



Bell & Howell *ZOOMATIC*

DIRECTOR SERIES

DESIGN 414

8mm
MOVIE
CAMERA

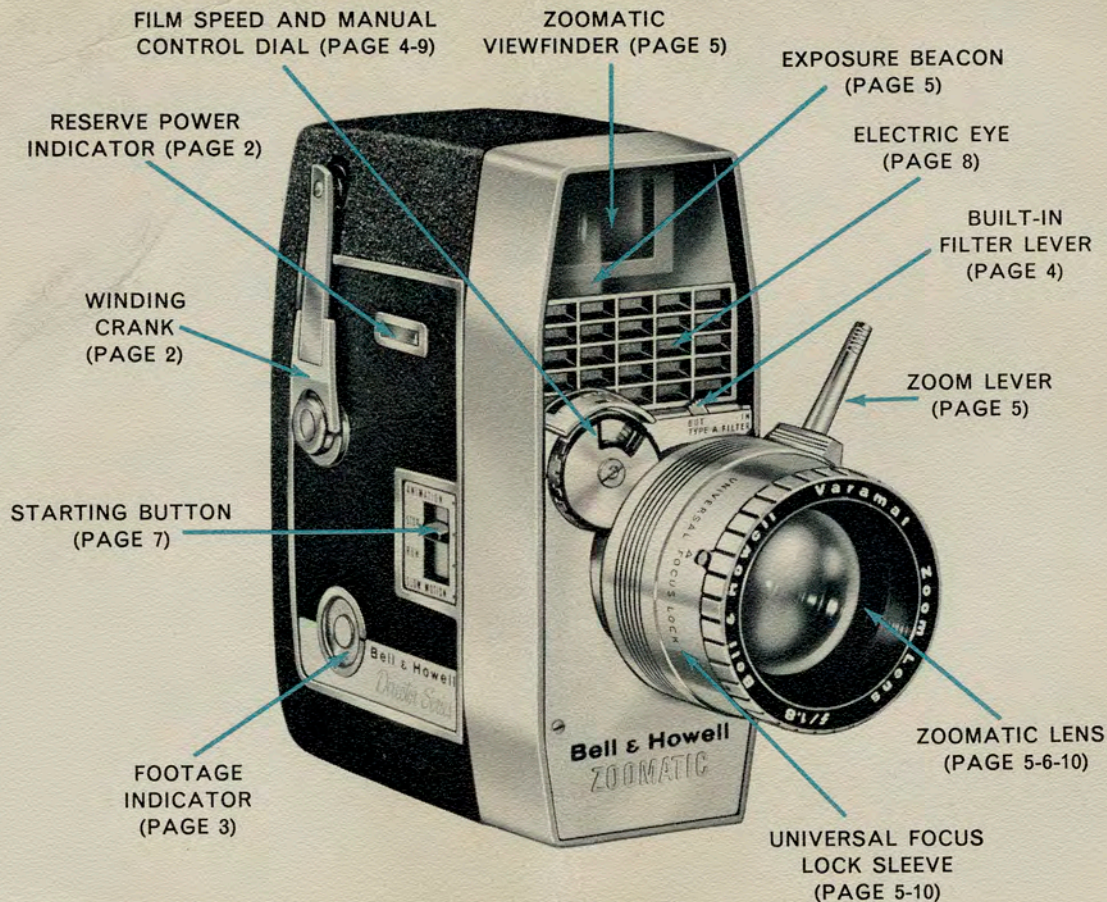


WELCOME
TO
BELL & HOWELL
OWNERSHIP

BELL & HOWELL • 7100 McCORMICK ROAD • CHICAGO 45, ILLINOIS

OPEN THIS FLAP
OF YOUR
INSTRUCTION BOOKLET

Keep the flap open as you read through the instructions that follow. This will give you a quick reference to all the working parts of your ZOOMATIC Electric Eye camera. Familiarity with these names before operating your camera will assure complete success with your first roll of film.





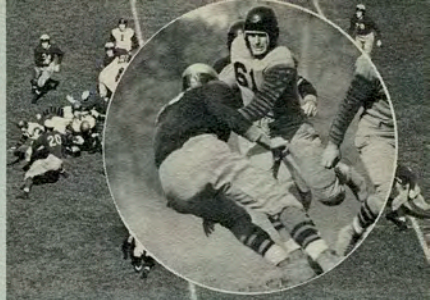
GET
ACQUAINTED
WITH YOUR
Bell & Howell
ZOOMATIC
ELECTRIC EYE
CAMERA

Before you take exciting scenes like those shown on the following page, get the feel of your ZOOMATIC Electric Eye camera. Examine it closely . . . the illustrations show a number of ways you can hold your camera. Use the one that feels most comfortable. Then sight through the Viewfinder . . . with the camera to your eye, move the Zoom Lever until you pin-point attention on the most important action. Press down the Starting Button to either "run" or "slow motion" and the Electric Eye will set your lens automatically.

For perfect movies, easy step-by-step instructions are described on the pages that follow.

ZOOM

Without moving a step, you can create the same dramatic zoom effects that are used in top films and television shows.



SLOW MOTION

Touch a button and capture the excitement of a baby's first steps, switch to slow motion for the first tumble; then back to normal speed for the smile or cry.

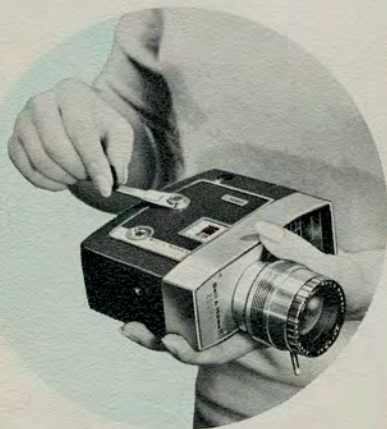


REGULAR MOVIES

No lenses to change, no turrets to turn. At the sweep of a lever, unlimited versatility . . . normal, wide angle and telephoto movies.



WINDING



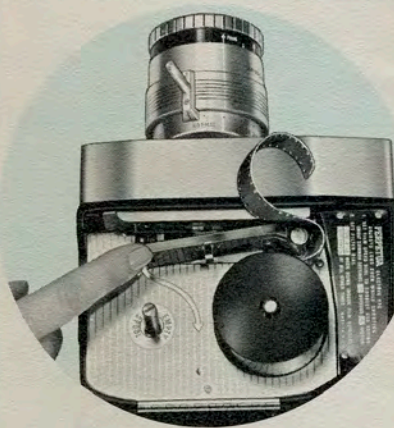
Fold the Winding Crank down. Wind in a *clockwise* direction until the Reserve Power indicator reads "Full Wind" and is completely "red". (Your camera cannot be overwound.) When you shoot and the red disappears, it's time to wind again. So you don't miss an important scene, wind after each exposure. After winding, snap the crank back in place.

FILM



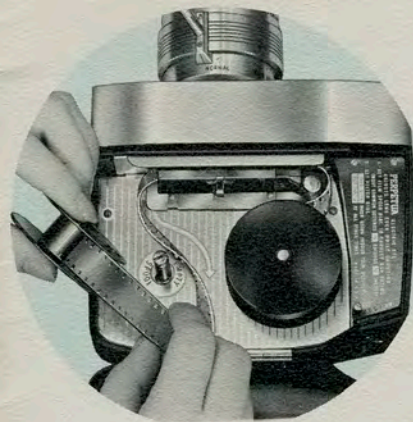
Because of the differences in lighting between the outdoors and artificial light indoors, you'll use two different color films in your ZOOMATIC Electric Eye camera; Type A film indoors, Daylight film outdoors. For convenience, you may want to use the same film indoors and out. Refer to page 4 on the use of filters.

LOADING FILM

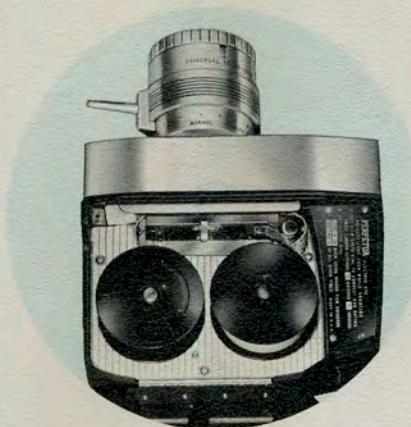


Open the camera door by pushing back the latch. With the camera door open, place the camera in front of you with the lens pointing away. The curved arrows on the inside plate indicate the exact path your film should follow.

Avoiding direct sunlight, unwind about 10-inches of film (keeping it taut on the spool). Drop the full spool of film over the spindle marked "Full Spool Here." (The side with the 4 notches should be up.)

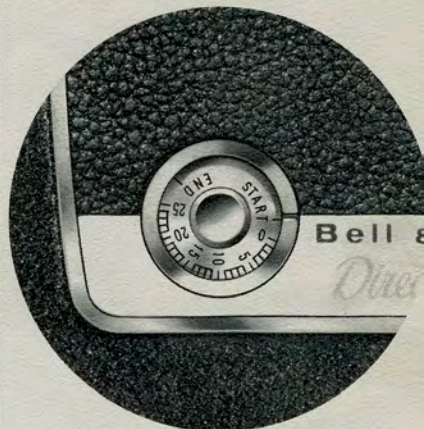


Open the film gate as illustrated and slip the film into the film channel. Hold the empty spool so it reads "Film when on this spool is only half exposed" (three notched side up). Thread the film end into the slot of the empty spool. Turn the spool making sure you secure the film end and take up any slack. Drop the spool onto the spindle marked "Empty Spool Here" turning it clockwise to tighten film. Close the film gate.



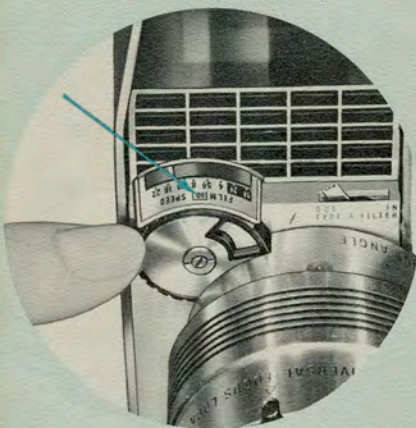
The illustration shows how your loaded camera looks. Before closing camera door, press the starting button and run the camera a second or so. If your camera is loaded properly, both spools will revolve and you'll see film moving through the film channel. Close camera door.

AUTOMATIC FOOTAGE INDICATOR

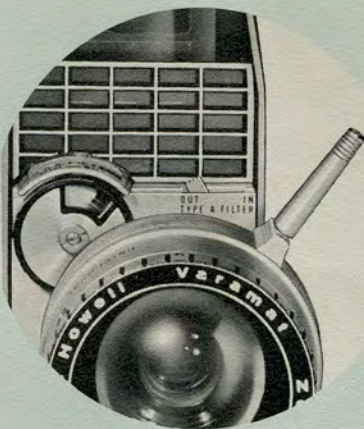


The Film Footage Indicator on your Electric Eye camera is automatically set when you load. Press the starting button down and run the camera until the indicator reads "O". This will run off the protective leader film. It takes about 12 seconds for the footage indicator to move from START to "O".

SET FILM SPEED



Look in the window (arrow) above the Film Speed Dial. If you loaded with Daylight (outdoor) film, turn the Film Speed Dial until number "10" appears. If you loaded with Type A (indoor) film, turn the dial until "16" appears. For faster film speeds, use the setting recommended in the manufacturer's instructions. The Film Speed Dial on your camera will adjust for film speeds as high as "40".

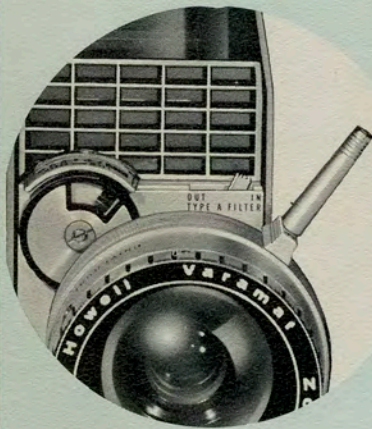


BUILT-IN FILTERS

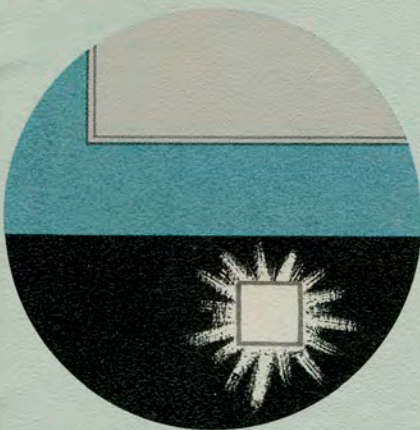
Set the Filter Lever to the "out-Type A" position. This is the position you'll use most of the time, whether you're filming indoors or out.

TYPE A FILTERS For convenience, you may occasionally want to use Type A (indoor) film outdoors. To do this, merely set the Filter Lever to the "Type A—in" position and change the film speed setting from 16 to 10. Remember to reset your camera when you move back indoors.

HAZE FILTERS The optical system of your camera automatically provides haze filtering for landscape, snow scenes and panoramic views even on cloudy hazy days. This exclusive feature eliminates the need for an accessory haze filter.



EXPOSURE BEACON



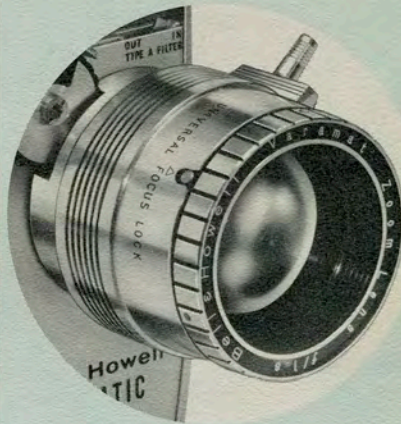
Point your camera toward and away from the light and watch the Exposure Beacon in the bottom of the viewfinder. When there's enough light, the beacon shows "yellow" and your movies will always be properly exposed. If the beacon turns "red" there's not enough light for filming. If "black" your camera is set for manual operation.

ZOOMATIC LENS AND VIEWFINDER



Creating dramatic zoom effects with the coupled lens and viewfinder on your Zoomatic Electric Eye camera is as easy as pointing your finger. All you do is sight through the viewfinder and move the Zoom Lever up or down while filming. Moving the lever up will give you the feeling that you are moving farther and farther away from your subject. Moving the lever down will give you the feeling that you are moving closer and closer. For best results when taking zoom shots, see tips on zooming—page 11.

UNIVERSAL FOCUS LOCK



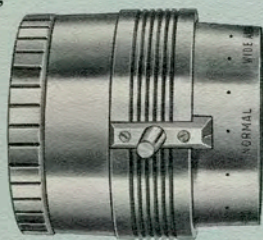
The Universal Focus Lock is a built-in convenience you will probably use for most of your filming. When shooting outdoors on a sunny or slightly overcast day, this setting gives a maximum focus range in front of and behind your subject. When you are filming fast action, or unpredictable scenes, this setting will give you sharp movies. When shooting close-ups or telephoto shots where the scene is dimly lit, the focus range is greatly reduced. For these scenes, set the lens at the exact distance of your subject as described on page 10.

WIDE ANGLE-NORMAL-TELEPHOTO MOVIES

There are two ways in which you can take specific wide angle, normal, or telephoto movies with your Zoomatic Electric Eye camera:

1. Sight through the viewfinder and move the Zoom Lever up or down until you frame the exact size picture you want to record on your film.

2. Move the Zoom Lever until the Wide Angle, Normal, or Telephoto setting is opposite the index marks on the lens barrel. The coverage at each setting is illustrated below.



WIDE ANGLE



Use this position for filming indoors in close quarters, where you want to include more in your picture. This position is also desirable for outdoor scenic shots.

NORMAL



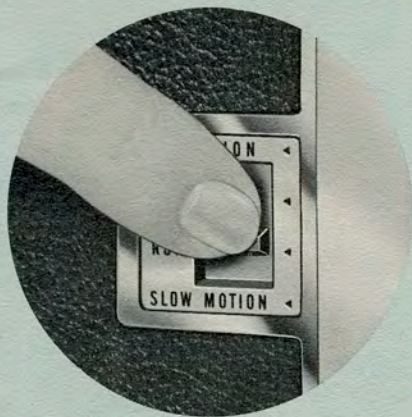
This is the lens position you'll probably use most of the time. Follow the action of your vacations and holidays, sports, hobbies and special events.

TELEPHOTO



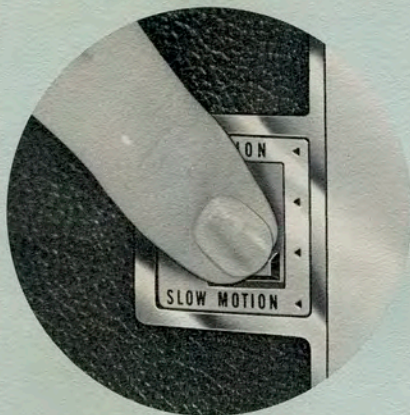
This position will magnify your subject, making it extremely useful when you want to film close-ups from a distance, candid, and enlarged views of distant objects.

1. RUN



3-WAY STARTING BUTTON

2. SLOW MOTION



3. ANIMATION



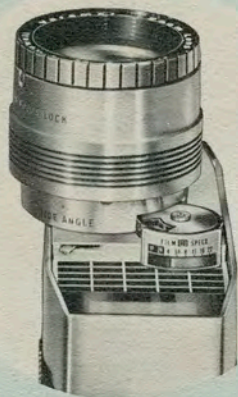
Press downward slightly to "RUN" position, and film moves through your camera at normal speed. If your camera has been fully wound, you can expose 15 feet of film, enough for 8 or 9 average length scenes.

Note: When you press the Starting Button or release it, avoid moving the camera. Such movement will be exaggerated when the film is projected on your screen.

Press all the way down for slow motion movies. (For properly exposed slow motion movies, the starting button must be depressed completely.) Use this faster sounding speed to take slow motion studies of your golf swing, Junior running down the football field, or Susie diving. You can switch from normal speed to slow motion and back again, without ever taking your finger off the Starting Button. Make sure there's enough light for slow motion movies. See automatic operation page 8.

Press upward to "ANIMATION" position, and a single frame is exposed. A minimum of single frame shots is necessary to make an adequate animation scene and can give you many unusual effects: For example, if you move a toy very slightly between each frame, it will appear to move when you project the scene. Similarly you can capture the beauty of a sunset, produce some tricky titles, or watch the opening of your prize rose with some time lapse shots. For best animation results, you'll want to use a tripod.

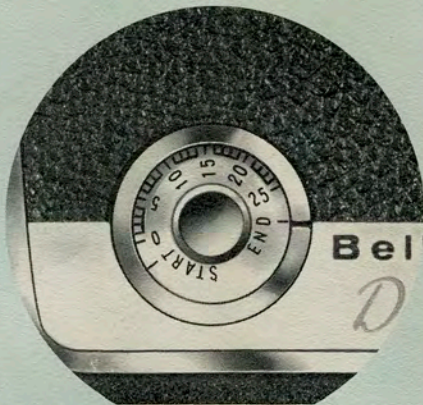
FULLY AUTOMATIC ELECTRIC EYE OPERATION



If there's enough light to take movies, the Electric Eye will set your lens automatically. To check the lens setting, hold your camera so you can see the graduated scale and red exposure needle. The needle will stop at any lens opening from 1.8 to 22, and is useful when using depth of field information described later. It is also useful when taking slow motion movies.

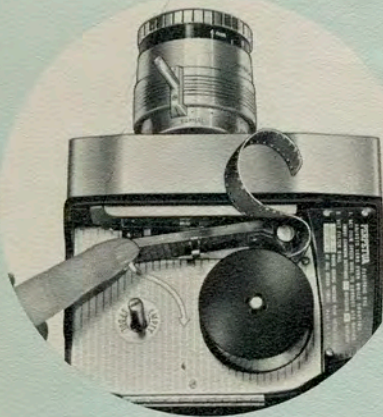
Note: If the red needle is in the light area of the scale when you point camera at subject, there's enough light for slow motion movies.

UNLOADING



After you have exposed the first 25 feet of film as shown on the Film Footage Indicator, keep your finger on the starting button until the footage indicator stops or reads "End." Avoiding direct sunlight, open the camera door. The top spool is now empty, film is on the bottom spool. Lift out both spools carefully and you're ready to reload for the second half.

USING SECOND HALF OF FILM



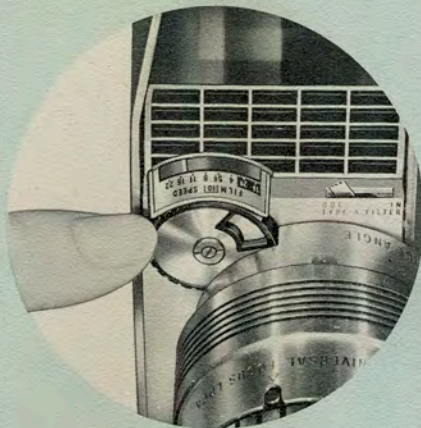
Each 8mm spool contains 50 feet of film (25 feet double width) so you must run the film through your camera again to expose the second half. Turn the spool containing the film over and place it on the upper or right hand spindle. Proceed with loading for the second half as instructed under "Loading." After you have exposed the second half, your film is ready for processing.

PLAN YOUR MOVIES



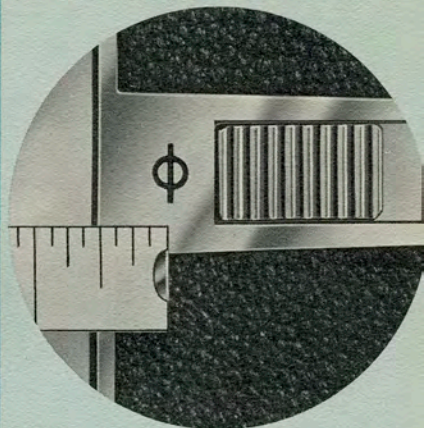
Hold your camera steady and level before you press the Starting Button. Try to plan your movies so they'll tell a story with continuity and interest. Shoot each scene for at least 7 seconds, taking a series of pictures with relationship between them. Now that you are familiar with your Electric Eye camera, you can take thrilling automatic movies you'll always be proud to show.

MANUAL OPERATION



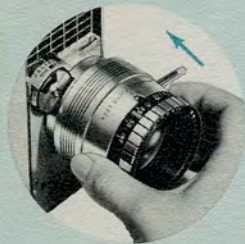
Turn the Film Speed Dial past "M" in the direction of the arrow, and watch the red exposure needle move. Turn the dial to set the needle at the lens opening you choose. (1.8, 2.8, 4, 5.6, 8, 11, 16, and 22.) You can ask your dealer, or write to us about the special effects you can get by setting your lens manually. Some exposure effects for backlighting scenes are described on page 13.

FILM PLANE REFERENCE MARK

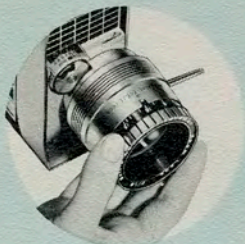


The small circle broken by the straight line next to the door latch, shows the actual film plane inside your camera. This reference point is valuable when you're shooting titles, close-ups, etc., as it lets you measure the exact distance from film to subject. It is also useful when you make distance settings by scale as described on the next page.

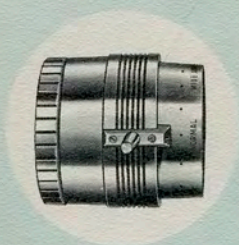
DISTANCE SETTINGS BY SCALE



When you want to set your Zoomatic lens accurately on a given distance, (especially advantageous when in telephoto) push the sleeve covering the distance scale back. After the sleeve has been pushed back, the lens may be set at any distance shown on the distance scale. Turn the front of the lens until the distance setting you want to use is opposite the small triangle index mark on the lens sleeve. The distance scale is marked with settings from 6 feet to infinity. The illustration (below) shows the lens set at 10 feet.



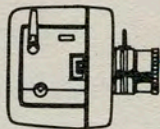
A ratchet is engaged when the sleeve of the lens is pushed back for distance settings. When the lens is zoomed, you'll hear this ratchet sound which is similar to the winding of a wrist watch. This signal reminds you that the lens is set at one of the distance settings. To reset the lens at the Universal Focus Lock position as previously described, merely turn the lens until the sleeve can be pulled forward *as far as it will go* so it covers the distance scale.



DEPTH OF FIELD WITH YOUR ZOOMATIC LENS

Depth of field as illustrated on the following page, refers to the points nearest to and farthest from the lens at which you get clear, sharp movies. It is governed by the size of the lens opening, the distance at which the lens is set, and the wide angle-normal-telephoto position. If you want to take full advantage of lens depth of field, familiarize yourself with the depth of field tables on the pages that follow. These tables show you the nearest and farthest points of sharpness for different combinations of lens settings described above.

DEPTH OF FIELD ...EXAMPLE



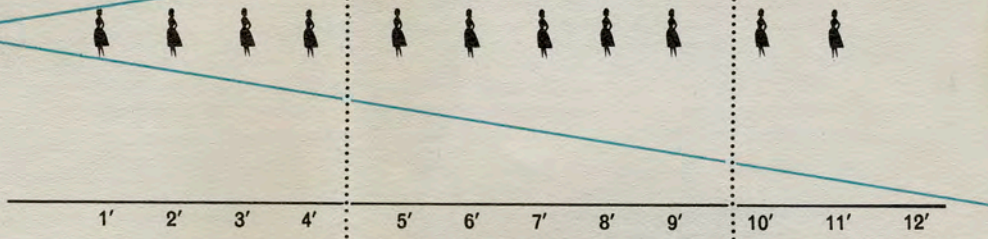
ZOOMATIC LENS
SET AT NORMAL
POSITION. DISTANCE
SCALE SET AT 6 FT.
LENS OPENING 1.8

NEAR LIMIT 4'4"

DEPTH OF FIELD 5'5"

FAR LIMIT 9'9"

OBJECT
FOCUSED ON



TIPS ON ZOOMING

1. Whenever you zoom, move the zoom lever up or down with the greatest degree of smoothness possible; any jerky or erratic movement will be exaggerated in projection.
2. For wide angle and normal movies, your camera can be held in the hand. For telephoto shots, or zoom movies, a steady support; even a camera tripod, is recommended. This, incidentally, is a good practice for all movie making.
3. Don't zoom too much. Like any good technique, it will be most effective when used sparingly.
4. Don't zoom too fast. This can give you a very undesirable effect on your screen when your film is projected. It only takes a second to zoom over the entire zoom range.
5. When using various lens positions, consult the depth of field tables. These tables show the near and far limits of sharpness at various lens openings and distance settings. Note: This range of sharpness decreases as you zoom to the telephoto position. Therefore, it is best to start your zoom effect with the lens set at the wide angle position.
6. When you use a specific distance setting on your lens, it is not necessary to change this setting when you zoom. However, if you switch to a new subject at a different distance, the scale must be set for the new distance.
7. The end of the Zoom Lever is threaded into a bar on the lens. For convenience, you may want to unthread the Zoom Lever and use only the bar for zooming.

TIPS ON MOVIE MAKING

1. If your fingers block the Electric Eye when you shoot, your camera will not "see" things in their proper light. Don't confuse your camera. Make sure it sees everything.
2. As you probably already know, the first principle of good photography is—"keep the sun over your shoulder"—unless you are shooting for special effects. Direct light from the sun will cause improperly exposed movies.
3. When shooting close-ups at a distance of 6 feet, the range of sharpness is greatly reduced with any lens. At this distance, you will want to use your distance scale, especially when shooting in telephoto position. As shown in the depth of field illustration on page 11, your background will not be as sharp as your subject. For this reason, the best close-ups are obtained with a plain background (such as open sky, sand, water), which does not detract from the subject.
4. When you want to shoot slow motion movies, point your camera at your subject

Before you take movies of that special occasion, *take a roll of practice film* with your Zoomatic Electric Eye camera. This will give you an opportunity to familiarize yourself with camera operation and a chance to check your results. Listed below are a number of tips and suggestions for better movies with your camera.

- and note the position of the red exposure needle. If the needle is in the light area of the scale, there's enough light for slow motion movies.
5. When you shoot indoors with a lightbar, there are several things you should remember: (a) Make sure your camera is loaded with indoor film and set at proper film speed. (b) Always keep your subject further from the camera than it is from the background. This will give you good over-all exposure as your subject and background will be lighted at approximately the same level.
6. When it is necessary to "pan"—that is to revolve the camera horizontally while the scene is being shot, there are several things you should remember: (a) When panning to follow a moving subject, keep it centered in the viewfinder. (b) As a rule, you'll get best results if you pan from left to right. (c) Never pan on close-ups—you'll get a blur. (d) Pan only when absolutely necessary; hold camera steadily.

Any additional questions you have on movie making can be answered by your Bell & Howell dealer. He is an expert in photography.

EXPOSURE EFFECTS

Ordinarily you'll get the most natural color and brilliant detail in your movies if you avoid scenes in which the sun is directly behind your subject. Back-lighted scenes (examples: sun shining behind your subject or a bright sky behind a shoreline heavy with trees) can give you interesting silhouette effects. In back-lighted scenes, the subject will appear dark against a bright background. If you wish to capture the color detail of a dark subject in a bright scene, the lens must be opened one or more stops. This is done by pointing the camera (set in Auto position) at the scene, noting the setting of the red needle. Then set lens manually to the next largest opening. Example: If the red needle showed a lens setting of $f/5.6$ in the Auto position, set the red needle manually to $f/4$. If the red needle showed a lens setting between $f/5.6$ and $f/4$ set the red needle manually between $f/4$ and $f/2.8$.

Try this a few times with difficult scenes until you get the effect you want. Sometimes you may want a dark foreground against a blue sky—then set the red needle manually to the next smaller opening, just the opposite of the procedure explained above.

EXPOSURE DATA

STARTING BUTTON POSITION	CAMERA SPEED	SHUTTER SPEED
RUN	16 FRAMES PER SECOND	1/35 SECOND
SLOW MOTION	48 FRAMES PER SECOND	1/100 SECOND
ANIMATION	SINGLE FRAME	1/35 SECOND

KEEP YOUR CAMERA CLEAN

A clean camera is a more efficient camera. Whenever necessary wipe off the lens viewfinder and film channel with a piece of lens tissue moistened with Bell & Howell Opti-Kleen. Use a toothpick to dislodge any hardened emulsion or dirt that might accumulate in the film channel from the passage of film. A rubber ear syringe is useful for blowing out any dust which might accumulate beneath the grid of the Electric Eye. Never use sharp tools on your camera.

DEPTH OF FIELD — WIDE ANGLE

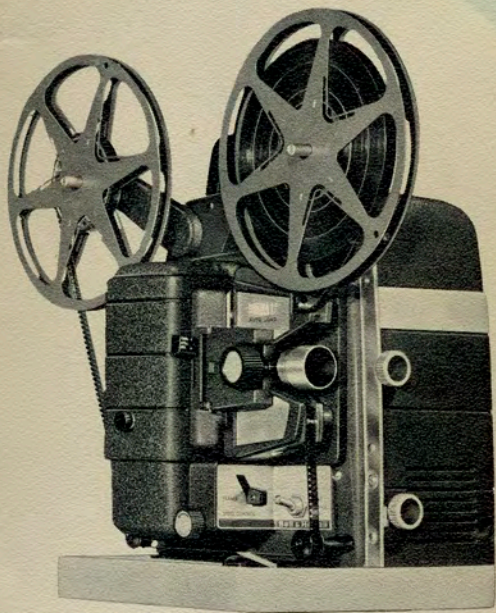
Lens Opening		1.8	2	2.8	4	5.6	8	11	16	22
Object Distance										
50 ft.	FAR	↑ 6' TO INF.	↑ 5'8" TO INF.	↑	↑	↑	↑	↑	↑	↑
	NEAR									
25 ft.	FAR	↓	↓	↑	↑	↑	↑	↑	↑	↑
	NEAR									
20 ft.	FAR	↓	↓	↑	↑	↑	↑	↑	↑	↑
	NEAR									
15 ft.	FAR	↑	↑	4' TO INF.	3' TO INF.	↑	↑	↑	↑	↑
	NEAR									
14 ft.	FAR	↑	↑	↓	↓	↑	↑	↑	↑	↑
	NEAR									
13 ft.	FAR	↑	4'6" TO INF.	↓	↓	2'1" TO INF.	1'6" TO INF.	1'2" TO INF.	10" TO INF.	7" TO INF.
	NEAR									
12 ft.	FAR	4'5" TO INF.	↓	↑	↑	↑	↑	↑	↑	↑
	NEAR									
11 ft.	FAR	↓	↓	↓	↓	↓	↓	↓	↓	↓
	NEAR									
10 ft.	FAR	↓	↑	↓	↓	↓	↓	↓	↓	↓
	NEAR									
9 ft.	FAR	↓	↓	3'2" TO INF.	2'5" TO INF.	↓	↓	↓	↓	↓
	NEAR									
8 ft.	FAR	↓	3'8" TO INF.	↓	↓	↓	↓	↓	↓	↓
	NEAR									
7 ft.	FAR	116'	↓	↓	↓	↓	↓	↓	↓	↓
	NEAR	3'8"								
6 ft.	FAR	31'	↓	↓	↓	↓	↓	↓	↓	↓
	NEAR	3'4"								

DEPTH OF FIELD — NORMAL

Lens Opening		1.8	2	2.8	4	5.6	8	11	16	22
Object Distance										
50 ft.	FAR	Inf.	Inf.	Inf.	6' ↑ TO INF.	↑	↑	↑	↑	↑
	NEAR	12'	11'	8'8"						
25 ft.	FAR	Inf.	Inf.	Inf.	↓	4'4" TO INF.	↑	↑	↑	↑
	NEAR	9'7"	9'2"	7'4"						
20 ft.	FAR	Inf.	Inf.	Inf.	↑	↓	↑	↑	↑	↑
	NEAR	8'9"	8'5"	6'10"						
15 ft.	FAR	365'	Inf.	Inf.	↑	↓	↑	↑	↑	↑
	NEAR	7'7"	7'5"	6'2"						
14 ft.	FAR	136'	364'	Inf.	4'10" TO INF.	↓	↑	↑	↑	↑
	NEAR	7'5"	7'2"	6'						
13 ft.	FAR	78'	121'	Inf.	↓	↑	↑	↑	↑	↑
	NEAR	7'1"	6'10"	5'9"						
12 ft.	FAR	52'	68'	Inf.	↓	↑	2'10" TO INF.	2'2" TO INF.	1'8" TO INF.	1'3" TO INF.
	NEAR	6'9"	6'7"	5'7"						
11 ft.	FAR	37'	45'	Inf.	↓	↑	↑	↑	↑	↑
	NEAR	6'6"	6'3"	5'4"						
10 ft.	FAR	28'	32'	Inf.	Inf.	3'3" TO INF.	↑	↑	↑	↑
	NEAR	6'1"	5'11"	5'1"	4'3"					
9 ft.	FAR	21'	23'	66'	Inf.	↓	↑	↑	↑	↑
	NEAR	5'9"	5'7"	4'10"	4'					
8 ft.	FAR	16'	18'	35'	Inf.	↓	↑	↑	↑	↑
	NEAR	5'4"	5'1"	4'6"	3'10"					
7 ft.	FAR	13'	14'	21'	182'	↓	↑	↑	↑	↑
	NEAR	4'10"	4'9"	4'2"	3'7"					
6 ft.	FAR	9'9"	10'	14'2"	34'2"	↓	↑	↑	↑	↑
	NEAR	4'4"	4'3"	3'10"	3'4"					

DEPTH OF FIELD — TELEPHOTO

Lens Opening		1.8	2	2.8	4	5.6	8	11	16	22
Object Distance										
50 ft.	FAR	190'	237'	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	↑ 4'8" ↓ TO INF.
	NEAR	29'	28'	24'	19'	16'	12'	9'	6'10"	
25 ft.	FAR	40'	41'	56'	118'	Inf.	Inf.	Inf.	Inf.	
	NEAR	18'	18'	16'	14'	13'	9'8"	8'	6'	
20 ft.	FAR	28'	29'	36'	55'	188'	Inf.	Inf.	Inf.	
	NEAR	15'	15'	14'	12'	11'	8'9"	7'	5'8"	
15 ft.	FAR	19'	20'	23'	20'	45'	315'	Inf.	Inf.	
	NEAR	12'	12'	11'	10'	9'	7'8"	7'	5'2"	
14 ft.	FAR	18'	18'	20'	25'	38'	134'	Inf.	Inf.	
	NEAR	12'	11'	11'	10'	9'	7'5"	6'	5'	
13 ft.	FAR	16'	16'	18'	22'	31'	78'	Inf.	Inf.	
	NEAR	11'	11'	10'	9'	8'	7'1"	6'	4'11"	
12 ft.	FAR	15'	15'	16'	20'	26'	52'	Inf.	Inf.	
	NEAR	10'	10'	9'6"	9'	8'	6'9"	6'	4'9"	
11 ft.	FAR	13'	13'	15'	17'	22'	29'	313'	Inf.	
	NEAR	9'6"	9'4"	8'10"	8'	7'	6'6"	5'7"	4'7"	
10 ft.	FAR	12'	12'	13'	16'	18'	27'	85'	Inf.	
	NEAR	9'	8'7"	8'	7'7"	7'	6'1"	5'4"	4'5"	
9 ft.	FAR	10'5"	10'6"	11'	13'	15'	21'	43'	Inf.	
	NEAR	7'11"	7'10"	7'6"	7'	6'5"	5'9"	5'	4'2"	
8 ft.	FAR	9'1"	9'3"	9'9"	11'	12'	16'	27'	Inf.	
	NEAR	7'2"	7'1"	6'10"	6'5"	5'11"	5'4"	4'8"	4'	
7 ft.	FAR	7'10"	7'11"	8'4"	9'	10'	13'	18'	67'	
	NEAR	6'4"	6'3"	6'1"	5'9"	5'4"	4'10"	4'4"	3'8"	
6 ft.	FAR	6'7"	6'8"	6'11"	7'5"	8'2"	9'9"	13'	25'	
	NEAR	5'6"	5'6"	5'4"	5'1"	4'9"	4'4"	3'11"	3'5"	



Bell & Howell **LUMINA 1.2** **8mm PROJECTOR**

Enjoy brighter color, crisper detail in every movie you show. New projection lens with f/1.2 speed is fastest ever . . . combined with new T-14 projection lamp, the Lumina 1.2 gives revolutionary new brightness. Even threads itself for you automatically in less than 3 seconds. Reverse and still picture. It even winds the cord back into the projector—automatically—after the show.

Complete with automatic room lamp cut-off switch, handy splicer in snap-on case.

This new Bell & Howell product is guaranteed to be free from imperfections in both material and workmanship for one year from date of original purchase. Should any part of this equipment be defective, it will be replaced or repaired free of charge (except for transportation), providing the equipment has been operated according to the instructions accompanying it.

No liability is assumed for film which is damaged or is unsatisfactory for any reason and no liability is assumed for interruptions in operation of equipment. This guarantee is void:

- a) If equipment has been damaged by accident or mishandling;
- b) If equipment has been serviced by other than Bell & Howell approved service stations*;
- c) If adaptations or accessories other than Bell & Howell have been made or attached.

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**Location of nearest approved service station will be furnished on request.*

Bell & Howell

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