

## **PANORAMIC PHOTOGRAPHY** by David C G Smith, EFIAP/s, FAPS

Definitions – There are many different interpretations of what constitutes “panoramic photography”. Taken literally, it would mean a 360 degree view, or one that exceeded the field of view of the human eye, but it is generally accepted to be an image with an aspect ratio of 2:1 or greater & may not necessarily use a wide field of view.

Once limited to the realm of expensive dedicated panoramic & large format cameras, the digital era & technological changes in hardware and software have brought quality panoramic photography well & truly to the amateur market. There are some obviously some limitations compared to dedicated equipment, which I will cover later.

Images can be displayed in traditional linear format as a print or projected image, or viewed as interactive virtual reality/immersive images on-screen. Current developments are also extending this to 3D as opposed to 2D capture and display. I will limit this discussion to 2D linear images, as this is what most camera clubs can currently display, but there is a wealth of information on the web for anyone interested.

So how can we capture images to display in panoramic or greater than 2:1 format? There are 4 basic ways of achieving this, with the choice depending on the required output resolution/shooting conditions:-

- Use a dedicated large format panoramic camera such as a 6x17cm format – these are expensive, but in some conditions may be the only suitable option. They can produce quality large scale gallery prints.
- Take multiple overlapping still images and stitch them to make a larger format image – this works well with limited subject movement and reasonably constant lighting conditions. Some cameras have built-in facilities to process this, some may assist with alignment & others require separate software to process. Specialised tripod heads and even robotic heads can assist with alignment for image capture.
- Many cameras and phones now have a “sweep mode” panorama function, where the camera is simply panned to take multiple images & the resultant image processed in camera. Results can be surprisingly good and minimal setup is required if time is limited.
- A single image can simply be cropped to the required format either in-camera or in post-processing. With modern high resolution cameras, this may be sufficient, depending on required output size. For projection, on-screen display or camera club sized prints, this is often adequate.

What other equipment and techniques are needed for panoramic photography? I will concentrate on taking images for stitching, as cameras with dedicated panoramic modes usually set up everything automatically. A tripod combined with remote release is certainly useful, particularly in low light, but it is also possible to achieve good results handheld in good light. If using a tripod with a standard camera mount, be aware that “parallax errors” may result as the camera is rotated. This may cause near and far objects to move relative to one another between frames, making the stitching process more difficult or causing “ghost” artefacts. This can be overcome by special mounting brackets which allow the camera to be positioned so it rotates about the “entrance pupil” of the lens. This position of this varies for different lenses and different focal lengths of zoom lenses, but can be determined by trial and error or by looking up data for a specific lens.

Many lenses from telephoto to wide angle can produce good results when stitching. Ultra wide lenses give a large field of view, but can also cause distortion, which again may be an issue for the stitching process, so try to use “standard” focal length lenses with minimal distortion. Vignetting, or light fall-off towards the edges can also be an issue, so use lenses with minimal vignetting, or correct this and any distortion before stitching. (Some stitching software may do this automatically, so don’t double correct).

I also recommend removing any filters, unless exposed to adverse conditions. In particular, polarising filters can produce large changes in colour density across the image, resulting in uneven skies. Lens hoods or other forms of shading are recommended if shooting into the light, as flare will be different across frames. Remember also to turn image stabilisation / vibration reduction off if not tripod compatible.

When setting up to take photos for stitching, try to pre-visualise the composition of the end result. Decide which lens/focal length to use & whether to take in horizontal or vertical format & if a single or multiple rows are needed. Practise panning for the shots, trying to keep the camera level & allowing about 25-30% overlap between images. Determine your start and end points, allowing extra margins for later cropping/straightening. The overlapping portions should contain well defined features from which the software can pick several common “control points” in both images to stitch them together.

If images are going to be printed, standard A4 and A3 width pre-cut panoramic papers have an aspect ratio of about 2.8:1, so this, or say 3:1 is a good format to work to. As a general guide, this would require a 3 image horizontal stitch or 7+ vertical images in a single row to produce this final image ratio.

One should also be aware of any subject movement that could occur between frames. This could be rapidly moving clouds, shadows, wind blowing trees/grass, ripples, waves, reflections, animals, birds or inanimate objects. If present, try to minimise the effect of these by positioning them in the centre of frames rather than the overlapping parts or resort to cropping a single image.

It is highly recommended to use manual exposure and focus for all images to be stitched to avoid variations between frames. This requires pre-determining the correct exposure and focus to give sufficient depth of field in all images. Focusing at the “hyperfocal” distance can help here, or pick an object one third into the frame. High contrast areas across the whole image may also benefit from “High Dynamic Range” (HDR) techniques to correctly expose the final stitched image. (Whilst graduated neutral density filters can be used for single row panoramas, it is imperative to keep the camera absolutely level when panning). A couple of test shots using aperture priority in high contrast areas can usually assist with settings for manual exposure.

Use a “fixed” white balance setting appropriate for the lighting conditions as opposed to “auto”, as this can also cause colour shifts between frames. Some cameras also have an “auto ISO” function in manual exposure mode. This should be disabled so the ISO setting stays fixed for all frames.

Dramatic lighting often creates the best images, but also changes very rapidly. This or other movement in images during exposure of the sequence may require a partial or total re-shoot. It is therefore recommended to shoot the sequence as rapidly as possible, allowing just enough time for the camera to stabilise between shots. Practise makes perfect! It’s also a good idea to review the sequence of images to check all are exposed/aligned ok.

Stitching – Having acquired the images, then next step is to stitch them together. Whilst this can be done by manually blending, there is a wealth of software available to automate the process. Some cameras have stitching software supplied; otherwise there are free programs such as “Hugin” and “Autostitch” which work well. Other more comprehensive software such as “PTGui” can be purchased and the “photomerge” option in later versions of “Photoshop” can also give good results. It’s really a matter of choosing the most suitable for the author’s needs.

Once stitched, a final straighten and crop may be necessary to achieve the desired format for printing or display. There is a lot of useful information on the web for further reading on any points raised in this article; just “Google” it! I have included a few of my favourite images, all of which have been produced without any specialised panoramic gear and some handheld. Here’s a quick summary of the basic tips for stitching:-

- Pre-visualise the end result & select the best lens/focal length to achieve it
- Decide on whether to shoot in horizontal or vertical format & practise panning
- Remove filters for most situations
- Focus on a point to give adequate depth of field and lock focus in Manual mode

- Use Manual mode for Aperture, Shutter Speed, ISO and White Balance
- Keep camera level and try to rotate about the Entrance Pupil of the lens
- Use 25-30% Overlap between frames
- Allow extra margins for final straightening / cropping
- Shoot frames in quick succession, review and repeat if necessary

Happy Panoramic Shooting!

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