

Flash Tutorial II (part one) (Rev. 1)

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This is the first of three parts of Flash Tutorial II*

This first part is an overview of flash photography so that you will better understand the next two parts, Fill Flash and Bounce Flash.

I will discuss these individually shortly but first here is an overview of the subject of flash photography.

There are four basic types of photographic flash equipment:

- The on-camera flash which is on most consumer digital cameras;
- Add-on speedlights;
- Flash bulbs
- Professional studio strobe lights.

*Flash Tutorial I is listed on the club's website under Links and Resources.

We will not deal with flash bulbs or studio strobe lights in this tutorial.

The light from consumer grade electronic flash units is discharged at full power.

The flash unit does not have the ability to automatically vary the intensity of the light so proper exposure is achieved by varying the duration of the flash of light, much like shutter speed.

When taking an electronic flash picture using TTL (through the lens), in automatic exposure mode, the camera will fire a fast series of low level pre flashes a fraction of a second before the main flash fires.

The camera then measures the reflected light from the pre flashes off the subject and along with focusing distance information from the lens, calculates the flash duration.

The human eye cannot detect the pre flashes.

The main flash will then fire using the flash duration just calculated and you should have a properly exposed picture, (providing that the distance does not exceed the power of the flash unit).

Camera mounted flashes directed at a person are situated only slightly above the axis of the lens so redeye will occur if the person is looking at the camera but it can be corrected in post processing.

Redeye occurs when the person is looking at the flash and the flash is close to the axis of the lens. The light enters the iris and is bounced off the red retina at the back of the eye and back at the lens. In the picture, what you are seeing is the red retina through the iris of the eye.

The redeye reduction feature on some flashes just gives a pre-flash which momentarily causes the iris to reduce slightly in size but is not always effective. I never use it.

Most post processing software can get rid of redevye very effectively and of course if you hold your speedlight off camera you will not only eliminate redevye but the light on your subject will be less flat.

Every serious photographer should have a speedlight

Also, when the flash is close to the axis of the lens, a large lens and/or lens hood will cause a semicircular shadow at the bottom centre of the picture because the lens or hood is blocking the light from the flash and causing the shadow at the bottom.

The main artistic problem with on-camera flash is that the lighting is flat, it is too evenly distributed and lacks the character of shadowing.

Flat lighting may be acceptable for snapshots of family members or pictures of events or other documentary pictures which have no artistic value, but flat lighting is boring.

If the flash can be situated higher and to one side of the subject the slight modeling shadows will give a more natural and pleasing look.

No matter where you use flash you should avoid having your subject too close to a background wall so that the subject's shadow will not show in the picture.

Flash power -

Every consumer flash has an output power which is expressed as a guide number (GN). Guide numbers must be used for calculating the aperture in all manual flash photography.

(The power of Studio strobes is usually expressed in Ws.)

The higher the GN the more powerful the flash output.

Your owner's manual will tell you what the GN is for your flash.

The GN for built-in flashes may be tucked away in some obscure place in the camera's manual but it should be there someplace. If you can't find it you may have to Google it. The GN will be displayed prominently in a speedlight manual.

Be sure to look it up and **remember it.**

Guide numbers are given for feet and metres. You can use metres and a metric GN or feet and an imperial GN, they both work the same way. We will use feet for this tutorial.

Remember this formula: The GN divided by the distance from the flash to the subject will give you the f/ stop

$$\underline{\underline{\mathbf{GN/dist.= f/}}}$$

Set your aperture to the resulting number using this formula.

Shutter Speed -

Shutter speed plays a significant part in electronic flash photography so I feel that a short discussion of shutter types is in order before we continue.

There are three basic types of shutters: Leaf Shutters; Focal Plane Shutters and electronic shutters.

Leaf shutters date back over 100 years. They are simple in design and were the mainstay of film cameras with fixed lenses for many decades.

A leaf shutter is situated at the focal point of the lens, where the image crosses.

Leaf shutters are not practical on interchangeable lens cameras.

The following image is an illustration of a leaf shutter that is partially open.

Leaf type shutter



The leaves simultaneously snap open, stay open for the predetermined time (shutter speed) and then snap shut and if you are using flash it will fire when the shutter is completely open regardless of shutter speed.

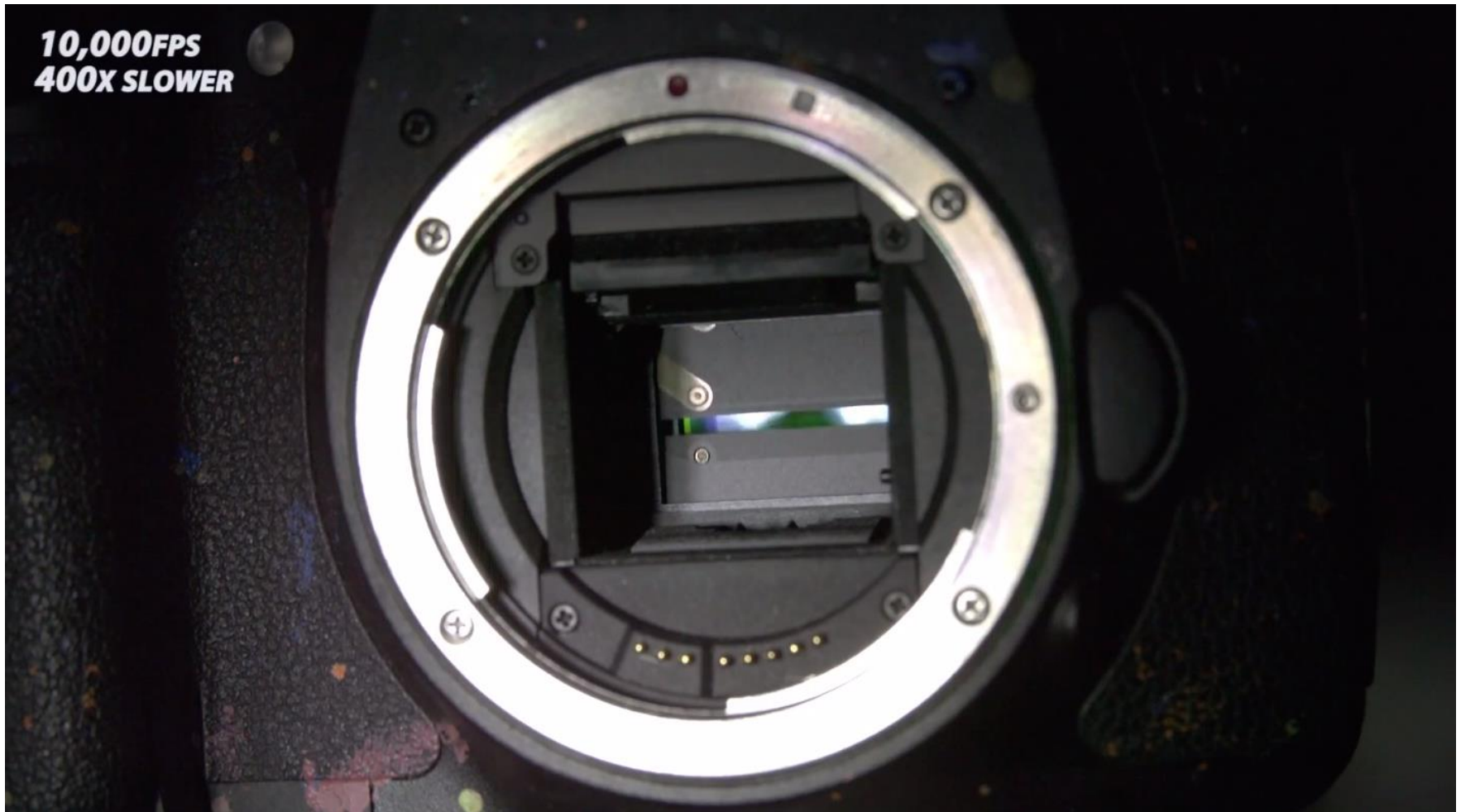
Focal plane shutters are found on most modern cameras today. A focal plane shutter has two curtains which travel down across the sensor. The curtains on older film cameras travelled from side to side.

When you trip the shutter the first curtain drops from the top, exposing the sensor to the illuminated image projected by the lens and when the exposure time has elapsed the second curtain falls, closing off the light, thus completing the exposure.

What I have explained in the previous paragraph is true at slow shutter speed up to and including 1/60 sec. At higher shutter speeds the second curtain starts to close before the first curtain reaches the bottom. At very high shutter speeds the second curtain closely follows the first so in effect the image is wiped down across the sensor.

The next illustration shows a focal plane shutter half way through the exposure where the second curtain is closely following the first curtain.

Focal plane shutter during a fast shutter speed



(ignore the numbers at the top left)

Electronic shutters have no moving parts. The sensor is fully exposed but is turned off. When you trip the shutter the camera silently turns the sensor on and keeps it on for the selected "shutter" duration and then turns it off. Flash is not recommended with electronic shutters. Some high-end DSLR cameras have an optional electronic shutter and almost all Mirrorless cameras have them as an option.

Electronic shutter



So you might be wondering what all of this shutter talk has to do with flash photography.

Well, electronic flash has a very short duration, so in order to obtain a proper exposure on the entire sensor the flash must be fired while the sensor is completely exposed.

A focal plane shutter must be completely open when the flash fires. Refer to your owner's manual to find the max. flash sync. shutter speed for your camera. Select this shutter speed in the menu and do not change it unless you have reason to do so.

For most cameras with focal plane shutters it will be about 1/60 sec. so we will use that number for this tutorial.

The flash will give a proper exposure for the subject and the exposure of the background can be varied by changing the shutter speed (not exceeding 1/60 sec.). More on this later.

It is possible to carry out flash photography at very high shutter speeds with a focal plane shutter but you will have to use "high speed sync". This is a mode where a speedlight which has this feature, fires multiple times, one flash for each slit of exposed sensor.

The speedlight must fire many times very quickly, so a high powered speedlight with a very short cycle time and an extra battery pack is recommended.

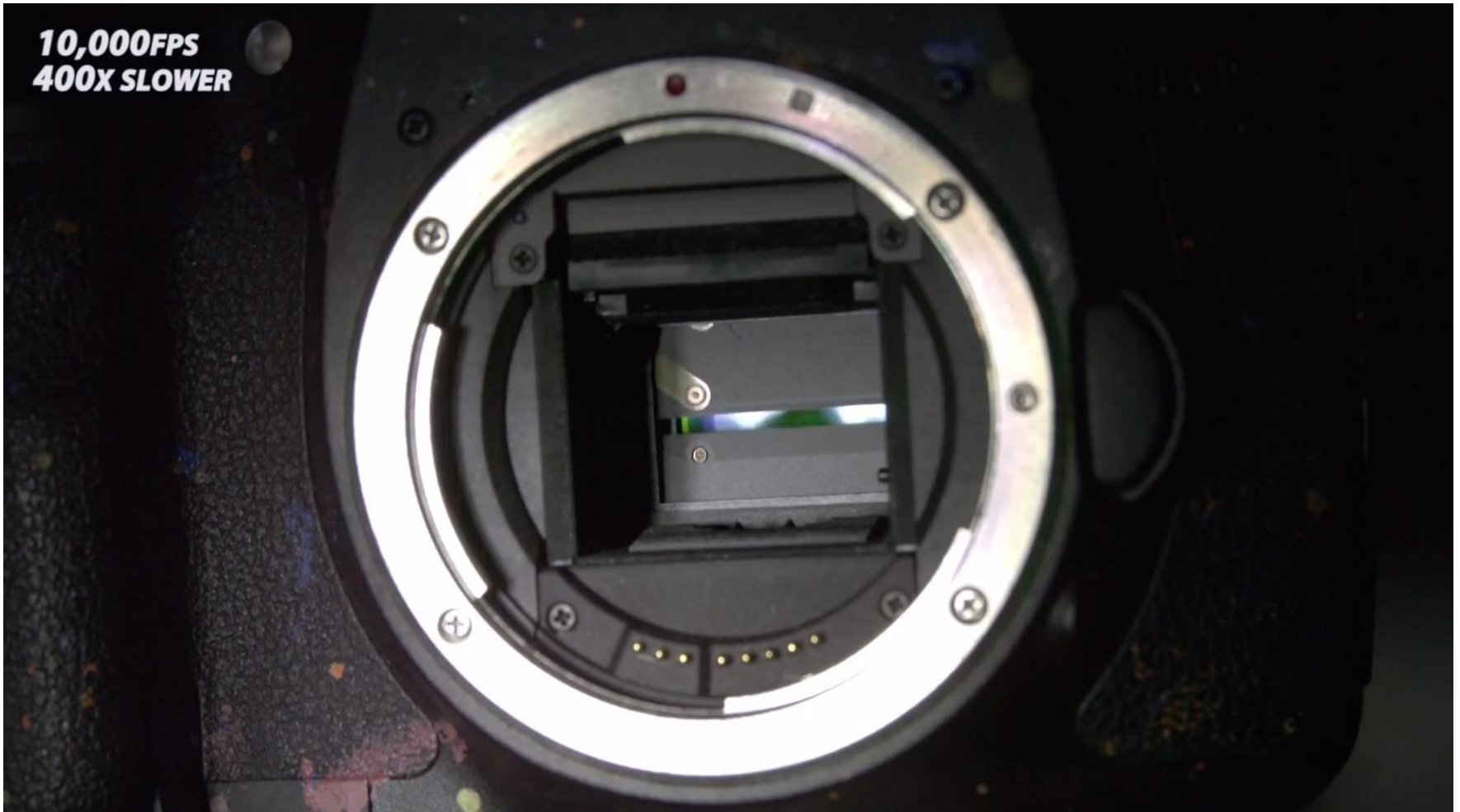
The following is a picture I took of a skateboarder in mid-air with the skateboarder properly illuminated and a perfectly exposed sky. It was taken with a shutter speed of 1/1,000 sec. using high speed sync.

This picture received an honourable mention in the 2020 SPARK juried competition for "Action".

An ordinary flash shot would have illuminated the subject, possibly overexposing the foreground and the sky would have been black.



Here is a repeat of the picture of the focal plane shutter showing the slit where the sensor is exposed. Imagine the flash firing in succession, once for every slit opening that the shutter exposes to the sensor.



You press the shutter, the first curtain moves down, and just before the second curtain starts to move the flash fires, then when the second curtain reaches the point where the first curtain was when the flash first fired, it fires again, and so on until the last slit in the shutter has had its flash.

At moderately high shutter speeds the slit will be a little wider and there will be fewer flashes but at very high shutter speeds the slit will be very narrow and the flash must fire once for each of them so there will be many more flashes.

This all happens so quickly that to the human eye it will seem like there is just one flash.

The speedlight must have this feature and an auxiliary battery pack is recommended. The four batteries in the speedlight control the electronics and the eight batteries in the pack power the flashes.

Cameras with Built-in Flash -

The built-in flash which is on almost all consumer digital cameras is a low powered electronic flash with a stroboscopic bulb. It can be convenient, but it is not very versatile.

Set your camera's mode to **P**, **S**, **A** or **M**, flip up the flash, wait for the ready indicator and take the picture, (but with the subject not too far away).

If you have your camera's exposure mode set to **AUTO** the flash will pop up whenever it thinks you need more light.

This can be very annoying because most of the time when you are seriously composing an artistic shot and studying the lighting and shadows you don't want flash at all and you have to keep flipping it down.

You can eliminate this problem by getting out of AUTO and choosing another mode, and you can still flip the flash up manually whenever you want.

The output power of the camera's built-in flash is relatively low and is only really effective up to about ten or twelve feet at ISO 100 so it has limited value for serious photography.

High end and professional cameras do not even have built in flashes because users of those cameras usually have speedlights.

The built-in flash (or a speedlight) can also be used as a Master to wirelessly fire other Slave speedlights but we won't be covering that in this tutorial.

Speedlights -

Speedlights are the most versatile portable source of powerful auxiliary light for any photographer. They are many times more powerful than the built in flash on your camera and can be used singly or in combination.

They can be camera mounted in the hot shoe or on a flash bracket, or they can be remotely triggered off camera. Their rotating heads can be directed up or to the side and in the dark they can pre-fire an infrared light pattern on the subject for the lens to focus on. What's not to like!

If you don't have a speedlight, you should seriously consider getting one. The more features and the more powerful the better.

Speedlights can be operated manually or they can be set to operate by automatically measuring the light TTL bounced off the subject and cutting off the duration to give a properly exposed picture.

Very old speedlights will not have this feature and can only be used in manual so beware when buying a very old speedlight. Also, the trigger voltage of some very old speedlights may be too high for your camera so be sure to check this out to avoid damaging your camera's circuitry.

Usually, speedlights that are manufactured by your brand of camera work best but can be very expensive.

I have had good luck buying used speedlights in good condition for a fraction of the new price. You should really have one.

If your speedlight has a zoom feature and it is zoomed in to a longer focal length it will concentrate the light on the narrower field of view which makes the light falling on the subject brighter. This is normally a good thing but it also increases the guide number. Zooming will continuously change the guide number so it will make the use of guide numbers impractical.

If you want to effectively use guide numbers you will have to turn the automatic zoom feature off and manually set it to the focal length of your (prime) lens. and if you are using a zoom lens set it at the shortest focal length of your lens.

Some cameras will not allow the infra-red focusing grid of the speedlight to fire if the focusing mode is in continuous. This may be a problem for Back Button Focus. Check it out for your camera.

Assignment -

Refer to your owner's manual or go on-line to get the following information about your equipment:

1. What type of shutter does your camera have?
2. What is the guide number for your camera's built-in flash?

3. If your camera has a focal plane shutter what is the maximum synchronized flash shutter speed?
4. What is the guide number for your speedlight if you have one?
5. Can you find the place in your camera's flash menu where you can select manual flash, TTL automatic flash, and TTL balanced flash?
6. If you have a speedlight can you find in the menu where to find the items listed in question 5. above?
7. Have you committed to memory your guide numbers and the formula for calculating the aperture for manual flash?
8. If you have a speedlight do you know all the features it has and do you know how to set them up?

If you can respond positively to each of these questions that apply to your equipment, you can give yourself a pass for this assignment.

Exercise -

If you always use a short lens when taking flash pictures this exercise is not for you.

If your usual walkabout lens is a fairly big zoom lens that goes out to 100mm or more and you would use it for flash, you should carry out this exercise.

Install the lens hood and zoom out to the maximum focal length.

With the camera level and pointed straight ahead take a flash picture of a bare light coloured wall using your camera's built-in flash.

If there is no shadow at the bottom of the picture you are good to go.

However if you see a semicircular shadow you will know that this combination is to be avoided.

Remove the lens hood and retake the picture.

Again, if there is no shadow you now know that you can take flash pictures with this lens fully zoomed out with the lens hood removed.

If there is still a shadow, zoom the lens back in (about 10%) and retake the picture. (This is only if your zoom lens extends and retracts.)

Keep doing this until there is no shadow showing.

You will now know that when taking flash pictures with this lens you will have to remove the lens hood and keep your zoom to less than the focal length at which you last saw the shadow.

The results using your camera mounted speedlight may be different because it is mounted a little higher. Check it out.

It is important that you know the limitations of your equipment so that you don't wind up looking like an idiot for ruining that once in a lifetime shot.