

Operation and Care of the  
**BELL & HOWELL**  
*Filmo* 70  
Motion Picture  
Camera



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*Filmo* 70  
REGISTERED

Motion Picture Camera



FOREWORD

THE Bell & Howell Filmo 70 Cameras, the use of which is explained in this booklet, are recognized as the most flexible, most adaptable amateur motion picture cameras available at any price. Built by the makers of the Bell & Howell Professional Cameras which produce most of the world's photoplays, Filmo 70 Cameras are designed by the same engineers and built with the same exacting precision as the B. & H. studio cameras. This is why Filmo 70 results can rival those achieved by the professional cameramen.

With such a capable instrument in your possession, you will naturally want to produce films which reflect all of the potential powers of your camera. The shortest way to achieve such results is to study this instruction book carefully, with your camera before you, before starting to take pictures.

For your convenience, these instructions have been kept as brief as possible consistent with clarity, and are presented under the major headings listed on page two. You will notice that suggestions on camera technique are included in addition to explanations dealing more strictly with the mechanics of using the camera.



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## Filmo 70 Camera Models

- 70-A. Speeds, 8 and 16; Lens, 1" F 3.5 T.H.C. universal focus; with leather case.
- 70-A-1. Same as 70-A except that 1" F 3.5 T.H.C. lens is in focusing mount.
- 70-A-2. Same as 70-A except, instead of F 3.5 lens, the 1" F 1.8 special T.H.C. lens is furnished.
- 70-A-3. Same as 70-A except, instead of F 3.5 lens, the 1" F 1.5 T.H.C. lens is furnished.
- 70-A-4. Double speed model (16-32). Otherwise same as 70-A.
- 70-A-5. Three speed model (12-16-24) with 144° shutter rather than standard 216° shutter. Otherwise same as 70-A.
- 70-B. Super-speed model (128 exposures per second only); without lens; with leather case.
- 70-C. Fitted with turret head and 1" F 3.5 universal focus, 2", and 4" T.H.C. lenses; speeds, 8-16; including special case.

## Filmo "70" Camera

- 70-C-1. Fitted with turret head and 1" F 3.5 T.H.C. universal focus lens. Case is not included.
- 70-C-2. Same as 70-C-1 except that 70-C-2 is double speed model (16-32).
- 70-C-3. Same as 70-C-1 except that 70-C-3 is three speed model (12-16-24).
- 70-D. Seven speed (8, 12, 16, 24, 32, 48, and 64) model with built-in 3 lens turret head, 6 area viewfinder, 1" F 3.5 T.H.C. UF lens, and Mayfair Carrying Case.

Note: Various lens equipments offered with this model are listed below. Abbreviations are used as follows. Except for lens equipment, these models are the same as 70-D.

UF—Universal focus lens

Foc.—Focusing mount lens

KCF—Lens in focusing mount with Kodachrome Filters

- |                              |                             |
|------------------------------|-----------------------------|
| 70-D-1. T.H.C. 1" F 3.5 Foc. | 70-D-6. T.H.C. 1" F 1.8 KCF |
| 70-D-2. T.H.C. 1" F 3.5 UF   | "      2" F 3.5 Foc.        |
| "      2" F 3.5 Foc.         | "      4" F 4.5 Foc.        |
| "      4" F 4.5 Foc.         | 70-D-7. T.H.C. 1" F 1.8 KCF |
| 70-D-3. T.H.C. 1" F 3.5 UF   | "      2" F 3.5 Foc.        |
| "      4" F 4.5 Foc.         | "      6" F 5.5 Foc.        |
| "      6" F 5.5 Foc.         | 70-D-8. T.H.C. 1" F 1.8 KCF |
| 70-D-4. T.H.C. 1" F 3.5 UF   | "      3 3/4" F 3.3 Foc.    |
| "      2" F 3.5 Foc.         | "      6" F 5.5 Foc.        |
| "      6" F 5.5 Foc.         | 70-D-9. T.H.C. 1" F 1.8 KCF |
| 70-D-5. T.H.C. 1" F 3.5 UF   | "      4" F 4.5 Foc.        |
| "      3 3/4" F 3.3 Foc.     | "      6" F 5.5 Foc.        |
| "      6" F 5.5 Foc.         |                             |



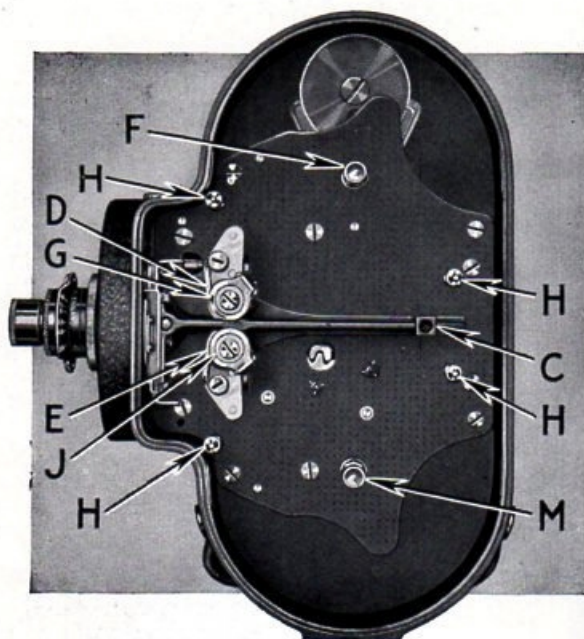


Figure 1

*Your guide for locating interior parts  
referred to in the instructions*

- |                          |                                |
|--------------------------|--------------------------------|
| C. Film gate arm         | G. Feed sprocket               |
| D. Upper film guide shoe | H. Floating film guard rollers |
| E. Lower film guide shoe | J. Take-up sprocket            |
| F. Feed spool spindle    | M. Take-up spool spindle       |

## Loading the Filmo 70 Camera

**NOTE:** While the Filmo Camera may be safely loaded and unloaded in daylight, it is best to avoid direct sunlight.

1. Wind the spring motor by turning the ratchet winding key A, Figure 2, to the left (counter clock-wise) until it stops.

2. Open the camera by turning either of the two cover latches, on the viewfinder side, one-quarter turn until the handle points to the word "Open," when the cover may be lifted off by grasping the viewfinder tube.

3. Open film gate by pushing gate arm C, Figure 3, toward back of camera as far as it will go. An intermediate stopping point is reached when the gate is open, but the gate arm should be pushed on back until the upper and lower sprockets, G and J, are drawn away from their guide shoes—D and E, as in Figure 3.

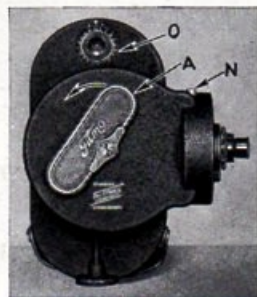


Figure 2

- A. Winding key (Arrow shows turning direction for winding.)  
N. Starting button  
O. Footage dial



Figure 3

*Opening the film gate*

- C. Film gate arm  
D. Upper film guide shoe  
E. Lower film guide shoe  
G. Feed sprocket  
J. Take-up sprocket



4. Remove a spool of film from its metal container. Unreel about 18 inches of the red and black paper leader. During this and all succeeding operations, keep the paper leader wound tightly. If it is permitted to loosen, light may be admitted which will fog the film on its edges.

With the square hole down and the leader feeding off the bottom of the spool to the left, as shown in Figure 4, place the spool over the feed spool spindle—F, Figure 4. Be sure that the two floating film guard rollers (H, Figure 5) are outside the film.

5. Insert the leader between the gate arm C and the feed sprocket G, passing it also between the feed sprocket and the upper film guide shoe D, as shown in Figure 5. See that the perforations in the leader are engaged with the sprocket teeth.

**Figure 6 (at right)**

Inserting film leader in film gate channel

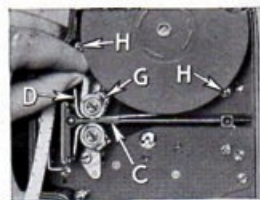
6. Place the leader in the film gate channel, as in Figure 6,



**Figure 4**

Inserting the feed spool

F. Feed spool spindle



**Figure 5**

Threading film leader around the feed sprocket

C. Film gate arm  
D. Upper film guide shoe  
G. Feed sprocket  
H. Floating film guard rollers



leaving enough slack above to form the upper loop, the extreme top of which should be about  $\frac{1}{4}$  inch from the metal camera shell.

7. Leaving a lower loop of about the same size as the upper loop, insert the leader between the take-up sprocket J and the lower film guide shoe E, as shown in Figure 7. Engage the sprocket teeth with the perforations in the leader.

8. Inspect the upper and lower film loops, K and L, Figure 8. They should be of the size shown, their extremities being about  $\frac{1}{4}$  inch from the metal camera shell. Correct their size if necessary by drawing the film forward or backward over the lower sprocket.

9. Engage a pair of perforations with the two shuttle teeth I, Figure 9, at the bottom of the aperture plate.

**Figure 9 (at right)**

Engaging film leader perforations with the two shuttle teeth

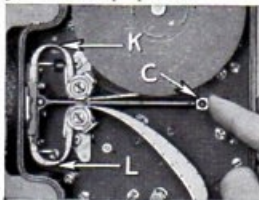
I. Pair of shuttle teeth



**Figure 7**

Threading film leader around the take-up sprocket

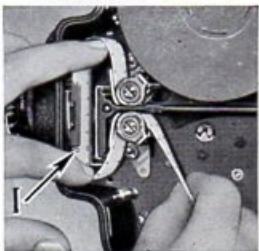
E. Lower film guide shoe  
J. Take-up sprocket



**Figure 8**

Closing the film gate

C. Film gate arm  
K. Upper film loop of correct size  
L. Lower film loop of correct size



10. Make sure that the leader perforations are still engaged with the teeth of both feed and take-up sprockets and with the shuttle teeth and that the loops are still of the size described in paragraph 8. Then close the film gate by pushing the film gate arm C forward as far as it will go. Be careful not to stop at the intermediate point. The gate should be pushed up snugly against the film. This operation is shown just completed in Figure 9.

A final check of the film loop size should now be made. The ideal sized loops will show, when the film gate is closed, a total of six pairs of perforations in each.

11. Insert the end of the paper film leader in the take-up spool hub slot, as shown in Figure 10. Revolve the reel to the right (clock-wise) to take up the slack. Then place the take-up spool over the take-up spool spindle M, Figure 11.

12. Test the correctness of the loading and threading by pressing the starting button N, Figure 2, quickly and momentarily a few times, watch-

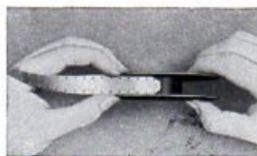


Figure 10  
Inserting film leader end in  
spool hub slot



Figure 11  
Inserting the take-up spool

ing to see that the paper film leader runs through the sprockets and aperture channel, and that it is being taken up by the take-up spool. Do not continue to run the camera after the word "STOP" on the paper leader reaches the feed sprocket. Correct any errors which are discovered by this test.

13. Replace the camera cover. It will not go on unless the gate arm C is fully closed. Turn the latches a quarter turn to the "closed" position. The camera should not be opened again until the entire reel has been exposed.

NOTE: Save the carton in which the film is purchased, as well as the metal container. These are used for mailing the exposed film to the laboratory for developing.

14. Set the footage dial (0, Figure 2) at 96. Start the camera and let it run until the footage dial registers zero. This is done to run through the four feet of paper leader which was left on the feed spool when you closed the camera. The film itself is now in the aperture and your camera is ready to use.

#### *Special precautions*

15. Some Filmo 70 users prefer to give their films additional protection from the light during the loading operation by leaving the inner of the two metal covers (which comprise the container) over the spool as it is placed in the camera and until the threading is completed through step 11.

16. Another precaution which is regularly taken by most owners is to test the take-up spool with the Filmo spool gauge (which is supplied with each camera) to see that the spool flanges are not spread or compressed. The



spool must pass the "go and no go" test given with the gauge; otherwise the film will either not enter freely or light will be admitted between the flange and the spooled film, causing fogging.

## Unloading the Camera

17. After the entire 100-foot roll of film has been exposed (as indicated by the footage dial having made a complete revolution and registering zero again) there remains on the feed spool approximately five feet of paper leader. This must be run through the camera mechanism before removing the camera cover. Press the starting button, allowing the camera to run until the dial turns a little past the six-foot mark. This gives assurance that the paper leader has enclosed the exposed film, protecting it from the light admitted when the cover is removed.

It is a wise precaution to avoid direct sunlight when unloading the camera. Take the exposed spool out carefully, pressing on the paper leader to prevent any tendency to unwind or loosen. Place the spool in the safety metal container in which it was received, insert this in the cardboard carton, and send it to the nearest Film Developing Station (see address on card in film carton).

## Taking Pictures

*Be sure to remove the red rubber lens cap before taking pictures.*

### Winding the motor

18. Wind the spring motor by turning the ratchet winding key A, Figure 2, to the left (counter clock-wise) until it becomes tight. If the key is nested in the palm of the right hand while the left hand holds the camera,

the camera itself may be turned one way while the key is turned the other, thus speeding up the winding operation. Due to the ratchet feature, the same backward and forward motion may be used that is employed in winding a watch.

The motor has a capacity of 27 feet, so four windings suffice for a 100-foot spool of film. However, it is advisable to wind after each scene or two, as this practice gives assurance of always having ample power for any emergency or for an especially long scene.

### Speed adjustment

19. Sixteen pictures or "frames" per second is the normal speed for taking and showing motion pictures and is the speed which should be used for most of your scenes. When they leave the factory, all Filmo 70 Cameras have their speed control dials set at 16.



**Figure 12**  
The speed control screw on the regular speed Filmo 70 Cameras

The speed control employed on the regular speed Filmo 70 Cameras is illustrated at the right. Double and three speed models have a similar control. (If your camera is a Filmo 70-D, see paragraph 35, page 24, for instructions on speed adjustment for that model.)

Inspect your camera to see that it is set to operate at 16. The large slotted speed control screw may be turned with a coin. The slot should point to the engraved line

on the camera front nearest the figure indicating the desired speed and *not* to the figure itself.

When the slot is set at the "8" index mark the camera will operate at 8 exposures per second, which is one-half normal speed. When the light is insufficient for getting a properly exposed scene at normal speed, half speed may be used to give twice as long an exposure as is obtained at normal speed. This doubles the rate of action in the projected pictures—an effect which is sometimes desirable, but which can be avoided, if desired, by having the subjects move slowly.

#### *Lens Adjustment*

20. Pay particular attention to the lens. If your Filmo has the standard equipment, it has what is known as a 1 inch F 3.5 *universal focus* lens. The term *universal focus* is synonymous with *fixed focus*—which means that no adjustment is necessary to photograph subjects at varying distances from the camera, but which limits the shortest distance at which sharply focused pictures may be taken to about 10 feet when the lens is set to work at an aperture of F 3.5. The smaller the aperture, the less the distance from the camera at which the subject will be in sharp focus. It will be seen later that the aperture at which the lens is worked cannot be determined arbitrarily, but that it is dictated by the prevailing light conditions.

The use of lenses in focusing mounts calls for care in determining the distance of subjects from the camera before setting the focusing scale, but such lenses permit photographing subjects at distances less than 10 feet even at the larger apertures.

The term F 3.5 describes the relative area of the lens aperture through which light may pass to record an image upon the film. On examining the lens, you will notice that one ring bears the figures F 3.5, 4.5, 5.5, 8, 11, and 16. A pointer or line is engraved upon the camera head adjacent to the ring. Turn the number bearing ring until F 3.5 falls opposite the pointer. As this is done, you will notice that the metal leaves of an iris diaphragm within the lens open until, when the lens is set at F 3.5, they are expanded to the maximum. When the light on the subject to be photographed is weak, F 3.5 is the stop to use, because this iris opening admits as much light as possible through the lens to the film.

Now turn the ring (bearing the stop numbers) in the opposite direction, and watch the iris diaphragm close down until, at F 16, only a small opening remains. This is the lens stop to use when the light is unusually strong.

As you turn back from F 16 to F 3.5, remember that each stop gives approximately twice the exposure (admits twice as much light) as the preceding stop. F 11 gives twice the exposure of F 16, F 8 gives twice the exposure of F 11, etc. An exception is that F 4.5 is an intermediate stop giving 50% greater exposure than F 5.5. Thus F 3.5 gives  $2\frac{1}{2}$  times the exposure of F 5.5.

When you have become familiar with the adjustment of the lens, study the exposure chart (which also accompanies your Filmo and is reproduced on pages 14 and 15) to get a general idea of the proper stops to use under the various conditions you are likely to encounter at this season of the year. Be guided by this chart in setting the lens diaphragm for your movie scenes.



## Filmo 70 exposure chart

Important: Study modifications on page 15. The following figures are the lens diaphragm stop numbers for the Filmo 70 Camera using 16 mm. film and operating at 16 pictures per second.

"Bright Sun"—Sun shining without obstruction.

"Hazy"—Sun obscured by light clouds, just a faint shadow being cast.

"Dull"—Sun obscured—no shadow cast.

"Very Dull"—Sky overcast with dark clouds.

Month	Light	11 A M to 1 P M	10-11 A M and 1-2 P M	9-10 A M and 2-3 P M	8-9 A M and 3-4 P M	7-8 A M and 4-5 P M	6-7 A M and 5-6 P M	5-5 A M and 6-7 P M
Jan. Nov. Dec.	Bright Sun	F 8	F 8	F 5.5	F 3.5	2.5	1.8	
	Hazy Sun	5.5	4.5	3.5	3.5	2.5	1.8	
	Dull	4.5	3.5	3.5	2.5	1.8		
	Very Dull	3.5	3.5	2.5	1.8	1.8		
Feb. Oct.	Bright Sun	11	8	5.5	4.5	3.5	2.5	1.8
	Hazy Sun	8	5.5	4.5	3.5	2.5	1.8	
	Dull	5.5	4.5	3.5	2.5	1.8	1.8	
	Very Dull	3.5	3.5	2.5	1.8	1.8		
Mar. Apr. Sept.	Bright Sun	11	11	8	5.5	4.5	3.5	2.5
	Hazy Sun	8	8	5.5	4.5	3.5	2.5	1.8
	Dull	5.5	5.5	4.5	4.5	3.5	2.5	1.8
	Very Dull	3.5	3.5	3.5	3.5	2.5	1.8	
May June July Aug.	Bright Sun	11	11	8	8	5.5	4.5	3.5
	Hazy Sun	8	8	8	5.5	5.5	4.5	3.5
	Dull	5.5	5.5	4.5	4.5	3.5	3.5	2.5
	Very Dull	4.5	3.5	3.5	3.5	3.5	2.5	1.8

## Filmo 70 exposure chart modifications

NOTE: "Increase" refers to larger lens diaphragm opening and "decrease" to smaller opening; F 3.5 is the largest and F 16 the smallest.

Increase stop shown for special subjects as follows:

One point: Buildings in shade; close-ups of persons.

One and one-half points: Trees covering most of picture, landscapes with heavy foreground, dock scenes, group scenes in the shade, red buildings and other dark objects.

Two points: Close-ups of persons in the shade; dark nearby objects covering almost the entire field of the picture.

Three to four points: Forest or woods interiors not open to the sky; poorly lighted river banks and ravines.

Decrease stop shown for special subjects as follows:

One point: Open landscapes with no foreground, open beaches, rivers, lakes and boat scenes, light colored objects, hills or mountains.

Two points: Distant landscapes, studies of clouds; sunset and sunrise, view of sea water and snow scenes.

Subjects that will require openings greater than that which the lens is capable of covering should not be attempted without reducing speed of camera.

For the average interior scenes full aperture opening and reduced speed should be employed. No attempt should be made to get details at normal speed operation except in well lighted rooms, or where sufficient artificial lights are available.

Increase stop shown 1 point when using double speed camera at 32 pictures per second.

Decrease stop shown 1 point when using normal speed camera at 8 pictures per second.

Super Speed Camera, increase stop shown 3 points. (F 1.8 lens recommended.)

Three Speed 144 degree shutter Camera, no modification at 12 speed. Increase stop shown half point for 16 speed and one point at 24 speed.

Filmo 70-D seven speed camera, use relative exposure indicator on camera.

NOTE: These tables are for all Northern States and altitudes up to 5,000 feet; above 5,000 feet decrease stop one point. For Southern States decrease stop by one-half point and for the Tropics decrease one point. In foreign countries or in places where the light conditions are uncertain use a Filmo Exposure Meter.

*How to hold the Filmo 70 Camera*

21. The position in which the camera is most advantageously held is shown in Figure 13. It is always well to steady the camera by pressing it firmly against the forehead and nose, bringing the left eye even with the viewfinder. Keep the arms close to the body, forming as rigid a rest or support for the camera as possible. It is very important to hold the camera steadily.



Figure 13

*The correct way to hold the Filmo 70 Camera*

When using telephoto lenses, it is well to employ a tripod, as any slight movement of the camera is exaggerated in projection. The camera base is tapped for mounting on any of the light folding tripods, of which several types are available. (See Filmo General Catalog for descriptions.)

*How to use the viewfinder*

22. This paragraph refers to Filmo 70 models A, B, and C. If you have Filmo 70 D, see paragraph 34, page 24.

The area seen through the spy-glass viewfinder corresponds exactly with the field included by the camera lens. As the image is clearly, sharply seen in an upright position, it is very easy to follow moving objects with this viewfinder, and to arrange the composition of your scenes for the most beautiful effects.

As the viewfinder is located at the side of the lens it is necessary, when filming objects four feet or less from the camera, to make a slight allowance in the horizontal posi-

tion of the camera to compensate for this offsetting. At distances greater than four feet, the viewfinder is accurate and no allowance for the offset need be made.

The small opening on the right side of the viewfinder objective lens is for the purpose of observing the lens diaphragm stop number. This permits the operator to check his diaphragm adjustment just before starting to film a scene, and serves as a last minute reminder to adjust the lens for the prevailing light conditions and for the nature of the subject.

*The starting button*

23. When the camera is wound and properly held, and when the lens diaphragm is properly set and the subject is framed in the viewfinder, it is only necessary to press the starting button (N, Figure 2) to begin taking motion pictures.

As soon as the button is pressed the hum of the motor will tell you that the camera is in operation. Maintain pressure on the button until you wish to conclude the scene, then release it quickly. If the pressure is relieved slowly a gravity catch will hold the starting button down, keeping the camera in operation. The gravity catch serves the purpose of permitting the operator to step into the picture when the camera is mounted upon a tripod. Pressing and quickly releasing the button will stop the mechanism after the button has been held down by the gravity catch.

*Length of scenes*

24. A common tendency, when first starting to use a moving picture camera, is to cut the scenes too short—that is, failing to keep the camera operating long enough



on each subject. As a result the scenes, when projected, flash on and off the screen too quickly for the eyes of the audience to grasp the image. Five feet can be considered an average minimum footage for such scenes as close-ups of people, scenics, or any action which is continuous but not changing in nature.

If action is changing, more than five feet of film may be required to tell the story. Ordinarily, the camera should be started just before the action and stopped just after the action.

While filming, counting seconds is the commonly used guide. Five feet of film are exposed in twelve seconds of normal speed operation. After the scene is filmed the footage dial may be consulted for the purpose of checking up on the accuracy of your counting.

#### What to "shoot"

**25.** Plan your shots to take full advantage of the possibilities of motion pictures. Probably your first pictures will be of family and friends. Avoid posed pictures—leave these for the still camera. You will very likely get your best scenes when your subjects are not conscious of being filmed, or when you can get them so interested in and occupied with their action that they forget the camera.

Plan your shots wherever possible to tell a little story of some kind, whether it be a simple account of a day's events at home or a chronological record of a holiday trip. Scenes need not necessarily be exposed in the order in which you want them to appear when projected, as they can be cut and spliced, after being developed, into any sequence.

#### Panorama pictures

**26.** Panorama views (made by pivoting the camera in a horizontal plane while it is in operation) often provide very pleasing additions to moving picture films. But if panoramas are not properly made they are anything but satisfactory. There are several precautions to be observed if "pams" are to be successful.

*First*, pivot slowly on every pam. When you think you are going slowly enough, cut your speed in half and you'll be better satisfied with the results.

*Second*, pam evenly, steadily, and, except in rare instances, in a horizontal plane. A jerky pam is hard on the eyes when projected, and furthermore, causes disappointment at not being able to see the subjects clearly for a sufficient length of time.

*Third*, do not attempt to panoram when a still shot will tell the story or get the desired scene. An abundance of pams makes a film tiresome, so save them for the proper occasion.

Often the following method will improve your pams. Swing slowly past objects of general interest until your viewfinder frames a picture of especial appeal. Hold the camera steadily on that scene for about 10 seconds (4 feet), then swing slowly on to the next scene of importance and stop again. This handling of the problem will give your audience ample time to enjoy each outstanding point of the scene and still retain that value of the pam—the showing of elements in their relation to each other.

#### Filming moving objects

**27.** In panoraming to follow moving objects, the problem becomes different. Here the camera should be swung



to keep the subject constantly as nearly as possible in the center of the field of view. The background, which may be blurred in the process, is *not* the most important element. Such pams should be arranged so that the object is not moving directly across in front of the camera (at a right angle). Have the subject moving toward or away from the camera at an oblique angle. In this way a minimum of panning will get all the action. If the action must take place at right angles to the camera, do not attempt a short shot, but get thirty feet away from the line of action before starting the camera.

### Lighting

28. Lighting is a subject on which much more could be written than space here permits. Not only is light essential in photographic work, but it also may be considered as a tool which permits artistic molding of the picture. Depending upon how the lighting is handled, the subject may be portrayed in almost stereoscopic depth and relief, or, at the other extreme, in a flat, unnatural manner. Since the subject of light is so important and so rich in its possibilities, it is recommended that the amateur read the chapters on this subject in one or more books on amateur cinematography.

The F 3.5 lens with which Filmo 70 Cameras are equipped is about four times as "fast" as the usual inexpensive still camera lens. This means that you can get properly exposed pictures outdoors earlier or later in the day, and that you do not necessarily need bright sunlight.

Close-ups (motion picture portraits) are usually better if taken in a subdued light as they are free from the dark shadows found in similar scenes taken in bright sunlight. A shady spot, open to the sky, is a good location for making close-ups of good tonal quality.

Full front lighting (sun directly behind the camera) tends to give a flat picture, lacking in depth. Side lighting is better as a general rule, and oblique lighting is usually to be preferred to full front lighting.

Pictures taken with the sun directly overhead (at or near noon) usually lack in pictorial quality as compared with those taken when the sun's rays slant down upon the subject, throwing longer shadows.

Cultivate the habit of studying the effect of light upon the types of subjects which you may wish to photograph. You will find that while a subject may be quite lacking in pictorial possibilities in one light, it may offer a wonderful effect when the sun strikes it from a different angle.

### Using the 70-A Double Speed Camera

29. Filmo Camera models 70-A-4 and 70-C-2 are built to operate at 16 and 32 pictures per second, rather than at 8 and 16, the standard speeds. Pictures taken at 32 per second show, when projected at 16 per second, a degree of the slow motion effect. This speed is very useful for filming sports in which the action is rapid, such as football, golf, swimming, diving, horse races, track meets, etc. Other uses for this Double Speed Camera, with special instructions dealing with its points of difference from the standard model, are presented in a special folder, form no. 508, which accompanies each Filmo 70-A-4 and 70-C-2.

### Using the 70-A Three Speed Camera

30. Filmo Camera models 70-A-5 and 70-C-3 have three optional speeds—12, 16, and 24 pictures per second. These models combine, to a certain extent, the advantages



of the regular (8-16) and the double speed (16-32) cameras by offering speeds both slower and faster than normal. Because of the special work for which the three speed cameras are generally used, such as obtaining critically sharp action pictures for enlargement, it is often desirable to give a shorter exposure than is given by the other models. So the shutter on the three speed cameras has an opening of only  $144^\circ$  as compared with the  $216^\circ$  shutter opening on the regular model. At 16 pictures per second the  $144^\circ$  shutter gives an exposure of  $1/40$  second.

Complete instructions for using the three speed cameras are given in the special folder, form no. 704, which is enclosed with each Filmo Camera of these models.

### Using the 70-B Super Speed Camera

31. The Filmo 70 Camera is also built in a super speed model (70-B) operating at one speed only—128 exposures per second, which is eight times normal speed. This camera produces the true s-l-o-w motion effect, and is used primarily for motion analysis work. Its threading and use require certain precautions which are not common to Filmo Cameras in general. Before using this model, read the special instruction folder, form no. 433, which accompanies every super speed model.

### Using Filmo 70-C (with Turret Head)

32. Filmo 70-C, C-1, C-2, and C-3 models are supplied with a turret head, and any Filmo 70 Camera originally purchased without the turret may be fitted with this handy device at a nominal cost. The purpose of the turret head is to permit interchangeable use of any three different lenses with a minimum of time required for the

changeover. The only special information needed to operate this model deals with rotating the turret to change lenses and with using the etched viewfinder objective lens. These special instructions are given in the folder, form no. 15,008, which accompanies each of the above models of Filmo 70 Cameras.

### Using Filmo 70-D Seven Speed Camera

#### *The 70-D turret head*

33. The Filmo 70-D Camera may be purchased with from one to three lenses mounted upon its built-in turret head. If less than three lenses are purchased with the camera, the remaining one or two openings in the head are closed with metal caps. These caps may be unscrewed and additional lenses screwed in at any time.

The 1" F 3.5 T.H. C. lens is recommended for use with every Filmo 70-D Camera, regardless of which two optional lenses may be selected. This lens is the one to use for the usual run of scenes under speed and light conditions which do not demand an opening greater than F 3.5. It produces clear, sharp pictures of good depth, and is of sufficiently short focal length so that rock-steady pictures may be made with it by using reasonable care in holding the camera in the hands.

When it is desired to turn the turret to take a scene through another lens, grasp the edge of the head and revolve it in either direction until the desired lens is in position. An audible click tells when the lens is properly seated, as does a feeling of the revolving motion being automatically stopped at the correct spot and the registration of the index mark on the turret head with the word "Run" on the camera proper. (See Figure 17,



page 26.) The starting button is automatically locked until a lens is correctly seated—a feature which saves film and disappointments.

### *The 70-D viewfinder*

34. After turning the turret head from one lens to another, revolve the viewfinder dial (Figure 14) in either direction until the figure corresponding to the focal length of the lens to be used coincides with the index mark on the viewfinder tube just in front of the dial. This action locates, within the viewfinder tube, a rectangle which restricts the angle of vision through the viewfinder to exactly that of the photographic lens.

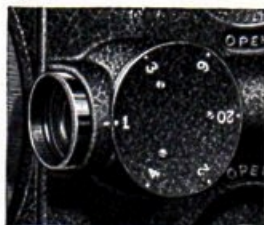


Figure 14

The Filmo 70-D viewfinder, showing the dial set for showing the field included by the one-inch lens

### *70-D speed adjustment dial*

35. The Filmo 70-D speed adjustment dial is illustrated in Figure 15. Any one of seven speeds (8, 12, 16, 24, 32, 48, and 64 exposures per second) may be selected.

Notice that the outer knurled ring revolves about the disc upon which these seven speeds are indicated. To obtain the 8, 16, 32, or 64 speed turn the outer knurled ring until the upper index mark upon it coincides with the index dot on the edge of the segment in which the desired speed is designated.



Figure 15

The Filmo 70-D speed adjustment dial, shown set for normal (16) speed operation

To obtain the 12, 24, or 48 speed, use the lower index mark on the knurled ring, setting it opposite the desired speed index dot at the bottom of the numbered disc.

Intermediate speeds may be used since the variation from one speed to another is gradual and not confined to the markings of the speed control dial.

### *Relative exposure indicator*

36. The Filmo 70 Exposure Chart gives the diaphragm settings to use under various lighting conditions and for various types of subjects, and is correct for pictures taken at normal (16) speed. Each of the other six speeds at which Filmo 70-D may be operated requires an exposure modification to compensate for the increase or decrease in shutter speed. For this reason a relative exposure indicator is built into the Filmo 70-D camera. This indicator is located low down on the right side, and is shown in Figure 16.

As an illustration of how the relative exposure indicator is used, let us assume that the exposure chart specifies F 11 as the correct normal speed diaphragm setting for a particular scene. We turn the inner dial until the figure 16 (normal speed) index mark coincides with the F 11 index mark on the outer dial. The correct lens stop setting for any speed may now be read directly on the outer dial, opposite the index marks of the various speeds on the inner dial.



Figure 16

The Filmo 70-D relative exposure indicator, shown set for a normal speed exposure of F 11. Exposures for all other speeds are read directly



If 64 is the speed to be used on the scene in question, we look at the 64 speed index mark and find that it now falls opposite the F 5.5 index mark. Therefore F 5.5 is the correct setting at 64 speed for a scene which would require F 11 at 16 speed.

#### 70-D starting button lock

37. The starting button of the Filmo 70-D Camera may be locked, if desired, to prevent accidental starting of the camera. This is done by revolving the turret 7/16 inch so that any one of the three index marks on the edge of the turret head falls opposite the word "LOCK" (Figure 17) on the camera proper. To release, turn the turret until an index mark falls opposite the word "Run."

#### Lubrication of Filmo 70-D

38. The Filmo 70-D Camera, because of the high speeds at which it may be operated, requires more attention to its lubrication than the slower speed Filmo 70 models. Five oil holes are provided, one in the center of the turret head and four in the mechanism



Figure 17  
The Filmo 70-D starting button (N) and "lock" and "run" control

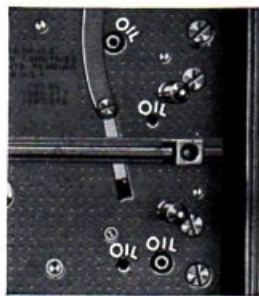


Figure 18  
Showing the four oil holes in the Filmo 70-D mechanism plate

plate beneath the film spools. These four oil holes are shown in Figure 18. Every hole should receive one or two drops of Filmo Camera Oil after each five or six hundred feet of film are exposed. Should the camera remain unused for ten days or more, oil it before using regardless of the film footage used since the last lubrication.

NOTE: See condensed Filmo 70-D instructions, Form No. 15,025, regarding lens mounts required for 70-D.

### Care of the Filmo 70 Camera

#### Lubrication

39. Two places on the Filmo 70-A and B Cameras should be oiled about once a month or after every five or six rolls of film used. Remove with a penknife the two caps shown in Figure 19, putting in 3 or 4 drops of the Special Filmo Camera Oil, after which replace the caps securely. Oiling is especially necessary when the camera is operated in humid countries or by the sea or salt water.

Aside from these two points on the camera front, no lubrication is necessary on Filmo 70-A and B models. On Filmo 70-C, the same lubrication is accomplished by unscrewing the cap on the turret pivot shaft and placing oil in the oil hole thus revealed.

Filmo 70-D, due to the high speeds at which it may be operated, requires additional lubrication, directions for which are given in paragraph 38.



Figure 19  
Location of two oil holes on Filmo 70, models A, B, and C



It is advisable to return every Filmo 70 to the factory once every two years for a general cleaning and oiling.

#### *Cleaning lenses and viewfinders*

40. Lenses should be kept scrupulously clean at all times. Clean them frequently to remove all dust, dirt, lint, or finger prints. To avoid damaging the highly polished glass surfaces, use nothing but the regular lens cleaning tissue, which may be had at a nominal cost in books which are convenient to carry in the camera case. Color filters should receive the same attention as lenses.

After cleaning the lenses, make sure that each lens element is screwed firmly in place, and that the lenses as a whole are screwed firmly into the camera.

Dirt on the viewfinder lenses should also be removed with lens tissue so that a clear vision will always be had.

#### *Cleaning aperture plate and film gate*

41. The aperture plate and the film gate (Q and R respectively, Figure 20) should be inspected frequently and cleaned if any dirt or film emulsion has collected upon them. Their smooth, highly polished surface must be maintained if the best results are to be obtained. Wiping these parts with a clean, dry linen handkerchief will ordinarily suffice. If the dry cloth does not remove the dirt, moisten the cloth with alcohol. Clean the upper and lower film guides (D and E, Figure 20) in the same way.

Occasionally wipe out the inside of the camera.



**Figure 20**

Filmo 70 interior parts requiring cleaning as directed in paragraph 41. Q—aperture plate, R—film gate, D and E—upper and lower film guide shoes

## Dressing Up Your Films

### *Projection*

42. When your exposed film is returned from the developing station it is ready to project. You will find the Filmo Projector ideal for home use. It gives flickerless pictures of maximum screen brilliancy, can be reversed for comic effects and stopped for prolonged viewing of any individual frame, and has many other valuable features. Its operation is simplicity itself and, as there is no fire hazard, it can be run wherever electric current is available. (See Filmo General Catalog for details.)

### *Cutting and editing*

43. After you have received your finished film roll from the developing station, you may find in projecting that you wish to eliminate parts or even the whole of some of the scenes. It also may be desirable to correct the continuity by bringing together certain scenes that were not taken in logical sequence during the time of photographing, and to insert titles. These are all simple operations after the art of making a good splice has been learned. Film which has been spliced properly is just as strong and pliable as any other part of a continuous strip of film. (See Filmo General Catalog for Film Editing and Splicing equipment.)

### *Titles*

44. Appropriate titles greatly increase the interest in motion pictures. There are several devices with which the amateur may make his own titles. (See Filmo General Catalog for details.)

We are prepared to make printed titles to order. Prices will be quoted on application.



*Getting professional effects*

45. The Filmo 70 Camera is a complete moving picture making outfit in itself. However, it is so designed that, as the amateur progresses, he may add accessory equipment for getting professional effects and refinements in his films and for increasing the versatility of his ciné equipment. There is the Iris Vignetter for opening scenes with the circle-in effect and closing them with a circle-out, the Lens Modifier for making comic distorted movies, the Duplicator for amusing trick effects, and the Portrait Attachments for getting sharp close-ups. Arc and Mazda lights are available for making pictures in-doors. Tripods and Tripod Heads, Exposure Meters, Distance Meters, Scene Record Books, and Color Filters are other useful accessories. The regular 25 mm. F 3.5 imported Taylor-Hobson Cooke lens is instantly interchangeable with others for special purposes: speed lenses for making Kodacolor pictures and for overcoming adverse light conditions, wide angle lenses for work in close quarters, and telephoto lenses for getting close-up pictures of distant objects. Filmo equipment is lifetime equipment because it can be added to as the owner's interest grows. This is your assurance against obsolescence and later necessity of buying a new camera in order to have the latest developments.

*Kodacolor pictures*

46. Motion pictures in full natural colors, beautiful and true to life, may be taken with Filmo Cameras and shown with Filmo Projectors. The necessary Kodacolor filters, available under license from Eastman Kodak Co., may be secured from your Filmo dealer, as may the Kodacolor adapted speed lens required for the Filmo Camera. Your dealer will gladly give you full information regarding the taking and showing of Kodacolor movies with Filmo.

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Centrally Located Service Stations  
for the convenience of  
Filmo Owners

THE Bell & Howell Company maintains stations at centrally located points (addresses below) where Filmo Equipment may be sent for expert service work. When your camera, projector, or accessories are in need of repairs calling for skilled treatment, send them to the nearest station and have the assurance that the work will be done properly by factory-trained experts. Your dealer will be glad to take care of packing and shipping for you and to make any minor adjustments which may be necessary and which do not call for factory equipment.



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