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CHAPTER 8 / FLASH WITH YOUR VOIGTLANDER 35mm CAMERA

Ours is an age of bottled, packaged and portable sunshine (flashlamps and flashtubes). It is indeed fortunate that this type of light is available. Otherwise, most of our indoor action pictures, whether in black and white or in color, could not have been taken. Color especially requires tremendous amounts of light and the only dependable and readily available source is the flashlamp or the flashtube.

A flashlamp consists of magnesium or magnesium aluminum alloy in a very fine wire form (Class M) or in pill paste form (Class F), and may have the conventional house lamp shape or, as recently modified, be condensed to the size of a walnut. When approximately a 4½-volt electrical current as supplied by small batteries courses through the flashlamp the aluminum compound in the bulb flares up for a tiny fraction of a second. Although this flash seems instantaneous to the eye, there is a short time required for the flash compound to heat up to the flashing point. There are two classes of lamps available with different flare-up time delays: Class F and Class M. The Class F lamps are fast acting, the delay being only five milliseconds (1/200 second) and the complete flash peak duration is also 1/200 second. The Class M lamps are medium acting with an ignition delay of 20 milliseconds (1/50 second) and here the flash peak duration is only 1/50 second.

Since the flashlamp can be used just once, inventors have tried to produce a source of flash light that will yield a large number of flashes without burning up. The result of their experiments is the electronic flashtube. This type of flash consists of a rare gas (bottled under pressure in a glass tube) which glows brightly only when a high voltage current courses through the tube. The duration of the glow is much shorter than in the flashlamp, usually 1/5000 second, and the guide numbers are in the low 30's. For these reasons, while most flashtubes produce at least 10,000 flashes without burning out, they are still not too practical.

When any dimly lighted activity is being photographed, flash is a must to stop the action. Assuming that color film is being used, you must realize that at this point of our technical development, color film emulsions are relatively slow and each exposure requires huge amounts of light to secure any fairly rapid exposure such as 1/50

second. Flash is the only source of light that can supply the quantity and swift "wallop" of light necessary to produce such short exposures.

Taking flash pictures with any Voigtlander camera is a simple matter. All the newer cameras have flash contacts built in with the shutter mechanism. Older models may be synchronized with auxiliary units that are specifically designed for each camera. Caution is required in the selection and fitting of an auxiliary synchronizing unit in order to be sure that the synchronizer selected is correctly designed for either the Prontor or Compur shutters. A synchronizing unit which is improperly fitted for plunger length may cause the shutter housing to be pierced and ruin the delicate inner mechanism.

There are three different shutter synchronizing methods:

1. *Prontor-S.* Synchronizes with Class F lamps up to 1/25 second with the Class M lamps above 1/50 second. Flashtubes should not be used with the Prontor SV shutter only.

2. *X-Shutter.* Consult the chart for using this shutter with Class F and Class M flashlamps as well as with O-delay flashtubes.

3. *M-X Shutter.* Synchronizes with all flashlamps and flashtubes.

Choose the information for your particular shutter, then type it and tape it onto your reflector. Standardize with one lamp so that there will be just one table to give you the correct information rather than a vast number of charts which may cause confusion.

A note of caution with flashtubes: Do not use flashtube units that are flashed by means of heavy duty relays or solenoids through contacts which use your shutter as the switch. The surge of current from such heavy units may completely destroy the delicate shutter.

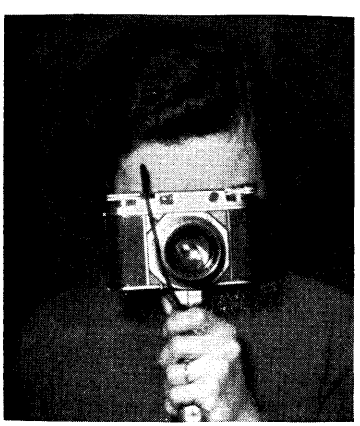
In reading a table of flash guide numbers, you may note that the guide number given for Class M lamps, as an example, up to the speed of 1/50 second is always the same. It changes only at faster speeds. The choice of correct synchronizing speed may do much to help the balancing of the light in your picture. The I-G-A-S formula (see following chapters) demonstrates the need for balancing your light in order to meet the relative contrast in sensitivity of your film emulsion. If the amount of light, then, provided by your flashlamp is one unit, then your background light must also provide one unit to have a 1:1 ratio. However, your background light of one unit does not necessarily have to be flash; it may be a floodlight for reasons of economy. Assuming that it is a floodlight, then the distance location of your floodlight is directly related to the shutter speed. At 1/25 second, the floodlight may be placed further away from the background than at 1/100 second. The further back your light is placed, the more even the illumi-

nation will be and the heat problem from the glowing flood lamp is not so great. In a similar manner, if you are using your flashlamp 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 underexposed. Therefore, even if you are given a choice of speeds for a single guide number, the selection of the speed to be used should be made and co-ordinated on the basis of understanding the complete lighting problem for the scene, rather than for just the one flash factor. The problem of balancing all your lights will be discussed at greater length in following chapters.

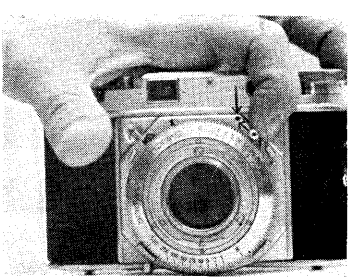
Note that Class F means fast action and that Class M signifies medium action. The names SM and SF have confused the public because both are Class F lamps. In speaking of Class F lamps note that the duration of its flash is 1/200 second. This means that even if a 1/25 shutter speed is used, the 1/200 action of the Class F lamp will still stop most actions.

Calculating Single Flash Exposure for Depth

With a properly synchronized flash unit, the Voigtlander 35mm camera is totally independent of any existing light conditions and photography becomes even simpler than with the old-fashioned box camera. With flash it is no longer necessary to wait for adequate light.



One hand release suggested for flash



Cocking the self-timer. Ideal for self-time flash.

You simply carry your own light with you, always ready for instant use.

Single Lamp Flash for Distances in Depth

When only one lamp is available to cover a great depth, this method is used to compute your exposure:

1. Determine the depth of your subject, e.g., if your subject depth is from 8 to 24 feet, the total subject depth is 16 feet.
2. Estimate your flash exposure for ¾ this distance; ¾ of the 16-foot depth equals 12 feet.
3. Add this ¾ distance to your nearest subject point. 12 plus 8 equals 20 feet. Calculate your guide number for 20 feet. Aim your flash at the 20-foot distance.
4. Focus for ⅓ the subject depth. ⅓ of 16 is approximately five feet. Add this figure once again to your near subject point. 5 plus 8 equals 13 feet.
5. With your factors Safe-Set, approach your subject until a sharp image is seen (this will be your 13-foot subject) and release your shutter at the peak of action. The single flash will cover the subject depth with as evenly exposed lighting as is ever possible with only one lamp.

The beginner and professional must make every picture count. As a definite help for a sure-fire, push-button type of photography, I recommend the Safe-Set method with the flash unit right on the camera. With this method, there are no variables. You pre-set your distance, pre-set your iris, and pre-set your shutter speed. All you need to do then is to approach your subject, set the focus, compose your subject in the ground glass, and as soon as the peak of expression is anticipated or seen, release the exposure lever. You will get a perfect picture.

Flashlamp and Flashtube Characteristics

Flashtube Adjustments:

X-Shutter

Class X or O-Delay (Bleed type). As electronic tubes have no ignition delay between the flare-up and the light, they flash instantly when a contact is made. Any X-shutter setting can be used. With the X-type shutter, a contact is closed when the shutter is wide open. At contact, the Strobe discharges completely because the closed circuit causes the condenser charge to bleed through the flash tube.

Non-X-Shutter Settings

Five millisecond delay.

Caution: This type of flashtube adjustment should not be used with an X-setting.

Certain relay operated electronic flash units may be used with shutters which have *F* or *M* settings. The relay is adjusted to fire the flashtube five milliseconds (1/200 second) after the relay is closed.

Twenty millisecond delay.

Caution: This type of flashtube adjustment should not be used with an X-setting.

This 20ms. relay-operated unit is generally used in conjunction with a solenoid. This 1/50 second delay type simultaneously starts the solenoid operating while the flashtube is timed to delay ignition until the shutter blades are open widest. A flashtube twenty millisecond delay gun may be used with any solenoid that is already adjusted for

M-X SHUTTER SYNCHRONIZATION

FLASHLAMPS: M Class	Name	Type	Lever at: X-Setting	Lever at: M-Setting
F Fast Acting	G.E.	SM	1 second to 1/100	Not recommended
	Sylvania	SF		
M Medium Acting	G.E.	#5,#11,#22	1 second to 1/25	1/50 to 1/500
	Sylvania	#25,Press 40, Press 50		
	Sylvania	#2	1 second to 1/25	1/50 to 1/100
S Slow Acting	G.E.	#50	1 second to 1/10	1/25 to 1/50
	Sylvania	#3		
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

a Class M flashlamp, without any additional changes of either the solenoid or the twenty millisecond flashtube gun.

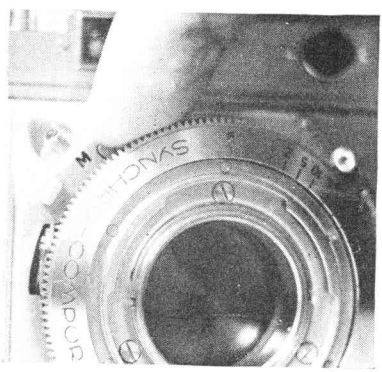
Flash Lamps

F—Class F (Fast Acting).

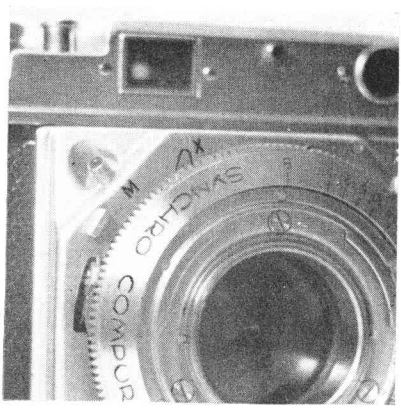
There is a five millisecond (1/200) heat-up delay before this lamp flashes. The G-E SM and the Sylvania SF are typical of this class. The flash itself lasts for 1 200 second and is often used at a slow shutter speed to stop the motion of a subject while permitting background lights to register more fully.

M—Class M (Medium Acting)

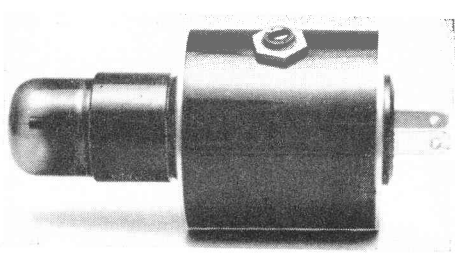
Twenty milliseconds (1/50 second) delay. G-E ※5, ※11 and ※2 and the Sylvania ※0, ※25, Press 40 and Press 50 as well as the



Setting the Flash lever at M



The Flash lever at the X-setting



Slave unit for wireless flashtube ignition (Speedlight Center, NY)

number 2 are typical examples of this type. The peak of the flash lasts for approximately 1/50 second.

NEW GUIDE NUMBER CALCULATIONS FOR MULTIPLE FLASH WITH BLACK & WHITE OR COLOR FILM

If two lights are used multiply Guide Number for 1 lamp by 1.4 e.f., #45 now becomes 63
If three lights are used the Guide Number for one lamp is multiplied by 1.6 so that #45 becomes 72
If four lights are used the multiplying factor is 2 and number 45 becomes 90

Sun as the Main Light:
Color settings with Ideal conditions

1/500 - f/2
1/400 - f/2.2
1/300 - f/2.5
1/200 - f/3.5
1/100 - f/4.5
1/50 - f/6.3*
1/25 - f/9

*Recommended basic setting

Color Sun-Flash Balancing - Sun as Mainlight

If flash is removeable:
Ratio Color Fill-in with #5B, 25B at 1/50 sec.

1:1	1:2	1:3	1:4
7	10	12	14

Set flash lamp from subject at

If flash is fixed to the camera; intensity is cut:

1/2 (2x) by 1 thin, clean white handkerchief

1/4 (4x) by 2 thin, clean white handkerchiefs

1/8 (8x) by 3 thin, clean white handkerchiefs

Sun as the Color Fill-in

Flash to subject-distance

#5B, 25B at 1/50 as mainlight	7	5	3¾	2½
Sun fills-in	1:1	1:2	1:3	1:4

N.B. Black & White Charts should be prepared separately based on the same rules.

Balance fill-in lights by

1-Change lamp distance with extension outlets.
2-Change reflector surface.
3-Change reflector size.
4-Change reflector focusing position if available.
5-Remove reflector (around 2 stop difference) for raw light effect.
6-Change lamp size.
7-Change shutter speeds to alter Effective Guide Number.
8-Change reflector position (feathering the light).
9-Use thin white handkerchief or spun glass diffusers, etc.
10-Alter shutter speeds with electronic flash because its Guide Number remains the same.
11-Bounce light from ceiling indoors, or from a cardboard reflector or wall outdoors.

THE RAPID f/ METHOD FOR FILL-IN COMPUTATION WITH ANY FILM

1. Determine your main light or sun light setting, e.g., f/4.5 at 1/50.
2. Your light balancing is now based on the f/4.5 setting:
   a. 1:1 ratio - The fill-in's light intensity must equal 4.5, therefore divide your f/opening into #45 if #5B, or 25B lamps are used, the result is the distance for placing the fill-in lamp, 10 feet.
   b. 1:2-1 stop less fill-in light is needed. One stop less than 4.5 is 3.5. So divide 3.5 into 45 for a 13 foot distance.
   c. 1:3-1½ stops less light compared to the f/4.5 main light is needed. f/2.8 is required so when 2.8 is divided into 45, the light, this time, is placed at 16 feet.
   d. 1:4-2 stops less fill-in or an f/2.5 equivalent. Dividing 2.5 into 45 results in an 18 foot lamp placement distance.

S—Class S (Slow Acting)

There is a 30 millisecond (1/30 second) delay in flashing. The G.E. ⅓50 and the Sylvania ⅓3 represent this most powerful class of flashlamps. The flash lasts for approximately twenty milliseconds.

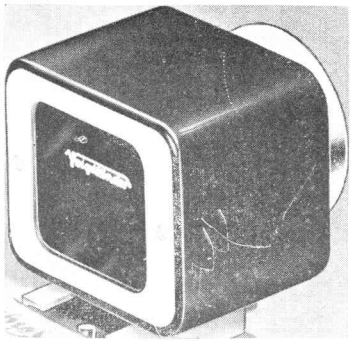
CHAPTER 9 / USEFUL ACCESSORIES

Your basic miniature camera provides at least 90 percent of the requirements for most picture taking. However, there are times when a Voigtlander 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 only.

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 will need it often and 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 optical accessories to be used at one time are numerous, the proper attachment of each is important.

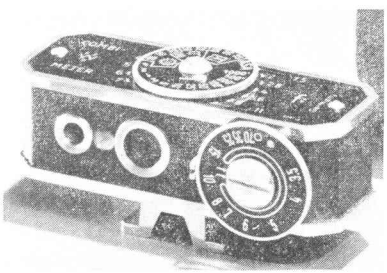
There may be as many as nine attachments, and the correct order is as follows:

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. Diffusion disc.
5. Retaining ring.
6. Filters. The Voigtlander filters are ground and polished to

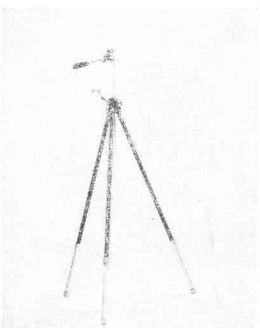


Kontur finder outlines the field of view full size

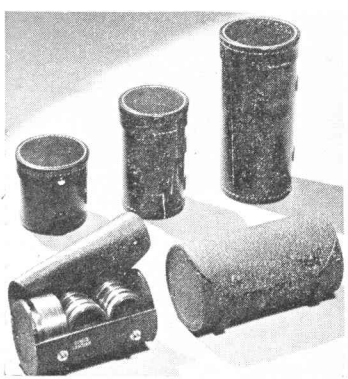
Convenient, accurate exposure meter



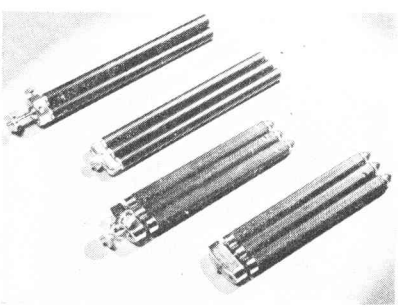
Auxilliary rangefinder



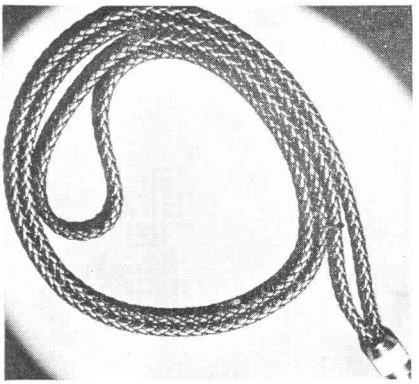
Elevating tripod



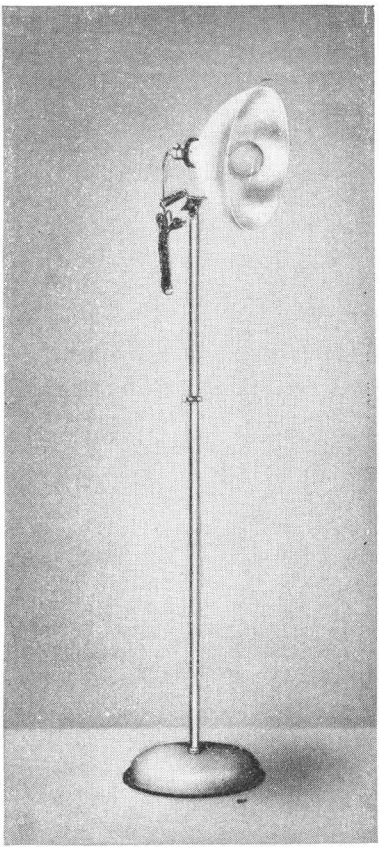
Filter carrying kits



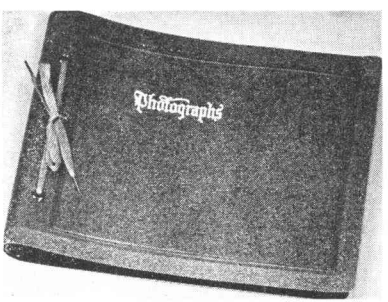
Handy travelling tripods



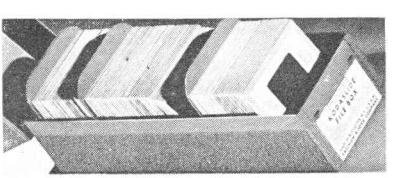
Camera carrying wrist strap



Varibeam Floodlight, floor model



Photographic album



Slide file

high standards. They are flat and parallel and will not produce image distortion.

7. Retaining ring.
8. Polarizing filter (Pola screen).
9. 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, 8 and 9, or 1 and 9. With this sequence, loss of light is minor and distortion is reduced to a minimum. However, more than two optical lenses are 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 (illustrations).
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 $1^{2}\frac{1}{32}''$, Series VI, etc.

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.
B (BULB)—At this setting, the shutter will remain open as long as pressure is maintained on the shutter release. Shutter closes when pressure is removed.
BETWEEN-THE-LENS SHUTTER—Blades or leaves of the shutter widen to open, then completely close to make an exposure. Located betwen the lens elements.
BLOWUP—An enlargement.
BOUNCE LIGHT—Light method using walls and ceilings to reflect light.
BRIGHTNESS RANGE—Permissible light-to-dark difference posible 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.

CAMERA, STEREOSCOPIC—Double camera, lenses set side by side with a separation of 65 or 70mm. Made so that the apertures and shutters operate simultaneously.

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 compositon.

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 raisng 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—Securing camera image sharpness for the lens at different subject distances by moving the lens forward or backward.

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 shades.

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 over-voltage.

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.

SAFETY-ZONE FOCUSING—Setting the distance scale at 18′ and aperture at f/8. Large subject areas are in focus at this setting.

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.

Stereo Terms

ACCOMMODATION—Ability of the eye to focus at different subject distances.

ALUMINUM SCREEN—Screen painted with aluminum paint. Maintains polarization and makes large-scale stereo prejection possible.

ANAGLYPH—Red and green combined single stereogram. When separate red and green colored gelatin lenses are worn over the eyes, depth perception is possible.

BINOCULAR VISION—Vision involving coordinated view of two slightly different scenes seen by each eye.

BREWSTER—The lenticular stereoscope as contrasted with the Wheatstone mirror type used for large X-rays.

CONVERGENCE—Turning inward of the eyes as one approaches a subject.

CYCLOPS—Single, centrally located stereo viewfinder.

DEPTH PERCEPTION—Ability to see three dimensions. Some people may have binocular vision but are unable to see depth.

EXTENDED BASE—Pictures taken with more than the normal 65mm interocular separation. An extended base is used for long-distance stereo (hyper).

FREE-VISION STEREO—Artificial three-dimensional device to produce stereo without the use of a stereoscope.

FUSING—Combining and blending two stereo images so that they appear as one and have depth.

HOMOLOGOUS POINTS—Similar subject points on each film of a stereo pair.

HYPER-STEREO—Long-distance stereo photography.

INTEROCULAR—Separation distance between two lenses of a stereo camera when taking a stereo pair. Also eye lens separation of the stereoscope (viewer).

INVERSION—Image reversal so that the right side of the body faces left. Not the same as pseudoscopic stereo.

LENTICULAR VIEWER—Stereo-viewer with positive convex lenses (Realist viewer), as differentiated from a prismatic or mirror type.

MASK, STEREO—Holding and framing device for stereo positives. Position of the mask determines the distance setting in space of the "window" effect.

MERGER, STEREO—Regular planar merger (indistinct image separation) is, generally, not possible with stereo. Mergers may take place at infiinity distances where triangulation ends and there is no depth perception.

MOUNTING JIG—Device for properly holding the film and mask for precise mounting.

ONE-FIFTIETH RULE—Calculation of the interocular separation by dividing lens-to-subject distance by fifty. The resulting number is the separation spacing of the two lenses.

OPTICAL TRANSPOSITION—Correction of the right and left view by optical means without cutting the roll of film.

OUT-OF-HORIZONTAL—Greater than normal spread of two homologous (similar) points of an image of a stereo pair. When the separation is greater than 65mm, the eyes can not both turn outward so that fusion (viewing) is impossible.

PRISMATIC VIEWER—Use of prisms permits 85mm homologous point subject positives with a 65mm principle prism point eye separation.

PSEUDO-STEREO—False stereo; stereo-like effect.

PSEUDOSCOPIC STEREO—Untransposed stereo; right eye sees left view and vice versa. Result shows foreground and background reversed. Confusing at first; may be difficult to detect.

REDUCED BASE—Stereo taken with less than a 65mm lens separation.

RELIEF, STEREO—Depth in stereo views.

ROTATING STAGE—Device to permit subject rotation between exposures, while maintaining perfect horizontal and vertical alignment.

SHIFT BAR—Device for shifting the camera between exposures. Used for hyper- or hypo-stereo.

STEREO-BASE—Lens-separating distance between the two exposures of a stereo pair. Normally used with a 65mm to 70mm interocular.

STEREO-PROJECTION—Direct viewing by means of a photo-optical device which permits many people to see stereo at the same time. Polarization is the most popular method.

STEREO-REFLECTOR—Multiple-mirror reflecting device (Stereotach) which permits the taking of two separate views with a 65mm separation on one film frame. Requires a special viewer, or may be cut apart for mounting on a Realist mask.

STEREOGRAM—Mounted stereo ready for viewing.

STEREOSCOPE—Stereo viewer.

TABLE-VIEWER, STEREO—Small size stereo projector specifically designed for table viewing without the need of a darkened room.

TILTING STAGE—Special microscope stage used to hold microscopic slides and angle them between exposures.

TOE-IN—Inward movement of the eyes (convergence).

TRANSPOSING—The correct re-alignment of the right and left stereo view for its specific eye. Stereo must be changed from the order that the camera produces to prevent pseudoscopic stereo.

TWISTER—Stereo positve which is improperly aligned from the horizontal and vertical, and which rotates in addition. Generally unviewable.

VECTOGRAPH—Single-sheet, direct vision stereogram. Must be viewed directly with polarizing glasses, or by projection onto an aluminum screen.

WHEATSTONE—Angled-mirror viewing device which permits the use of large-size stereos.

WINDOW-EFFECT—Space placement of a window on a stereo at any desired distance positon by definite mask cutting.

X-RAY STEREO—Produced by shifting the X-ray tube between two separate exposures on two pieces of film. When very large, requires a Wheatstone viewer. May be copied to a smaller size for Realist viewing.

CHAPTER 10 / FILM FOR BLACK-AND-WHITE PHOTOGRAPHY

Film consists of a layer of cellulose acetate, or other resin, acting as a base to support a complex gelatin emulsion composed of sensitized silver salts mixed with minute quantities of sensitive conditioning chemicals. Black-and-white film differs from color film in that the former generally has only one layer. While this one layer may be made sensitive to one or more colors at the same time, it is itself not color forming.

By the color response of black-and-white film, we mean the relative brightness in shades of gray that the film will show in recording the different colors of the spectrum, as compared to their true color visualization by the human eye. This is made clearer upon describing the three main black-and-white film types.

Panchromatic, Type B. Approximates the color sensitivity of the eye.

Blue sensitive. Activated fully only by blue light. Color blind to other true colors.

Infra-red. Sensitive to deep red and invisible red rays that the eye cannot see visually.

With this information you should be able to choose the right film for the right job. If you are copying newspapers, then only the blue-sensitive, fine grade positive film would be necessary. If you desire a mural from an outdoor architectural motif, then a fine grained (ASA25) or a micro-type emulsion (ASA8) would be the logical choice. For the beginner I suggest an ASA50 film such as Plus X because it combines speed, grain and color response.

As with any new field, you should first learn to use one film and one developer so that you may standardize your results for general picture taking. Later, you can use the special emulsions for the specific problems for which they were formulated. Here again, learn to use them under standardized conditions so that you may be always assured of a uniformity of result.

BLACK-AND-WHITE FILM

Film	*Color Sensitivity*	*ASA* D	*ASA* T	*Kodak Developer*	*Time* Condenser	*Time* Diffuser	*Use*
Kodak Plus-X Supreme Superior 2	Pan B	50	40	D-76 Microdol Liquid/DK-20	11 12	13 14	All Around
Kodak Finopan, Superior 1	Pan B	25	20	D-76 Microdol Liquid/DK-20	9 10	11 12	Fine detail, contrast stereo
Kodak-XX; Superior 3; Ultra-Speed Pan	Pan B	100	80	D-76 Microdol Liquid/DK-20	13 15	15 17	Extra speed
Kodak Direct Positive	Pan B	64	50	Home Kit	--	--	One-step Slides; stereo
Bulk only Kodak Positive	Blue Sensitive	--	3		7	9	Black-and- White Copying
Kodak Micro-File Micropan, Minipan	Pan B	--	37	D-11	5 min.	6 min.	Finest grain
Kodak Infrared only with Kodak Wratten Filter No. 87 No. 25(A)	Infrared	--	 4 3	D-76 Microdol Liquid or DK-20	 9 10	 11 12	

N.B. Pan B film with a Kodak Wratten Filter (2x) outdoors and a Kodak Wratten X-1 Filter (4x) indoors will duplicate in a gray scale the true color sensitivity of the eye.

CHAPTER 11 / FILTERS FOR BLACK-AND-WHITE PHOTOGRAPHY

A filter may be defined as a separating or screening device which permits only specific colors or light rays to enter the camera lens while preventing undesired colors or rays from reaching the film. Filters for black-and-white photography serve many purposes when used with the many black-and-white film emulsions.

1. *Corrective.* Since an emulsion can only approximate the speed or color reaction of the human eye, there will always be a need to correct the response of the film so that it will approach the relative visual brightness through shades of gray that we see with our eyes. If we saw our world only in shades of white, black, and gray instead of colors, we would then be able to approximate the same tone scale as black-and-white film when it is activated by different colors.

2. *Contrast.* Another function of the filter is to distort color rendition of an emulsion for a dramatic or spectacular effect. Most night effects can be made during the day by the proper selection of filters. Contrasts may be accentuated to any end of the gray scale so that the tonal range may be either compressed or expanded.

3. *Polarization.* The polarization filter, because it transmits light vibrating only at a certain definite angle, helps to eliminate glare, purify colors, increase contrast and darken skies.

4. *Neutral density.* Many other emulsions are manufactured to a very high speed so that some means is required for certain taking phases, to actually reduce the amount of light entering the lens. If a filter is used to reduce the number of rays which enter the lens, it is necessary that it will maintain the correct color rendition of the subject. This is accomplished by using gray-toned filters which are graduated in density to reduce the amount of transmitted light without distorting colors or light values. They merely reduce the total amount of light entering the lens so as to permit a desired exposure when a very narrow opening is not possible, or a very high shutter speed cannot serve your purpose.

There are four filter types:

1. *Gelatin.* Where a large number of filters is needed for experimental work, gelatin filters are excellent because of their low price and easy adaptability. However, they require great care in handling because they show fingerprints and dust specks which are difficult to remove. Also the gelatin will frequently warp in a humid atmosphere if the filters are not stored properly.

2. *Cemented.* These filters are the most popular as they are inexpensive, function well, store easily, and can be kept clean because of the protective outer sides of glass.

3. *Dyed-in-the-mass glass.* These are the most durable filters, but careful selection is necessary to assure full color uniformity, duplication, and matching in sets.

4. *Water Cell.* This type of filter can be made by dissolving certain color chemicals in distilled water, and then placing the solution in a glass water cell. They may be used in front of hot lights so that the cell will function, in addition, as a heat-absorbing medium.

Coating filters with a thin layer of magnesium fluoride is a recent development. While coated filters are desirable, it is well to remember that many great pictures were taken before the advent of coated lenses. A coated filter, in itself, will not automatically produce a masterpiece. Great effort will always be required to create something that will be more than a snapshot.

With the exposure latitude of present day black-and-white film, the actual exposure with a filter over the lens is not too critical. You may overexpose or underexpose two stops either way and still get an excellent picture. Therefore, there is no need to compute each filter factor to precisely two or more decimal points.

Since a filter will admit only light of its own color, the color that is the same as the filter will be darker on the negative. Where the filter has excluded or rejected any color rays, the negative will be light, because no rays of this color enter the lens and expose the film. When this negative is printed, the heavy tones (the same color as the filter) will be light on the positive print, while the clear portion of the negative will print a dark gray or black, producing areas of shadow. From this information you can gather that to lighten a color you should use a filter of the same color while to darken the color you should use a filter which prevents any of the color to be darkened from reaching the film.

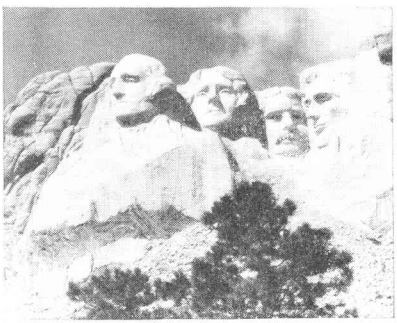
The chart in this chapter will give you all the required information to lighten or darken a subject's color by means of the appropriate filter.

It is important in making exposures to understand filter factors. Every piece of glass in front of your lens will absorb and prevent some light, however small, from reaching the emulsion. Since light is absorbed and excluded, you must compensate in some way for the rejected light that does not reach your emulsion, or your developed film will be underexposed. The additional exposure that must be given

Yellow filter effect (2x)*

Orange filter (3x)*

Green filter (4x)*



Red filter (8x)*

*Courtesy Eastman Kodak Company.

for each filter is known as the filter factor. You know that a red filter will hold back so much light that eight times the normal exposure must be given. A one-second exposure without a filter becomes an eight-second exposure with a red filter. Some technical filters have exposures of thirty times or more. You can see that unless adequate exposure compensation has been made for the additional light that is needed, forgetting a filter factor may ruin your picture.

Know the effect you want, and then use the proper filter to secure it. Do not over-filter, else the extra exposure will eliminate the desired tone or fine detail. Properly used, filters can become a valuable aid in interpreting your subject. "Shoot" a landscape with various filters, and you will be amazed how different the same scene can appear.

The Safe-Set Method for filter use is simple in that your filter factor is corrected on your emulsion speed setting of your exposure meter, chart, etc. So that if your filter factor is two, divide the emul-

BLACK-AND-WHITE FILTER INFORMATION

The Subject Color	*To Lighten a Color*	*To Darken a Color*
VIB (violet,indigo,blue)	C-5	B
G (green)	B, G, or X-1	
Y (yellow)	K1, K2, G, or A	C-5
O (orange)	K1, K2, G, or A	C-5
R (red)	F, A, or G	C-5

FILTER FACTORS *for Panchromatic Emulsions, Type B*

Kodak Wratten Filter	*Sunlight*	*T-Tungsten*	*Uses*
K-2 (Yellow)	2	1 1/2	Produces normal skin tones, clouds (panchromatic film only)
G (Orange)	3	2	Darkens blues (sky tones, etc.), dramatizes outdoors
X-1 (Green)	4	3	Lightens foliage, separates different greens
A (Red)	8	4	(Panchromatic and Infra Red only) Blackens skies, night effects in daylight
Neutral Polarizing Screen	2	2	Reduces glare, increases contrast, darkens skies.

N.B. Remember 2, 3, 4, 5 factor numbers for the standard black-and-white filters. Never over-filter.

Black-and-White Filters recommended for photography *cannot* be used with color film. Of the Filters included in the above table, only the neutral polarizing screen may be used with color film.

sion speed by two and use this new number on your calculator. In this way you will not have to be concerned with new calculations for each exposure. With the same filter in place, your exposure readings are made in a one-step direct procedure. In this way the pre-setting method reduces your chance of error and makes photography easy.

CHAPTER 12 / 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.

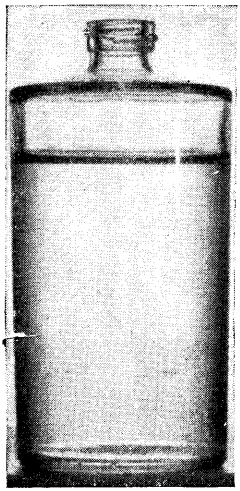
There are two types of daylight development tanks available:

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.

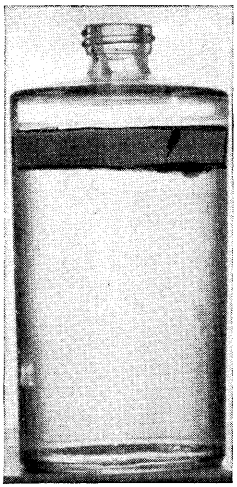
2. *Reel type.* The reel type must be carefully loaded to prevent any buckling of the film. It is the more popular type of development tank in use. Here, too, your agitation should include shaking and turning the tank in addition to moving the reel by the core rod. Core rod agitation is not sufficient 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

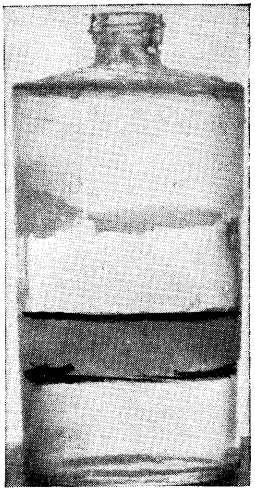
DEVELOPER	Chemical - Grams	Elon (Metol)	Sodium Thiosulfate	Sodium Sulfite	Hydroquinone	Borax	Kodalk	Sodium Thiocyanate	Potassium Bromide	Sod. Carb. Mono.	Acetic Acid 28%	Chrome Alum	Boric Acid Crystal	Potassium Alum	to Water	REMARKS:
DK-20		5.0		100			2.0	1.0	0.5						1000	Finest grain.
DK-20 R		7.5		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-76 R		3.0		100	7.5	20.0									1000	1 oz. to a roll.
D-76 F		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.



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 fix 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 69.

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.

But since there is no other process available at the moment, the manufacturers and processors take as much care as possible to maintain a high color standard.

6. Special table transparency frames (Lumax) are available. They reflect the room light from the ceiling onto the transparency by means of an aluminum surface which is placed behind the transparency at a light-catching angle. The picture size that you see is limited to the size of the transparency.

7. *Diaversal Prints.* With the Diaversal process, a direct positive may be made from the transparency without the need of an intermediate negative. With this process, wallet-size prints may be made and duplicated ad infinitum. Larger pictures can be made as easily as black-and-white enlargements.

Slide Presentation

The presentation of your slides for viewing is very important in maintaining the interest of your audience. You must become a showman and make your pictures tell the story. Write a script which will co-ordinate your slides so that they have a unified effect. If the script is long and difficult to remember, then tape record it for your convenience. Once you have edited your slides and script, you can expect to receive many invitations to put on your show. When this happens you will know that, as a photographer, you have "arrived."

CHAPTER 22 / STEREO AND STEREO PROJECTION

Thirty-five millimeter stereo (three-dimensional photography) has been a continuing source of interest to photographers and has provided a field for a good deal of experimentation. The owner of a 35mm camera is fortunate in that his standardized taking and viewing equipment (Realist or Veriscope viewers; Leitz or Rolleiflex shift bar) is suitable for stereo photography.

Why do you see depth with stereo? This is the question most frequently asked about stereo photography by the beginner.

This is the explanation: You have two eyes. The separation of the eyes generally is 65mm (2⅝ inches). Because of this, each eye does not see exactly the same scene as the other. Since the eyes are separated by 65mm, the view of each eye is offset by this separating distance. This difference in viewpoint is known as parallax. If you

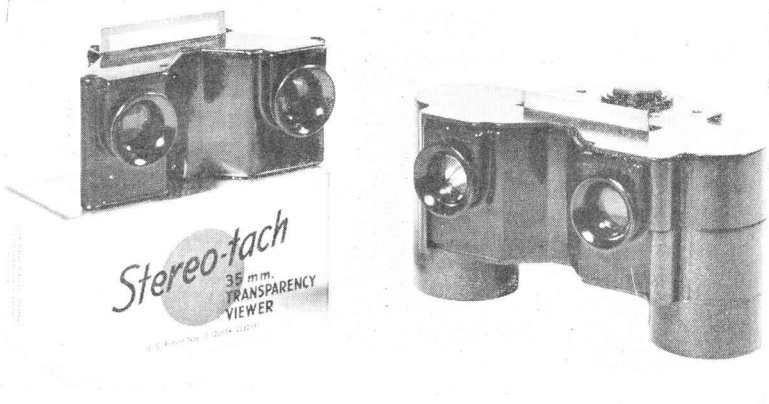
have ever fired a gun, you realize that you must correct for the difference between your line of sight and that of the bore of the gun muzzle. If you do not compensate for this difference, you will always miss your target if your eye cannot be made to see the same view of your target as the gun bore. It is precisely this difference in viewpoint (parallax), however, that makes depth perception possible with stereo. Because when each eye records and transmits a slightly different viewpoint to your brain, a fusion of the two images occurs. The result of the fusion and co-ordination of the different viewpoints into a continuous smooth picture is depth perception.

With one eye, you can see only a flat picture because there is only one viewpoint. If you take two pictures which are exactly alike without moving the camera at all and view them in the stereo viewer, the scene will still be flat. You must "triangulate"—that is, you must see each scene from two different points of view in order to be able to duplicate the depth effect of your eyes. Depth perception is possible only when the two images are taken from two different viewpoints. The difference in viewpoint may be minute, as little as one tenth of an inch apart for close distances. On the other hand for long distances, the separation for the two different exposures may be yards or even miles. There are formulas for calculating the taking separation distances. You will be shown how to calculate the distance between paired exposures so that you may be able to produce excellent depth perception for any distances.

You can take stereos with your 35mm camera by any of the following practical methods:

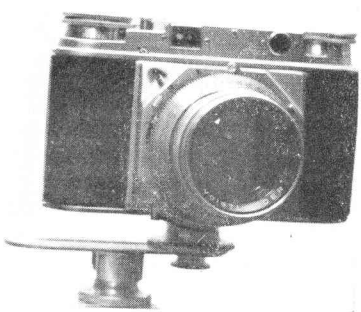
1. *1/50 Formula (Projection)*—1/25 (viewing) shift bar for still subjects only. The theoretically ideal stereo effect has been calculated to result from an inter-lens separation which is 1/50 of the camera-to-subject distance. As you come closer to the subject (24 inches or less) this formula number for the separation must become greater in order to secure a better modeling of the subject.

When the camera is used according to the shift-bar formula, the ideal method is by the use of a horizontal format because the border of the film is an excellent reference point for aligning your film when it is ready for mounting. However, a full frame is not recommended because the standard stereo size has become 24x24mm. Therefore, your composition must be calculated for this area. This is simply done by masking your viewfinder with clear scotch tape. $\frac{1}{6}$ the horizontal dimension in from each side. The central $\frac{2}{3}$ portion now will show the exact field for the 24x24mm size.



Stereotach Illuminated Viewer

For Stereo pictures.



For Stereo pictures.

After each frame has been cut, rule a line through the center of the edge only. This will give you a center point for aligning your positives.

In mounting your slide, it is important to separate your left and right views. They must be correctly placed on a mask else a condition known as a pseudo-stereo will result. A pseudo-stereo is unacceptable as it can cause eye fatigue.

You make your stereo pairs by using your camera on a sliding shift bar for two separate exposures. With this bar, the 1/50 formula is used in the following way. You measure your subject-to-lens distance. If the subject is 40 inches from your lens, the interocular distance between exposures will be 4/5 of an inch. You focus and compose your picture and then ready the camera for the exposure. Then,

shift the camera to the left for half the needed distance (2/5 of an inch for this example), take your picture, rewind it and again cock your shutter, etc. Then shift your camera to the right for the full distance. In this way, your viewed image will be exact and the distance shifted will be correct. It is important to understand that only by shifting equally on both sides of your center point will your viewed image and your final stereo be alike.

If the subject-to-lens distance is 20 inches, then the separating point will be 2/5 inch, etc. In using a shift bar you must remember the sequence of the exposures that are being made. You must also remember to change your supplementary lenses as you come closer in order to keep your subject in focus. In addition, you must correct for viewfinder parallax at close distances. If you intend to take many close-ups, then you may construct a permanent stand with markings for the exact focusing distance. Should the depth produced by the 1/50 shift prove inadequate for your needs, then you may try a formula based on 1/25 or 1/12.5 distance. This will increase the separation of your two exposures. The increased separation will produce a greater amount of triangulation, and this in turn will produce the greater stereo effect.

2. *The Stereo-tach Reflector Method.* This unique device is the most practical method for the amateur. The Stereo-tach system consists of four front-surfaced mirrors which are so arranged that two separate images are formed from two differing viewpoints separated by the normal inter-eye distance of 65mm. Both of these different images are formed on only one full film frame (24x36mm). Each image size, half of the pair, is approximately 18x24mm. The use of the Stereo-tach is economical because both images are formed together on only one full frame. In order to view this Stereo-tach transparency, the special Stereo-tach viewer (which is a reverse of the taking mirror arrangement) must be used. However, each frame may be cut apart and the halves remounted in the standard Realist type mask. The recommended taking distance with the Stereo-tach is ten feet. At shorter distances, the angles of the subject reflection from the mirrors form images which are difficult to view. Since both pictures are taken at the same time, the Stereo-tach method is suitable for taking moving subjects.

If the camera lens mount rotates in focusing, the Stereo-tach will rotate with the lens and will produce a poor stereo. You can minimize lens rotation in focusing by the use of your hyper-focal distance or depth of field scales. Set the distance, etc., according to the Safe-Set

Method and be sure the Stereo-tach is perfectly level on the camera. You may use the Stereo-tach viewfinder, or you may mask your camera's viewfinder with two pieces of scotch tape so that each will cover ¼ the horizontal measurement of your viewfinder; the middle half in the center will be clear and is the only portion used for composing your stereo picture.

A limitation of viewing stereo with a hand viewer is that only one person at a time can view your transparency. The best method of mass viewing is by the use of polarizing materials and spectacles. These polarizers are placed over each separate view in the optical system, so that one eye will see its polarized view at one angle and the other eye will see the other polarized view at the opposite angle. Coordinating polarizing spectacles are worn over both eyes which permit each eye to see only its own respective view without any interference from the other eye's image. When each eye sees its specific view only, the brain fuses the two images so that you see the subject in depth.

There are three methods for stereo projection:

1. Using the Stereo Realist or TDC Stereo Projector. These are two-lens projectors. Each lens projects only one polarized image. Either projector will take up to the full 35mm 24x36mm size, and the resulting projection size may be as large as 5 feet by 5 feet.

2. Taylor Stereo Table Viewer. This is a small projector, conveniently designed for table use with regular room light.

3. Since you view the Stereo-tach transparency by reversing the taking device (the Stereo-tach viewer), projection is likewise possible by projecting your scene back through the Stereo-tach taking device. *But this image synthesis (re-forming) is possible only if the projector lens has the same focal length as the camera lens.* If the stereo was taken with a 2-inch lens, it must be projected with a 2-inch lens, so that the proportion of taking and viewing perspective are carefully maintained. If you try to use a projection lens of longer or shorter focal length than was used on the camera, your two screen images (from each stereo half) will be so far apart that your eyes cannot fuse the separated images to re-form the picture in depth.

Only the polarization method of projection will permit color to retain its true identity. Many people claim that color is the only thing that makes our everyday surroundings interesting. By using your 35mm camera for stereo, you are able to recapture this interest in a life-like form. No matter what taking method is used, stereo always is worthy of a trial. Its real-life quality and dramatic depth will enable you to realize another potentiality for pleasure with your camera.