the camera mechanism stops while you are filming, change your filming angle before going on with the scene so that the interruption will be less noticeable.

Make it a habit to rewind your camera after every sequence, even short ones.

PAN SHOTS

A pan shot is made by moving the camera horizontally or vertically. Unless you are following a moving subject, it is preferable not to take pan shots of landscapes, monuments or any other subjects.



finder. Never reverse the direction of panning, and make sure that the camera on a subject, then slowly and smoothly swing the camera. During the pan, you can pause for a second or two when an object of special interest appears in the viewfinder. The longer the focal length of the lens, the slower the movement of the camera must be. At 16 or 18 f.p.s., 15 seconds should be taken to make an 8th of a turn (45°) with a standard 25 or 26 mm lens, and 42 seconds with a 45 mm tele lens. Or, to put it simpler, you should take 7 seconds to go from one side to the other, or from top to bottom, of the picture in your viewfinder, whatever the focal length of the lens in use. These times can be reduced by one third if your filming speed is 24 f.p.s.

If you have no tripod, use a grip or handle on the camera, with the elbows resting on a firm support.

LIGHTING

Front or side-lighted subjects give excellent results with colour film, back-lighted subjects are difficult but produce striking results. Back-lighted subjects are better with black-and-white film than front or side-lighted ones.

The best hours for shooting with a film are given in the instruction sheet packed with the film. Bright, but not overhead light is necessary when filming in colour: the morning and evening are the best times with black-and-white film.

INDOOR SEQUENCES

Well lit indoor scenes can be filmed if a fast lens is used, even in available light.

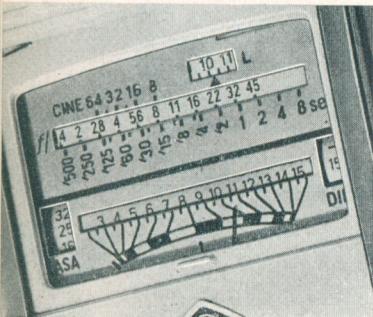
If the natural light is not sufficient, you can use flood lamps, but do not forget to load your camera with artificial light type films when shooting colour sequences.

NIGHT SEQUENCES

With a very fast lens you can film fireworks or lighted neon signs with very good results. Film at 12 f.p.s. if the available light is not strong enough.



DIAPHRAGM ADJUSTMENT



The lens diaphragm allows the operator to vary the amount of light reaching the film, and is adjusted, in accordance with the lighting conditions, the film sensitivity, the filming speed and the opening angle of the variable shutter. The amount of light admitted by the diaphragm is doubled at each stop down, i.e. starting from the highest figure. Example: opening the diaphragm from f/11 to f/8 doubles the light flow entering the camera.

The exposure table printed in this manual (3rd cover page) contains all the necessary information as to the exposure time with relation to the filming speed and the opening of the variable shutter. It therefore allows you to set the diaphragm correctly for the filming speed.

Using a lightmeter will avoid exposure faults. A lightmeter is indispensable to determine the exact lighting conditions of a scene—in daylight or artificial light—particularly if the scene has many highlights and shadows or if you are using colour film.

The Reflex prism directs into the viewfinder 8 to 25% of the light entering the lens, depending on the diaphragm stop used. Even at the maximum of 25%, this loss of light represents only 2/5ths of a stop which is practically impossible to see on the film.

We draw your attention to this diaphragm correction so that you can take it into account when continuing a colour film that was partly exposed in another H 16 camera and is to be finished with the H 16 Rex.

DISTANCE SETTING

The Reflex viewfinder of the H 16 Rex camera shows the picture exactly as it will be recorded on the film. It is therefore a simple matter to get the exact distance setting and to see the depth-of-field available.

The depth-of-field, i.e. the zone in which the picture is sharp, varies according to the focal length of the lens, the diaphragm opening and the filming distance.

The depth-of-field is *small* when using a long focal length lens, an open diaphragm or a short filming distance.

The depth-of-field is *large* when using a short focal length lens, a closed diaphragm or a long filming distance.

Lenses are supplied with a chart showing the depths-of-field at the various settings. If depth of field to infinity is desired with Kern-Paillard lenses, which have either the Visifocus or Compass scale, you should first adjust the diaphragm, and then set the ∞ sign in front of the last orange dot of the Visifocus scale or at the end of the white curve of the Compass scale. The opposite end of the scale will show the minimum distance within which your shots will be sharp (example: 9 ft. for a standard 25 mm lens with the diaphragm on f/8).

The distances are calculated from the film plane (see page 4).



FILMING SPEEDS

When the film has been shot at a slow speed (12 f.p.s.), a regular projection speed of 16 or 24 f.p.s. will give an accelerated motion effect; a film shot at a fast speed (32 to 64 f.p.s.) gives a slow motion effect. The speed desired is selected by turning the speed control knob until the figure for the speed is opposite the index.

Do not forget that the diaphragm setting must be corrected if you alter the filming speed: open it $\frac{1}{2}$ stop when going from 16 to 24 f.p.s., 1 stop when changing from 16 to 32 f.p.s., $1\frac{1}{2}$ stops when going from 16 to 48 f.p.s. and 2 stops when changing from 16 to 64 f.p.s.

12 f.p.s. Slightly accelerated motion. Gives movement to slow subjects, such as clouds. This speed is also used for filming still subjects under bad lighting conditions.

16 f.p.s. } Normal speed for a silent film.

18 f.p.s. }

24 f.p.s. } Normal speeds for a sound film.

32 f.p.s. Slight slow motion. Recommended for smoother hand-held pan shots, shooting from a moving vehicle or filming with a tele lens. Particularly useful for filming sporting events.

64 f.p.s. Slows the action down to one quarter normal. This speed is used for analysing rapid movements.

ULTRA-ACCELERATED MOTION SHOTS

are made with frame-by-frame (or single-shot) exposures taken as quickly as possible—see page 13—often used in scientific time lapse studies of very slow movements, such as the growth of a plant. Frame-by-frame exposures are also used for animating titles and cartoons, and for comic effects as in scenes where the crowd in a street is rushing about frantically.

See the table on cover page 3 for exposure times.



EDITING AND TITLING FILMS

After shooting several films, you will most probably want to "edit" them, i.e. to cut out unwanted sequences, reduce the length of others and join the remaining scenes in a logical order.

It is also an excellent idea to enhance the value and interest of your films by adding main and sub-titles. Indicating the location is most important and can be done by either filming maps, road signs, etc. or by adding titles (see pages 42-43).

ADDING SOUND TO FILMS

A musical background or narration will also greatly increase the audience's pleasure in your films.

16 mm films can take an optical or magnetic sound track. If you intend adding a magnetic sound track, make sure that the film you will use has only one row of perforations. Shoot the film at 24 f.p.s. to ensure best quality. For speech on magnetic sound stripe a filming speed of 18 f.p.s. is satisfactory.

Should you be considering going in for sound work, see your Paillard-Bolex distributor about the Paillard-Bolex S-221 sound projector. This projector not only gives you the possibility of recording sound on films equipped with a magnetic stripe but also of showing films with either an optical or magnetic sound track.



Film with magnetic sound track



Film with optical sound track

FAULTY FILMS AND THEIR CAUSES

Fault

Film all black

Under-exposed film, inverted frames,
strong orange tint

Frames too dark, without life

Washed out, too clear frames

Blurred frames

"Jumping" frames

Unnatural colouring

Dominant red-orange tint

Possible cause

Variable shutter left closed.

Film has been wrongly loaded, with the dark side of the film towards the lens.

Under-exposed (diaphragm closed down too far with regard to the filming speed and the aperture opening of the variable shutter).

Over-exposed (diaphragm open too wide with regard to the filming speed and the aperture opening of the variable shutter).

Inaccurate distance setting.

Camera unstable while filming. Pan shot made too quickly.

Using filters for black-and-white film with colour film.
Films developed long after exposure.
Films badly stored before use.

Sequence shot too early in the morning or too late in the evening.

Using tungsten lamps with a "daylight" film, or using a lamp not receiving enough current with an "artificial light" film.

Dominant blue tint

Filming far subjects at high altitudes or on water without the necessary filter.

Filming on water or scenes with strong sky reflections without a polarized filter.

Partly obscured frames

An object in front of the taking lens, possibly a long tele lens or finger.

Turret badly positioned.

Parallel scratches on the edge of the film

Dust or emulsion particles in the filmgate of the camera.

Camera badly loaded.

Fogged film

Direct light entered the camera through the Reflex viewfinder.

Film fogged at the edges

Lack of precautions during the loading or unloading of the camera—the film was accidentally exposed to direct light.

The filter-holder may not have been in its slot.

Left side of the subject cut off

Filming close-ups without taking the parallax correction into account.

Sides of the subject cut off

Viewing error, such as filming with a tele lens with the auxiliary viewfinder set for a 25 mm lens.

Reading this booklet carefully should avoid such mistakes and produce excellent films.

ADVICE TO EXPERIENCED MOVIE MAKERS

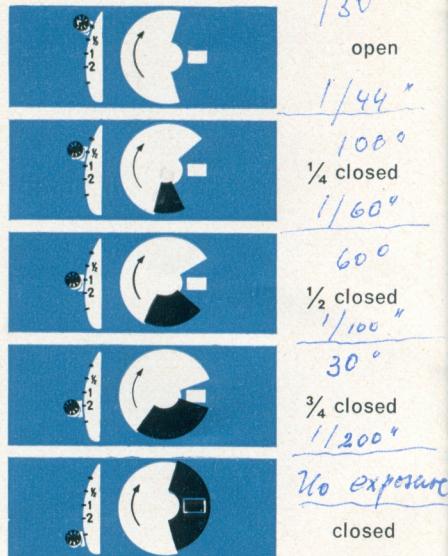
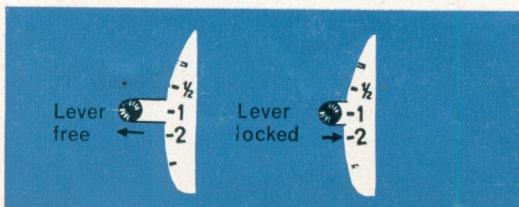
THE OPERATION OF THE VARIABLE SHUTTER

The H 16 Rex camera is fitted with a shutter having a variable aperture opening, thus permitting changes in exposure time without a change in the filming speed.

Varying the aperture opening of the shutter is done by moving a simple lever, whether the camera is in operation or not. This lever can be locked in any of the five positions shown opposite or moved from the fully open to the fully closed shutter position.

The lever is locked in position by pressing it downward, and freed by being pulled out.

The $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ closed positions of the variable shutter are indicated on the lever scale by numbers $\frac{1}{2}$, 1 and 2 respectively. These numbers refer to the diaphragm stop and have the following meanings:



- Setting the shutter to the $\frac{1}{4}$ closed position is equal to closing the diaphragm by a $\frac{1}{2}$ stop.
- Setting the shutter to the $\frac{1}{2}$ closed position is equal to closing the diaphragm by 1 stop.
- Setting the shutter to the $\frac{3}{4}$ closed position is equal to closing the diaphragm by 2 stops.

USE OF THE VARIABLE SHUTTER

The variable shutter allows you to produce a number of professional effects without using any other accessory, i.e.:

FADE-IN

A film beginning abruptly with a title or well lighted scene may unpleasantly dazzle the eyes of an audience in a darkened room.

Only $1\frac{1}{2}$ to 2 seconds are necessary for the eye to adapt itself to the most intense screen image as long as the transition is gradual.

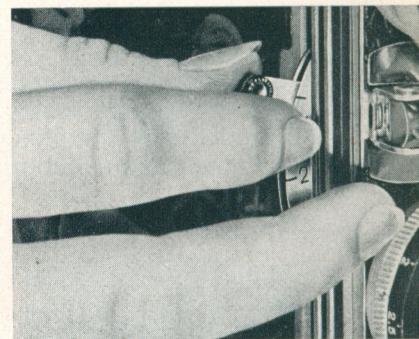
Under these circumstances, it is advisable to begin the first sequence with a fade-in made with the variable shutter.

Proceed as follows:

1. Close the variable shutter without locking the control lever.
2. Start the camera with the left hand while simultaneously opening the shutter with the right, using the control lever. Try to maintain a steady movement of the lever. This can be done by pressing the middle finger against the edge of the turret and pushing slightly forward the small black knob of the lever, held firmly between the thumb and index finger. (See illustration.)

Example: To obtain a fade-in approximately two seconds long at a filming speed of 16 f.p.s., check the time by counting aloud "twenty-one—twenty-two". The variable shutter control lever should reach the upper notch at "two". A trial run is advisable before the actual filming.

3. Continue filming until the end of your first sequence.
4. For safety's sake, lock the lever in the open position before filming the subsequent sequences.



FADE-OUT

A gradual darkening at the end of the last sequence avoids an abrupt finish. The fade-out can be slower than the fade-in.

Proceed as with the fade-in but in reverse order, counting "twenty-one—twenty-two—twenty-three" for example. At "three", the lever should have reached its lowest notch. Release pressure on the lever knob at the same time.

TRANSITIONAL FADE

If, in your film, you cannot help combining two scenes of widely different brightness, it would be wise to end the first one with a fade-out and begin the second with a fade-in. Thus, the difference of brightness will be less bothersome.

To avoid breaking up the action filmed, these two fades should total not more than approximately two or three seconds at the speed of 16 f.p.s. Counting "hundred-and-one" would be quite long enough, i.e. $1\frac{1}{2}$ seconds per fade.

LAP DISSOLVES

A lap dissolve is unquestionably one of the most pleasing transitional effects between two sequences and is made by superimposing a fade-in on a fade-out. In the final result, the picture of the first sequence gradually disappears as the picture of the following sequence appears. Thus, a remarkably soft transition is achieved during which the picture brightness scarcely varies.

Proceed as follows:

Method 1 (highest precision is attained; but a tripod is necessary for steady framing)

If possible, stop filming before the fade-out without interrupting the action being filmed.

1. Stop filming at the end of the sequence.
2. Set the upper frame of counter dial (a) to zero.





3. Make the fade-out without modifying the framing. The duration, at a filming speed of 16 f.p.s., should average 2 seconds, i.e. 2 to 3 seconds for black-and-white film and 1½ to 2 seconds for colour film (so as to make the alteration in the colours, due to the increasing under-exposure, less visible).
4. Lock the shutter lever in the closed position.
5. Disengage the motor by lowering the lever (b) to 0, then push the side release (c) to M.
6. Rewind the film in reverse run by means of the small auxiliary hand crank until the upper dial of the frame counter reads zero again.
7. Push the side release (c) to STOP and the lever (b) to MOT.
8. Frame the second sequence and release the shutter lever.
9. Press the release knob and make a fade-in of the same length as the previous fade-out.
10. Continue filming.

Method 2 (if the sequence cannot be interrupted)

1. Close the sequence with a fade-out as described above.
2. Lock the shutter in the closed position.
3. Set the two frame counter dials to zero.
4. Disengage the motor and rewind the film in reverse run until the frame counter shows the following figures:

Duration of fade-in in seconds	Speeds		
	16 f.p.s.	18 f.p.s.	24 f.p.s.
1 ½	976	973	964
2	968	964	952
2 ½	960	955	940
3	952	946	928

DOUBLE EXPOSURES

In order to enhance the artistic effect of a sequence, the professional movie maker sometimes uses double exposures, i.e. the superimposing of two different scenes, filmed separately, on the same length of film.

Proceed as follows :

a) To double expose the whole sequence

1. Set the diaphragm of the lens according to the lightmeter reading.
2. Half close the variable shutter by locking the lever in position " 1 ".
3. Set the frame counter to zero.
4. Film a sequence.
5. Note the reading of the frame counter.
6. Close the variable shutter completely and lock its lever in that position.
7. Disengage the motor and rewind the film until the frame counter again reads zero.
8. Start the motor.
9. Free the variable shutter lever and lock it in position " 1 ".
10. Engage the motor and film the second sequence until the frame counter reads the figure noted under 5.
11. Open the variable shutter and lock its lever in that position.

b) To double expose only part of the sequence

1. Set the lens diaphragm according to the lightmeter reading.
2. Film the beginning of the main sequence, then stop when you reach the point where you intend to make the double exposure.
3. Set the frame counter to zero and free the variable shutter lever.
4. Begin filming again. Start with a half fade-out lasting $1\frac{1}{2}$ seconds, by pushing the lever down in position " 1 " while counting " hundred-and-one ". Lock the lever in that position but do not stop filming.
5. Stop filming where you want the double exposure to end and note the frame counter reading.
6. Free the variable shutter lever.
7. Continue the sequence with a half fade-in lasting $1\frac{1}{2}$ seconds and end it with the lever locked in the " open " position. Note the frame counter reading.

8. Close the variable shutter and lock its lever in that position.
9. Disengage the motor and rewind the film until the frame counter reads zero again.
10. Engage the motor and free the variable shutter lever.
11. Film the superimposed scene. Begin with a half fade-in lasting about $1\frac{1}{2}$ seconds, made by pushing the lever into position "1" and locking it there, but do not stop filming.
12. Stop filming when the frame counter reaches the number noted under 5.
13. Free the lever and make a half fade-out lasting approximately $1\frac{1}{2}$ seconds. Stop the camera when the frame counter shows the number noted under 7.

N.B. Use a tripod for such sequences and, if possible, have an assistant.

The production of the different fades and double exposures described on the preceding pages will be particularly simplified by utilizing the automatic variable shutter control device: the Rexofader (see page 46).

REDUCING THE DEPTH-OF-FIELD

It is normal practice in photography to make the main subject stand out by blurring the background. This effect is easily obtained by using wide diaphragm apertures where the depth-of-field is sufficiently limited.

The variable shutter gives you the possibility of reducing the exposure time without having to alter the filming speed, thus limiting the depth-of-field as in professional photography.

E.g.: Main subject from 7 to 10 feet from the camera
 Background between 30 feet and infinity
 1" (25 mm) lens set at 7 feet; lightmeter reading 1:11.

Shutter open
 (lever on red dot)

diaphragm opening: f/11
 sharp definition from
 3 feet to infinity
subject and background sharp

Shutter $\frac{3}{4}$ closed
 (lever on "2")

diaphragm correction = 2
 diaphragm opening: f/5.6
 sharp definition from 3'9" to 15'
subject sharp, background blurred.



CHOOSING A MORE APPROPRIATE DIAPHRAGM OPENING

The use of a very small diaphragm opening is, in principle, not recommended, for the diffraction effect may reduce the picture sharpness.

Furthermore, even the smallest aperture may give an over-exposed picture, under some lighting conditions.

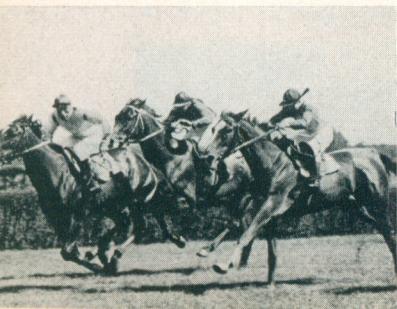
As the variable shutter gives the possibility of reducing the exposure time without altering the filming speed, both the above inconveniences are avoided and a neutral grey filter becomes superfluous.

INCREASED PICTURE DEFINITION

Due to the reduced angle of the variable shutter, the smaller exposure time for each picture increases the sharpness of moving subjects.

If, however, the filming speed is not increased proportionally, this greater definition may cause increased picture jumping during projection.

In certain special cases where definition is more important than the risk of jerky pictures (such as the scientific frame-by-frame analysis of certain phenomena, a film of sporting events, motion studies etc.), the possibility of reducing the exposure time without having to modify the filming speed is appreciated, for it enables the movie maker to reduce the blur caused by a rapidly moving subject. The increase of sharpness is also most advantageous for projection on to a wide screen. There is no risk of flutter when filming with shutter partially closed, if the speed is increased. A filming speed of 24 f.p.s. or more will be suitable with the shutter half or three-quarters closed.





CARTOONS

These are composed of series of single frame exposures (see page 13). A certain artistic sense is necessary to achieve good results.

Each movement of the subject is broken down into a set of positions and then transferred onto a number of drawings. **There must therefore be as many drawings as there are phases in each movement.** These drawings are generally made on sheets of acetate which must be exactly positioned with respect to each other to give a convincing impression of continuity. This positioning is usually done by perforating each sheet in precisely the same spot and then placing them on pins. The plate of the Paillard-Bolex "Super" titler has adjustable retaining pins on which the acetate sheets are placed as and when the subject's movement is made. For more security, press these sheets against the titler plate with a sheet of flawless glass. In this case, see that your lights do not reflect off the glass.

The Paillard-Bolex "Super" titler also gives you the possibility of realizing cartoons in several dimensions and with different decorative themes.



ANIMATION TECHNIQUE

Still subjects also can be animated by the single frame technique.

For such shots, use your camera on a highly stable tripod with the platform locked in position: Paillard-Bolex make a special one for your camera. Operate the camera by cable release so that it remains perfectly steady and does not alter the framing of the subject from one shot to another.

As the subjects filmed are normally small, they will be filmed from close, which means that the distance setting and framing must be precise. These operations are extremely simple when the Reflex viewfinder of your camera is used.

After having shot a frame of the subject in one position, move it by a fraction of an inch to another and expose a second frame, and so on. Articulated dolls, toys, etc. lend themselves especially well to animation.

The final rhythm of a movement depends on the number of shots taken to animate it.

Single frame exposures are also used to animate titles and for trick effects such as a dotted line advance on a road map to show a route taken during a trip, etc. Other amusing and instructive effects will suggest themselves as you grow more experienced.

For **ultra-accelerated motion**, see page 30.

MACRO- AND MICROCINEMATOGRAPHY

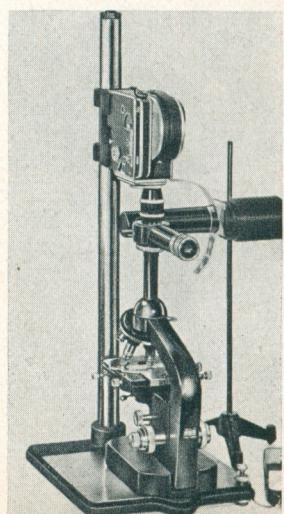
Scientists, businessmen, engineers, as well as many amateur movie makers, are turning more and more to the micro- and macrocinematographic techniques for studies and research. The movie camera has proved itself to be a most useful instrument for recording actions or phenomena that cannot be seen with the naked eye.

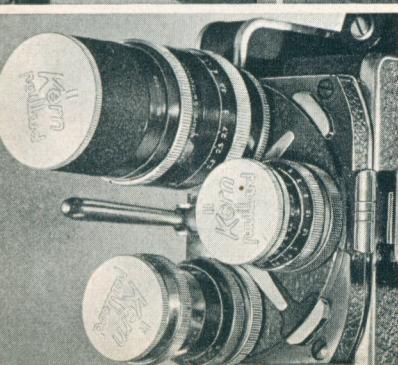
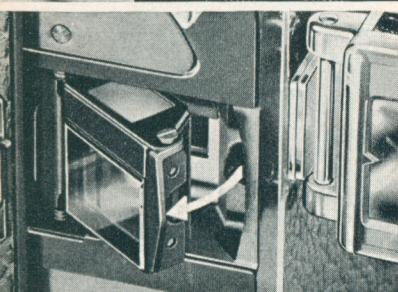
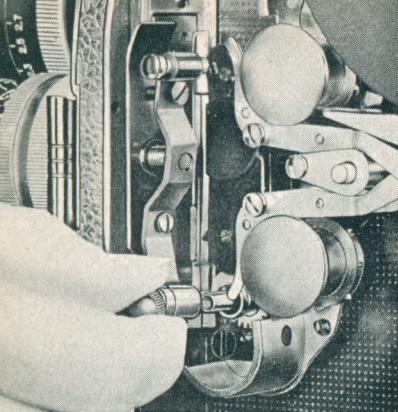
Macrocinematography is the filming of very small subjects, either still or moving, and is made possible by increasing the lens seat/film plane distance with extension tubes between the camera and the lens. Paillard-Bolex make available a set of four extension tubes TUBEX (see page 47) that increase the lens seat/film plane distance by fifths of an inch up to 3 inches.

For maximum definition, the lens focusing must be adjusted with high accuracy. Here again your Reflex viewing system will guarantee you perfect framing and distance setting.

Microcinematography consists principally of filming with the aid of a microscope and is used mainly in the field of chemical and biological reactions.

The illustration shows the solution adopted by Wild S.A. of Heerbrugg, Switzerland.





HOW TO LOOK AFTER YOUR CAMERA

CAMERA

The interior of the camera, where the film drive mechanism is housed, must be kept spotless.

Gelatine deposits and dust are sometimes found in the gate and on the pressure pad after unexposed film has been run through the camera.

Clean them as follows:

- a) Open the pressure pad by raising its pin, then unscrew its shaft.
- b) Remove the pressure pad by pulling it towards you.
- c) Clean the gate and pressure pad, paying special care to the aperture, with a clean cloth wrapped around the end of a small stick of wood. If the gelatine deposit is hard to remove, slightly wet the cloth. Make sure that the part is well dried after cleaning.
- d) Replace the pressure pad.

REFLEX PRISM

The Reflex prism is situated in front of the filming window and can be reached by turning the turret. As it is mounted on hinges, it is a simple matter to turn it for cleaning the back and the ground glass. Use a soft, dry brush for cleaning these parts. The prism can be cleaned even when the camera is loaded (preferably in the shade).

Important ! The Reflex viewfinder must not be taken apart.

LENSES

All the outer surfaces of your lenses should be kept absolutely clean. Use the special tissue paper sold in photo stores for this purpose. However, the lenses should not be constantly rubbed as this might damage the anti-reflex coating.

Screw the lens caps on the lenses when the camera is not used. Special care should be taken to avoid getting dust or fingerprints on the glass (perspiration attacks glass).

SPECIAL CARE OF THE CAMERA IN TROPICAL CLIMATES

Certain precautions must be taken to protect both camera and film from heat and dampness.

Never leave film in the camera longer than the time necessary to expose it.

The camera and all its accessories should be cleaned regularly and thoroughly. The leather and the carrying cases should be treated with a protective chemical available in leather goods stores.

To prevent hot, moist air from condensing and aiding the formation of bacterial growths, do not store your equipment in the cases between takes, but leave it freely exposed to the air.

On the other hand, your equipment should be protected, especially during the monsoon period, by putting it away in airtight tin boxes with a silica gel or calcium chloride humidity absorber. Avoid using these chemicals too liberally, however, to prevent excessive drying, which might damage the leather or film. A relative humidity of 35 to 40 % is quite acceptable. Care should be taken to avoid dropping any of the chemical on your equipment.

PRECAUTIONS AGAINST COLD AND SAND

If you are going to film at high altitudes or in very cold climates, send your camera to the Paillard-Bolex agent for special winterizing.

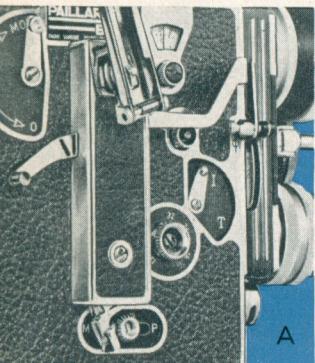
Avoid getting any dust or sand in your camera, as this could damage the mechanism. Where necessary, put your camera in its carrying case and, if possible, in a plastic bag between takes.



TO COMPLETE YOUR EQUIPMENT

A REXOFADER

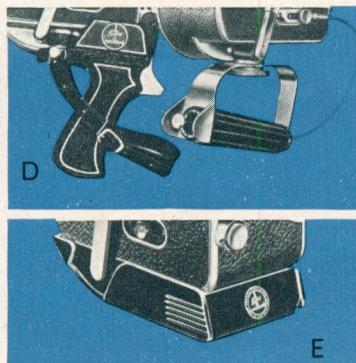
This is a device for automatically and evenly opening and closing the variable shutter of your camera, and is therefore very useful for making easy, professional-type lap dissolves.



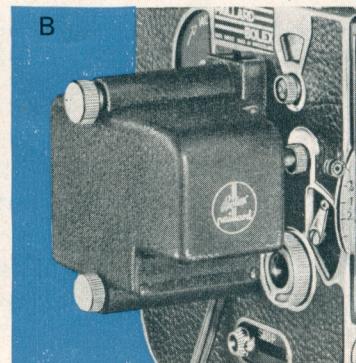
A

B ELECTRIC MOTOR

Runs off batteries or house current (with a special transformer). Useful for long, uninterrupted takes, such as sporting events, scientific films, etc.



D



E



C

F CABLE RELEASES

Recommended for running the camera normally or frame-by-frame without jerking or otherwise moving your equipment. Two lengths available: 21" and 40". If your H16 Rex camera is fitted with an Rexofader, the cable release can be fitted to the front release of the camera by a *special adapter*.

D GRIPS

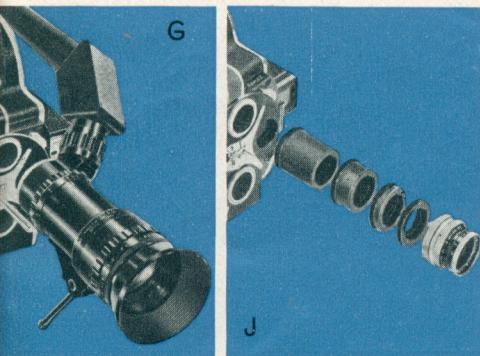
Several models available. Allows the operator to hold his camera firmly and steady. Handier than a tripod.

E BASE

Holds the camera steady even if fitted with a Pan Cinor lens or tele lens. Can be placed on any flat surface, such as a table, wall, etc. The base can be screwed onto the tripod.

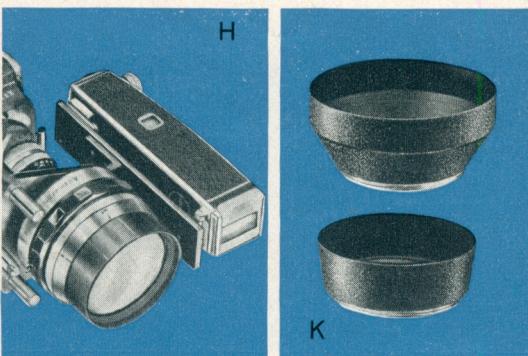
G SOM BERTHOT PAN CINOR LENSES

Lenses with a variable focal length, giving travelling effects without moving the camera. Operated by a simple lever.



H MÖLLER ANAMORPHIC LENS

Optical attachment fitting in front of the taking lens of the camera and the lens of the projector. For shooting and projecting wide-screen films, i.e. pictures with a 2:1 ratio.



J EXTENSION TUBES

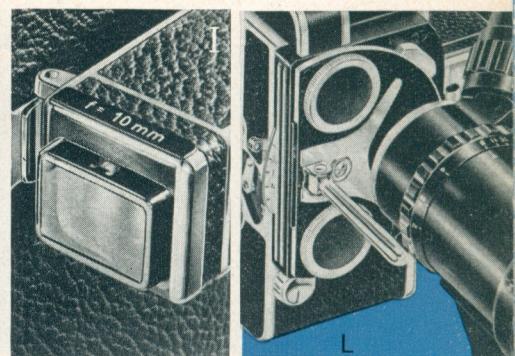
Used in macrocinematography to obtain great enlargement of minute subjects such as insects, etc., filmed at short distances. The direct (through-the-lens) viewing system of the H 16 Rex camera gives exact framing and distance setting. These tubes are supplied with a correction chart.

K LENS HOODS

These accessories protect the lens from direct light and are indispensable when shooting against the light. Necessary only for lenses without a built-in sunshade.

I 10 mm FIELD ADAPTER

Optical attachment sliding in front of the viewfinder. Gives a field corresponding to that of a 10 mm focal length lens.

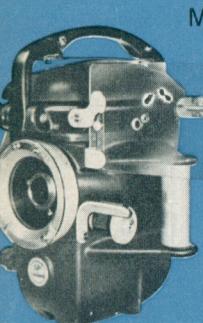


L TURRET LOCKING SCREW

Is used to lock the turret of the H 16 Rex camera, necessary when filming with a long, relatively heavy, tele lens. This screw is supplied normally as an accessory but is included in the equipment of a SOM Berthiot Pan Cinor lens, and the Yvar 150 mm.

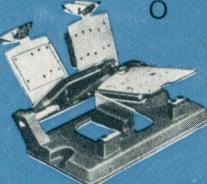
M UNDERWATER HOUSING

Enables you to use your camera at depths of 300 ft. under water. It is perfectly watertight and simple to use. Detailed prospectus on request.



N "SUPER" TITLER

Highly precise. Has many possibilities, i.e. mobile titles, titles in several dimensions, trick effects, cartoons, etc. Detailed prospectus on request.



P FILM WINDER

Can take spools with a capacity of up to 1800 ft. of film. Three models available: monofilm, bifilm and trifilm.

Q SPOOLS

Made of finest quality, unwarppable steel, painted grey.

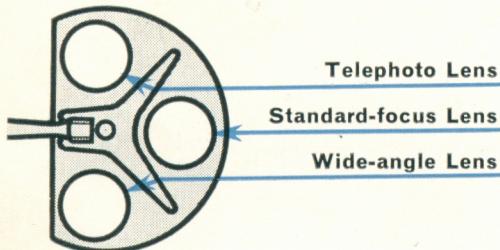
O FILM SPlicer

For 8, 9.5 and 16 mm film sizes. Gives strong, perfect splices.

THIS IS IMPORTANT

CORRECT POSITION OF THE LENSES ON THE TURRET

Keep the lenses positioned as shown below to ensure that the wide-angle and long-focus lenses are kept sufficiently far apart. It is advisable to remove the 100 mm and 150 mm lenses from the turret each time before using a lens of shorter focal length, in order to keep the field of the latter entirely free. When a heavy lens (such as a 150 mm lens, for instance) is being used, the turret should be locked into place with a nut type BX 1497.



EXPOSURE TIMES

Shutter	open	$\frac{1}{4}$ closed	$\frac{1}{2}$ closed	$\frac{3}{4}$ closed	closed
Lever	up	on $\frac{1}{2}$	on 1	on 2	down
Speed					
12 f.p.s.	1/30	1/40	1/60	1/120	0
16 f.p.s.	1/40	1/54	1/80	1/160	0
18 f.p.s.	1/45	1/60	1/90	1/180	0
24 f.p.s.	1/60	1/80	1/120	1/240	0
32 f.p.s.	1/80	1/108	1/160	1/320	0
64 f.p.s.	1/160	1/216	1/320	1/640	0
Speed control knob on	Single-frame exposures				
12 f.p.s.	1/30	1/40	1/60	—	0
16-64 f.p.s.	1/35	1/46	1/70	—	0

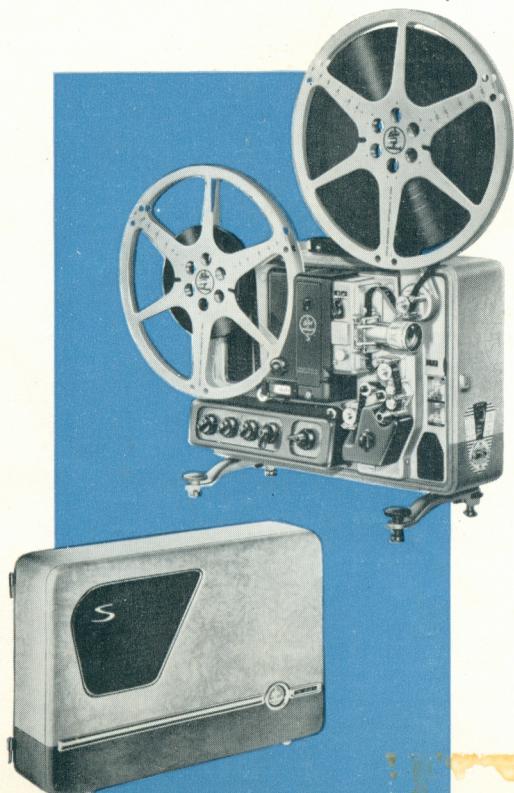
We would recommend you to shoot a roll of film and check the results before filming a vacation trip or other important occasion. This will allow you to become familiar with your camera and will show you if you are correctly following the indications in this instruction manual. When in doubt, see your retailer for advice or help.

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BOLEX S-221 SOUND PROJECTOR



Conforming to the same rigid standards of precision as your camera, this projector is its ideal companion and makes the utmost out of both silent and sound films. Furthermore, it ensures complete protection to your films and allows you to equip them with sound yourself.

Frequency range:

- magnetic sound: 50 to 10,000 cycles/sec. \pm 3 decibels
- optical sound: 50 to 7,000 cycles/sec. \pm 3 decibels

Amplifier:

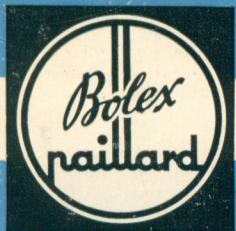
- frequency range: 30 to 16,000 cycles/sec. \pm 3 decibels
- power output: 15 watt

Loudspeaker:

- built into the projector cover, power output: 6 watt
- auxiliary (available as accessory), power output: 15 watt

"Hi-Fi" lens:

- 3 focal lengths available: 35 mm f/1.3 — 50 mm f/1.3 — 70 mm f/1.6



PAILLARD S. A. SAINTE-CROIX (SWITZERLAND)

