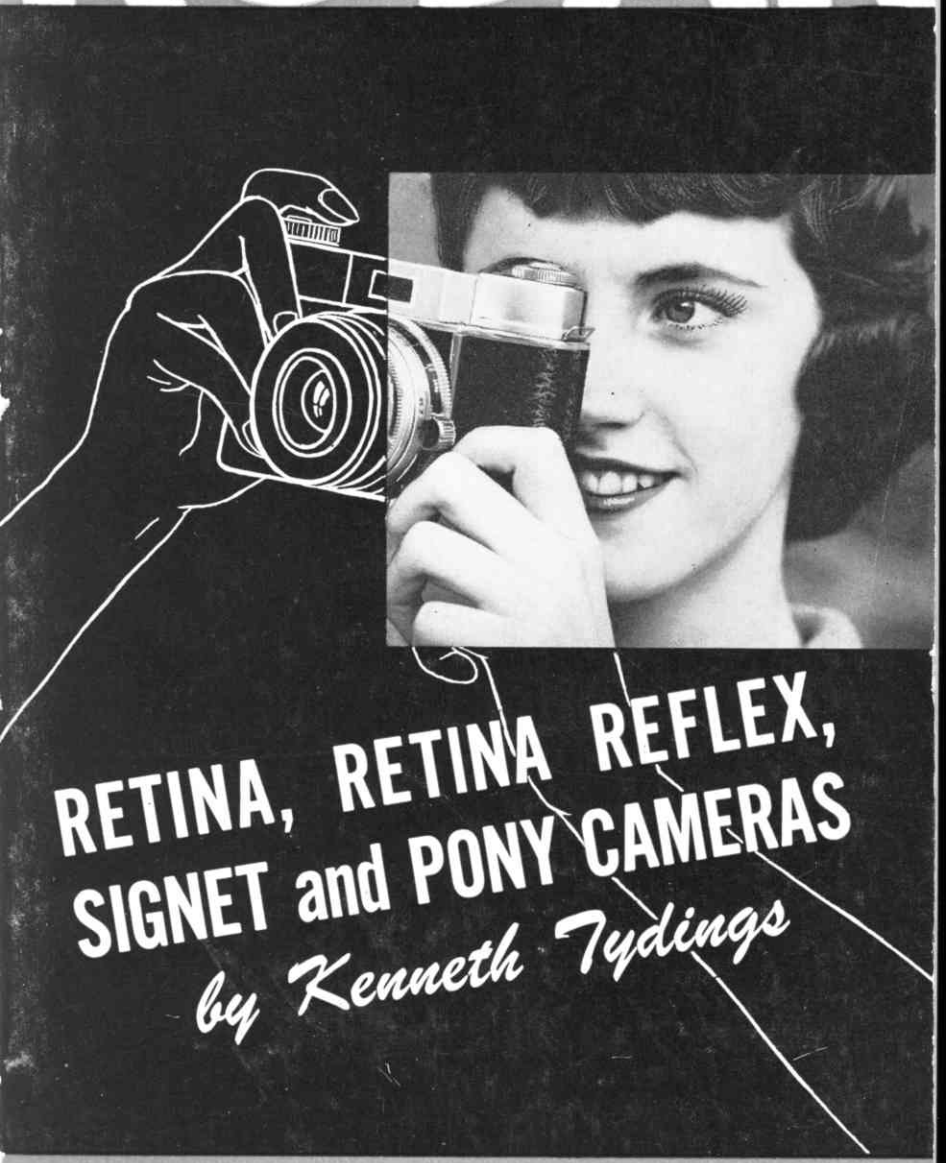
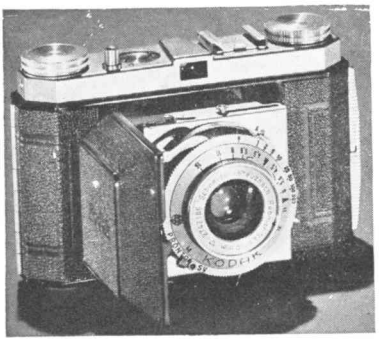
GUIDE TO KODAK



RETINA, RETINA REFLEX, SIGNET and PONY CAMERAS

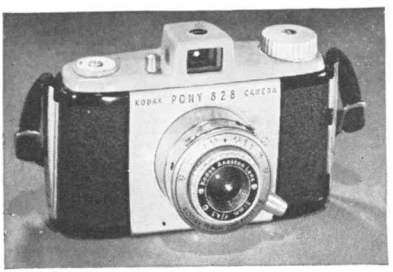
by Kenneth Tydings

THE MODERN CAMERA GUIDE SERIES

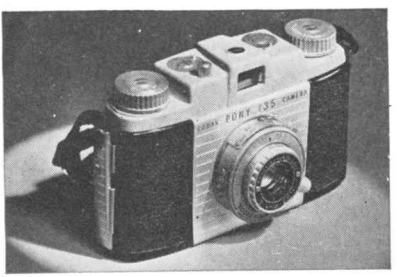


Folding: Non-rangefinder (Retinette)

Retina III C

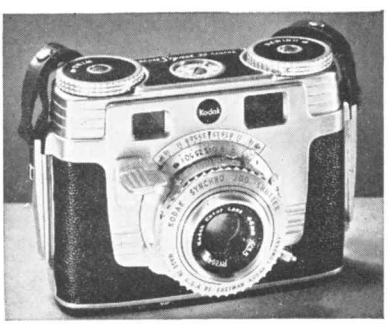


Rigid: Non-rangefinder (Pony 828)*



Rigid: Non-rangefinder (Pony 135)*

Retina Reflex



Rigid: Rangefinder (Signet 35)*

CHAPTER 1 / THE KODAK ELECTRIC EYE CAMERAS

Whenever exciting photographic news is being made, Eastman Kodak is usually doing it. This time, the exciting news is the Kodak perfection of both "push-button" and "automation" photography. Push-button photography is one where you still have to do something yourself to make the picture. With automation photography, everything is done for you.

The forward advance of push-button photography is exemplified by the new Kodak Retina IIIS and the Kodak Retina Reflex S. With these cameras, in addition to having complete interchangeable prime lenses instead of replaceable front elements as with the older cameras, the exposure is set by lining up a needle with a reference mark in the exposure meter window. The needle value is changed by either twisting the shutter speed setting ring or the iris opening ring because both are part of a finely engineered photo-electrical system which activates the reference needle. By changing the speed or iris values, the reference resistance values of the electrical system are changed and this change can be "read" and calibrated on the meter dial.

Setting an exposure takes less time to do than to tell, because once the meter has been set for the film speed, then you need only line up the reference needle for the basic exposure setting and sight and shoot the picture.

The Kodak Retina IIIS and the Kodak Retina Reflex S are, of course, precision instruments. The former uses a single rangefinder-viewfinder system for producing sharp images, while the latter uses a single-lens reflex system to do so. The IIIS viewfinder is automatically corrected for viewfinder parallax for the fields of view of the 35, 50, 85, and 135mm lenses. The Retina Reflex S has no problem viewfinder field and parallax because the lens viewing the subject is also the taking lens. The Reflex S is able to accommodate lenses from 28 to 135mm because you always get what you see.

There will be an entire gamut of accessories for all the basic shots in addition to photo-microscopic and close-up equipment.

Automation Photography:

The Kodak Automatic 35 reaches the ultimate heights of automation photography because push-button activity is eliminated entirely as there are no reference needles to line up. With it, you need only point, sight, and shoot the picture. The exposure setting has been

The Kodak Automatic 35 ushers in the "Age of Automation Photography."

made for you with an ingenious system deserving world-wide recognition because of its simplicity. Here is how it works:

The film speed and the shutter speed are set at the start of the shooting. The automation activity is performed entirely by the built-in exposure meter of the Kodak Automatic 35. The needle of the meter moves in a straight line rather than in the conventional curve that we usually see on a meter dial. The straight line motion is utilized mechanically when it moves farther in or farther out of its groove, depending on the amount of light present. The extent to which the needle moves the groove controls the exposure opening. When you press the release, it strikes against the needle of the exposure meter which limits the opening that it can form. The continuing pressure of your finger on the release finally activates the shutter. There are conditions when the light level is low. Built in safeguards tell you that an exposure cannot be made so the exposure controls are changed to a manual setting.

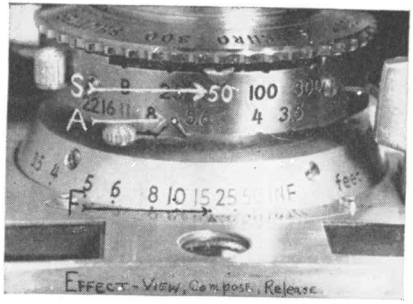
Human beings still are needed.

Despite all the push-button and automation advancements there are many occasions when you must superimpose your judgment over the reading suggested by the meter. This must be so because an ex-

Retina Reflex S Camera—50mm *f*/2.8 Retina Xenar lens.

posure meter basically only measures light. The dials which take the meter reading and translate it into a usable shutter speed to *f*/opening combination do so mechanically. Both the meter and the dial cannot think for you, cannot judge contrasting subject or light conditions for you. As an example, some judgment is required when you are shooting a picture from a darkened room or area into a very bright spot like a sunlit street. It must be used too, when shooting from a brightly lighted street into a dark room or alley. In the first instance, the darker area is so large that the indicated exposure would cause a serious overexposure of the bright area. Conversely, the exposure reading from the bright area into the dark area would cause the exposure reading to be so high that the shadows would be underexposed. In these instances, you must assume your prerogative of using your own judgment. For the first condition, shorten the exposure by one stop, so that the highlights will not be "burnt out," while in the second case a longer exposure will have to be given by one stop, so that some shadow detail will be recorded. It is true that this "thinking" takes judgment and is time-consuming. However, if you want pictures that have quality instead of just quantity, take the trouble for this extra step. Keep in mind that if a picture is worth taking, it is worth taking correctly.

DR. TYDINGS' COLOR OUTDOOR SAFE-SET FORMULA



1. Film: Color daylight; Type A or Kodacolor A with No.85B; Ansco Color Indoor with Conv. No.11.
2. Light: Clear day; not harsh.
3. For scenics: Set focus at 18 feet; keep subject at least 10 feet away.
4. For portraits, etc.

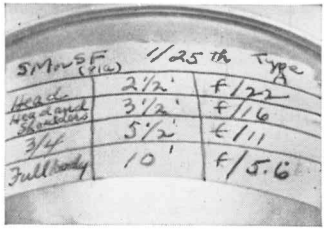
	Lens • 2″ Focal Length		*Signet 44mm Lens*	
	Field Size in Inches Vertical	Approx. Distance	Field Size in Inches	Approx. Distance
Child Head			21x14	2 Feet
Head	22x15	2.5 feet (.75M)	24x18	2.5 Feet
Head & shoulders	32x21	3.5 feet (.96M)	44x30	4 Feet
Three-quarters	45x30	5.5 feet (1.7M)	60x40	6 Feet
	63x41	7 feet (2.13M)		
Full body	90x60	10 feet (3.05M)	82x55	8 Feet
Horizontal-Full body	126x82	14 feet (4M)	113x75	11 Feet
	144x96	16 feet (4.6M)	105x110	16 Feet
For children: Use all settings for the previous size e.g. a child's full body, vertical equals an adult's three-quarter body size.				

A. Choose the subject distance from the chart.
B. Pre-set your rangefinder for your subject distance.
C. Look through the rangefinder or guess your distance, etc., then move back and forth until your image is complete.
D. View and compose your subject.
E. Gently squeeze the release at the peak-of-the-picture.
F. Wind for the next exposure.

FLOODLAMP GUIDE—LAMP BESIDE THE CAMERA

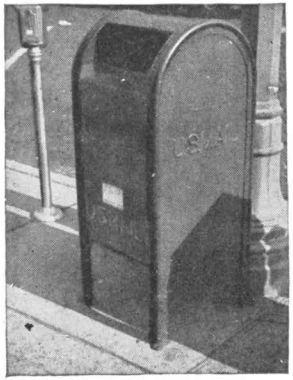
Lamp: Floodlamp 1 in suitable reflector or one RFL2
Film: Indoor Color, Type A

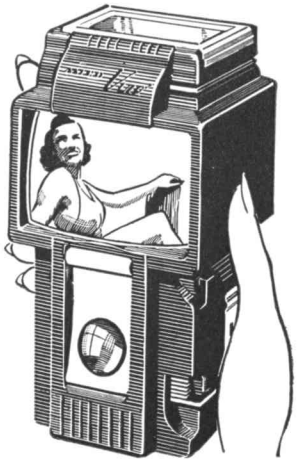
Shutter Speed:	*Opening*	*Lamp-to-Subject Distance*
1/25	f/2.8	4.6 feet
	f/3.5	3.7
	f/4	3.25
	f/5.6	2.3
1/5	f/2.8	10 feet
	f/3.5	8
	f/4	7
	f/5.6	5
	f/8	3.5

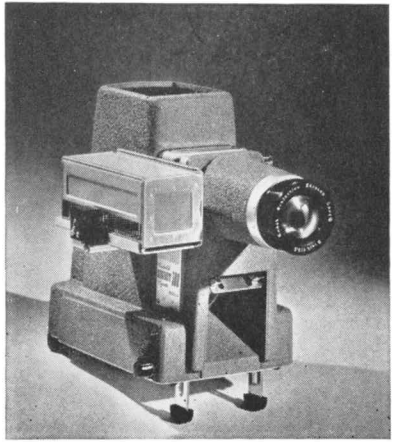


Back of flash reflector

Check your name, address and postage before mailing. The returned slides may be enjoyed by viewing, projection or enlargement.



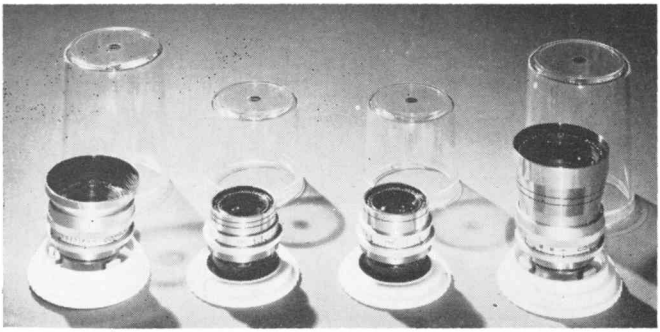




The manufacturer was aware that meter settings would have to be altered. He made provisions for a manual control set in case you did wish to use your judgment. As the meter works extremely well in 85% of the average conditions that you meet, shoot a few shots like the conditions mentioned above. Shoot one exactly as the meter reads, then shoot another with the compensation suggested. This is the only way to learn when your experience must supersede your meter reading.

Both new or old Kodak cameras (see Chapter 26) take excellent pictures which are sharp and well exposed. The new cameras, as stated, do so more easily than the old ones, only because of the latest electric-eye technical advances. So, whichever Kodak camera is used—enjoy using it!

Retina IIIS Camera—50 mm f/2.8 Retina Xenar lens.



THE RETINA LENS BANK

Left to right: (1) 28mm f/4 Retina Curtagon extreme wide-angle lens; (2) 35mm f/2.8 Retina Curtagon; (3) 85 mm f/4 Retina Tele-Arton; (4) 135mm f/4 Retina Tele-Xenar.

CHAPTER 2 / S—SHUTTER SPEED

The shutter of your camera may be compared to a water faucet. When the faucet is opened, water will flow through. Similarly, when the shutter opens, light can enter your lens. If the shutter remains open a long time, more light will naturally enter the lens than if the shutter remains open for only a short time. When the volume of light intensity is very low, a shutter may have to remain open for minutes or even days at a time (time exposure). Sports or action pictures, on the other hand, will require the fastest speed that your camera may have. A simple rule for the beginner to remember is that still (inanimate) subjects can be taken with a slow shutter speed, while living subjects can be taken with the fastest speed that the shutter may have.

A little later, you will find that a slower speed permits a narrower iris opening which gains a greater depth of sharpness in your picture. In choosing a correct shutter speed, you will often have to compromise between a fast speed and little depth in your picture, or a slow speed and a greater depth of sharpness. So, while presetting will ensure pictures, judgment and compromise will always be of value to get specialized effects such as a sharp foreground against an unsharp background—a portrait, let's say, against an unsightly background that would detract attention from your subject.

Speed Markings

The shutter speeds of your Kodak camera, depending on the model, generally are TB 1, 1/2, 1/5, 1/10, 1/25, 1/50, 1/100, 1/150, 1/200, 1/300, 1/500 second. The new Retina's speeds are marked in a linear pattern so that each new marking is double or half the preceding index mark: B, 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250 and 1/500. For simplicity of marking, the speed indicator dial shows only the last half of the number. For example, when 200 shows on the scale, 1/200 is meant.

A large range of speeds, while important for specialized work, is not necessary for the beginner. A survey of most salon prize winners shows that their shutter speed has been set at 1/100 second. Because of this fact, the beginner should see that even his present camera will generally suffice for and produce superior pictures.

LVS—Light Value Scale

The newer Retina cameras have an extra scale engraved on the shutter setting dial to simplify setting the iris-shutter speed ratios

for an exposure should you wish to change the shutter speed and/or iris opening. In constant bright sunlight, for example, many different iris-shutter speed combinations are possible: f/8, at 1/60, f/11 at 1/30, f/16 at 1/15, and f/22 at 1/8 will produce identical exposures. The older shutters were not uniformly marked, in that the 1/10 second setting was followed by the 1/25. The newer Retinas have speed settings which exactly double or halve each other, so that a direct relationship exists between 1/15 with f/16 and 1/30 with f/11.

The light value scale tends to minimize simple arithmetical errors and has been an aid for more accurate exposures.

The Light Value Number

The Intensity of Light is given a Light Value Number in the extra scale that we mentioned. This one number can free the photographer from worrying about the relationship of the various f/or shutter speed combinations, because as long as his indicator shows that Light Value Number, he will know that his exposure setting is correct. The newer meters are calibrated to produce a Light Value Number directly so that you may be pre-set at your favorite shutter speed and be certain the f/value is correct by merely adjusting to the necessary Light Value Number.

Light Value Numbers and scales still are only guides to the final exposure setting because: slower speeds or wider openings may be needed for darker portions of a picture, while a very bright subject may require a faster speed or a narrower opening. The light value scale thus simplifies the mechanical making of an exposure setting by its use of a single number. It should, however, only be taken as a guide, rather than the final authority on what the exposure setting must be.

Pre-set Shutter Speeds

To simplify shooting technique, you can pre-set your shutter speed at 1/100 second and compensate for any brightness changes by varying the iris opening. If, for example, your subject is average in tone, your iris can be set on a sunny day at f/12, then changed on a bright day to f/9, etc. All other factors, with the exception of the iris opening, remain the same throughout.

Hand-held or Tripod

A tripod-taken picture will usually be sharper than a hand-held shot because the chances of vibration are minimized. Yet, if you have to hop around the place in order to get pictures, a tripod can be a very great hindrance. When the decision is yours to make, use a tripod for shutter speeds slower than 1/50. Hold the camera if the shutter setting is 1/50 or faster. In every case, the camera vibration should be minimized, because when the finished pictures have been magnified by enlarging, projection, or viewing through a hand magnifier, any blurry quality will become as obvious as a sore thumb. The possibility of blurring with a hand-held camera even at speeds of 1/50 or faster can be reduced if you brace yourself in this fashion as you take your pictures: Place your feet so that your toes are approximately 4 inches apart, your heels about 6 inches; hold your camera firmly so that it rests within the palm of your hand or with the thumb underneath the base; take a deep breath, exhale, and shortly after the exhalation (you are at your steadiest then) release the shutter by gently squeezing the button. This method will still yield good pictures even at 1/10 second. A popular feature of the Kodak miniatures is their portability; use a tripod only when you must.

SHUTTER SPEEDS FOR MOVING SUBJECTS

Line of Motion

Subject at 25 feet	↑↓	↘	⇆
Walking at 5 miles per hour	1/25	1/50	1/100
Children playing	1/50	1/100	1/150
Street activity	1/50	1/100	1/150
Swimmers, skaters	1/50	1/100	1/150
Vehicles at 20 m.p.h.	1/100	1/200	1/300
Football, running	1/100	1/200	1/300
Vehicles at 40 m.p.h.	1/200	1/400	1/600
Tennis	1/300	1/600	1/900
Horse race	1/500	1/1000	1/1500
Airplanes	1/500	1/1000	1/1500

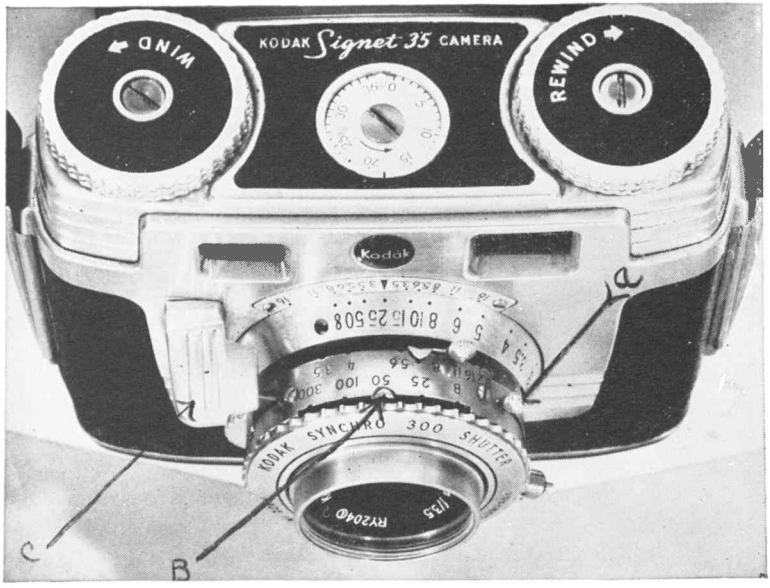
N.B. *When your subject is at 50 ft., multiply all speeds by* 2 (1/100 x 2 = 1/50).

For 100 *ft. subject distances, multiply all speeds by* 4 (1/100 x 4 = 1/25).

Releasing the Shutter

A new camera is very much like a new automobile. You must use it a while to discover its individual characteristics. For this reason it is wise to practice releasing the shutter, because some release buttons depress considerably before they actuate the shutter itself. The best place to practice is in front of a large mirror. Stand fairly close, look through the viewfinder, and watch yourself as you release the shutter. Any camera movement that you notice would have resulted in a blurred picture had film been in the camera.

You are told to practice because action pictures, baby portraits, etc., require split-second exposure pressure at the very peak of action. The shutter must be released immediately, else you can lose forever in that split-second lag the priceless once-in-a-lifetime expression or never-to-be-repeated action. Practice releasing the shutter a number of times, because regardless of how steady you may think



A. Shutter cocking lever B. Speed selector C. Release*

you are, you will always tend to push the camera slightly in the direction of the release. If you do learn to release your shutter without vibration, your pictures, even at 1/10 second, will enlarge cleanly and not show any camera movement.

Exception: There is only one time when camera movement is desirable. The camera should be moved when you are unable to stop the subject as it moves across your field of view. The rapid subject movement can only be caught by moving your camera with your subject. This technique is called panning.

Panning

Panning means swinging or moving the camera in line with the subject's motion. This is done by swinging your camera in an arc so that the subject, as it moves past you, is always within the borders of your viewfinder at the point of best composition. When you snap your shutter under these conditions, the object will be sharp while the background can be blurred if the shutter speed was very slow. If the shutter speed is very fast, the background may not show blurring, but it will generally be out of focus because fast shutter speeds are usually associated with wide lens openings.

As a practical project, stand at a corner and take a shot of an automobile in motion with a speed of 1/500 second, and then take another at 1/25 second. You will then see for yourself what happens under these conditions.

Cable Release

Adjacent to the shutter release, or in combination with it, is a socket or a threading to take a cable device which will release your shutter from a distance. Your camera dealer has a booklet to tell him the correct cable thread which will fit your specific model. *Caution:* Use only the proper cable release. If the wrong tip is used, there is a possibility of the plunger injuring the shutter mechanism.

A cable release is used to avoid camera vibration in taking the picture. The cable release may be used at great distances when the photographer may want to have the subject lose his self-consciousness while posing. There is no apparent limit to the length of a cable release, because certain air pressure types have been made as long as 20 and 30 feet. For more practical purposes, the Kodak TBI metal cable release No. 2 is particularly recommended because it can be additionally used with cameras that have "B" but no "T"

setting. It serves for "T-Time," "B-Bulb," or "I-Instantaneous" exposures.

B-Bulb Setting

The "B" is generally used with exposures from 2 to 5 seconds. The shutter remains open only as long as there is pressure on the release. The cable release is preferred to the release on the shutter because the distance of the cable's plunger from the camera itself minimizes the shutter releasing vibration.

T-Timing Setting

When exposures longer than 5 seconds are to be made, then the "T" setting is used. The more advanced cameras have this setting and the shutter must be tripped twice—once to open and the second time to close the shutter blades. The less expensive cameras which do no have a "T" setting can achieve this same result with the Kodak TBI metal cable release No. 2. The shutter is set at "B" and the plunger is locked as the shutter is opened with the lock screw on the cable release. It will stay locked until you unscrew the set pin holding the plunger.

Delayed Action—Self Timer

How often have you taken pictures of yourself? How often have you been photographed with your family? The average photographer probably has very few pictures of himself because he is always taking rather than being taken. A delayed-action mechanism, also called a self-timer, is built into some cameras and can be added to others. The Kodak self-timer was designed for this purpose. With it, every picture can become an entire family picture because its 10- to 15-second delay gives you sufficient time to "run" into the picture before the shutter is automatically released by it.

Self-Timed Flash Pictures

You can take flash pictures of yourself by posing at a set flash-to-subject distance, which can be based on the Safe-Set method chart, or by posing at any point in a scenic picture. The self-timer does the rest. Your presence in a landscape often can mean the difference between success or failure because a human figure will often add a warmth and interest that will bring life to a picture instead of a stony objectiveness.

Opening a faucet allows water to flow through it for the length of time that the faucet remains open. However, an important item is the width of the faucet opening. If the faucet diameter is narrow, a small amount of water can come through. If the faucet diameter is large, then a greater amount of water will pour through for a stated interval of time. The relationship of the diameter of the faucet to the length of time that it remains open is similar to the relationship of the lens opening to the shutter speed. The shutter speed, in turn, determines the length of time that the lens will continue to remain open. The diameter of a faucet is measured in inches. Photographically, the lens opening diameter must be related to the focal length (lens-to-film distance) at which it forms an infinity image, and this ratio is usually shown as an f/number.

The f/number is the relationship of the size of the lens opening to the length or distance that the light rays must travel before they form a focused, sharp image on the film. A small number indicates a wide opening, whereas a high number indicates a narrow opening. The wider the opening the greater the amount of light that is admitted at a given interval of time. The narrower the opening, the smaller the quantity of light that enters the camera in the same time interval. For equal exposures you can have a large opening and a short shutter speed, or a narrow opening with a long exposure. There are different advantages to be derived from either choice. A wide opening will permit a short exposure such as is necessary for action pictures. A narrow opening will give increased sharpness over a larger area of the picture. When a sharp image is desirable but not always possible, you compromise by getting what you can with at least your main subject in sharp detail. Lenses narrow generally at full stop intervals to f/22. If intermediate settings are desired, the chart is useful in figuring out what compensation must be made for the difference in time when you make an opening larger for a shorter shutter speed or narrow your opening so as to require a longer exposure for an equivalent density of exposure.

The iris diaphragm of the lens regulates the size of the opening which admits light to the camera. The diaphragm is in many ways similar to the iris of the eye. Look into a mirror while bringing a light close to your eyes. As the light is brought closer, you will see that the iris opening narrows; as the light is moved away, the iris widens. You duplicate this narrowing and widening in the camera

by moving the iris opening indicator from the lower to the higher numbers. Look through the back of your camera and you will see the similarity between the iris of your lens and the iris of your eye.

Remember that the narrower the opening of your lens, the greater will be the depth of field. Therefore, narrow stops give great depth and wide stops yield very shallow areas of sharpness.

It is possible to pre-set and keep your iris opening constant by varying the shutter speed. This may become necessary if a certain depth of field is required. So by changing the shutter speed only, your depth of field is maintained and the speed varied to compensate

Full-stop marking	Relative light increase, if only the iris is widened	
f/1	1	These are full stop openings with a 100% difference in light transmission between two adjoining stops. If the indicator is moved approximately half way between the two markings, the iris is opened ½ stop and the difference in light transmission is increased 50%. Half way between f/5.6 and f/8 produces f/6.3, between f/8 and f/11 is f/9.
f/1.4	2	
f/2	4	
f/2.3	8	
f/4	16	
f/5.6	32	
f/8	64	
f/11	128	
f/16	256	

Half-stop openings		
f/3.5	1	These specific numbers produce a difference in light transmission of 50% from one mark to another.
f/4	1½	
f/4.5	2	
f/5.6	3	
f/6.3	4½	
f/8	6	
f/9	9	
f/11	12	
f/12.5	18	
f/16	24	
f/18	36	
f/22	48	

N.B. *Everything being equal, if the shutter speed is changed from* 1/100 *to* 1/200, *the iris must be widened one stop.*

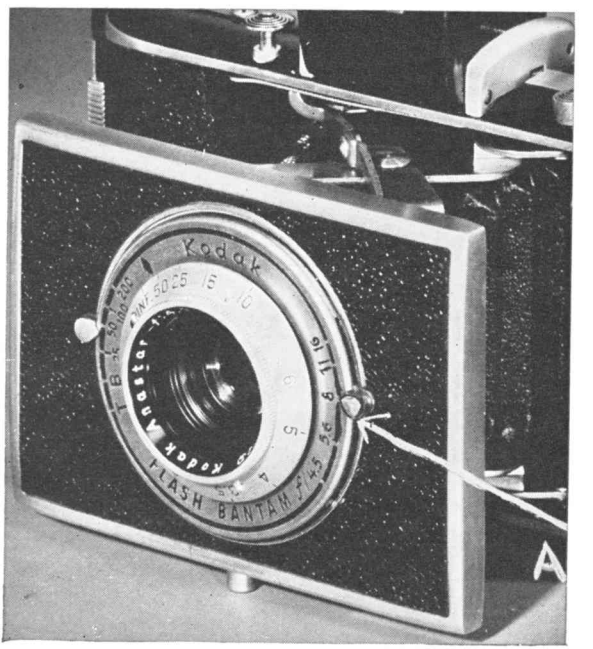
If the shutter speed is changed from 1/100 *to* 1/50, *the iris is narrowed one stop.*

If the shutter speed is changed from 1/100 *to* 1/75, *the shutter is narrowed by* ½ *stop.*

If the shutter is narrowed from f/8 *to* f/16, *the shutter speed is lengthened four times so that* 1/100 *will be re-set to* 1/25.

for any changing light. As an example, if your subject is average and the iris is set for f/12, you use 1/100 second for a sunny day; 1/50 for a bright day, etc.

An inherent quality of a 2-inch lens of short focal length is its remarkable depth of field. A 2-inch lens at f/4 has the same depth of field as a 4-inch lens at f/8 or an 8-inch lens at f/16. In getting an equal depth of field for a given amount of light, this knowledge is very valuable. With a 2-inch lens set at f/4, you will be able to get a picture. At f/16 with a lens of longer focal length for the same depth of field, your picture will be hopelessly underexposed. In many cases, the depth of field possible with a lens of short focal length and a wide opening are the all-important differences which make a picture possible. With a fast shutter speed, your lens opening will have to be as wide as possible to admit more light (f/3.5 or even f/2, if available). When your shutter speeds are slow, you may narrow your opening so as to get an increase of your depth of field. So far you have learned to set your shutter and control the variable opening (iris) on your lens.



A. Aperture Selector*

CHAPTER 4 / F—FOCUSING

Focusing is the process of ensuring the maximum amount of image sharpness on the film. Correct subject-to-camera distance can be determined by simply guessing, or by using a pre-measured string or tape measure, an auxiliary rangefinder, or a coupled rangefinder. In its essential form, you can focus on a subject only when it is two-dimensional. However, when your subject has a measure of depth, a group or garden 20 or 30 feet deep, then you begin to wonder just where to place your point of sharpest focus. For these reasons, focusing has been divided into three categories: hyperfocal distance, depth-of-sharpness, and critical sharpness. One of these types is certain to answer your sharpness problems relative to the point of best focus.

Hyperfocal Distance Settings

When you are photographing a rapidly moving object which is difficult to bring into focus quickly, you will have your first encounter with the problem of sharpness in depth. A rapidly moving subject does not allow you any "real" time to keep it in focus. Your focusing motion, if the shutter speed will be relatively slow, can jostle the camera sufficiently to produce a blurred effect. Rangefinder focusing can be avoided entirely by the use of the hyperfocal distance scale. This seems odd to a man spending a great deal of money for an expensive camera possessing a coupled rangefinder, yet the correct application of optical laws avoids the need of a rangefinder when this focusing method is in use. There are plenty of real uses for your rangefinder when flash pictures, depth of sharpness problems, or a critically sharp focus must be had.

Hyperfocal Distance Scale

When your lens focus is set at infinity and the opening is f/4, the nearest point that will be acceptably sharp will be 42 feet. At f/8, the near sharpness point will be 21 feet. At f/16, the nearest point of sharpness will be 10½ feet. A curious relationship can be observed if you move the point of focus from infinity to either 42 feet at 3/4, from infinity to 21 feet at f/8, or from infinity to 10½ feet at f/16. You will discover, when you take pictures, that at f/4 everything will be in focus from 21 feet (half of 42 feet) back to infinity, from 10½ feet (half of 21 feet) to infinity at f/8, and from approximately 5 feet to infinity at f/16. The list of all the near focusing points at infinity in relationship to their matching f/open-

HYPERFOCAL DISTANCE TABLE

SIGNET 44mm LENS			2" (50mm) LENS		
Opening	*Distance*	*Over-all Focus*	*Opening*	*Distance*	*Over-all Focus*
f/ 3.5	50′	25′ - to Infinity	f/ 3.5	52′	26′ to ∞
f/ 4	38′	19′ - ∞	f/ 4	42′	21′ – ∞
f/ 8	19′	9 1/2′ – ∞	f/ 8	21′	10 1/2′ – ∞
f/ 16	9 1/2′	4 3/4′ – ∞	f/ 16	10 1/2′	5 1/4′ – ∞
f/ 22	7′	3 1/2′ – ∞	f/ 22	7 3/4′	4′ – ∞

ings produces a scale known as the Hyperfocal Distance Scale. This is most useful out-of-doors because light conditions permit narrow openings that are usually needed to make the hyperfocal setting possible. If f/16 were used and the focus set at 10½ feet, then everything would be sharp from 5½ feet to infinity. No rangefinder should be used, because a rangefinder will show a point of sharpness at a single distance, whereas the hyperfocal distance setting creates an area of sharpness-in-depth.

The viewfinder of your camera shows everything sharp and can give you some idea of what your final picture will be.

In practice, knowing that action will occur between 10 to 40 feet gives you sufficient information to select an opening of f/8 and a focus setting of approximately 21 feet. Now, you are ready to take anything within these distances without checking focus because *you know* that they will be sharp.

Rangefinder Coupled Cameras: Disregard your central rangefinder image when using hyperfocal distance settings; they will make you think that your subject is out-of-focus, whereas you now know that your hyperfocal distance setting makes them sharp throughout that area.

Depth of Sharpness Technique

Depth of Sharpness Table—The depth of sharpness in any limited area can be read from a table, known as a depth of field table, or from the depth of field (sharpness) scale around the perimeter of your lens mount. The depth of sharpness scale is particularly valuable for pictures where a definite amount of front to back sharpness is needed, e.g., in a room. As an example, if everything must be sharp from 3 to 15 feet, consult the depth of field table engraved on the lens and find out what f/opening must be used to encompass the depth. The f/opening on either side of the focusing distance index point shows this.

DEPTH OF FIELD TABLE FOR 44MM KODAK EKTAR f/3.5 LENS

IF FOCUSING LEVER IS SET AT DISTANCE SHOWN IN FIRST COLUMN THEN ALL OBJECTS WILL BE IN SHARP FOCUS BETWEEN THE DISTANCES INDICATED (IN FEET AND INCHES) IN THE COLUMN BELOW THE LENS APERTURE SETTING ('F' STOP)

Focus Lever Set at	F 3.2		F 4		F 5.6		F 8		F 11		F 16		F 22	
	From	To	From	To	From	To	From	To	From	To	From	To	From	To
2	1 11	2 1	1 10	2 2	1 10	2 2	1 9	2 3	1 9	2 5	1 7	2 7	1 6	3 0
2.5	2 4	2 8	2 4	2 8	2 3	2 9	2 2	2 11	2 1	3 2	1 11	3 7	1 9	4 4
3	2 10	3 3	2 9	3 4	2 8	3 5	2 6	3 8	2 5	4 0	2 2	4 9	2 0	6 2
4	3 8	4 5	3 7	4 7	3 5	4 10	3 3	5 4	2 11	6 0	2 8	7 10	2 5	13 2
5	4 5	5 9	4 4	5 11	4 1	6 5	3 10	7 3	3 6	8 10	3 1	13 2	2 9	40 7
6	5 3	7 0	5 1	7 5	4 10	8 1	4 4	9 7	4 0	12 4	3 5	23 6	3 0	INF
8	6 8	10 0	6 5	10 8	5 9	12 4	5 4	16 0	4 9	25 9	4 0	INF	3 5	INF
12	9 3	17 3	8 9	19 4	8 4	25 6	6 10	49 3	5 10	INF	4 9	INF	3 11	INF
24	14 11	61 4	13 8	100 4	11 8	INF	9 6	INF	7 9	INF	5 11	INF	4 8	INF
INF	39 2	INF	31 4	INF	22 5	INF	15 10	INF	11 6	INF	8 0	INF	5 10	INF

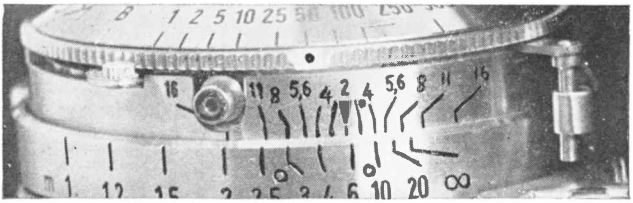
TABLE BASED ON A CIRCLE OF CONFUSION OF .002"

50 MM LENS DEPTH OF FIELD TABLE

By "depth of field" is meant the range of sharpness in front of and behind the subject focused on, within which details in the picture will be sharp and distinct.

Distance Focused Upon	*f*/2	*f*/4	*f*/8	*f*/11	*f*/16
	Ft. *Ft.*	*Ft.* *Ft.*	*Ft.* *Ft.*	*Ft.* *Ft.*	*Ft* *Ft.*
INF.	65 to inf.	32 to inf.	16 to inf.	12 to inf.	8 to inf.
50 ft.	28 to inf.	19 to inf.	12½ to inf.	9⅔ to inf.	7 to inf.
25 "	18 to 40	14 to 106	10 to inf.	8 to inf	6 to inf.
15 "	12 to 19	10⅓ to 27	8 to inf.	6⅔ to inf	5⅓ to inf.
10 "	8⅔ to 12	7⅔ to 14½	6¼ to 25	5½ to 62	4½ to inf.
8 "	7⅙ to 9	6½ to 10⅔	5⅓ to 15⅔	4¾ to 24	4 to inf.
6 "	5½ to 6¾	5 to 7½	4¼ to 9⅔	4 to 12½	3½ to 24
5 "	4⅔ to 5⅙	4⅓ to 6	3⅚ to 7⅓	3½ to 8⅚	3⅙ to 13½
4 "	3⅔ to 4¼	3½ to 4½	3¼ to 5¼	3 to 6⅙	2⅔ to 8⅙
3.5 "	3⅓ to 3⅔	3⅙ to 4	2ft. 11 in. to 4½	2¾ to 5	2½ to 6⅓
3 "	2 ft. 10½ in. to 3⅙	2¾ to 3⅓	2ft. 6½ in. to 3¾	2 ft. 5 in. to 4	2¼ to 5

The depth of field is not given for *f*/2.8 or *f*/5.6. The depth for these two openings can be estimated by comparison.
"Inf." is the abbreviation for Infinity—meaning an unlimited distance from the lens.



Built-in depth-of-field scale. Read similar f/opening on either side of arrowhead. In the illustration everything is in focus at f/4 from 4. to 10 meters.*

When the exposure is to be made, you must find what shutter speed is needed for f/16 because you know everything but one factor—the time. From the depth of field scale, you know the focusing distance and the required opening. The time for this opening is found either with an exposure meter if flood lamps are used, or by building up sufficient numbers of flash lamps or speedlights to produce enough light for an f/16 opening.

The Safe-Set Method Again

Whatever has been said so far is in line with our attempt to standardize procedure by using as many fixed factors as possible, and then having some suitable means or guidance for finding the only remaining variable.

Pre-Set Focus for Action

Action pictures within limited areas can be divided into two broad groups of 30-foot settings and 10-foot settings:

30 feet—f/8 for subject sharpness from 15 feet to infinity.

10 feet—f/8 for subject sharpness from 7 to 15 feet.

Alter your shutter speed as light conditions change to maintain these factors.

Critical (Razor-edge) Focusing

A rangefinder is a simple triangulating device which estimates distances by forming a geometric pattern to your subject from two separated points of view. When these slightly different images are brought together by a movable mirror or some other image-adjusting device, the extent of the movement can be measured and calibrated so that the distance can be either read as a number or the mechanism can be coupled with the lens as it focuses, so that the rangefinder and lens are completely coordinated.

The less expensive Kodak cameras do not have a built-in rangefinder. You can buy a Kodak auxiliary rangefinder and mount it on the camera. Then it can be used for critical focusing or for flash distance measurement with a great deal of accuracy in this way:

1. Select the body size and distance needed for it.
2. Set the focusing scale of the detachable rangefinder for this distance. Then set the focusing scale of the lens for the same distance.

Out-of-focus with an overlapping image*

In-focus with Signet's combined rangefinder and viewfinder*

3. Ready your shutter and iris settings so that no time will be lost.
4. Your detachable rangefinder can be held next to the camera if no auxiliary shoe is available, or it can be fitted into the auxiliary slot made for such purpose.
5. Look through the window of the rangefinder and walk forward or back from your subject until the overlapped images are corrected to show the image is in focus.
6. As soon as the subject is sharp, shift your eye to the camera viewfinder. When the subject reaches the peak of action or expression that you think ideal, release the shutter. With this method, your camera without a rangefinder will be able to take pictures as sharp as those with the rangefinder built in it.

This technique is invaluable for accurate flash pictures, because lens-to-subject distances must be accurately measured for correct exposures.

Pre-Set Focus

The following conditions call for camera pre-setting wherever possible:

1. Flash lamp, flash tube, and flood light exposures must be pre-set because accurate exposures can be made only when the lamp-to-subject distance is exact.

2. Rapidly moving subjects must be pre-set because fast focusing is, at best, difficult. Pre-set for an area where the action will occur, and wait until the subject moves into the pre-set position.

3. Pre-set the camera for a picture requiring a fixed ratio of reduction or enlargement, as routinely requested for medical photographs. Once the image ratio has been fixed, move the entire camera back and forth for correct focus, rather than by changing the focusing scale.

Pre-setting Has Its Limitations

Do not pre-set:

1. If your subject moves so slowly that follow-focus is possible. Focus continually so that a sharp picture of the subject may be taken wherever it may be throughout its movement.

2. With the widest iris openings, continuous sharp focusing is essential because of the shallow depth of field.

Sharp Pictures

It is axiomatic to take the sharpest pictures possible. Sharpness effect may be softened with fusion streams or lenses when this effect is wanted in portraiture. A sharp image, as you realize, may be softened at any time. However, it is impossible to take an out-of-focus image and ever make it critically sharp.

To Recapitulate:

The Hyperfocal Distance Settings are used for subjects that have large areas of depth.

The Depth of Field Scale is used for subjects having depth in moderate dimensions.

Rangefinder precision focusing is necessary for extremely close subjects or when the front-to-back subject measurement is small or shallow.

Whatever focusing system is used, secure the sharpest image possible.

FILM FOR BLACK-AND-WHITE

Silver salts have the property of reacting to light by becoming darker. This, in essence, is the basis for preparing an emulsion which will hold these silver salts, expose them to light in your camera, and then develop the result so that the image is fixed and will not fade. Black and white film produces an image with scale ranges from the clarity of the gelatine emulsion to an almost opaque density. Black and white film, unless it is a special positive reversal emulsion, produces a negative which will be dense where the subject is white and clear where the subject is black. The negative is printed on another film or sensitized paper which shows the opposite or positive picture wherein black is black and white shows white.

Three basic film types are manufactured:

Blue Sensitive—The film is only activated by blue light. It is color blind to other true colors in that they will reproduce as dark masses. Its sensitivity permits its use in a dark room where only a red light is glowing. Blue sensitive emulsions are used for positive film or for copying where correct color rendition is not a factor.

Infra-Red Sensitive—The film will record infra-red rays that are invisible to the eye.

Panchromatic —Type B—This emulsion approximates the color sensitivity of the eye in terms of black, white, and gray tones. A blue color, for example, will photograph light, as the eye sees it. It is the only emulsion used for conventional photography. Blue sensitive film serves for copying and printing negatives. The infra-red emulsion is used for pictorial and medical purposes where only an infra-red emulsion can record dramatic contrasts in pictorial landscapes or photograph, for example, veins under the skin.

Within the Panchromatic—Type B family, further subdivisions exist, and their choice is determined by the following characteristics:

Speed:

Some emulsions are faster than others. The faster emulsions usually exhibit coarser grain. Speed is measured by an official ASA speed rating; the numerically higher films are faster than those with lower numbers. For example, a film rated ASA 100 is twice as fast as one rated ASA 50, etc.

Contrast:

High speed emulsions usually have less contrast and usually cannot be developed to a very high contrast without causing fog or grain. Fog spoils the clarity of the film and grain makes the subject look as though it had been sprinkled with pepper and salt. Slower films, with an ASA of 25 or less, have more contrast and less grain.

Density:

Higher speed films usually require longer developing times to achieve the same density secured by films of slower speed.

Grain:

Small grain size is desirable because almost every negative is enlarged. The grain size of faster emulsions can be minimized with ultra-fine-grain developers. However, these usually produce a loss of emulsion speed and require an additional increase of at least one-half to one-stop extra exposure.

Extended Development:

Medium speed films "take" extended development very well under existing light (10X) photography. They can be over-developed in fine-grain formulas or even developed in high-energy developers without distorting their grain and emulsion structure to objectionable degrees.

Thin Emulsion Films:

Emulsion chemists reasoned that thick emulsions have a tendency to disperse and diffuse light rays. So they formulated emulsions which are ultra-thin and are then able to produce better resolution and subject contrast. These emulsions, additionally, have no need for fine-grain developers because the solvent-acting fine-grain developers tended to take such a "bite" out of the silver grain that the enlarged results were not sharp. For this reason, the standard D-76, Microphen, Microdol, etc., developers can be used for fine-grain results.

Incidentally, a thin emulsion better shows the high resolving power of the camera lenses than do the thicker emulsions. With such films as Adox 14 and Adox 17, Panatomic-X or Plus-X, you can really appreciate the high resolving power of your fine lenses.

Evaluation:

Select a film that is just fast enough to do the job and with sufficient fineness of grain while retaining a desirable degree of contrast. Standardize with a medium speed ASA 40 to 80 film, because it is fast enough for available light with the higher speed lenses, yet slow enough for the usual subject contrasts and fine-grain quality.

Higher speed films, such as Kodak's Tri-X with an ASA 200, or Dupont SX, ASA 300, should be utilized only when there is no other way of getting the picture.

Quickly learn to use one film, one developer, one flash lamp, one of everything, so that you can standardize your resuls for all-around picture taking. Later, specific problems can be answered with the specialized emulsions available. But, here again, learn to use these special emulsions under standardized conditions so that you will always be assured of uniform results.

What Is Color Film?

Black and white film produces a colorless to gray to black image. Color film, on the other hand, produces true colors as we see them.

Color film actually is three films in one. It consists of three sensitive emulsions, positioned one above the other. You take three pictures at one time. However, each emulsion reacts to only one of the primary colors. When the film is developed, each layer produces the one specific color to which it is sensitized. However, you simultaneously view all three films at one time. The eye combines their individual colors and you see a single picture in true color. Fast or Slow Speed Color Film, e.g., Kodachrome or Anscochrome or Ektachrome

Fast black and white film, you have been told, reacts quicker to light but has more grain and less contrast. Fast color film, similarly, is coarser grained and the color saturation is not yet as complete as with the slower films. For this reason, use Kodachrome whenever lighting conditions permit, and use Anscochrome or Ektachrome for emergency conditions when light levels of illumination are very dim.

A very high percentage, almost 90%, of 35mm. photography is with color. So first load up with a slow speed daylight color film such as Kodachrome, daylight type, K135, and take pictures.

Two Basic Types of Color Film—Outdoor and Artificial Light

No single color film can reproduce both indoor and outdoor color with true fidelity. If indoor film is used with outdoor light, the picture will not be true; and if outdoor film is used with indoor lighting, it too will not reproduce correctly. Each color film is balanced to its own particular color. The color is measured as degrees Kelvin or K° (in honor of Lord Kelvin who first described this standardization). The indoor film comes in two types: Type A, balanced to 3400° K and Type F, balance to 3800° K.

The degrees Kelvin then represent a scientific light temperature reference point for measuring and describing and comparing one light source with the color quality of a heated black body (usually iron). As iron is slowly heated, it turns different colors from a deep red, to cherry red, to orange, to yellow, to blue, and to blue-white. The hotter the iron, the whiter it appears. The temperature levels at which these changes occur are the comparison points for the color

of our light. Sunlight has a comparative value of 5900° K; artificial light flash lamps, such as # 5 or # 25 clear lamps, F 3800° K, should be taken with Type F color film or SM or SF lamps for Type A because the color balance of these flash lamps specifically matches the color balance of the matching film. In these cases, no filter is needed.

Note: Whenever possible, match your color film and light source to avoid the use of filters.

Color Transparency, Negative and Positive—Color Reflection Positive

(1) Positive Transparency. If a transparency (a picture viewed by holding it so that you are looking through it as a slide) is wanted, then two types are available which cannot be interchanged unless special light conversion filters are placed over the lens of the camera or over the light source. The transparency type films are known as Kodachrome, Ektachrome, Anscochrome, etc.

(2) Color Negative. However, if color prints are wanted from a color negative, then a special universal type Kodacolor CU, that can be used both indoors and outdoors, is available.

(3) The color positive reflection type pictures that have a white base, so that you do not have to hold them up to the light, are known as Kodacolor positives, Printon, etc.

It is best to use outdoor film for outdoor lighting and indoor film when artificial light is used. In line with this thought, speed lights should be used with outdoor film because the color temperature of the speed light approximates the color balance of the outdoor film. Photo floods and SM lamps should be used with Kodachrome, Professional Type A, because their color temperatures are matched and mated. No. 25 and No. 5 flash lamps are used with Kodachrome, Type F, and Ektachrome, Type F, because here again the color temperature of the light source matches the color balance of the film.

Some photographers find it convenient to use the same color film both indoors and outdoors. This is possible if Kodachrome, Professional Type A, is used with an 85 A filter outdoors, or Ektachrome, Type F, and Kodachrome, Type F, are used with an 85 C filter, outdoors.

Eastman Kodak, however, recommends that for better results, any of their films should be used only with the light source for which that film was designed.

CHAPTER 7 / COLOR FILTERS

Color film, too, cannot accommodate itself to differences in light as does the human eye. Color film presents the problem of color balance. Color balance is achieved by matching the color temperature of your light source with the color temperature for which the color film has been adjusted. Three types of color filters have been designed for doing so:

1. *Color conversion filters.* Indoor color film can be successfully used outdoors if a color conversion filter is used which changes the effective color balance of the film so that both will match. Indoor color film, as we have noted, is matched to the same color temperature as Class M flashlamps, a color temperature of 3800° Kelvin. It is converted for outdoor use with a Wratten 85-C filter. While outdoor film can be converted to indoor use, the resulting film speed is cut drastically and it is only suggested for emergencies.

Type F film with an 85-C filter has an outdoor ASA rating of 10. An advantage in converting indoor film to outdoor use is that the 85-C acts as a haze-cutting filter at the same time. Eastman Kodak recommends that outdoor film be used with outdoor light sources and indoor film with Type F flash. However, if you are a one-film man, use Type F film at all times and carry a Wratten 85-C for conversion to outdoor use.

2. *Color balancing filters.* When the temperature of the light source is only a few hundred degrees warmer or colder than what it has originally been balanced for, the color temperature can be changed with such color balancing filters as the Wratten 81 series which raises the effective color temperature, or the Wratten 82 series which lowers the effective color temperature. For example, when Type F film (color temperature 3800° Kelvin) is used with photoflood lamps (3400° Kelvin), then a Wratten 82A filter is used over the lens so that the light source and the color temperature of the film again balance.

3. *Color correction filters.* Many uncontrolled light sources may be deficient in small percentages of magenta, blue, green, yellow, etc. These deficiencies can be corrected with color correction filters made by Eastman and Ansco. They are the only filters that can produce an exact color reproduction of your subject.

All three color filters have filter factors. Remember to use them.

Do not be a filter collector. Use the film that matches your light source so that you don't need to use filters. However, if one

film must serve all indoor and outdoor shooting, then standardize on the indoor type.

Color Information

It is very easy to learn proper landscape color balance by studying Mother Nature. You will always find that the backgrounds of your color slides are blue and that the foregrounds lean toward the reds.

Backgrounds should be blue to appear normal. Blue colors are known as receding colors.

Foregrounds may be red. The warm colors are known as advancing colors. While a sunset is farther away than your mountains, the warm color leaves you with the impression of closeness compared to the nearer (in miles) mountains.

Contrast can be chosen by selecting complementary colors on your color wheels (hue circuit).

Warm tones are colors of red or orange. To further warm a color, add more of a warm color.

Cold tones are colors of blue or green. To further cool a color, add cooler colors.

Direct opposites on a color wheel generally harmonize.

1. Equal subject color areas produce competing areas of attraction.
2. Unequal subject color areas are desirable to provide a center of interest.
3. Outdoors, if your sky value is too high compared to your subject value, then the higher contrast will always draw the center of interest. Wait for a hazy sky to lower the contrast and so shift the attention to your subject.

This is the era of color, but the full potentialities are yet to be realized. The subject is so vast that this text can serve only as an introduction to further study. Practical considerations have been given priority in order to give sufficient information about basic color theory so that you can use this material in everyday picture taking.

Before any house is built, a foundation must be formed. Similarly, the foundation for color must start by breaking down the complex mixtures to the elementary colors in their simplest form. The

building-block colors are known as primary colors. There are only three primary colors, but these may be of two types:

1. If you are adding primary colors to get a white light, Primary Blue plus Green plus Red equals White. When any two primary colors are combined, they form a new complementary color to the third, remaining primary. Complementary: Magenta (Green plus Red), Cyan (Blue plus Green), Yellow, (Green plus Blue).
2. If you are subtracting primary colors from white light to leave a black (absence of light): Magenta plus Cyan plus Yellow equals Black. The complementaries are: Green (Cyan plus Yellow), Orange (Yellow plus Magenta), (Purple Cyan and Magenta).

Colors are identified by:

1. Hue-color: the distinguishing of colors as you see them—red, green, blue, yellow, etc. Using the combined word hue-color will simplify for the beginner what is meant by hue.
2. Value-bright: dark, middle or light, refers to the relative brightness of a color as it is mixed with white (tint) or black (shade).
3. Chroma-gray: strong, moderate, or weak, refers to the relative brilliance of a mixture of a hue-color which is subdued when differing proportions of gray are added.

The combining of the first two words has been purposeful in order to have the beginner associate the two important words and so be able to better understand and describe the balancing of the three different color factors.

Color Harmony

The color harmony that is detailed here is objective, although the pleasing grouping of colors is, in many cases, a purely subjective reaction. Because of this subjective reaction, many great painters died penniless when the world lagged far behind in appreciating their bold new color effects or color harmony.

In using this chart, you will produce classically correct color harmony. While these harmonies are conservative, they will serve as a starting point for more daring attempts.

The most frequent color slide subjects are people. While the color harmony mentioned is for men, women, and children, slight alterations may make them applicable for inanimate subjects. These harmonies are not rigid and inflexible. You still must exercise judgment for the hue, chroma, and value, because of the age, appearance, proportions, and dress of your subject.

Brightness, brilliance, and gaiety are the trade marks of childhood and youth. For this reason, children's clothing ought to be very light, with pastels predominating. Little boys should be clothed in blue, little girls in pink, with very few attention-attracting designs or patterns on the clothes to mar the effect of pure simplicity.

A contrasting accenting effect may be secured for little girls by permitting them to wear a hair ribbon which must blend with the color scheme. In keeping with the spirit of the high-key effect, the tint of the background ought to be light, while the hue-color must be of the proper color contrast.

It is very important that your subject be in front and well separated from your background by a generous distance. If the subject is light in tone and situated too close to the background, the light tone of the clothing or surface will reflect the different hue-color of the background and so degrade its own color. To prove this, take a piece of white satin material and place it next to bright, different hue-colors. You will be surprised to see that the satin reflects a different hue-color whenever it is placed next to a different hue. If the close position of a subject and background is unavoidable, then a polarizing filter must be used to limit the unwanted reflection of the background from your subject and so keep the hue-color purity of the subject and the background distinct from each other.

Color Correction

Since the exposure for color must be correct to within very narrow latitudes, it is natural to find exposure errors cropping up from time to time. If you know beforehand that an exposure error has been made with Anscochrome, then this over- or under-exposure information may be sent with your film so the processor can adjust the first developing time to compensate for the error. With Kodachrome, known exposure error information may be relayed to Eastman for their consideration. However, once your transparency has been developed and returned and you then discover your error, the only means for correction that the amateur may use is through Ad-

dacolor. Addacolor is a method whereby you bind differently colored sheets of colored gelatin directly to your transparency. The choice of Addacolor will correct and control your transparency color so as to make up for certain minor deficiencies of exposure or incorrect light source (K°).

Transparency	Addacolor*
Too Blue	Yellow
Too Green	Red
Too Yellow	Blue
Too Red	Green

Another advantage of Addacolor is that it permits an over-correction towards a warmer or cooler color for individual interpretation. The simplicity of the procedure makes it ideal. This method is a definite aid which will save many priceless transparencies that would otherwise be discarded.

* Addacolor is a product of L. Bertz.

Use of Kodak Filters with Kodak Color Films—June, 1956

For current recommendations, see film instructions

LIGHTING CONDITIONS	Kodachrome and Kodak Ektachrome Films DAYLIGHT TYPE	Kodachrome Professional Film TYPE A	Kodak Ektachrome Film TYPE B	Kodachrome and Kodak Ektachrome Films TYPE F
Daylight. Clear or hazy sun casting sharp or soft shadows.	No filter needed	Daylight Filter for Kodak Type A Color Films (No. 85)	Daylight Filter for Kodak Type B Color Films (No. 85B)	Daylight Filter for Kodak Type F Color Films (No. 85C)
Daylight. Bluish—open shade or overcast. No shadows.	Skylight (No. 1A)	No. 85	No. 85B	No. 85C
Daylight. Distant scenes, mountain and aerial photography.	Skylight (No. 1A)	No. 85	No. 85B	No. 85C
Electronic Flash Tubes (in new portable units)	See Data Sheet	Not recommended	Not recommended	Not recommended
Blue Flash Lamps	No filter needed	Not recommended	Not recommended	Not recommended
Blue Photoflood Lamps	Not recommended	Not recommended	Not recommended	Not recommended
Photoflood Lamps	Photoflood Filter for Kodak Daylight Type Color Films (No. 80B)	No filter needed	Light Balancing No. 81A	Light Balancing No. 82A
3200 K Lamps	No. 80B + No. 82A	No. 82A	No filter needed	Light Balancing No. 82C
Clear Flash Lamps (except SM, SF, and M2)	Not recommended	Light Balancing No. 81C	No. 81C (see film instructions)	No filter needed
SM and SF Flash Lamps	Not recommended	No filter needed	Not recommended	Light Balancing No. 82B
M2 Flash Lamps (new type)	Not recommended	Light Balancing No. 81D	Not recommended	No filter needed

Kodacolor Film is intended for exposure in daylight or with clear flash lamps and does not require the use of filters with these light sources. However, either source should be used alone, not mixed with illumination differing in color quality. Blue flash lamps should not be used as the sole light source, but they are recommended for softening shadows when near-by subjects are photographed in bright sunlight.

Kodak Ektacolor Film, Type B, is balanced for exposure with 3200 K lamps. Filter suggestions for other commonly used light sources are packed with the film. Filter suggestions for Type S (short exposure) film are given in the instructions packed with the film.

KODAK COLOR LIGHT BALANCING FILTERS (courtesy Eastman Kodak Company).

Bluish Filters	Exposure Increase in Stops*	Yellowish Filters	Exposure Increase in Stops*	Yellowish Filters	Exposure Increase in Stops*
No. 82 (CC3)	1/3	No. 81 (CC13)	1/3	No. 81E	2/3
No. 82A (CC4)	1/3	No. 81A (CC14)	1/3	No. 81F	2/3
No. 82B (CC5)	2/3	No. 81B (CC15)	1/3	No. 81G	1
No. 82C (CC6)	2/3	No. 81C	1/3	No. 81H	1
		No. 81D	2/3		

*These values are approximate. For critical work, they should be checked by practical tests, especially if more than one filter is used.

Temperatures (K°) of Common Light Sources.

1800°	Candle flame	3800°	Regular photoflash
2200°	Drying, heat, red ray lamps	4400°	Sun, two hours after sunrise
2400-3100°	Home incandescent light lamps	4500°	Bright-white fluorescents
3200°	Commercial photographic color lamps	4800°	Blue daylight photofloods
3300°	SM-SF flash lamps	5800°	Average noon-day sun
3350°	CP lamps for color photography	6000°	Blue (daylight) photoflash
3400°	Photofloods	6500°	Strobe, electronic flash
3500°	White fluorescents or sun, one hour after sunrise	7000°	Uniform overcast sky
		10,000°	Blue sky
		20,000°	North blue sky

Color Light Balancing and Conversion Filters

Anscochrome Light Balancing Filters (courtesy Ansco Company)

UV-15
1. Haze correction (slight)
2. For photoflood correction with Anscochrome Color, Tungsten Type.

UV-16
1. Haze correction (medium)
2. For clear flash lamp correction with Anscochrome Color, Tungsten Type.
3. In enlarger's optical system, in addition to recommended filters when exposing Anscochrome Color Printon.

UV-17
1. Haze correction (strong)

#10 Conversion For 3200° correction with Anscochrome Color, Daylight type (4x).

#11 Conversion For daylight correction with Anscrochrome Color, Tungsten type (1½x).

#12 Conversion High-Speed strobe correction with Anscochrome Color, Tungsten, type.

CHAPTER 8 / LOADING AND UNLOADING FILM

Loading the camera should be a simple procedure. You can make it so by practicing the steps illustrated in your instruction booklet once or twice before the camera is loaded with film. Before loading, practice the SAFE-SET METHOD of Chapter I. Do so with the camera back off the camera to visualize the changes in shutter speeds. Changes of the iris openings can be seen by looking into the lens itself.

While the camera has been designed for rugged operation, it still is a delicate instrument and should be handled carefully. Load it for the first time over a table to prevent possible damage should it slip from your fingers. Start correctly with this step by step routine: 1. The film speed indicator dial is turned to show what film will be used.

2. The film should be loaded in subdued light. In open sunlight, turn your body away from the light and hold the camera next to your body.

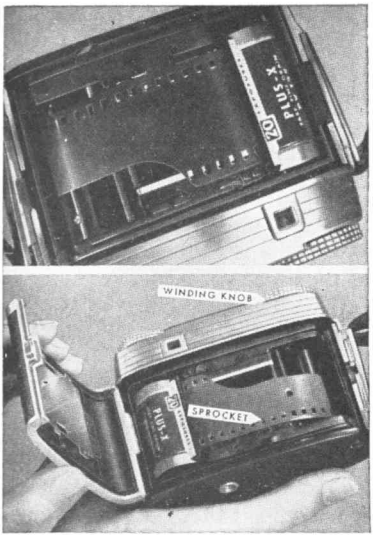
3. The leader must be threaded into the take-up spool and secured. It is advisable to first insert the tip of your leader into the slot of your take-up spool and then pay out film from your cartridge until it is placed in its chamber. This minimizes film handling. When the cartridge is in place, wind the film forward slowly while keeping your finger lightly over the take-up spool.

4. The perforation must engage the sprocket teeth. Doing so automatically aligns the film in relation to the edges of the take-up spool. With the 828 film size, loading is helped if the paper is placed exactly parallel to the inside edges of the take-up spool.

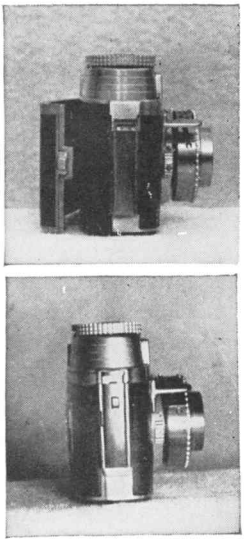
The film should only be handled by the edges. The slightest scratch or pin mark becomes noticeable in an enlargement.

5. The locking catch of your camera back must be fastened securely. This prevents the camera back suddenly flying open at the most inopportune time to spoil all the film which you have exposed with such great pain.

6. Close the back of your 35 mm Kodak miniature and wind off three frames before you take a picture. This is done by winding the film until the exposure counter moves to the next number and stops turning. Repeat this procedure three times. Turn your exposure counter to the number 1. The counters for the Retina, the Pony, and the Signet cameras show the number exposures remaining rather than those already made. In other words, the counter runs from the



Film in position*



Camera back open
Camera closed

high numbers down to the low numbers. With the Retina, when number 1 is reached on the counter, the film cannot be advanced further without resetting the counter. This safety feature prevents the film end being torn from the spool.

With the Bantam paper leader secured, turn the winding knob until it locks. The first frame of film is now in picture-taking position. To advance the film to the next frame, pull down the release button while turning the winding knob a half turn, release the button and continue turning the knob until it locks. A number of exposures may be checked in the window in the camera back.

There is no stop on the 828 camera. Just watch for boxed number 1 in the window. After exposure, no release is needed. Just wind to the next box number in the window.

The folding cameras must have their distance focus set at infinity to be able to recess the lens and close the front cover.

Unloading

With the Bantam models, the film is wound onto the take-up spool. As the 828 film size has a paper backing, you continue to wind the film forward until you hear the free end of the paper flapping in the take-up chamber. Open the back of the camera, release the film

spool and immediately bend back the paper end and seal the free edge with a glued paper tab.

You will know when your 35 mm Kodak miniature cameras have reached the final film frame by looking at the exposure counter numbers. 135 film differs from the usual roll film. There is no paper backing because the extra thickness would add tremendous bulk to the full spool. Instead, there is a light trapped cartridge which permits rewinding the film back into the original cartridge after all the exposures have been made. When you turn the rewind knob in the indicated arrow direction for some time, you will find there is a sudden loss of tension and you will hear or feel the end of the film leading the take-up spool and sliding across the film aperture back into the original magazine. Another simple way to determine if the film is completely rewound is to observe a moving part on the outside of the camera. For example, on most cameras the rewinding knob will turn backwards while the film is being rewound and will stop turning completely when the end of the film comes off the spool. This is the only point at which you may open the camera safely.

If you have torn the film from the spool by winding with too great an effort at the end of the roll due to an error in setting your exposure counter, then it will be necessary to go into a dark room, open your camera, remove the cartridge and take it apart so that you can re-secure the last portion of your film to the center core with Scotch tape. Then, replace the core in the outer shell of the cartridge and finally snap on both sides. You can wind your film by hand or by replacing and winding the cartridge in the camera. Be sure that your movement is smooth for winding or re-winding your film. A jerky motion will produce friction, scratches, and cinch marks.

The simpler Kodak miniature cameras do not have an automatic interlock between the film advance and shutter setting, but require two distinct steps for advancing the film and readying the shutter for the next picture. Therefore, with the simpler cameras wind your film immediately after taking your picture, and then as soon as you have advanced your film to the next frame set the shutter-cocking lever. When you see the shutter-cocking lever in the set position, you will know that you are ready for the next picture. Some cameras without double exposure prevention, such as the older Kodak Retina I Camera, cannot be closed with the shutter cocked. However, if you decide not to take a picture, merely place your hand over the lens and release the shutter. With the shutter uncocked, the camera can be closed. Simply remember as soon as you open your Kodak Retina I

Camera to set the shutter immediately and you are ready for the next picture. Should any point of loading or unloading the camera require detailed knowledge, you can make this information readily available by typing it and taping it to your carrying case or the camera body.

Kodak 35 with f/5.6 lens—No interlock between winding knob and shutter setting.

Kodak 35, f/4.5, f/3,5, and f/3.5 with rangefinder—Shutter is set as film is wound. Intentional double exposure can be made.

Kodak Retina I without body release (release on the shutter)—No interlocks.

Kodak Retina I and II with body release—Release is locked until film is wound but winding knob does not set the shutter.

Kodak Retina IIa—Turning winding knob sets the shutter.

Kodak Bantam Special, Kodak Pony 35 and 828—No interlocks between film winding and shutter.

Kodak Signet 35—Film winding does not set shutter but when shutter is tripped it is locked against a second actuation until the film is wound. Intentional double exposures can be made by moving a small lever on the bottom right hand side of the camera.

Film Type Indicator Dial

Some cameras have a film-type indicator dial available on the re-wind knob. Set this dial for the type of film that is in the camera. If the camera does not have a film-type indicator, then either drop the wrapping box name panel into the case, or use a china marking pencil on the body to record the name of film.

It is startling to find out how poor your memory can be.

CHAPTER 9 / E-EXPOSURE WITH CONTINUOUS SOURCE DAYLIGHT OR TUNGSTEN LIGHT

Now that the mechanical factors have been described, let us integrate this knowledge and prepare for actual picture-taking. It's really a simple matter, because you now know how to set your shutter, iris and focus. The only remaining item is to decide on what exposure setting to make. Outside of flash, which requires a different system of exposure determination, there are a few general methods for determining correct camera settings when lighting conditions are normal and taken with daylight (D) outdoor lighting or with Tungsten (T) photo flood or regular room illuminating lamps. Follow this advice:

1. Use the instruction sheet packaged with every roll of film. The D on these charts refers to daylight, while a T signifies Tungsten or artificial light. There is a difference in the response of the film to either daylight or Tungsten regarding A.S.A. rating (film speed). For this reason, there are two suggested meter settings.

2. The exposure chart in this chapter continues the technique of the Safe-Set method by standardizing the setting procedure so that only one variable remains—the iris opening. The shutter speed, film speed, etc., are always the same. The different iris openings are derived by simple arithmetic. The chart is used in this way: First choose the number allocated to the different light conditions and then multiply this number by the number assigned to the suitable subject classification. The product of the multiplication is your iris setting. For example, using a film with an ASA 50 and a shutter speed of 1/100th second, then a subject that is average (Class 3) multiplied by a hazy sky lighting condition (Class 2), results in 6, the iris is set at f/6.3. The best way to learn this system is to practice with different subjects and different lighting conditions while noting the factors permanently on a piece of paper. When you compare the results with your notes, you will know how accurate you have become with this chart.

While this chart gives you iris openings for one shutter speed, you can change the shutter speed by also changing the f/opening as was described in Chapter III.

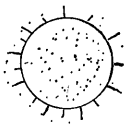
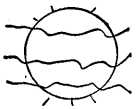
Eastman Kodak manufacture many exposure guides in booklet form which are accurate, compact, and inexpensive.

3. A photo electric meter, properly used, is an accurate means

SIMPLIFIED OUTDOOR EXPOSURE CHART

Film: Outdoor Color—A. S. A. 10 B & W—A. S. A. 50
Kodak Wratten Filter #85 with Shutter Speed 1/100
Indoor Color Film

Shutter Speed—1/25th

45° Light Angle to Subject	 4—Sunny Strong shadows	 3—Bright Soft shadows	 2—Cloudy	 1—Dull
4 - Wide, clear open spaces	16	12	8	4
3 - People, trees, architecture in outdoor middle distances	12	f/9 or **COLOR Basic recommended setting 1/50th at 6.3**	6	3
2 - Average subjects; open street, near distances	8	6	4	2
1 - Shaded street	4	3	2	1

For normal subjects, normal conditions, normal areas.
Use 1/2 stop wider for dark subjects, etc.
Narrow 1/2 stop for light subjects, etc.

for computing correct exposures. While a chart may be used outdoors where light conditions and subject conditioners are fairly uniform, the photoelectric meter is recommended both with artificial lighting or for outdoor conditions where extreme accuracy is needed.

Photoelectric meters are either of the "Reflection", "Incident Light" type, or a combination of the two. The Retina IIIc incorporates a built-in meter which can be used either as a reflection type or for incident light (light falling on the scene) type meter.

The Retina IIIc Meter

The information applying to the built-in Retina Photo electric exposure meter will also apply to other similar meters when they are used with the other Kodak cameras that are not built in.

A. Reflection-type meters measure the amount of light reflected from the subject. It is used by pointing the meter at the subject. If the subject is of average contrast, then a single reading is usually sufficient. However, subjects with extreme contrasts require at least two readings: a reading from the darkest portion of the subject, and another from the lightest. As an example, a landscape should be read by pointing the meter to the sky if that is the lightest and at the foreground if that is the darkest portion of the picture. The two readings are then halved for the suggested exposure setting.

If you have time only for a single reading, then point the meter in the Retina IIIc at approximately a 45 degree angle to encompass a portion of the sky and a portion of the foreground.

B. Incident Light Reading. The diffusion plate is placed over the meter of the Retina IIIc and the camera must now be brought to and pointed away from the subject and towards the direction where the camera would be. This technique is the reverse of the reflected light method because the incident light reading is taken by pointing the meter in the direction of the camera. Incident light readings seem to give more favorable results with color because the diffusion plate integrates the light uniformly and lessens the chance of error where subjects are wearing clothes of various colors or have extreme differences of contrast.

If the camera cannot be brought to the subject, a substitution reading can be made by pointing the camera away from the subject. The light must be, at this point, the same as that falling on the subject.

The Grey Card

Reflected Readings With a Grey Card

A neutral tone which falls midway between white and black can be used to take a reflection reading because it will allow the black portions of a picture to become black, while the light portions of the picture receiving more light will photograph white. A neutral tone can be secured by the use of a grey card manufactured by Eastman Kodak. It is a special card, colored a neutral grey, of 18% reflectance, which is used by holding it in the position of the subject facing the camera. So that it receives the same type of lighting as the subject. The grey card must be large enough so that only the reflection from the grey card will unfluence the meter. A 3 ½-inch x 6 ½-inch sized card can be used if the meter is held about 2 ½ inches from it. In use, incidentally, the Retina IIIc itself, should not cast a shadow onto the card. The reading so obtained is used to compute the exposure setting. With a grey card, it is unnecessary to average readings.

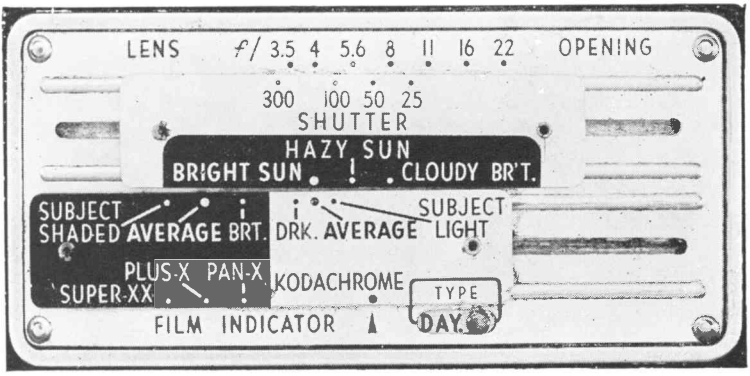
Rule For Cameras With Built-in Meter

Indoors: First position your lamps, then move them closer or further to balance your lights together for any ratio of key light and fill-in. Now, take the meter reading at the camera position.

Outdoors: If time does not permit, then point the camera at approximately a 45 degree angle to the horizon, read the meter, set the exposure, focus, compose and shoot.

Kodak Signet 35 Outdoor Exposure Guide

The Signet 35 Camera incorporates guide built onto its back to indicate the correct exposure for different films speeds with three common subjects under the most usual lighting condition.



Signet Cameras exposure guide

CHAPTER 10 / E-EXPOSURES WITH FLASH LAMPS AND SPEED LIGHTS

In our age, we try to make everything packaged and portable. Now, sunshine too is packaged and portable when it is in the form of a flash lamp or speed light. It is fortunate that we now have this type of light. Otherwise, most indoor pictures of people could not have been taken. Color pictures, especially would be impossible because of the tremendous amounts of light needed. The only dependable and readily available source of this packaged and portable sunshine is the single-use flash lamp and the multiple-use flash tube better known as a speedlight. The flash lamp can only be used once because it is burnt up in the process of producing its light. The speedlight is a repeating source which usually can be used at least 25,000 times before replacement.

Single Use Flash Lamps

A flash lamp consists of magnesium or magnesium-aluminum alloy packed under oxygen pressure in a glass envelope resembling either an automobile headlight lamp or a regular room lamp.

It may have the conventional house lamp shape or it may be condensed to the size of a walnut—or even as small as a peanut.

Class F Lamps are fast-igniting: the delay is only 5 milliseconds (1/200 second) and the complete flash peak duration is also 1/200 second. Class F lamps can be recommended because the 1/200 second speed will stop motion even though a 1/25 second shutter speed is used. As another advantage, Class F lamps match and mate Kodachrome Type A indoor color film, so that no filters are needed.

Class M (No. 5, No. 25, No. 0, No. 11, etc.) have greater power than the above lamps. However, their flash duration is only 1/50 second. They may be used at the X-setting at all slow speeds up to 1/25 second. They must be used at an M-setting (available with the C-4 or C-44) for speeds of 1/25 to 1/300 second.

Class M 2 lamps are peanut in size. They are best used at the X-setting at speeds up to 1/25.

Class M and M 2 lamps are balanced for Type F indoor color film. When used with Type F film, no filter is necessary.

The lamps have two characteristics which must be known for successful synchronization (assuring the peak of the flash at the moment the shutter is opened for light-gathering efficiency):

IGNITION TIME—Lamps take various times to ignite to the flashing point. Some flash with a 4 to 5 milli-seconds (thousandths

of a second) delay, while others may take as much as 20 milli-seconds (one-fiftieth second) until they are ready to flash.

PEAK OF FLASH—Some lamps such as the SM or SF have a flash duration of 5 milli-seconds (one two-hundredth second) whereas other lamps have a long peak as much as 40 milli-seconds (one twenty-fifth second) duration.

There are, of course, many advantages and disadvantages to either of these characteristics which shall be elaborated progressively.

The Class F lamp (SM or SF) are fast-igniting with a delay of only 5 milli-seconds. The peak of the flash also is one two-hundredth second. For this reason, the Class F lamp may be used at any speed from 1 to 1/30th second at an x-synchronization setting with an assurance of positive synchronization, yet the picture would seem to have been taken at 1/200th second because the duration of the flash was so short.

COLOR FILM: Class F lamps are matched for Kodachrome, professional type A film so that no light balancing filter is needed.

The Class M (No. 5 or No. 25) lamps are medium duration igniting, with a delay of 20 milli-seconds (1/50th second) and the flash heat lasts 1/50th second. These lamps produce more light than the Class F lamps.

COLOR FILM: Class M lamps match Kodachromé, Type F, or Ektochrome Type F, so that here, too, there is no need for a light balancing filter. The new M-2 is balanced for Type F color films.

The Class M-2 lamps are very tiny in size with an ignition delay of approximately 15 to 18 milli-seconds and a duration of approximately 1/50th second. They must be used with a 3-inch reflector for maximum light-producing efficiency.

Multiple Use Flash Tubes (speedlights)

The ignition time for flash lamps is almost instantaneous so that there is no appreciable delay time in ignition. For this reason, the X or O delay shutter setting should be used.

The flash lasts anywhere from 1/500th to 1/2500th of a second, depending upon the speed light manufacturers' specifications. The high speed of the flash will stop action. A slow shutter speed of 1/100 or so has no influence on the speed light flash, so that even at this low shutter speed, the action will be stopped because it is the duration of the flash rather than the shutter speed that stops the motion.

Synchronization

Synchronization is the process of adjusting the shutter so that the flash will take place while the shutter is open.

All the newer models of the less expensive Kodak cameras contain an X setting which can be used with both flash lamps and flash tubes. Older models only had an M setting. These models should be brought to a repair man and have him install an X setting.

Note: Class M or M-2 lamps can be used with the X setting at shutter speeds up to approximately 1/30 or 1/60 depending upon model, but require the M (20 milli-second delay) setting when faster synchronizing speeds must be had with these flash lamps.

Faster Synchronizing Speeds

If a too slow shutter speed is used with a strongly backlighted subject, a ghost image may appear on your film. A ghost image, in this specific case, really is a double exposure. This may happen with a flash tube or with a flash lamp used at 1/25th second. The first exposure is made with the flash lamp or flash tube while the second continuing exposure occurs while the subject is moving rapidly during the 1/25th exposure and the strong back light is still recording this movement. With speed light, the ghost image can be avoided by using the X setting at the fastest shutter speed available, e. g. X F 1/500th with the Retina IIIc's Compur-Rapid shutter.

SM lamps, with the Class F delay setting, can be used with the fastest available shutter speed because the lamps' faster ignition time delay has been accounted for.

Calculating The Exposure

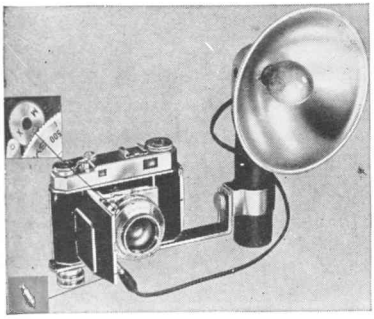
Lamps have varying intensities. Each lamp, depending upon power, is assigned a so-called guide (power) number. When the distance of the lamp to the subject is divided into this power number, the resultant number becomes your f/ opening. For example, a Class F, SM lamp, has a power number of 56 when used with Kodachrome, Professional Type A film at 1/30th second. If the lamp is 10 feet from the subject, then dividing 10 into 56 gives us a number of 5.6 and this now is the f/ opening at which the aperture will be set.

Here again one sees the possible application of the Safe-Set Method in that all factors except one, the f/ number are unknown and that factor can be rapidly computed by simple division. However, as even simple division takes time, best results are obtained by pre-selecting the body size so that the distance becomes known and

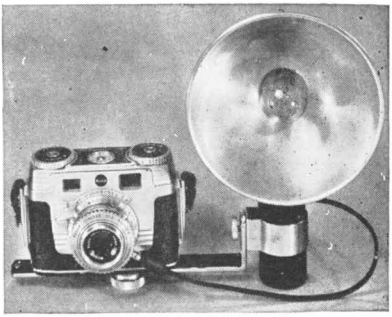
then pre-setting the f/ opening and distance scale so that when you are within 10 feet of your subject by range finder verification you will be SAFE for a perfect picture.

Pre-setting is more than advisable in these flash cases, it is a must. Prove this by trying to take a number of pictures at odd distances. Prove this by trying to calculate openings at these odd distances. Prove this by trying to have some child listen to you as you ask him to remain in place while you are making these calculations. Then, will you realize the validity of the Safe-Set Method.

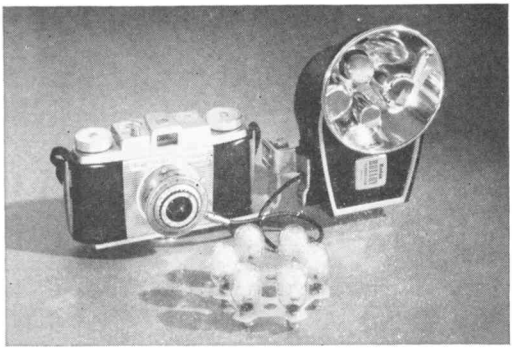
BLUE FLASH LAMPS. Blue flash lamps should be used only as a fill-in for pictures taken with daylight color film. This is so because the color temperature of the Blue lamp is approximately 4800 degrees Kelvin, whereas daylight color film is balanced for approximately 5600 degrees Kelvin. However, blue flash lamps can be used with daylight color film by using their guide number to compute the fill-in f/ opening in the regular way.



Retina IIa with M-X Compur Rapid*



Signet Flash outfit*



Kodak Rotary Flash Type 2

Efficient Use of Guide Numbers

You may note in reading a table of flash guide numbers that the guide numbers given for Class M lamps up to a speed of 1/50 second is always the same. It changes only at faster speeds. Similarly, as Class F guide number may be the same for all speeds up to 1/100 second. If rapid subject movement is not a factor, then the choice of correct synchronizing speed may do much to help your picture. The I-G-A-S formula (Section 4) tells us that it is necessary to balance your light in order to meet the relative contrast and sensitivities of your film emulsions. So, if the amount of light provided by your flash lamp is one unit, then your background light should also provide one unit to have a 1:1 ratio. However, your background light of one unit need not be necessarily flash. It may be a flood light to save the price of a flash bulb. Assuming that it is a flood light, then the distance location of your flood light is directly related to the shutter speed. At 1/25 second, the flood light may be placed twice as far away as at 1/100 second. The further back your light is placed, the more uniform the illumination will be and there will be less heat on the subject. In a similar manner, if you are using your flash lamp on the camera as a fill-in for an outdoor picture, the outdoor scene may be perfectly exposed at 1/25 second while at 1/100 second, even though the flash intensity remains the same, the general scene will be under-exposed ¼. So, the selection of one of a variety of speeds available with a single guide number must be understood to light your picture efficiently and economically.

Single Lamp Flash for Distances in Depth

When only one lamp is available and it must cover a subject that has a great front-to-back depth, compute your exposure in this way:

1. Determine the actual depth of your subject, e.g., if the subject depth is from 8 to 24 feet, the total subject depth is 16 feet.

2. Focus for ⅓ the subject depth. ⅓ of 16 is approximately 5 feet. Add this figure (5) to your near point (8), and so focus at 13 feet.

3. The flash aperture is estimated by adding half the subject depth to the near point (½ of 16 equals 8, then 8 + 8 equals 16). The guide number is divided by 16, e.g., guide number 64/16 equals f/4.

4. This places the correct exposure at the mid-distance. If the foreground is more important, close the iris one stop. If the background is more important, open the iris one stop.

5. Aim the light if it can be removed, or raise the camera if the lamp is fixed to it so that it is high and pointing down toward the center of the field. This produces a more uniform illumination.

6. For a basic setting in an average 15-foot room, focus at 8 feet and base your aperture for a 12-foot distance. Then you need only adjust your aperture. Close it one stop for near subjects and open it one stop for distant subjects.

The single flash will cover the subject depth with as uniformly exposed lighting as is ever possible when one lamp is used.

The beginner and professional must make every picture count. As a definite help for a sure-fire, push-button type of photography, I urge the beginner to try the Safe-Set Method with the flash unit right on the camera. With this method, all variables are eliminated. Your distance, your iris, your shutter speed are all pre-set. All you need to do is to merely approach your subject, get the focus, compose your subject and as soon as the peak of expression can be anticipated or seen, release the lever. You must get a perfect picture.

M-X SHUTTER SYNCHRONIZATION

FLASHLAMPS:			Lever at:	Lever at:
M Class	Name	Type	X-Setting	M-Setting
F Fast Acting	G.E. Sylvania	SM SF	1 second to 1/100	Not recommended
M Medium Acting	G.E. Sylvania	#5,#11,#22 #25,Press 40, Press 50	1 second to 1/25	1/50 to 1/500
	Sylvania	#2	1 second to 1/25	1/50 to 1/100
S Slow Acting	G.E. Sylvania	#50 #3	1 second to 1/10	1/25 to 1/50
FLASHTUBE (Electronic Flash): M-X Synchronization				
Lever at: X only Bleed or 0 delay	Zero Delay		1 second to 1/500	Not recommended
5 ms delay for shutter	Use relay for 5 ms delay		1 second to 1/100	Not recommended
20 ms delay for shutter	Use relay for 20 ms delay		1 second to 1/50	Not recommended

X-SHUTTERS ONLY

1/500 sec. - Bleed or Zero delay flashtubes without relays
1/100 sec. - SM or SF (Class F)
1/25 sec. - Class M. (#5, #25, #0, Press 40) 20 ms delay

CHAPTER 11 / PROCESSING FOR BLACK-AND-WHITE PHOTOGRAPHY

After your film has been exposed, you must re-wind it back into the original cartridge or continue winding until the end of the paper backing can be pasted to prevent the film from unraveling. The exposed film appears no different from the unexposed film, but it is not capable of yielding an image. The potential undeveloped image is called by the scientists a "latent image." The changing of the invisible latent image to a visible permanent form is development.

Development must be performed entirely in the dark because your film is always sensitive to any light until the emulsion has been developed and completely fixed. It can be done either in a completely darkened room or with a light-tight development tank provided with an opening for changing the different solutions.

The amateur will generally find that darkroom development is a tedious process because so much of the time is spent in the dark just waiting. To make waiting more pleasant under normal light surroundings, the modern light-tight development tank has come into use. The film must be loaded in a darkroom. For an amateur, this may be a closet or a special type of changing bag. Once the film has been loaded into the tank, every other processing operation may be performed with full safety in daylight or roomlight. In using a tank be sure that your film is placed smoothly on the reel to prevent film buckling. For if this happens, an uneven white streak will appear on the positive print where the buckle has taken place.

There are two types of daylight development tanks available:

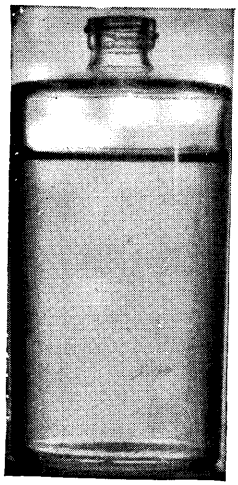
1. *Apron type.* Your film is wound around an apron that has raised dimpled studs at both edges. The studs separate the film from the apron and at the same time allow your developing fluids to circulate. This apron type often does not assure adequate fluid circulation because of the narrow space between film and apron. However, by turning the tank on its side and shaking continuously, this difficulty can be overcome.

2. *Reel type.* The reel type must be carefully loaded to prevent any buckling of the film. It is the more popular type of development tank in use. Here, too, your agitation should include shaking and turning the tank in addition to moving the reel by the core rod. Core rod agitation is not sufficient because the fluid at the center of the reel cannot escape. However, if you shake and turn the tank, the central column of fluid will be agitated and you will get complete circulation.

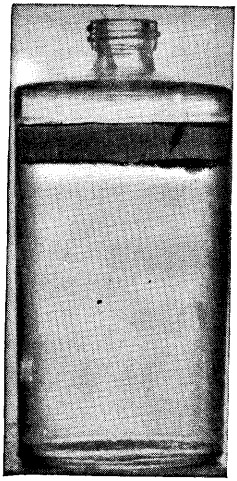
FILM FORMULARY

DEVELOPER	Chemical - Grams	Elon (Metol)	Sodium Thiosulfate	Sodium Sulfite	Hydroquinone	Borax	Kodalk	Sodium Thiocyanate	Potassium Bromide	Sod. Carb. Mono.	Acetic Acid 28%	Chrome Alum	Boric Acid Crystal	Potassium Alum	Water to	REMARKS:
DK-20		5.0		100			2.0	1.0	0.5						1000	Finest grain.
DK-20R		7.5		100			20.0	5.0	1.0						1000	Replenisher - 1 oz. to a roll.
D-76		2.0		100	5.0	2.0									1000	Moderate grain.
D-76R		3.0		100	7.5	20.0									1000	1 oz. to a roll.
D-76F		2.0		100	5.0	20.0									1000	Existing light technique.
D-11		1.0		7.5	9.0				5.0	25.0					1000	High Contrast development.
SHORTSTOP 1.											120				1000	Neutralizes & stops development.
2.															1000	Water alone may be used.
3.												30			1000	Also hardens film.
FIXING BATH			240	15.0							48.0		7.5	15.0	1000	The ideal film fixer.
Diaversal Kit or First Dev.		1.5		25	5				2.0	50					1000	or Dektol 2:1 - Develop 1 min. - 60-68° F.
Second Dev.			5	50					+First developer-4 ozs.					+water to 24 ozs.		or Dektol 2:1+3.5 Gm. Hypo to 24 ozs. working sol.-Dev. 2 min.
Toners 1.	Eastman Rapid Selenium - 1 oz. to 32 ozs. water - Tone 1 to 3 minutes.															After toning, simply wash for 5 to 10 minutes. Roomlight may be turned on after first development.
or 2.	Ansco Flemish Toner - 1 oz. to 40 ozs. - Tone 1 to 3 minutes.															

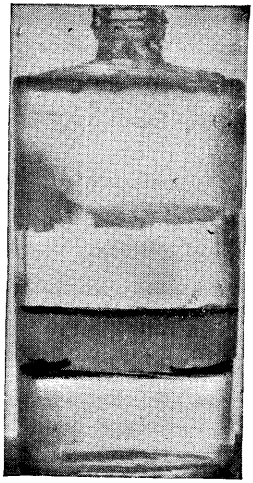
Note: The beginner should purchase these formulae in a compounded, ready packaged, powder or liquid. Microdol Powder or Liquid replaces the packaged DK-20.



Solutions will oxidize.



Inside floating paraffin lid in place.



Inside lid sinks as liquid is poured out.

Once your film has been carefully loaded on to the film reel of your tank and the lid closed, you may then go into any light to start the development procedure. With black-and-white film, I would recommend that you do your own processing if you wish to bring out the full quality of the film. In addition to a developing tank, the other simple equipment for processing your own negative includes a thermometer and the developing solutions.

When you do not use these solutions for any length of time, the air affects them so that they lose their strength. When this happens, all your efforts as far as correct exposure, light control, etc. are concerned will be wasted. To minimize the possible spoilage through air oxidation, you can use the author's method for keeping your solutions fresh. Professionals use this device, the floating lid, to keep their solutions fresh for months at a time. The illustrations and directions below explain this easy method of protecting your processing solutions. Once you have made an inside floating lid for your bottles, you may be sure that your solutions will stay fresh for the maximum length of time, because your lid is a permanent addition. I would suggest that you prepare at least four or five bottles in this way so that you will have a couple of extra ones available at a moment's notice.

Materials: Paraffin (Parawax or any other brand of fruit preserve paraffin), bottles, water.

1. Fill your empty bottle with cold water up to where the shoulder starts to taper in.

2. Melt one half ounce (approximately ¼ bar) of paraffin in a double boiler, pot or heat proof glass dish. Melt carefully so that no open flame reaches the melting wax.

3. Pour the melted wax into the water-filled bottle. Let stand till completely cool. You will find that the wax has formed a thick layer on top of the water.

4. When you tilt the bottle the wax layer (floating lid) will move with the water. As you pour out water, the lid will sink to the lower water level.

5. Make up fresh processing solutions in properly labelled bottles with floating lids.

Make up at least four different floating lid bottles for:

(a) Developer, (b) Replenisher, (c) Chrome Alum Stop Bath, and (d) Fixer.

One question the amateur asks about developing is: Shall I mix my own formulae of individual chemicals, or should I purchase them ready for use? My advice would be to purchase your chemicals ready mixed. You will find that cheaper in the long run, because you are sure of the continued factory quality controls. With pre-weighed chemicals, all you have to do is dissolve the powder in the exact amount of water at a temperature the manufacturer recommends. Factory controls assure uniform quality, and the solutions will always be fresh and maintained at full strength if they are kept in the bottle with the floating lid described above. Should you, however, wish to mix your own chemicals, you will find two standard formulas listed in the table on page 62.

The second step in the development process is to rinse your film in order to halt film development. For this a stop bath of plain water, a solution of acetic acid (vinegar), or a solution of chrome alum may be used. The acetic acid solution can be used only once, while the chrome alum solution can be used again and again until a sediment forms. The chrome alum solution will also harden your emulsion so that reticulation (mottled film appearance) caused by uneven solution temperatures is kept to a minimum.

After the stop bath of chrome alum, another rinse with water is recommended to remove any chrome alum solution which may still be present on the film. After the water rinse has been poured out, the final step is to pour in your fixing solution. Fixing solution consists of a mixture of sodium or ammonium hypo-sulphite compound in

water. This mixture has the property of moving only undeveloped silver salts. All that can remain in the emulsion is the developed (reduced) form of silver which is black or gray where the reflected light from your subject has reached the emulsion. Since the emulsion has thickness, the depth of the emulsion will be dark in direct proportion to the amount of light that has affected it. Little light causes little darkening; more light, proportionately greater darkening.

Only after the fixer has been in the daylight tank for approximately ten minutes do you open the tank to look at the film. If there is any cloudiness or murkiness to the emulsion, replace the film in the fixing solution for another five minutes. Remember that if your clearing time is over twenty minutes, it is a good idea to change your solution.

When your development has been completed, be sure to pour each solution back into its own bottle. Each bottle should be distinctly marked to prevent your contaminating solutions.

The best results are obtained with fresh processing solutions at a temperature of 68 degrees Fahrenheit (A.S.A.). It is axiomatic that the least expensive part of photography is the processing. Consider the fact that you spend a great deal of money and time taking pictures and then foolishly lose the value of this expenditure by trying to squeeze an extra roll from old, oxidized solutions. A small expenditure of money for fresh solutions will insure uniform results in development.

When the negative has been removed from the fixing solution it is washed in clear running water for at least ten minutes and then hung up to dry. Be sure that the negative is free from spots or water marks. To remove the sediment that sometimes adheres to film, wet a large wad of absorbent cotton, squeeze until it is damp, and then gently slide it along the negative to remove all surface sediment. Even the slightest amount of pressure must be avoided to prevent any chance of microscopic scratches being caused by the movement of the dampened cotton. These scratches, if formed, may show on enlargement and will require corrective treatment on the negative or print.

Great care in processing will produce its own reward—a perfect negative. Processing in photography is easy when you form the habit of doing it correctly. With correct processing, you will always know what uniform results may be expected. The good results which are attained by simpler standard methods will be satisfying and will spur you to greater efforts.

FLASH SYNCHRONIZATION WITH PRONTOR SV SHUTTER

Prontor SV Only	*Class F*	*Class M*	*Electronic Flash*
Synchro-Switch on Red Dot in position "X"	1 to 1/50 sec.	1 to 1/25	1 to 1/300
Synchro-Switch on Yellow Dot Cock and move the delayed action lever to F	1 to 1/100	N.R.	N.R.
Synchro-Switch on Yellow Dot Cock and move the delayed action lever to M.	N.R.	1/50 to 1/300	N.R.

N.R. — Not recommended

The SV's delayed action mechanism can only be used when the synchro-switch is on "X".

The Prontor S Shutter, although no synchro-switch is used, always is at "X".

CHAPTER 12 / USEFUL ACCESSORIES

Your basic miniature camera provides at least 90 percent of the requirements for most picture taking. However, there are times when a Kodak miniature camera may be adapted, by the addition of accessories, to meet specific conditions. As an example, the taking of extreme close-ups necessitates a supplementary lens accessory because the camera generally focuses to 3½ feet.

Accessories are many in number and, no matter how important they may seem at the moment, many are used only once or twice a year. If you think you must purchase an accessory, be sure that you not only will need it now but will use it frequently throughout the year. In the course of the years, certain stock accessories have become accepted as useful devices for either protection or operational helps. These include a light shade, cable release, carrying case, tripod, etc., all of which will be later explained. When the accessories to be used at one time are numerous, the proper attachment order is important.

There may be as many as nine, and the correct order is as follows:

1. A filter holder. This is the basic unit which will hold all the other lens accessories. Therefore, it is important that it be secure. If there is any bit of wobble or play, your filters, close-up lenses, etc., will not be mounted flat (parallel) in relationship to the film, but will

be set at a distorting angle. The prism effect produced by the distortion will invariably produce a poorer picture. So be certain that the filter holder that you use is rigid, and film and lens parallel.

2. Portrait or other positive lens. These should be first quality, perfectly centered ground and polished lenses.

3. Retaining ring.

4. Filters. The Kodak Retina filters are ground and polished to high standards. They are flat and parallel and will not produce image distortion.

5. Retaining ring.

6. Polarizing filter (Kodak Pola screen).

7. Lens hood (also acts here as a retaining ring).

When all items are used, this is the order of sequence. But, you may use only 1, 2, 3, 6 and 7, or 1 and 7. With this sequence, loss of light is minor and distortion is reduced to a minimum. However, more than two optical lenses is not recommended, because the increased length of your accessories may act as a shielding tube and cut off the corners of the negative. Each retaining ring must be correctly sized to hold each portrait, filter, polarizing, etc., disc in proper parallel alignment. Finally, check each filter and disc for proper thickness. If they are too thin, the loose fit in the filter holder or retaining ring will cause them to lean sideways when the accessories are placed upon the camera lens and the camera is tilted slightly. The leaning will cause prism distortion and must be avoided.

Attaching Accessories

Accessories are fitted to the camera lens barrel by either of two methods:

Non-interchangeable (push-on nesting; combinable)

1. Fits only one specific lens diameter.

2. Compact; one attachment nests into another.

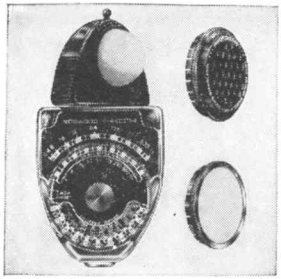
3. Easily slips on and off.

Interchangeable (Series V, VI, etc.)

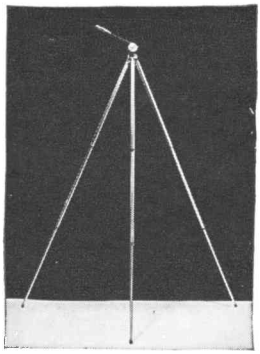
1. One series set will fit any specifically fitted rear filter holder of a similar series.

2. Discs, Retaining rings, etc., are interchangeable.

3. Series sizes are determined by lens diameters, e.g., $\frac{3}{4}''$ to $1\frac{3}{16}''$, Series V; $1\frac{1}{4}''$ to $1^{21}\!/_{32}''$, Series VI, etc.

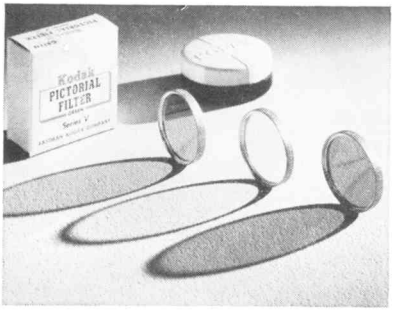


Incident-light meter



Kodak eye-level tripod

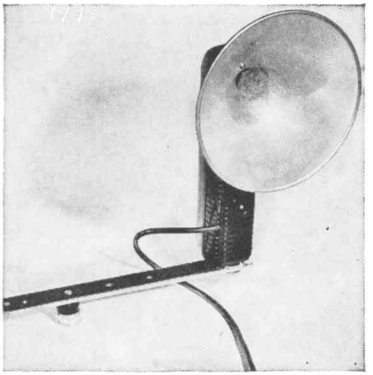
Kodak Vari-Beam Clamplight



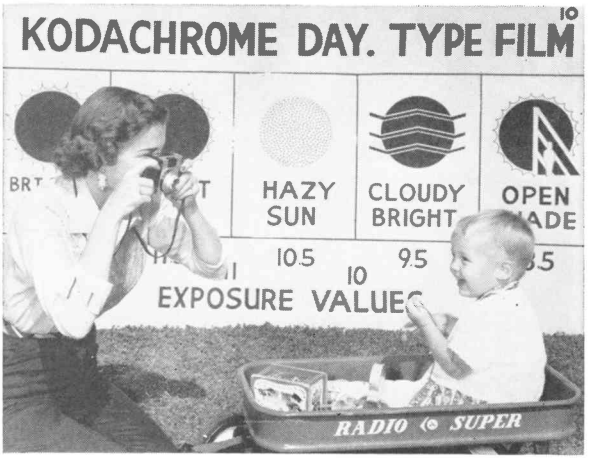
Kodak Pictorial Filters

Kodak Stacked Filter Holder

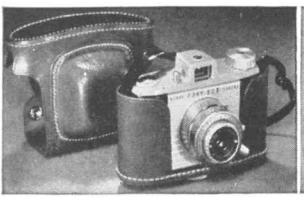
Self-timer for delayed action



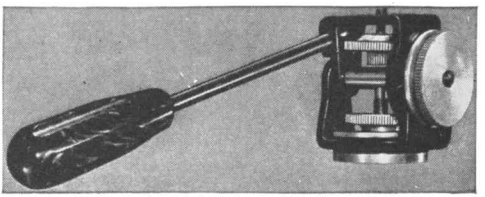
Kodak Standard Flashholder in ASA Standard Bayonet connector



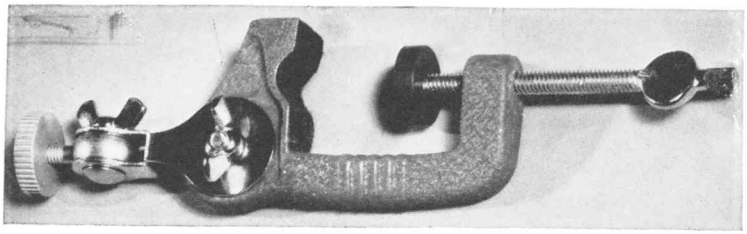
Behind mother and baby is an enlargement of one of the seven EVS cards supplied with new 35 mm cameras. The cards show you the single number to set on the camera for any light conditions.



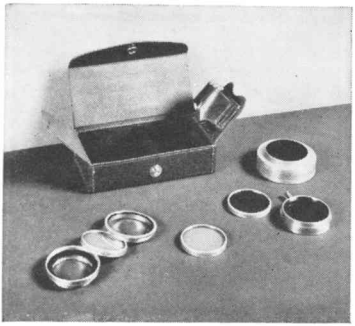
Protective carrying case



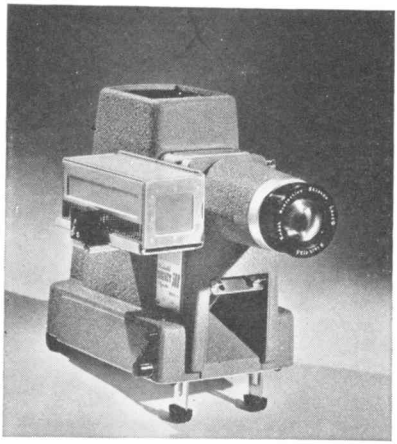
Pan Head



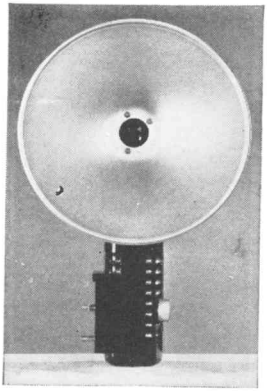
Kodak Flexiclamp for holding camera



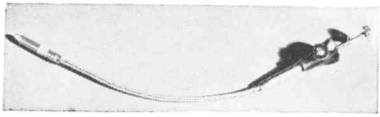
Combination Filter Case



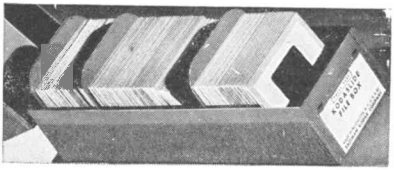
Signet 300 Projector



Kodalite Flashholder



Kodak Metal Cable Release No. 5



Flexo file for slides

PHOTOGRAPHIC DICTIONARY

This brief dictionary has been prepared to serve as a convenient source of reference for the new camera owner.

ABERRATION—Distortion in the lens.
ACID—Chemical used to stop development.
ADAPTER—Converting unit attached to the lens.
ALKALI—Chemical used to accelerate development.
ALUM—Chemical film hardener which prevents softening, reticulation, and scratching.
ANASTIGMAT—Flat, distortionless, straight-line image.
ANGLE OF VIEW—Subject area seen by a lens in all directions.
ANGLE SHOT—Picture from an unusual angle.
ANHYDROUS—Without water.
APERTURE—Lens opening allowing image-forming rays to enter camera.
ARTIFICIAL LIGHT—Light other than sunlight.
A.S.A.—American Standards Association. Systematizes materials, procedures, techniques, etc.
AUXILIARY LENS—Extra lens attachment to change the function of the regular camera lens.
BETWEEN-THE-LENS SHUTTER—Blades or leaves of the shutter widen to open, then completely close to make an exposure. Located between the lens elements.
BLOWUP—An enlargement.
BOUNCE LIGHT—Light method using walls and ceilings to reflect light.
BRIGHTNESS RANGE—Permissible light-to-dark difference possible for subject, negative, or positive.
BULB EJECTOR—Device for removing hot flashlamps.
BULB EXPOSURE—Picture taken with the shutter set at **B**.
BULK FILM WINDER—Economical device for winding your own individual cartridges from larger rolls.
CABLE RELEASE—Wire, shutter-releasing device which enables you to take pictures without touching the camera. Cable releases may be used five or more feet from the camera.
CAMERA—Light-tight box, having sensitive film on the inside and a light-admitting device (lens) at the other end.
CAMERA, PLANAR—Single-lens camera.
CARTRIDGE, STANDARD—Regular 35mm daylight-loading film-holder which may be purchased anywhere.
CHROMA—Purity of a color mixed with gray.
CIRCLE OF CONFUSION—Area in which two dots appear as one. Two separated dots will appear as one when separated by 1/100 inch at a 10" reading distance.
CLOSE-UP—Picture taken closer than eight (8) feet from subject.
COATED LENS—Anti-reflection deposit on lens surface to permit more light to pass.
COLOR BLIND—Film sensitive only to blue or violet light.
COLOR CONTRAST—Distinct separation of different colors.
COLOR CORRECTED—Optically balanced to assure similar sharpness of all colors.
COLOR HARMONY—Combination of colors producing a pleasing effect.
COLOR SENSITIVITY—Varying color response of different films.
COLOR TEMPERATURE—The degrees K° refer to the comparative color changes that occur when a black body (iron) is heated. A low number indicates a more reddish color; a higher number, a bluer shade. Most important for natural color film.
COLOR TEMPERATURE METER—Device which measures color temperature, establishes color balance.
COMPLEMENTARY COLORS—Any two combined colors other than the primary.
COMPOSITION—Orderly arrangement of a picture to produce the most pleasing effect.
CONDENSER—Light-concentrating lens.
CONTRAST—Comparison of light to dark.
CONTRASTY—Abrupt difference of light-to-dark tones.
CROPPING—Trimming a picture for the most effective composition.
CUTTER—Special slicer for cutting film or print with clean or deckled (wavy) edges.
DAYLIGHT TANK—Special developing tank which permits negative processing in full light.
DEFINITION—Sharpness.
DELAYED ACTION—Automatic shutter release mechanism operating after a predetermined interval without human effort. Permits you to photograph yourself.
DENSITOMETER—Measures thickness of exposed and developed film silver deposit.
DEPTH OF FIELD—Area of satisfactory image sharpness. Distances at different apertures are usually supplied in table form.
DEVELOPER—Chemical which blackens only exposed portions of film.
DEVELOPMENT—Complete process of developing, shortstopping, and fixing exposed film.
DIFFUSION—Light which is scattered. Reduces sharpness of image.

DOUBLE EXPOSURE—Taking two pictures on one negative. May be accidental, or intentional for special effects.

EASEL—Paper-holding device for enlarging.

ELEVATOR TRIPOD—Convenient device for lowering or raising a tripod head without changing the length of the tripod legs.

EMULSION—Gelatin or resin carrier of sensitized silver particles.

EMULSION SPEED—Reaction rate of different films to light.

ENLARGER—Photo-optical device to produce large pictures from small negatives.

ENLARGEMENT—Large print made from a smaller negative.

EXPOSURE—Activation of sensitive silver in the film by light. Admission of light into the camera through the lens.

EXPOSURE COUNTER—Numbering device for counting the exposures in the order that they are made.

EXPOSURE GUIDE—Chart suggesting aperture and shutter settings for differing conditions of light and subject.

EXPOSURE LATITUDE—Film ability to be over- or under-exposed and still yield an excellent picture.

EXPOSURE METER—Light intensity measuring device to indicate correct aperture and shutter settings.

EXTENSION FLASH—Coordinated multiple flash from different locations used to light a picture with greater balance.

FEATHERING—Using only the edge portions of a light in order to avoid a hot spot.

FILL-IN LIGHT—Diffused weak light usually used at the camera position to prevent too dark shadows.

FILTER—A colored glass that fits over lens and separates white light. May admit certain colors (transmission) while preventing other colors from coming through (absorption).

FILTER, GELATIN—Non-permanent filter usually used for experimental purposes.

FILTER, LAMINATED—Gelatin filter cemented between two pieces of glass.

FILTER, NEUTRAL DENSITY—Increases exposure without altering color values.

FILTER, POLARIZING—Transmits light rays of only certain angles. Minimizes glare.

FILTER, FACTOR—Additional exposure necessary because all filters retard some light.

FINE-GRAIN—Controlled small grain needed to produce negatives suitable for huge enlargements.

FIXING—Removing unexposed and undeveloped silver salts from an emulsion.

FIXED FOCUS—Standard camera distance scale setting with a narrow aperture which produces great depth of field and lessens the need for accurate focus. Box cameras are fixed focus.

FLASHGUN—Combined battery and flashlamp holder.

FLASHLAMP—Powerful single-use light source. Flash duration, generally 1/50 second.

FLASHTUBE—Powerful multiple-use light source. Flash duration 1/5000 second.

FLAT—Opposite of contrasty; showing little gradation of tone.

FOCAL LENGTH—The infinity (far distance) lens distance position from film.

FOCAL PLANE SHUTTER—Light admitting curtain similar to a window shade with a slit of varying size for different time intervals of exposure.

FOCUSING SCALE—Measurement chart which shows the required lens from film distance for different subject distances.

FOCAL FRAME—Convenient close-up camera device which eliminates the need for focusing or framing the subject.

GRAIN—Granular image breakdown due to optical or silver clumps formed by improper development.

GRADATION—Tone separation.

GLARE—Unwanted concentrations of light; hot spots.

GUIDE NUMBER—Flashlamp or flashtube reference number used to simplify the calculation of the proper aperture for different subject distances.

HI-LO SWITCH—Electrical device which permits focusing with dim lights and picture taking with brightened lights.

HARDENER—Toughens film or paper.

HOT SPOT—Undesirable concentration of light which over-exposes subject at the point of reflection.

HYPERFOCAL DISTANCE—Related focusing scale and aperture setting at which everything is in focus from half the set distance to infinity.

HYPO—Sodium thiosulfate, used to dissolve undeveloped emulsion on the film.

ILLUMINATION—Light necessary for photography. No illumination, no picture.

IRIS—Variable lens opening which may be adjusted to different sizes.

JIG—Holding device.

KELVIN (K°)—Visual comparison temperature number of a heated body.

LATITUDE—Permissible variation in exposure.

LEAF—One blade of a between-the-lens shutter.

LENS—Light-gathering system, usually of glass.

LENS CAP—Lens protective covering.

LENS HOOD, LENS SHADE—A light shield which prevents stray reflected light from entering the lens.

LENS SPEED, f/ NUMBER—Relationship of lens opening to film distance.

MASK—Shield; outline; cover.

MASK, BORDER—Uniform artistic outline around film or print.

MAIN LIGHT—Predominating light.

MERGER—Indistinct separation of subject or adjacent shades of color.

MICROFILMER—Convenient space-saving device for reproducing documents on 35mm film strips.

MIDGET LAMP ADAPTER—Device permitting the use of a small bayonet flashlamp in a standard size socket.

NEWTON RINGS—Irregular target-type spots resulting from imperfect mounting.

OVER-EXPOSURE—Too much light admitted for an exposure. Distorts tone values.

PANCHROMATIC—Black-and-white film sensitive to all colors.

PARALLAX—Viewpoint difference of camera lens and viewfinder.

PEAK-OF-ACTION—Apex, height of action.

PEAK-OF-FLASH—Broad plateau portion of the flashglow which makes flash synchronization possible.

PHOTO-ELECTRICITY—Electrical current generated when light strikes certain metals (selenium).

PHOTO-FLOODS—Incandescent lamps which burn brighter than normal because of overvoltage.

PHOTOMICROGRAPH—Picture taken by a camera through a microscope.

PLANAR—Single lens.

RANGEFINDER—Distance-measuring device, split-image or superimposed.

RANGEFINDER, COUPLED—Simultaneously measures the distance and correctly moves the lens focus into position.

READING—Estimate of an exposure by means of a photo-electric meter.

REFLECTOR—Device for directing light rays back to an area. Increases lamp efficiency.

REFLEX—Camera with image focused through a lens and reflected by a mirror onto a ground-glass.

RETAINING RING—Holding ring which keeps filter in filter adapter.

RETICULATION—Uneven wrinkling of the emulsion due to uneven temperature in development.

RETOUCHING—Pencil or brushwork on a negative or positive to improve the picture.

REVERSAL—Process which produces direct positives without a negative.

REWIND KNOB—Key or lever to wind film back into a cartridge.

SET-SCREW—Screw friction or mechanical device to limit the movement of mechanical parts.

SHORTSTOP—Solution which halts development.

SHUTTER—Device for governing the time interval that a lens remains open, like a water faucet that opens and closes.

SHUTTER RELEASE—Device for opening and closing a shutter.

SILHOUETTE—Subject is dark and outlined against the light background. Made by over-exposing the background while under-exposing the foreground.

SINGLE-LENS REFLEX—Reflex which focuses by the same lens that takes the picture.

SLIDES—Mounted transparencies.

SOLENOID—Electro-magnetic shutter-tripping device used to synchronize flashlamps and flashtubes.

SPEEDLIGHT—An intense flash from a radio-type tube, 1/5000 second duration. Also called electronic or speed flash.

SPOTTING—Minimizing or obliterating scratches, spots, emulsion imperfections on the negative or positive.

SPOTLIGHT—Special type of point-source light which produces straight-line rays. Used for crispness, contrast, and sharp outline.

STOP—Opening; full 100% difference in light aperture; full opening of the iris number; from f/4 to f/5.6 is one stop.

STROBE—Speedlight.

SUPPLEMENTARY LENS—An additional lens placed over the regular camera lens used to alter focal length. Rigid cameras (non-bellows) usually use the positive type for close-ups.

SYNCHRONIZER—Mechanical or electrical device used to coordinate the opening of the shutter with the peak-of-flash.

TELEPHOTO LENS—Lens which produces an enlarged image as compared to the size produced with the regular lens, both pictures from the same camera position.

TEXTURE—Detail revealing; 90° angle of light for maximum effect.

TIMER—Measures hours, minutes, or seconds at regular intervals; may be audible when used for enlarging.

TIME EXPOSURE, T—Long exposure, requiring set-screw cable release or T setting on shutter.

TRIANGULATION—Subject distance measurement by observation from two points of view. Principle of rangefinder operation.

TRIPPING—Releasing the shutter.

TRIPOD—Sturdy, vibrationless camera support.

TRANSPARENCY—Film intended to be viewed by transmitted light.

TWIN-LENS REFLEX—Double camera type, with the top dummy camera used only for focusing.

UNDER-EXPOSURE—Insufficient light admitted for a good picture.

VALUE, COLOR—Relative brilliance (lighter or darker).

VIEWFINDER—Optical device to outline the subject area as seen by the lens.

VIGNETTE—Picture with a different border. Only the desired area is sharp.

WIDE-ANGLE LENS—Has a greater angle-of-view than the normal prime lens.

WINDING KNOB—Handle, lever, or key to move film forward to the next exposure.