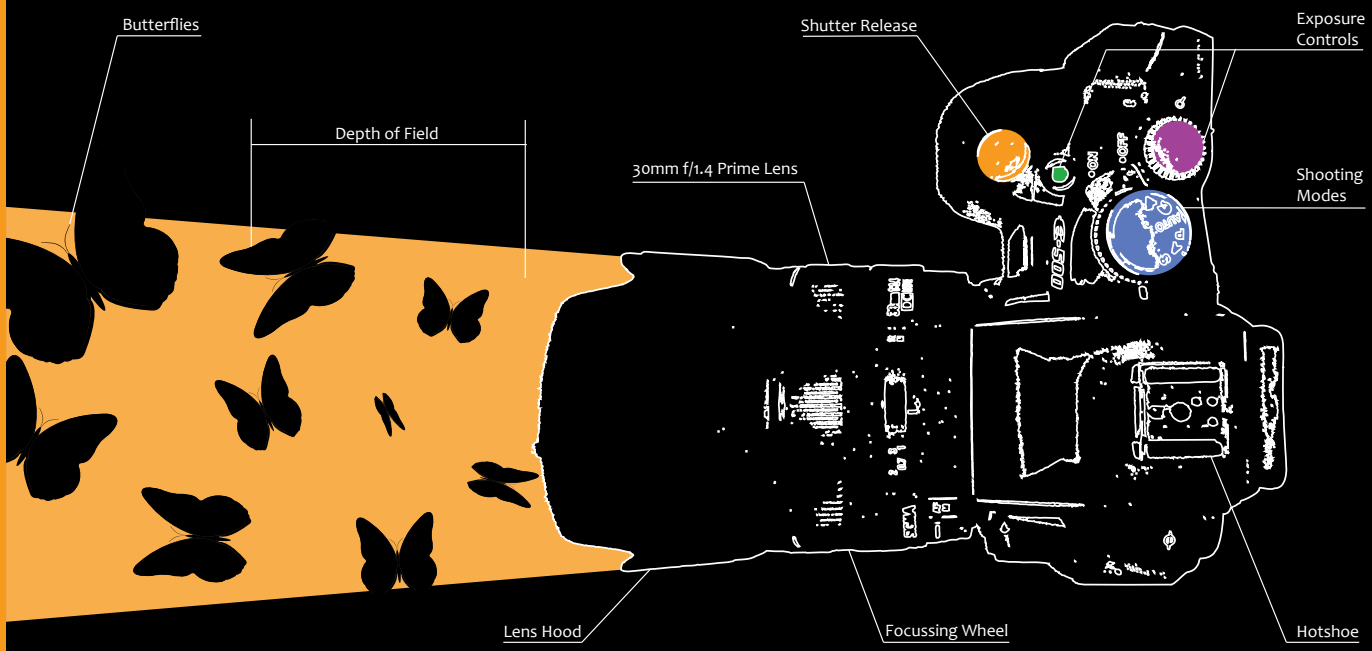
Will McAllister Photography

SLR

Basic Settings Guide



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Basic Settings

Your SLR camera will have many settings, and can appear very complicated, however there are only 4 main settings that you need to understand in order to use the camera properly. These are:

Shutter Speed *The length of time the shutter stays open to let light hit the film/sensor*

Aperture *The diameter of the 'pupil' controlling the amount of light hitting the film/sensor*

ISO *The film or sensor sensitivity.*

These three settings control the amount of light hitting the photosensitive chip, which is known as **exposure**. Therefore they are called '**exposure controls**'. A new feature of digital cameras is the ability to set the ISO rating whenever you want; whereas with film cameras, ISO was fixed and depended on the film, so you could only change it by changing the film.

The scales by which we measure exposure controls are designed so that each 'notch' on the scale represents a doubling or halving of the amount of light being recorded by the film or sensor. If you increase the aperture by one notch and then decrease the shutter speed by one notch, the exposure will be the same.

These notches are known in the business as '**stops**' and photographers will refer to them frequently as though they were a unit of measurement, e.g. that photo is overexposed by 2 stops, meaning the exposure let in 2 stops too much light and the photo was too bright, the reverse of this 'underexposure' means there wasn't enough light and the photo came out too dark (remember, a stop represents a doubling or halving of the amount of light, so a photo which is overexposed by two stops actually had four times as much light as would be ideal, 2x2=4, a photo overexposed by three stops would have eight times too much light).

Judging whether a photograph is correctly exposed is a matter of opinion, it is up to you to decide whether it is too bright, too dark or just right, and this depends heavily on the subject matter. A photograph of snow, for example would be expected to be bright. This is where beginners often run into trouble with the auto settings on their cameras. The camera doesn't know the image is supposed to be bright and thinks it must be overexposed, so it reduces the exposure by a number of stops, resulting in grey snow!

The scales shown at the top of the following 3 pages show the stops for each setting. Modern cameras often also have intermediate values between the stops and it is useful to know which values for each setting equate to whole stops. If, as in the example above a photo is overexposed by two stops, then you know to reduce the exposure by two stops using any of the exposure controls. You can reduce it by two stops of shutter speed, or one stop of shutter speed and one of aperture, or any other combination; it will have the same effect on the brightness of the photo. All of the scales on the following pages are displayed with darker values towards the left, so to reduce the exposure, move the settings towards these values.

Another term you might sometimes hear is 'Exposure Value' or 'EV'. This is another way of measuring exposure. 1EV is equal to 1 stop, the difference is that while stops only measure the difference between two exposures, EV can measure a single exposure. EV is not often referred to and you don't really need to remember how it is calculated, but the mathematically curious can use the following formula:

at ISO100 $EV=\log_2 N^2/t$, where N is aperture and t is shutter speed.

White Balance

The fourth important setting, White Balance is the digital version of different films designed for use under different lighting conditions, and corrects for the colour of the light the photo is taken under.

Shutter Speed

Darker Photos
Freezes Action

Brighter Photos
Motion Blur

Shutter speed is a measure of the length of time the shutter stays open to let light hit the film or sensor. It is measured in seconds but some cameras, especially old ones show $^1/_{1000}$ as 1000, $^1/_{500}$ as 500 and so on, and show whole seconds either as 1s, 2s etc. or in a different colour. I have used this way of writing shutter speeds in the scale above, to save space.

The longer the shutter is open, the more light will hit the film or sensor and the brighter the photo will be, however anything that moves while the shutter is open will show motion-blur on the photo. If you don't want a blurred photo you will have to use a faster shutter speed which might mean you need alter other settings to ensure sure enough light enters the camera. Sometimes, however, when you want motion-blur you have the opposite problem of trying to reduce the amount of light entering the camera.

If you are **handholding** the camera, then generally, $^1/_{200}$ is the slowest shutter speed you can use without seeing motion blur from the movement of the camera itself, although this depends on the focal length (zoom) of the lens. If you need to use a slower shutter speed than this then you will need to use a **tripod** to reduce camera movement.

Motion blur created by a slow shutter speed can be used as a creative effect:
Left: flowing water is blurred to create a more fluid effect.
Above: vehicle lights create bright trails on city scenes.

Aperture

32 22 16 11 8 5.6 4 2.8 2 1.4 1

Darker Photos
Wide Depth of Field

Brighter Photos
Narrow Depth of Field

f22 

f11 

f5.6 

Inside each lens is an iris, similar to the one you have in your eye which can be opened or closed to control the amount of light hitting the film or sensor. This setting is known as aperture and the number used to measure the aperture is known as an f-number, where lower numbers represent a wider aperture. f-numbers are written as f1.4, f5.6* etc.

A wider aperture allows more light to hit the film or sensor creating a brighter photo, however a smaller aperture gives the photo a greater depth of field, which means a wider range of distances from the camera will be in focus. A narrow depth of field can be used to throw the background or foreground out of focus for creative effect (photographers often refer to the quality of the blur achieved in this way as '**bokeh**') while a wide depth of field can ensure that as much of the image is in focus as possible.

Different lenses have different maximum apertures (smallest f-number). The wider the maximum aperture, the more light the lens can let in and therefore the better it will be in dark conditions. The maximum aperture is usually referred to as the '**speed**' of the lens, e.g. a maximum of f1.4 would be quite a fast lens.

* The numbers used to measure aperture are all powers of the square root of 2

In landscape photos (above) a wide depth of field and therefore a narrow aperture is often desired to keep both foreground and background in focus. However a narrow depth is often used for creative effect (left), putting the background out of focus so the subject stands out more.

ISO

Darker Photos
Crisper Photos

Brighter Photos
Noisier Photos

100

400

1600

The sensitivity of film to light is measured as an ISO rating. The higher the rating, the more sensitive the film. There is a trade-off though, the more sensitive the film is, the larger the photo-sensitive grains have to be, and films with high ISO ratings produce increasingly grainy photos.

The sensitivity of the sensor in a digital camera is measured in exactly the same way though the trade-off is slightly different. The more sensitive it is, more random noise it detects. The effect is similar to grain, and using high ISO ratings creates photos with increasing amounts of random coloured noise.

The most commonly seen ISO ratings are 100, 200 and 400, ratings higher or lower than this are seen as better suited to exceptional circumstances. 100 is recommended for use in bright daylight, or when a long shutter speed is used, with 400 being more suited to indoor conditions and hand-holding the camera, and 200 being a useful compromise. Each doubling or halving of the ISO rating is equivalent to increasing or decreasing aperture or shutter speed by one stop.

The main difference when using a digital camera is that a different ISO rating can be selected for each photograph. There will also be an auto setting, which will typically select one of the above three commonly used ISO ratings dependent on the current lighting conditions.

Unlike the trade-offs with the other exposure controls, and unlike traditional film photography, digital noise is rarely used creatively and most photographers use the lowest ISO rating they can get away with to avoid it, however in dark conditions you may have to use a higher rating to get the photo correctly exposed. You will need to consult your camera's manual, but it is likely that there is a Noise-reduction option, to help alleviate this problem. A lot of photo-editing applicatons also come with noise-reduction options, some do a decent job of it but others just degrade the quality of the image.

White Balance

If you use film, or have used film in the past, you may know that different films are suitable for different lighting, such as daylight and tungsten lighting. This is because different light sources emit light of different colours but our brain corrects for this so that we see white things as white. If our photos are going to look as we expect, we need the film to correct for this too, or photos taken under tungsten lighting, for example, will appear yellow. This colour is measured as a 'colour temperature' in degrees Kelvin. Knowing the exact temperatures of different kind of lighting isn't necessary for beginners as most camera manufacturers will give you a choice of presets named for the kind of lighting they are designed for, but redder lighting such as that of the setting sun is of a lower temperature than bluer lighting such as fluorescent tubes.

If you are using film, then you must make sure that the film you are using matches the lighting conditions. If it doesn't say on the box what lighting conditions the film is for then it should be suitable for daylight conditions but you will see some colour casts to your photos if you use it under artificial lighting.

If you are using digital then you have the luxury of being able to select a different colour sensitivity for each photo. This setting is called '**White Balance**' and is usually made simpler by a set of icons illustrating the lighting conditions to use each setting for. They are fairly self evident, a picture of the sun means daylight, clouds mean cloudy, a house with a shadow means shade, a light bulb means incandescent (including tungsten lighting) and a bar means fluorescent lighting (which can be either yellow or blue/green). You will also find an auto setting where the camera will try to decide the appropriate setting itself, a custom setting (if you know the precise colour temperature of the lighting), and a setting which allows you to point the camera at something white and take a reading from that. You'll have to consult your manual to find out more about those advanced features.

White Balance is applied by the camera after the photo has been taken, so if you take your photo in RAW mode, then you can easily alter the White Balance on your computer later. This is especially useful when you are shooting under mixed lighting and a single White Balance will not achieve the correct colour across the photo. Computer software may offer more advanced White Balance tinkering than your camera does.

White Balance Setting

Actual Lighting Conditions	Daylight	Fluorescent (Yellow)
Daylight		
Fluorescent (Yellow)		

The photos to the left show how White Balance affects the colour of the photo, and how the correct setting for a daylight scene will give an unnatural colouration to a photo taken under fluorescent lighting and vice versa.

Other Useful Settings

Shooting Modes

Shooting mode determines how your camera sets the exposure controls automatically. On most cameras there will be a dial with the following letters: S(or T), A, M and Auto.

S or T means Shutter priority mode. This is where you choose shutter speed yourself and the camera picks an aperture to correctly expose the image.

A is the reverse of this, Aperture priority mode. You select aperture, the camera selects shutter speed.

M is full manual mode, where you select shutter speed and aperture yourself.

Auto mode tells the camera to select both shutter and aperture settings itself; there will also be special programme modes for different types of photography such as portrait, night, sports and landscape, which are automatic. In all of these modes, ISO is usually handled separately.

Focal Length

Focal length is a measure of the zoom of the lens. You can get away with using your camera without having to know how zoom is measured, but there are a few things worth knowing about it:

It is measured in millimetres (mm). The theoretical distance between the film/sensor and the focal point.

The 'zoom factor' depends on focal length and the size of the film or sensor. 50mm was a 'standard' lens for 35mm film, but as sensors are typically smaller, standard lenses for digital cameras may be more in the area of 25-30mm

Shorter focal lengths are more 'zoomed out' and known as 'wide angle lenses'. Longer focal lengths are more 'zoomed in' and known as 'telephoto lenses'. A 'zoom' lens is simply any lens with a variable focal length.

Longer focal lengths let less light in and therefore you will need to increase the exposure.

Raw v jpeg v tiff

Somewhere on your camera will be an option to select which file-type you want to take photos in. These are typically as follows:

JPEG: You may be familiar with jpegs (or jpgs), they are by far the most common file-type used to share photos on the internet. The advantage is a small file-size, this is due to compression, which is actually a reduction in the quality of the photo which you will see in low quality jpegs. Your camera will give you the option of selecting file size and quality. Size is measured in pixels such as 800x600, while different cameras use different terms for quality. Examples include fine and superfine, or SQ, HQ and SHQ*. It is advisable you select the highest quality available. The biggest disadvantage of jpeg is that every time you save the file it is compressed again, so files that have been worked on many times gradually lose quality.

TIFF: Tiffs are are format which compresses files without the loss of quality in jpegs. However with the advent of raw files, tiffs have very much fallen out of use as they are slow to open.

RAW: Unlike jpegs and tiffs, raw files are not compressed at all. The file contains the raw data as it was recorded by the camera and therefore this file-type is the most versatile of all, though also the largest file-size. Each camera manufacture has it's own file-type and the disadvantage is that many basic software packages can't open raw files. However your camera should have come with a CD of software which will open your camera's raw files, and professional software such as Adobe Photoshop will open raw files of all types. One opened, raw files can be manipulated in a number of ways (such as White Balance) without affecting quality. Raw files can also record the full range of shades between light and dark that your camera can, where recording to jpegs usually results in some clipping of highlights to pure white and shadows to pure black. A comprehensive guide to manipulating raw would be going beyond the scope of this guide.

* Standard Quality, High Quality and Super-high Quality

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