

FLASH PHOTOGRAPHY.

If you find using flash to be a frustrating experience, don't despair. Flash photography is at least three times more complicated than ambient light photography. But when you come to understand all that happens during those few milliseconds after you press the shutter button, you're well on your way to taking consistent flash photographs with predictable results.

THE BASICS

Before you venture into the world of flash shooting, you need to first understand the basics of exposure. This guide assumes that you understand how shutter speed affects exposure and motion blur, how aperture affects exposure and depth-of-field, and how the ISO setting affects exposure and digital noise. If you don't yet have at least a theoretical grasp of these concepts, then it's best to learn about them before venturing into the flash world.

FACTS THAT EVERY FLASH SHOOTER MUST UNDERSTAND

The first four facts are universal, whether you're using the camera's built-in flash, a hot shoe-mounted flash unit, or studio strobes.

Flash fact #1: Every flash photograph is two exposures in one – an ambient light exposure and a flash exposure. This is a critical fact to remember. The shutter opens, the flash fires, the shutter closes. During this time, both ambient light and flash will contribute to the recorded image. Flash photography requires managing both exposures.

Flash fact #2*: Flash exposure is not affected by shutter speed. The entire burst of light from the flash begins and ends while the shutter is open, so keeping the shutter open longer won't help with flash illumination. The flash exposure and the effective range of your flash unit will be affected by aperture and ISO settings, but not the shutter. Of course, **the ambient light component in a flash photograph is affected by shutter speed.** So changing the shutter speed is one way to manage the amount of ambient light that contributes to a flash photograph.

Flash fact #3: Flash illumination is dramatically affected by distance. This is known as the inverse square law. Think of it this way: Suppose you're using a lens that gives you a 4 x 6 ft. field of view at a distance of 10 feet. That same lens will give an 8 x 12 ft. field of view at a distance of 20 feet. So when you double the distance, the same light is covering an area four times larger (96 square feet vs. 24 square feet)! So you need four times as much light to get the same illumination. This phenomenon sometimes referred to as "flash falloff", will affect any image with more than one subject at different distances. Whenever your subject distance increases by a factor of roughly 1.4 (the square root of 2), the flash illumination will be cut in half. Suppose you're taking a large group portrait. The people in the first row are 10 feet away, and the people in the back row are 14 feet away. With on-camera flash as the primary light source, the front row will be a full stop brighter than the back row!

In the image below, each cup is one stop brighter than the one behind it, and one stop darker than the one in front of it. It would take 16 times as much light to properly expose the cup at 11 feet verses the cup at 2.8 feet. Do those distance numbers look familiar? They're the same as standard f/ stops for aperture settings, and the relationship is identical.



Flash fact #4: Your camera measures ambient light and flash illumination separately. In Av, Tv or P modes, it will attempt to expose properly for the ambient light by adjusting either the shutter speed, aperture, or both. **The fact that you have your flash turned on has no effect on this** (one exception is that in P mode it will not use a shutter speed slower than 1/60 with flash). The camera's metering system cannot predict how much illumination will be gained by the flash, so it doesn't try. In manual mode, the meter in the viewfinder measures only ambient light, because that's all it has to measure.

Flash fact #5: With automatic flash metering, the flash illumination is measured after the shutter button is pressed, and the flash output is adjusted accordingly. There are technical differences between the various types of flash metering, but all of them operate independently from the camera's metering of ambient light, and all of them work by adjusting the output of the flash, not by changing the camera's exposure settings.

Flash fact #6*: Every SLR camera with a mechanical shutter has a maximum flash sync shutter speed (1/200 or 1/250 on current Canon DSLRs). This has to do with the way focal plane shutters work. At slower shutter speeds, the first curtain opens, the flash fires, and after the specified time duration, the second curtain closes behind it. At shutter speeds faster than flash sync, the second curtain begins to close before the first curtain is completely open. The second curtain follows the first across the frame, exposing only a slice of the image at any given moment. Firing a flash during this process would illuminate only part of the image.

Flash fact #7*: (Applicable to modern electronic cameras only) If you set your shutter speed faster than flash sync, or use Av mode with an aperture setting that requires a shutter speed faster than flash sync for proper exposure, the camera will automatically revert to flash sync speed when the shot is taken if a built-in or hot shoe-mounted flash is turned on. Usually this results in overexposure (unless you have a "safety shift" custom function enabled). If you're getting overexposed images when using flash outdoors, this is probably the reason. The image is not overexposed because of light from the flash. It's overexposed from ambient light because the shutter speed was too slow. If you're using flash for fill in bright situations, it's necessary to stop down the aperture or lower the ISO setting to get the shutter speed below flash sync.

* The exception to facts 2, 6 and 7 is FP Flash, sometimes referred to as "high-speed sync."

EOS flash photography confusion.

The main area of confusion in EOS flash photography is the fact that P, Tv, Av and M modes handle flash illumination differently, especially when ambient light levels are not bright. Here's a summary of how the modes basically work when you have a flash unit turned on. This summary assumes that you do *not* have [FP mode](#) flash enabled if that option is available to your particular camera and flash unit combination.

Mode	Shutter speed	Lens aperture
P	Automatically set from 1/60 sec to the camera's maximum X-sync speed.	Automatically set according to the camera's built-in program.
Tv	You can set any shutter speed between 30 seconds and the camera's maximum X-sync speed.	Automatically set to match the shutter speed you have set.
Av	Automatically set between 30 seconds and the camera's maximum X-sync speed to match the lens aperture you have set.	You can set any lens aperture you like.
M	You can set any shutter speed between 30 seconds and the camera's maximum X-sync speed.	You can set any lens aperture you like.

And here are the details:

Program (P) mode flash.

The overriding principle of Program (P) mode in flash photography is that the camera tries to set a high shutter speed so that you can hold your camera by hand and not rely on a tripod. *If that means the background is dark, so be it.*

Program mode operates in one of two modes, depending on the ambient (existing) light levels.

1) If ambient light levels are fairly bright (above 13 [EV](#)) then P mode assumes you want to fill-flash your foreground subject. It meters for ambient light and uses flash, usually at a low-power setting, to fill in the foreground.

2) If ambient light levels are not bright (below 10 EV) then P mode assumes that you want to illuminate the foreground subject with the flash. It sets a shutter speed between 1/60 sec and the fastest X-sync speed (see above) your camera can attain. The aperture is determined by the camera's built-in program.

Because the camera tries to keep the shutter speed at a reasonable speed for handholding the camera you will end up with dark or black backgrounds if you take a flash photo in P mode when ambient light levels are not bright.

On most if not all EOS cameras, P mode is not shiftable when flash (internal or shoe-mounted Speedlite) is used. Note also that DEP mode cannot work correctly with flash - its metering settings basically revert to P mode if you try it.

Tv (shutter priority) mode flash.

In this mode the camera lets you change the shutter speed. It then automatically chooses an aperture setting to expose the *background* correctly. Flash duration (flash output) is determined by the flash metering system. In other words, the camera always works in fill flash mode when it's in Tv mode - it always tries to expose the background adequately, unlike P mode.

If the maximum aperture value of your lens starts flashing in the viewfinder it means the *background* of the scene you're shooting is too dimly lit. If you want to try and expose the background then you should decrease the shutter speed to compensate. Otherwise the camera will just try and expose the foreground with flash and the background will come out dark. Naturally at slower shutter speeds you'll need to use a tripod to avoid blurring caused by camera shake.

As always, the camera will prevent you from exceeding its built in X-sync speed unless FP mode is available to you and engaged. If the minimum aperture value of your lens starts flashing then your scene is too brightly lit. You must then either engage FP mode if it's available or perhaps put a neutral density filter on the camera or use slower film. Or turn off flash altogether and simply use a reflector of some type to bounce ambient light onto the subject.

The 420EZ and 430EZ flash units will operate in A-TTL mode in Tv mode, but the 540EZ works only in TTL mode. Note also that some people have reported that in this mode their type A camera bodies underexpose the background by up to a stop when light levels are low and an E-TTL flash unit is engaged. If this is the case try testing by comparing the aperture setting with M mode, which does not do this. You may need to apply exposure compensation if this effect exists on your camera and is undesirable.

Av (aperture priority) mode flash.

Av mode lets you set the depth of field by specifying the lens aperture. The camera then chooses a shutter speed ranging from 30 seconds to the camera's X-sync speed, in order to expose the *background* correctly. *If that means the shutter speed is some really low value so that you need to use a tripod to avoid camera-shake blur, so be it.* In dark conditions, therefore, Av mode works in slow sync mode.

Flash duration (flash output) is determined by the flash metering system. Like Tv mode the camera always works in fill flash mode when in Av mode.

There is one exception to this. A number of EOS cameras have a custom function you can set to ensure that the shutter speed in Av mode when using flash is locked to the X-sync speed. The EOS 10/10s and Elan II/EOS 50, for example, have such a custom function, which lets your camera behave more like P mode when in Av mode. However this custom function will only lock the camera to X-sync in Av mode and will not choose a shutter speed from 1/60 sec to X-sync, the way P mode does.

As always, the camera will prevent you from exceeding its built in X-sync speed unless FP mode is available to you and engaged. If the shutter speed value of 30" flashes in the viewfinder then there isn't enough light to expose the background correctly and you'll need a larger aperture or faster film. If the camera's X-sync flashes in the viewfinder then you'll need to decrease the lens aperture, engage FP mode if it's available or use slower film.

The 420EZ and 430EZ flash units will operate in A-TTL mode in Av mode, but the 540EZ works only in TTL mode. Note also that some people have reported that in this mode their type A camera bodies underexpose the background by up to a stop when light levels are low and an E-TTL flash unit is engaged. If this is the case try testing by comparing the shutter speed setting with M mode, which does not do this. You may need to apply exposure compensation if this effect exists on your camera and is undesirable.

Manual (M) exposure mode flash.

In manual exposure mode you specify both the aperture and shutter speed, and your exposure settings will determine how the background (ambient lighting) is exposed. The subject, however, can still be illuminated by the automatic flash metering system since the flash can automatically calculate flash output levels for you. This is a marked contrast to the olden days, when photographers would carry around little flash exposure tables with them in order to work out manual flash settings.

This is how flash works in manual mode. Note that we're talking about the manual *exposure* mode setting only, which can use automatic TTL flash metering (it will not use A-TTL metering in manual exposure mode). Also, we *aren't* talking about setting the output of the flash manually - that's [manual flash](#) and a different topic altogether.

- Set your camera to M for manual exposure mode.
- Set the aperture and shutter speed to expose the background correctly.
- Press the shutter button down halfway if your flash has a rear-panel LCD (liquid crystal display). The flash coupling range will appear in the flash unit's LCD. This range is the distance that can safely be covered by the flash.
- If your lens has a distance scale you can check the current focussing distance to ensure that the distance to your subject falls within this range. Otherwise you'll have to estimate.
- If the "flash ready" lightning bolt symbol appears in the viewfinder you can press the shutter all the way to take the photo. The flash's TTL or E-TTL system will determine the flash exposure level of the subject.

If your flash lacks a rear-panel LCD you won't have a preview of the flash coupling range, of course. Also, LCD-equipped flash units will not calculate the flash coupling range if you're using bounce flash, and the coupling range will not necessarily be correct if you have a diffuser on the flash head.

Some Speedlite flashes, such as the 540EZ and 580EX, can display the coupling range in either feet or metres, depending on which measurement system has been set by the small switch in the battery compartment. Others, such as the 430EZ, are hardwired to one measurement system or the other, depending on where the flash was sold. US market flashes used feet and all other countries on the planet* had only metre flashes available to them. And the 580EX II can set the measurement system through a custom function.