

SHARPNESS

TTG Camera Club – April 2015

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Sharp? What and Why

- Judges “Sharp where it needs to be” etc.



Camera Model: PENTAX K-7
Lens: Sigma Lens
Focal Length: 500.0mm
(35mm equivalent: 750mm)
Aperture: f/8.0
Exposure Time: 0.0013 s
(1/800)
ISO equiv: 400
Metering Mode: Matrix
Exposure: aperture priority
(semi-auto)
White Balance: Manual
(Cloudy)

The elements

- The following elements need to be managed for a sharp image
 - Focus
 - Camera Shake
 - Subject Movement
 - Shutter Speed

Focus

- Stating the obvious - If your image is not in focus then it won't be sharp.
Make sure you focus carefully on the key part of your subject which for people and animals is the eyes (not the nose).
Remember: You can manually set the focus point as needed.
- Some cameras allow micro adjustment for compensating for front/back focusing of the auto focus system.
Do some research on this subject as it can make a big difference to AF performance.
- Also consider using continuous focus mode (AI servo) when shooting action, sport and wildlife.
- Eyes!
- Depth of field
- Hyperfocal distance
 - Focusing your camera at the hyperfocal distance ensures maximum sharpness from half this distance all the way to infinity. The hyperfocal distance is particularly useful in landscape photography, and will help you make the most of your the depth of field — thereby producing a more detailed final print

Lenses

- All lenses have a sweet spot where they are their sharpest. It is usually a few stops closed down from fully open.
Eg. for a fast prime (f/1.7) it may be around f/4; and for many zooms is often around f/8.
Zooms also have an optimal zoom where they are sharpest.
- You can google your exact lens model and the phrase 'sweet spot' to find out your lens characteristics or experiment!
For tack sharp images work with your lens sweet spot.
- Another factor is the image quality (IQ) of your glass. Very simply, cheaper kit lenses don't always have the same IQ as more expensive glass. You do, to a large extent, get what you pay for.
- Some lenses have inbuilt optical stabilisation (OS) / vibration reduction (VR) / image stabilisation (IS)
(called different things by different manufacturers).
These lenses usually cost more than the un-stabilised versions.
Some cameras have shake reduction (SR) built into the camera body (Pentax and Sony).
You can expect stabilisation to give 2.5 to 4 stops performance.
- We know that as you close a lens down the depth of field (DoF) increases so you might think that closing the lens right down to f/22 or more would mean sharper images. But, another effect comes into play called the [limit of diffraction](#).
This physical limit is the reason that lens sweet spots are closer to f/8 than f/22.

Camera Shake

- Camera vibration can be tamed by the use of several techniques, shutter speed, support and/or special features.
- Camera vibration when hand held requires a shutter speed of at least the reciprocal of the focal length x the crop factor. Eg. a 100mm lens (non VR) on a Nikon D90 (1.5 crop) needs a minimum of 1/150 shutter speed. But many have found adding another 1/100 to the formula makes for much sharper images.
So in the example above 1/250 is going to give your best results.
- Again, some cameras and/or lenses have stabilisation which gives 2.5 to 4 stops performance.
- The other way to stabilise your camera is to use some form of **support**. You have several options.
The main method of support is to use a tripod. You may also elect to use a monopod or bean bag or simply brace yourself against a solid object. Please review [Stability - Why use a Tripod \(or monopod\)](#) and [How to hold your camera](#).
- When using a tripod for long exposures camera vibration can be significantly reduced by using special features such as mirror up delay. You need to read your camera manual to find out how to do this.
- You can also use remotes (either IR, wireless, or cables) to activate the shutter reducing vibration.
- When using your finger to activate the shutter you should squeeze not jab at the shutter. A more advanced technique is to roll your finger onto the shutter, and once mastered, will give you the smoothest action. You make use of knurled bit of the shutter release so you can roll your finger off that onto the shutter release gently without shaking.
[Demonstrated here](#) about 3 minutes into the video.

Subject Movement

- If you are shooting sports or wildlife then shutter speeds of 1/500 or faster are typically needed to freeze subject movement.
- If a person is running perpendicular to your lens axis (across in front of you) you will need a shutter speed about 1/1000 (or more) to freeze the action.
- You will need to experiment as the crop factor and focal length affect the speed you need.
- Of course if you are panning to get a blurred background you may elect to use slower shutter speeds compensated by your panning action. Typical speeds range from 1/30 to 1/100 when panning.
- Remember: If you need to get your shutter speed up, open up the aperture and/or raise your ISO speed. A noisy sharp image is always better than a less noisy blurred image. Noise can be handled in post processing.

Using ISO to get the shutter speed up

- You are better off raising your ISO and having noise than having a blurry image.
- Post processing can deal with noise, whereas nothing fixes blur
- A third party noise program is often useful (eg. Neat Image, Noise Ninja, or DeFine)
- See <http://www.pentaxforums.com/forums/32-digital-processing-software-printing/234818-comparison-noise-reduction-plugins.html>

ISO trade offs

- The higher the ISO the higher the noise
- What is Noise?
 - Image **noise** is an undesirable by-product of image capture that adds spurious and extraneous information. The original **meaning** of "**noise**" was and remains "unwanted signal"; unwanted electrical fluctuations in signals received by AM radios caused audible acoustic **noise** ("static").
- Loss of Dynamic Range

Summary

- Be careful with Focus
- Work with your lens sweet spot if possible
- Stabilise your camera
- Use as fast a shutter speed as needed
- Noisy is always better than blurry (unless it is an 'Art' image 😊)
- Use software to manage noise

Questions?

