

## Shutter Speed

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Shutter speed is a term, which refers to the length of time your camera's shutter is open. As the shutter opens and closes to expose your film or digital media, the shutter speed measures in seconds or fractions thereof the length of time that light is reaching your film. Obviously, the longer the shutter speed, the more light you are letting in. Very fast shutter speeds will allow you to stop action, but require a great deal of light. The shutter is used in conjunction with the diaphragm to control the exposure of the film.

One of the reasons to have control over your shutter speed is in order to control the motion of the subject.

There are two types of shutters in cameras; the more common type is the focal plane shutter. The second is called a leaf plane shutter.

As with everything, there are advantages and disadvantages to both. We will discuss some of them here.

### Leaf Shutter

The blades of this type of shutter are usually located between or near the lens elements and close to the diaphragm. Leaf shutters have several blades made of thin spring steel. When the shutter is closed, these blades, or leaves, are at rest and overlap each other. This prevents light from reaching the film. When the shutter release button is pressed, the blades open quickly and allow light to pass and expose the film. They remain open for the duration of the preset exposure time before springing shut again.

A leaf plane shutter is usually more expensive, however you are not limited as to how fast of a shutter speed you can use with your flash unit. You are able to use any speed for flash synchronization.

## Focal-Plane Shutter

A focal-plane shutter is essentially two lightproof cloths or thin metal curtains that move across the film aperture in the same direction. They move in either a horizontal or vertical direction, depending on how the camera was manufactured. This type of shutter is housed entirely within the camera body and is mounted on two rollers, one on each side of the film aperture. As the curtain is moved from one roller to the other by spring tension, the second curtain follows, forming an opening that permits light to pass from the lens to the film. After the opening has passed, the second curtain stops and prevents additional light from reaching the film. In the design of focal-plane shutters, the curtains form a slit that travels across the film aperture to expose the film. When a slow shutter speed is set, the second curtain waits a relatively long time before it follows the first curtain; in this case, the slit is quite wide. When a fast shutter speed is set, the second curtain quickly follows the first and only a narrow slit is formed.

A focal plane shutter is less expensive than a leaf plane shutter, but it limits the top shutter speed that you can use a flash unit.

When using a focal plane shutter, you have to read your camera manual and find out what is the appropriate shutter speed for flash synchronization. This is very often at 1/60 or 1/125 of a second.

When a camera with a focal-plane shutter is used with an electronic flash, a predetermined shutter speed must be set. At this speed, the shutter and flash unit are said to be in synchronization. When the flash and shutter are synchronized, the shutter opening is wide open at the same instant the flash fires. Usually, the fastest shutter speed that synchronizes with a flash unit is indicated in red or another off color or a lightning bolt symbol on the shutter speed dial.

## Shutter Speed

A range of shutter speeds is available on professional and consumer level cameras. Common shutter settings are as follows: T, B, 1 second, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000, and 1/2000 second. The fastest leaf shutter speed is 1/500 second. Some focal-plane shutters can be as fast as 1/2000 second. On modern cameras, the shutter speeds are faster, slower and have speeds in between these settings. In addition to a given set range of speeds, most shutters are made so they can be opened for an indefinite period. At the setting marked "T" (time), the shutter opens the first time the shutter release button is depressed and remains open until the shutter release button is depressed again. At the setting marked "B" (bulb), the shutter remains open as long as the shutter release button is depressed. It closes as soon as the shutter is

released. The interval that you want the shutter to remain open is selected by moving a lever or shutter speed dial to that particular setting on the shutter speed scale.

On the shutter speed dial, the top part of the fraction (numerator) is not indicated; for example, the shutter speeds  $1/60$ ,  $1/125$ ,  $1/250$ , and so forth, are indicated as 60, 125, and 250.

## Function

The shutter serves two functions: controlling the duration of the exposure and controlling subject movement. These two functions are entirely separate and distinct. You must determine the shutter speed required for each condition. After determining the shutter speed, you select the f/stop that provides the correct exposure for the film speed and lighting conditions. Normally, the duration of exposure is short enough to prevent image blurring. You can always set the shutter speed faster than the speed required to stop image motion, but it should not be longer if you want the image to be sharp. When a shutter speed of  $1/125$  is sufficient to stop subject motion, you can set the shutter speed to  $1/125$  or even faster, but not at  $1/60$  if you want to stop the motion and produce a sharp image. Each time you change the shutter speed, the diaphragm needs to be adjusted in order to produce a properly exposed image. The correct sequence in determining the diaphragm and shutter speed to produce a properly exposed negative is as follows:

1. Compose and focus the image.
2. Stop down or open up the diaphragm until the desired depth of field is achieved.
3. Select the shutter speed that will produce a proper exposure when combined with your aperture setting.
4. Determine whether the shutter speed is fast enough to prevent image blurring.
5. If the selected shutter speed is too slow, reset it to a faster speed and open up the aperture accordingly.

## Selecting the Shutter Speed

Knowing what shutter speed produces the right effect for each picture is a skill you must acquire. Your pictures may easily be spoiled by movement of either the camera or the subject. In some instances, this movement will actually improve your photographs. Novice photographers often find it hard to believe anything can happen during the brief instant that the camera shutter is open. This is not true. Images can be blurred with a shutter speed as fast as  $1/250$  of a second. For example, when a very fast subject moves during the fraction of a second the shutter is open, the image may be recorded on the film as a blur. Blurring caused by camera movement is

noticeable in all of the images within the photograph. When blurring is caused by subject movement only, at least one part of the scene will be sharp, and the subject will usually be blurred. Camera movement blur can be corrected by supporting the camera properly or by using a faster shutter speed. Subject image movement can be reduced either by using a faster shutter speed or by panning the subject.

When a faster shutter speed is used, a wider aperture is required to produce correct exposure. For this reason, you should know what minimum shutter speed is required to stop or freeze different actions. You must take into account conditions that exist when taking photographs. Strong winds, vibrations (for example from a moving vehicle), or a ship rolling from side to side, must be considered.

When a subject is in motion during exposure, the image on the film also moves. Even though the duration of exposure may only be 1/1000 of a second, the image moves a small fraction of an inch during this time. The problem you encounter is how much image movement can be tolerated before it becomes objectionable and adjust your shutter speed accordingly. To determine what forms an objectionable blurring of the image, you must visualize how the photograph is going to be used. An image on a wallet can be much blurrier than an image that is magnified to an 11x14 wall portrait. A print that is viewed up close must be much sharper than a print viewed from a distance. Once you know how the photograph is to be used, you can determine the shutter speed required to produce an acceptably sharp image. In some situations, it may not be possible to produce a completely sharp image.

There is a general rule you must follow for determining shutter speed when handholding a camera. This general rule is do not hand-hold a camera with a shutter speed that is slower than the reciprocal of the focal length of the lens you are using. What this means is that if you are using a 50mm lens, do not use a shutter speed slower than 1/50<sup>th</sup> of a second. If you are using a 150mm lens, do not use a shutter speed slower than 1/150<sup>th</sup> of a second.