

BASIC FLASH PHOTOGRAPHY

Don Mohler General Electric Co.,

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The FUNDAMENTALS OF:

**Flash Selection
Camera Synch.
Flash Guns
Reflectors
Extension Flash
Exposure Guides
Corrections
Personalized Exposure
Shadow and Glare Control
Deep Subjects
Bounce Light
Flash fill in Sunshine
Big Bulbs, Large Areas
Triangle Lighting
Multiflash**

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FLASH PHOTOGRAPHY

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[Photography with flashlamps is one of the most widely used and practical methods of taking pictures. Basic techniques for using single and multiple flash are explained in this article, and open flash, bounce lighting, exposure, reflectors, cameras, and daylight flash are described.]

• Also see: *Electronic-Flash Lighting and Exposure; Flashlamp Characteristics; Lighting Sources for Color; News Photography.*

FLASH IS USED TO GET PICTURES IN any surroundings, regardless of prevailing illumination or the lack of it—to balance lighting, to give lighting direction, to gain control of illumination and exposure.

Flashbulbs are used in flash holders, flash guns, or in flash attachments equipped with a reflector. When these are fixed to the camera there is no problem of aiming the light: it points where the camera points. This serves the purpose if flash photography is used simply to make quick and easy record pictures of people, places, and events. To this end, flash on the camera is the best guarantee of a picture every time for amateurs as well as for newspaper photographers. But lighting will be monotonously flat.

How much light you get and how well it covers the scene depends on the reflector as well as on the bulb. Well-designed, good-sized, polished reflectors will concentrate eight times

Flashlamps or electronic flash often are used in studio set-ups when working with animals or children who may have to be "caught" with a fast shutter. The set-up may be arranged using photoflood bulbs to set the exposure and position the lighting. The models then may be placed in the scene after flashlamps have been substituted for the photofloods. The fast flash will catch just the right moment wanted for the photo.

as much light in a forward direction as will the bare bulb without a reflector. Satin-finished and folding-fan reflectors generally give four times as much light as a bare bulb. They spread the light more, so aiming is not critical and there is enough coverage for use with lenses of moderately wide angle. Reflectors that are made quite small and shallow for portability and convenience may put only twice as much light into the picture as would a bare bulb.

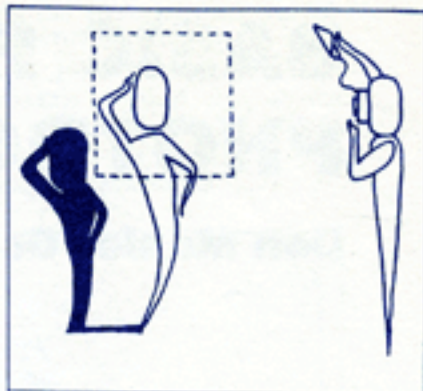
There are some 30 types and sizes of flashbulbs available. Three sizes—midget, miniature, and sub-miniature—account for 90 percent of flash use. Two types, clear bulbs for black-and-white photography and blue bulbs for daylight color films, are available in all sizes. One type and size, best suited to the photographer's equipment, method, subject matter, and desired results, is generally selected and standardized by the amateur photographer for all work.

EQUIPMENT

Equipment too is standardized: one flash holder, one camera, one lens, one film. Complicated subject matter should not be attempted at first. Mastery of elementary flash technique depends upon standardization of all possible variables, and with this foundation variations for special purposes can be attempted later.

The basic tools for flash photography, whether with flashbulbs or with electronic flash, are: 1) Adjustable camera with built-in synchronization; 2) Flash holder; 3) Three-foot extension cord; 4) Data guides; and 5) Tripod.

Flash camera. A fully adjustable camera is essential to serious photography, with its control of focus, aperture, and shutter speed. This is as true of a camera used for flash photography as of one used for other purposes. To use flash at all shutter speeds, a synchronizer is necessary. This is usually a timing-switch mechanism built as an integral part of the camera shutter. The device sends current to the flash so that the shutter is open during the few thousandths of a second



High positioning of flash throws shadow down and out of picture area.

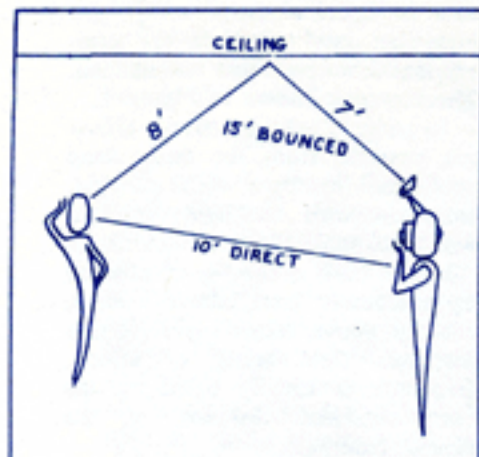
when the flash is at full output.

For shutters at, in, or near the camera lens, this is called "M" synch. For focal-plane-shutter cameras, this is called focal-plane synch. "X" or "F" synch is limited to slow shutter speeds with flash and is usually found on simple, non-adjustable cameras.

Flash holders. The flash holder preferably should have a removable or folding reflector so that bare bulbs can be flashed to reduce the light when working very close, to weaken the forward light when not too much flash is wanted in combination with existing lighting indoors, or to gain the brilliancy of small highlights and sharply edged shadows characteristic of bare-bulb photography. Bare flashbulbs should be covered or enclosed in clear plastic as protection against the slight possibility of a weak or damaged bulb shattering when flashed. Another highly desirable feature of some flash holders is an "open-flash" button which allows bulbs to be fired manually and independently of the camera.

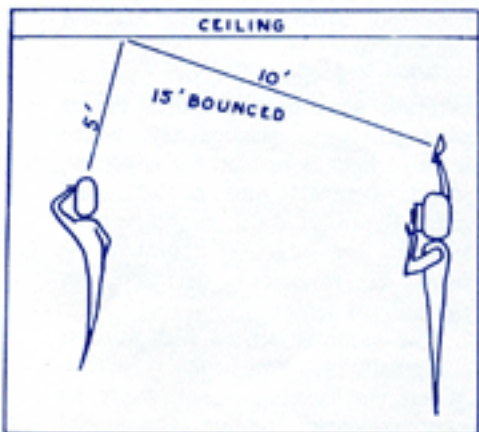
Extension cord. The three-foot extension cord is essential to flash control. With the flash holder connected to one end of this wire and the camera to the other, the flash can be fired at arm's length from the camera. It can be used high, low, or to the side. It can be aimed far or near, or can be directed to the floor, ceiling, or side walls for indirect, bounced-light effects.

Flash data. Exposure data for all shutter speeds, flashbulbs, and films is available from lamp manufac-



Above: Bounce flash directed halfway between camera and subject.

Below: Bounce flash aimed just above the subject.



turers. Sufficient information cannot be obtained from the abbreviated data on lamp packages or from the instruction sheets packed with films. The particular information needed for any combination of camera, lamp, reflector, film, synchronization, and shutter speed can be taken from the data booklet, which is updated periodically as products change or new products are introduced.

Tripod. A tripod is essential to all serious photography. With flash it allows you to aim, frame, focus, set, and anchor the camera. The photographer then can concentrate on controlling the lighting effect and directing or watching the subject.

MALFUNCTION

Photoflash lamps ordinarily function with great reliability and uniformity. When they do not, it is

a relatively simple matter to find and correct the trouble. Except in the rare case of an imperfect or damaged bulb, trouble will be due to weak batteries or poor electrical connections.

With the flash holder off the camera, check the batteries. This and all other tests can be made with a small clear filament test lamp available in sizes to fit all photo-flash sockets. It should light up or give a quick blink of light on strong batteries when a bit of wire is touched across the flash holder-outlet terminals. If it does not light, check the flash holder itself for weak physical contact at the battery ends, or for corrosion. Tighten or clean the damaged part.

Next check cords and connectors. If the test lamp blinks weakly or not at all, look for loose or broken parts between flash holder and camera. Finally check the camera itself. With the flash holder connected, test lamps should light or blink when the shutter is operated.

EXPOSURE

The amount of flash light on the subject depends upon the distance between flash source and subject. At distances of seven to ten feet, small flashbulbs give illumination fully equal to direct sunshine. Since light intensity varies with the distance between light source and subject, an adjustable camera is needed so that uniform exposure can be had over a range of flash-to-subject distances.

The bedrock of elementary and advanced flash techniques is pinpoint exposure control. The constant point of reference is the exposure guide number. Five of the nine variables involved in optimum exposure are accounted for in each exposure guide number. To find the correct number in a table of guides, make cross reference to the data for the flashbulb, reflector factor, speed rating of the film, type of synchronization, and shutter speed employed.

Having located this guide number, use it to find the correct stop for all lamp-to-subject distances. For instance, if using a number M5 flashbulb, three- to six-inch polished

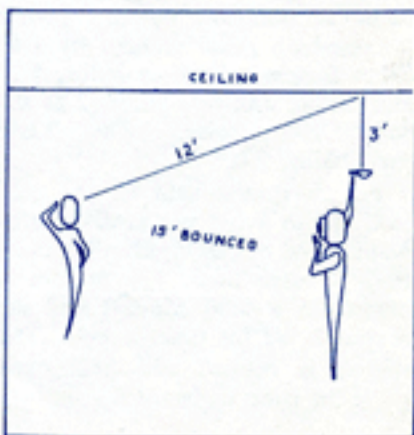
reflector, film rated ASA 40, M synchronization, shutter speed of $1/200$ of a second, the exposure guide number is 110. Dividing this by ten, for a ten-foot flash-to-subject distance, gives 11—for an indicated stop of $f/11$. By dividing the guide number by five for a five-foot distance, the stop is $f/22$. At 55 feet, $f/2$.

EXPOSURE CORRECTION

The lamp-to-subject distance becomes more and more critical as a factor in exposure the closer you get to the subject. An error of plus or minus ten inches in measuring distance at five feet lamp-to-subject distance makes a difference of a half stop in either direction. With a guide number of 110, for instance, the indicated correct opening at five feet is $f/22$; at 5.8 feet $f/19$, halfway between $f/22$ and $f/16$; at 4.1 feet $f/27$, halfway between $f/22$ and $f/32$. To put it another way, there's a spread of one full stop in the 20 inches between 4.1 feet and 5.8 feet.

Lamp-to-subject distance should be measured exactly. When the distance is less than seven feet, a tape should be used to measure it down to inches. If you use flash quite near the camera, you can measure the distance by focusing the camera sharply on the subject and reading the focusing scale.

Once the camera is set at the correct f -stop according to the guide number, three more variables—



If the bounce flash is aimed directly overhead, open up the diaphragm another stop.

surroundings, subject matter, and results desired—must be taken into account in pinpoint exposure control.

In small highly reflective surroundings, such as a bathroom, as much as one half stop less exposure than is indicated by the guide would give better results. In large or dark-walled surroundings, such as an auditorium or gymnasium, or outdoors at night, a half to a full stop more than indicated exposure might be necessary. A very light subject, such as a white kitten, calls for a bit less exposure than a dark one, such as a dirty engine.

And finally exposure is varied according to the results desired. Exposure might be increased somewhat to play safe, rather than risk a too-thin negative. On the other hand, for optimum print quality and considerable enlargement, the best exposure might be the minimum that would barely capture detail in the shadow areas.

To compensate for all these on-the-scene variables, the serious photographer will bracket his exposures by making one picture at the indicated correct stop, one at a half to a full stop less, and one at a half to a full stop more. The method used depends on whether he is exposing transparency material, where small adjustments make noticeable differences, or exposing negative material, where there is some room for final adjustment when making the print.

One last correction. At flash-to-subject distances of seven feet or less, underexposure will result even though allowances have been made for all nine variables listed above. This is because the lens-to-film distance is increasing as the camera is focused closer, thus upsetting the true *f*-stop value toward the underexposed side. Also the relative amount of light reflected into the picture area by walls, ceiling, and surroundings will be less as the light source is moved close to the subject.

Rather than calculate the necessary allowance for close use, the practical answer of many working photographers is to bring the flash one foot closer to the subject than calculated. This makes a quick, reliable correction. For what nor-

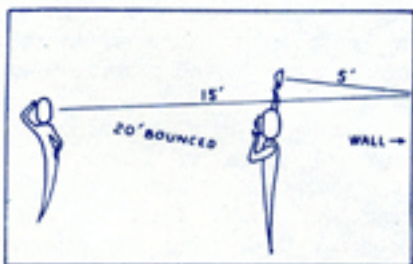
mally would be a seven-foot shot, the flash would be used at six feet; on a five-foot shot, set the flash at four feet. If the flash is anchored on the camera, calculate the *f*-stop by adding one foot to the true flash-to-subject distance before dividing the guide number.

GUIDE, APERTURE, DISTANCE

Two thirds of the value of an exposure guide number is wasted if it is used only to determine the calculated *f*-stop at various distances. There are other uses for the relationship of guide number (*G*), aperture (*A*), and distance of flash to subject (*D*).

Dividing *G* by the largest aperture on the camera gives the maximum shooting distance, wide open. Or if a given stop is selected to control depth of field, then dividing *G* by this *A* will tell exactly what *D* should be for normal lighting.

Also $G = A \times D$. If a series of test pictures are flashed from the same ten-foot distance, starting at

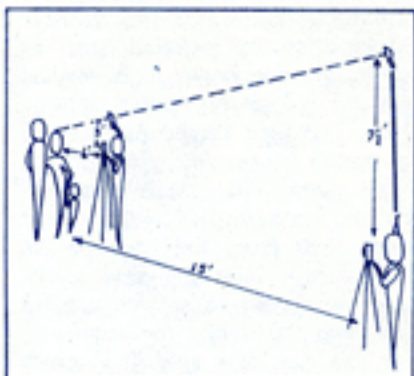


Flash bounced off a vertical surface.

one *f*-stop less than the published guide number indicates and continuing at half-stop increments up to one full stop more than the indicated aperture, the results will show the best exposure for the individual reflector, shutter action, and synchronization. Multiplying the *D* of ten feet by the *A* used on this shot gives the *G* best suited to the combination. If this is different from the published *G*, divide one by the other to get a personalized correction factor applicable to all other guide numbers.

For example, in testing a guide number of 80, suppose the best personalized exposure guide calcu-

lated by the above method was 63. ($63 \div 80 = 0.78$.) Multiply all other published guide numbers for bulbs of the same physical size, shutter speeds, or film speeds by 0.78 to correct them for use with that specific tested equipment.



Off-camera flash should be used one half as far above camera as camera-to-subject distance.

SHADOW AND GLARE CONTROL

The best position for the flash is rarely at the camera, aimed straight ahead. A three-foot connecting cord between flash and camera unshackles the flash. The camera is operated with one hand, preferably from a tripod, the flash aimed with the other.

When taking a straight-on picture, use the flash high and to one side to throw background shadows low and to the other side. Use flash nearly touching the camera lens, and the picture will be almost shadowless. Use it low to throw the shadow high behind the subject for an unusual, sometimes grotesque, effect. With two or more people in the picture, the safest position for the flash is high, directly above the camera lens. By this method no face in the group will be shadowed by the others.

When light is directed straight at a smooth, polished surface such as glass, metal, or wood paneling, a hot spot of glare is reflected. A shift of position, placing the surface at an angle to the light, avoids reflection into the lens. Often overlooked is the glare from a clear window located behind the principal subject, or from eyeglasses. If subjects with glasses are directed to turn their

heads slightly, the glare will be deflected. If they must face squarely into the camera, a flash high and to one side will eliminate the glare.

DEEP SUBJECTS

A properly aimed flash is practically the only solution to photographing scenes where objects near and far must be included, such as groups, interior views, high vertical subjects, and people seated at long tables. The light should be elevated and aimed at, or over, the far part of the scene. The center beam will light the furthest parts, while weak spilled light from the edge of the reflector will light the near parts. Exposure should be set for a point about two thirds into the scene.

If one part of a subject is much darker than another, for instance, the groom in formal black and the bride in white satin, aim the light at the groom and away from the bride.

BOUNCE LIGHT

Subject contrast can be flattened by bouncing light off reflective ceilings, side walls, back walls, or the floor. Bounced light is diffuse and nearly shadow free, but is tricky to work with.

For fast work in typical residential and office interiors, with white ceilings and light walls from which you will bounce the flash, provide two stops more exposure than for direct flash.

To pinpoint exposure, particularly for color photography, first figure the total distance the flash must travel from its position to the ceiling surface and back to the subject. Second, divide the exposure guide number by this distance to get the basic *f*-number. Third, open up a full stop more to allow for the light absorbed by the ceiling surface. This is for a bounce flash directed halfway between camera and subject, as well as for flash aimed just above the subject. If the flash is aimed directly overhead, open up another stop.

If the flash is bounced off a vertical surface, such as the back wall or the floor, the calculation is the same—add up the distance from flash to wall to subject and allow an extra opening according to the

reflectivity of the surface.

In bounce flash the light takes on the color of the surface from which it is bounced. This is of little importance in black-and-white photography, but with color, it is a problem. Only neutral bounce surfaces, white or gray, should be used unless the effect of tinted light is wanted.

The nearer the flash is to the bounce surface, the smaller the area it will illuminate. If a relatively strong directional effect is wanted, the flash is used only a few feet from the bounce surface. If aimed to illuminate the entire wall behind the camera, the wall becomes a giant, soft-light source.

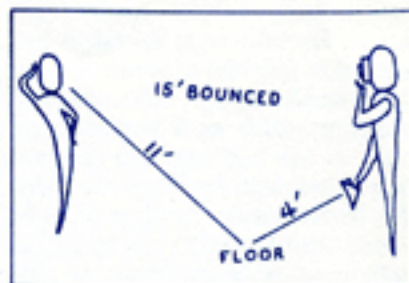
FLASH FILL WITH SUNSHINE

Subjects outdoors in the sunshine may have very dark shadows, too much contrast, or may be lighted from the wrong direction. Exposure control alone cannot correct this. Synchronized flash can put extra light into the shadows while adding proportionately very little light to the sunlit areas and none to the general scene behind a foreground subject.

For most daylight pictures in the range of seven to fifteen feet, set exposure for the over-all daylight scene and simply shoot the synchronized flash from the camera at this exposure, particularly if the sun is to one side or behind the subject.

For more accurate control of the amount of flash fill, determine the proper exposure for the daylight scene alone, using an exposure meter or reference guide, and set the camera for this exposure. Then divide the exposure guide number by the aperture for which the camera is set to get the distance at which the flash must be used for normal fill.

The flash should be used as close



Flash bounced off the floor.

to the camera-to-subject axis as possible, preferably right at the camera. When placed at the camera position, if the flash is not close to the calculated proper flash-to-subject distance, a long connecting cord, 20 to 30 feet, allows it to be positioned near or far without moving the camera.

If the shooting distance is too close for flash at the camera, the light can be cut one stop in effectiveness by draping one thickness of a clean white handkerchief across the face of the reflector, and cut two stops by using two thicknesses.

The long connecting cord has a multitude of uses in extending elementary flash technique. On dull days flash used very high and to one side can act as a substitute for sunshine. Care must be taken to arrange the subject in front of a background, such as a wall or foliage, so that it too will be lighted by the flash. An open scene behind the flash-lighted subject on a dull day will print dull and flat, and the sunshine effect on the subject will appear unnatural.

THE FLASH CORD

The three-foot extension cord gives control over the angle, direction, and aiming of the flash. A longer extension cord allows even more shooting variety. The greater the camera-to-subject distance, the greater the need for getting flash far from the camera.

For routine subject matter it is generally desirable to have the extension flash as high above the camera as one half the camera-to-subject distance. To photograph a subject about 15 feet away, put the flash about seven and one half feet above the camera lens. To get

this sort of elevation, an assistant may hold the light, or it may be fixed on a portable stand, or it may be held overhead on an extended tripod with the legs folded.

The unipod is one method of getting the flash far from the camera when assistance is not available. A tripod usually will be needed for camera support. A six-foot unipod at the end of the photographer's three-foot arm allows him to get the flash nine feet or more from the camera.

BIG BULBS

Where large areas must be covered, as an entire stage at an indoor ceremony or an accident scene outdoors at night, the large, medium-screw base flashbulbs provide maximum light. Reference to the exposure guide numbers will indicate how much coverage they will provide.

In lighting maximum distances, a considerable amount of foreground may be included in the scene. The flash must be elevated and aimed to the far part of the scene to prevent gross overlighting of the foreground. Or flash and camera both can be used, as from the front edge of a balcony, to photograph an entire stage 100 feet away.

To get more light for large areas, two or more bulbs may be used side by side or, if the subject is static, two or more may be flashed in succession from the same position using open-flash technique. The exposure guide number for two bulbs is obtained by multiplying the one-bulb guide number by 1.4. Other factors are: three bulbs, 1.7; four bulbs, 2.0; five bulbs, 2.2; six bulbs, 2.45; seven bulbs, 2.65; eight bulbs, 2.8.

For maximum light on the subject, and to avoid any errors due to malfunction of synchronization, open flash is often used. The camera is placed on a solid support and the shutter is set for time or bulb. The shutter is opened and held open while the lamp or lamps are flashed.

WALK-AROUND FLASH

For vast interiors, caverns, architectural views, or shots outdoors

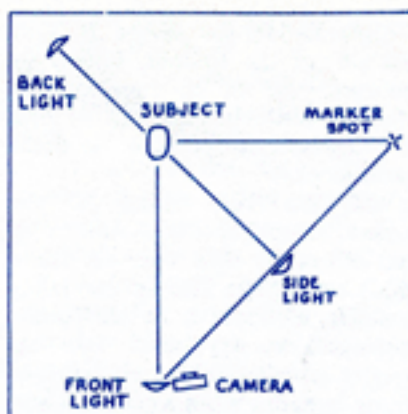


Figure 1. Triangle lighting, a basic system for multiflash photography.

at night, each part of the scene may be lighted separately by open-flash techniques. A basic flash-to-area-lighted distance is first established. Take this to be 20 feet, for instance. With a guide number of 160, the indicated aperture would be

$$\frac{160}{20} = 8, (f/8).$$

With the camera aperture at $f/8$ and the shutter open, the photographer walks into and around the scene and flashes each part of it in succession from twenty feet away until all important areas have been flashed. He returns to the camera and closes the shutter. Care must be taken with each flash to avoid standing between the camera and the area to be lighted, or the photographer will appear in silhouette in the picture.

TRIANGLE LIGHTING

Triangle lighting can give the photographer a variety of effects. Use two or three identical lamps in identical reflectors and wire all lamps together on one line from the camera-shutter synch by means of multiple-outlet connectors.

The frontlight is placed as close to the lens as possible. The distance from this lamp to the subject is measured. Then, at right angles, an equal distance is measured out to a marker spot. The sidelight is placed halfway along a line between marker spot and camera and raised somewhat.

If a backlight is used, place it diagonally opposite the sidelight

and an equal distance away, also high. Be sure to shield the camera lens from backlight illumination. The set-up is shown in Figure 1.

In triangle lighting various effects are possible from the basic lamp positions: frontlight with sidelight; frontlight with backlight; sidelight with backlight. Manipulation of the sidelight from a floor-level position up to camera level, above camera, and far above camera level further increases the variety of effects. Exposure is usually based on the lamp-to-subject distance of the closest frontlight.

In multiflash photography the photographer may use the photocell-operated slave unit, which flashes its lamp with no wired connection between it and the camera lamp. It is triggered when the flash on the camera goes off.

When the lighting effect must be carefully seen and measured before photographing, particularly where a lot of light is needed for coverage, effect, contrast and control, and great depth of field, the picture is planned for large flashbulbs to be used in reflectors designed for photoflood lamps.

The scene is lighted with number 2 photoflood lamps in the reflectors. When the lighting is set, make an exposure-meter reading. The correct f -setting, substituting number 22 flashbulbs for the photofloods, will be found on the meter at the indicated photoflood exposure for four seconds; using 22B blue flashbulbs, the f -setting will be found at the photoflood exposure for two seconds; for number 50 flashbulbs, six seconds; for 50B blue flash, 2.5 seconds. Set the aperture, turn off the floods, take them out of the sockets, substitute the flashbulbs, open the camera shutter, switch on the current to the flashes, switch it off, and close the shutter.