Camera Exposure Settings Explained, or
How to use the Manual Setting on your camera

Exposure – What is it?

The 'Exposure' is what makes the lighting of the image right. It is a balancing act between the amount of light you let through the lens and how sensitive to light the recording sensor is.

If the exposure is not correct your picture will be overexposed (too much light) or underexposed (not enough light)

How do I get the right exposure?

Your camera may give you a guide to when your settings are correct for the correct exposure, but you still need to know how to alter the settings to get there.

The 3 things that decide this are:

1. **The Shutter Speed**

   This is behind the lens in the camera and it opens and closes to let the light passing through the lens onto the sensor, where the image is recorded.

   The speed of the shutter opening and closes dictates how much light gets through. The faster the shutter-speed is set, the smaller the amount of light that is allowed through it.

   Shutter speeds are measured in fractions of a second and expressed like this: 1/500 (which means that the shutter will open for one five-hundredth of a second)

2. **The Aperture**

   This is the opening through which the light passes into the shutter. The bigger the opening, the greater the amount of light is allowed through the back of the lens to wait for the shutter to open and let it onto the sensor.

   Apertures are measured in 'f-stops' and are expressed like this: F/5.6

   The smaller the number of the f-stop, the wider the opening will be and therefore the greater amount of light will be allowed to pass through.

3. **The ISO**

   This is a term to indicate how sensitive the sensor (the image recording plate) of your camera is.

It has nothing to do with the amount of mega-pixels and is a variable setting that is used to boost the amount of light that your camera will be able to record.

ISO values are measure as numbers, with the lowest numbers making the sensor LESS sensitive.

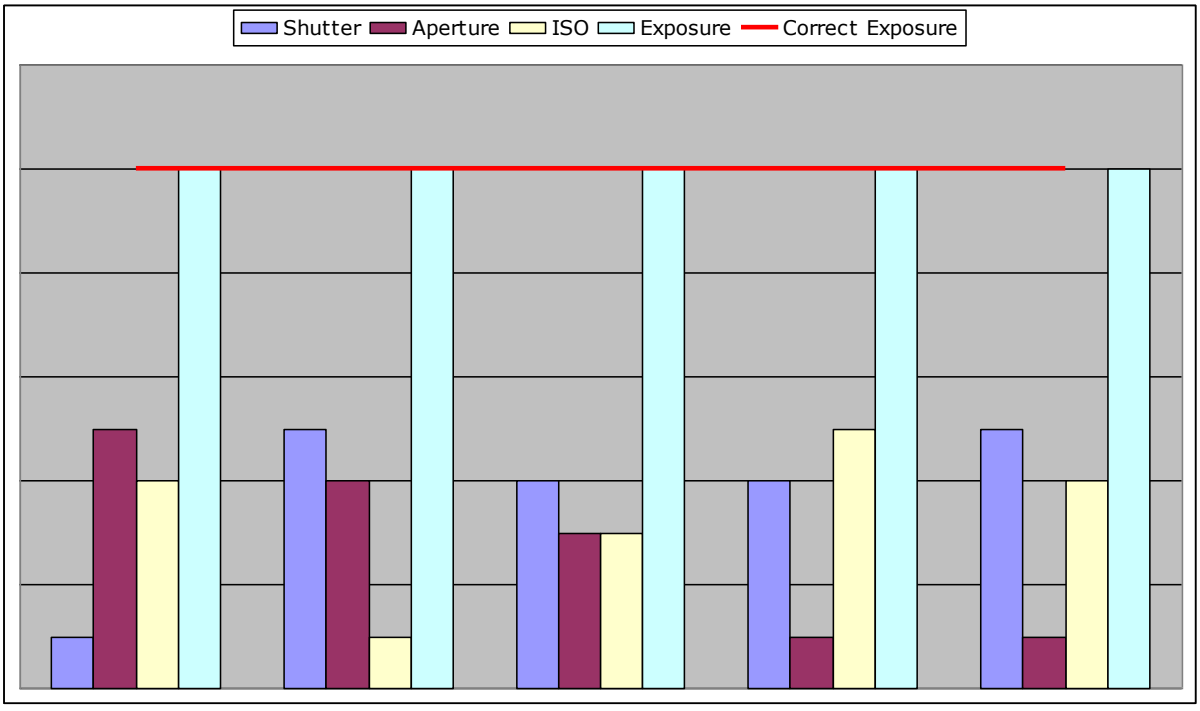
Typically the ISO range will start at 100 and go to 3200. Some cameras go higher and lower but this is the typical range at which most shots are taken.

The Balancing Act

Now you know that there are 3 things that need to be altered to get the exposure correct.

These need to be balanced and there are many different combinations that will give you the correct exposure, although some combinations will have different effects on how the final picture turns out.

Example to Illustrate:



The graph above shows 5 different shutter/aperture/ISO combinations that all result in the correct exposure. The lighting conditions and the type of subject should determine what type of combination is best.

Best Practice Tips – Choosing the right combination

What Shutter Speed?

1. *First Rule – Match the equipment*

If hand-holding your camera then the first rule of thumb is that your shutter speed should not be smaller (slower) than the focal length of your lens.

This is a general rule to safeguard against camera shake that is brought about by having a long lens on your camera. This is because if it is a heavy lens then you may be more prone to hand vibration when holding it up. Also, with zoom lenses, the further your lens is 'looking' the more pronounced small movements become, which intensify 'shake'.

A lot of lenses these days have anti-shake systems that mean this rule becomes less vital. However, let's use this rule for the purposes of learning how to correctly expose our pictures.

Therefore your minimum ideal hand-held shutter speed should be the focal length of the lens.

i.e. 400mm lens or 400mm focal length on zoom = 1/400 minimum hand-held shutter speed

2. *Second Rule – Match the subject*

If shooting moving objects you will need a shutter speed much higher than if they are stationary. Birds in flight or flap will need to be shot at 1/500 or higher even where your focal length is shorter than this – the faster the shutter the more chance of stopping the motion

If the light allows then choose the fastest shutter speed available in your 3-part exposure balance for any moving objects.

NOTE: For most wildlife shots the shutter speed at which you take the picture is the most important component in your 3-part exposure balance

What Aperture?

As well as being the thing that lets the light from the lens into the shutter, the aperture setting also controls the 'depth of field' in the shot. This is the term that is used to describe how much of the shot from the front to the back is sharp.

It is nothing to do with the focusing of the lens but can give some nice blur effects to backgrounds when used correctly.

Generally, the wider the aperture (smaller the F-stop number) the smaller is the depth of field and the greater the amount of light entering the lens.

Therefore if you use a 'WIDE' aperture (smaller F-stop number) you will increase the light coming in and make the depth of field 'shallow'.

Note: It is at this point that you need to be thinking what your shutter speed is and where your viewfinder exposure pointer is.

If you are very close to an object, taking a macro shot for example, you need to have a very small aperture (larger F-stop number) to get depth of field. This is because the closer you get to an object the narrower the depth of field gets.

Where you are over 3 metres from an object and if the light allows then choose the widest aperture available in your 3-part exposure balance as a general rule.

As you explore your camera and the setting, taking lots of pictures you may find that your pictures are a little better at certain apertures. This is what is known as 'the sweet spot'. Most photographers do not shoot 'wide open' at the widest aperture and use a balanced aperture of F/8 where the light AND shutter speed allows.

What ISO Setting?

As described, the ISO controls how sensitive the sensor is to light. The attribute of the ISO setting is that it introduces 'noise' into the image at certain values, which vary from camera to camera.

In general terms, if the light is very low, then in order to get the right shutter speed and aperture you will need to increase the ISO value (higher number).

With very high numbers (over 1000) you will get some noticeable 'noise' (graininess) on your images.

In very bright sunlight you could go down to a low setting like 100, which in the old days of film would give you the best prints. However, with most digital cameras a setting of 400 will give good results.

NOTE: Each of the 3 parts to the exposure balancing allow you to select which part to increase or decrease unless the lighting conditions are extreme. The ISO setting gives you the most flexibility to increase shutter speed or change your aperture setting. This is because unlike aperture and shutter speed settings a change in the ISO incremental setting will not have a dramatic effect on the image.

The best ISO setting (in the author's opinion) is AUTO, which lets you concentrate on the shutter speed and aperture settings only.

Exposure 'Automatic' Programs – Which to use and When

1. AV (Aperture Priority)

This setting allows you to set the desired aperture and then the camera automatically balances the shutter speed for you.

Where you intend to take hand-held pictures of moving subjects then you should avoid using this setting. This is because you lose control of the shutter speed and the camera may set it at a value that is too low to get a good image.

This program is more frequently used for non-moving subjects like portraits or landscape shots where the camera is tripod mounted and there is little chance of vibration

2. TV (Shutter Priority)

This is the best program to use when you are taking hand-held pictures of moving subjects, as it lets you select the shutter speed you want to use.

The camera will then set the aperture as wide or narrow as it needs to be to balance with your shutter speed (and the ISO setting you have selected)

You should note that if the lighting conditions are not bright enough for your shutter speed even when your camera has set the widest aperture it may drop your shutter speed as well. You can compensate for this by increasing the ISO or by dropping your shutter speed setting.

The Author's Equipment and Settings

Canon 7d
Canon 1100d
Canon Powershot SX30

EF 300mm F/4.0L IS USM
EF 100mm F/2.8L Macro IS USM
Canon 1.4x Convertor III
Kenko DG Extension Tube Set 36+20+12

Exposure:

Aperture	Manual
Shutter	Manual
ISO	Auto