



# SPHERICAL PANORAMAS

Guy J Brown FRPS checks out the Panosaurus tripod head which, says its manufacturer, offers a low-cost means of recording 360° spherical panoramas

Panoramic photography has enjoyed a resurgence in recent years due to the advent of stitching software, which allows a sequence of partially overlapping digital images to be combined into a single picture with an extended field of view.

Panoramic images have also proven popular on the internet, as they can be downloaded and viewed interactively within a web browser. Recent advances, such as Apple's cubic Quicktime VR image format, provide the means to pan around a full-screen completely immersive scene in real time. This is achieved by creating a 360° spherical panorama, as though the scene were projected onto the surface of a sphere with the viewer at its centre. Spherical panoramas include the parts of the scene directly above and below the camera, so that when viewed interactively it is possible to look straight up and straight down.

Typically, a spherical panorama is shot using a tripod with a head that allows the camera to be simultaneously rotated and tilted. Using a wide angle lens, a 360° view is recorded as three rows of images (in which the camera is level, then tilted up and tilted down). For this reason, spherical panoramas are also sometimes referred to as multi-row panoramas.

Alternatively, if a full-frame fisheye lens is used then a spherical panorama can be shot in a single row, with two additional shots to cover the zenith (the area directly

**Above: Spherical panorama of West One complex, Sheffield.**  
**Right: Panosaurus spherical panoramic tripod head, shown mounted on the Kaidan QPXL-1 Quick Tilt Leveller base.**

*Panoramic images produced for this review can be viewed as interactive Quicktime VR movies at [www.guyjbrown.com/technical.html](http://www.guyjbrown.com/technical.html)*

#### Links

**Greg Rubottom's Panosaurus site**  
[www.gregwired.com](http://www.gregwired.com),  
**Kaidan** [www.kaidan.com](http://www.kaidan.com),  
**PTMac** [www.kekus.com](http://www.kekus.com),  
**CubicConverter**  
[www.clickheredesign.com.au](http://www.clickheredesign.com.au)



above the tripod) and the nadir (the area directly below the tripod). To avoid the tripod legs appearing in the panorama, the camera must be removed from the tripod and an image of the ground taken from approximately the same position as the scene was recorded. This image is then hand-edited into the final panorama.

### Tripod head criteria

A tripod head for spherical panoramic photography must therefore satisfy a number of criteria. Firstly, it must be possible to rotate the camera about a point (commonly called the nodal point) such that perspective is maintained as the camera is moved. If this is not done carefully, parallax occurs when the camera rotates, causing foreground objects to be displaced relative to the background – the resulting images will then be very difficult to stitch without visible joints.

Secondly, the head must allow the camera to be tilted in elevation. Finally, it should be possible to release the camera quickly from the tripod head (for shooting the nadir), and ideally the head will remain properly calibrated when the camera is removed and affixed at a later date. My experience with previous panoramic heads suggests this is a more difficult engineering design problem than it may first appear; all of the previous heads I have tried either lacked stability or were difficult to set up. Spherical panoramic heads also tend to be expensive.

### Panosaurus

Enter the Panosaurus, a spherical panoramic head designed by American photographer Greg Rubottom. Retailing at about £95, the Panosaurus is far cheaper than its rivals, such as Manfrotto's 303 SPH head, but provides similar functionality. The cost has been kept down by shipping the head in flat-packed form, and by using mostly plastic construction. The majority of components are made from expanded PVC, with the exception of the vertical column and two strengthening strips on the horizontal arm, which are aluminium.

The head weighs a mere 0.9 kg, and when folded is small enough to fit into a medium-sized camera bag. The Panosaurus is suitable for cameras with a tripod bush that is aligned with the centre of the lens (this is true of all DSLRs). It will also fit cameras in which the tripod bush lies to the left of the lens centre, when viewed from the front. In practice only a few cameras (notably the Nikon 950, and Canon S400 and S230) won't attach to the head.

### Components

The Panosaurus arrives in a small box containing 20 components, and a booklet that carefully explains how to assemble and calibrate it. It took me about two hours to put the head together, adjust it for my camera and lens combination, and shoot a panorama. On finding that one of the components was a small nail, I had visions of banging bits of the Panosaurus together with a hammer – fortunately, the nail is only used to calibrate the head.

Initially, the camera is attached to a base plate and mounted onto a horizontal arm in landscape orientation. The nodal point is then determined by sliding the camera along the arm until parallax is eliminated. This is achieved by aligning a vertical object near to the camera (the nail) with a more distant vertical line, and checking that alignment is maintained as the arm is rotated. Once this is done, the position of the base plate is noted and the camera is mounted in portrait orientation, which is the usual shooting configuration.

The camera is mounted onto the base plate via a 1/2ins bolt, so a screwdriver or small coin is required to attach and remove it. An unfortunate aspect of this design is that the base plate must be completely removed from the horizontal arm in order to detach the camera – having gone to the trouble of carefully setting up the Panosaurus, it's a shame that the arrangement must be disturbed when mounting and unmounting the camera.

### Baseplate

The base plate obscured the battery compartment of my DSLR, and on compact models it may also cover the slot for the memory card. This is probably unavoidable, but because of the way in which the camera is attached, to change a battery it is necessary to remove the camera and sliding base plate from the horizontal bar, unscrew the base plate and then put the whole thing back together. Additionally, there is no stop at the end of the horizontal arm, so that if the fixing bolt is not properly tightened, the base plate could slide completely off the arm and fall to the floor. You'd have to be careless to do this, but it would still be nice to have a stop at the end of the arm.

## The Panosaurus is an efficient beast and I obtained some good results

GUY BROWN FRPS

The Panosaurus attaches to a tripod with a 1/4ins thread. Some professional tripods have a larger 3/8ins bolt and therefore require an adaptor; it would perhaps have been better to supply a 3/8ins thread on the Panosaurus and an insert to step-down to 1/4ins. In practice, it is preferable to mount the Panosaurus on a three-way tilting base anyway, so that it can be easily levelled without moving the tripod legs.

### Kaidan QPXL-1 Quick Tilt Leveller

The review head was supplied with a Kaidan QPXL-1 Quick Tilt Leveller (£100), which worked well. Once attached to a tripod, the head can be rotated according to markings on the base, which is calibrated in increments of 5° with numbered steps every 10°. There are no detents (click-stops), but a screw can be adjusted to determine the tension of the rotating head.

When in use, this screw is hidden beneath a bubble level, which clips into the rotating base and is held in place by a weak magnet. The bubble level has a tendency to fall out when the head is carried, so you need to remove it before transporting the head. I imagine that quite a few bubble levels will get lost.

### Fully constructed

When the Panosaurus is fully constructed, you realise why the name is so appropriate: it's big, rather clunky and not very pretty to look at. Nonetheless, it is a surprisingly efficient beast, and I obtained some excellent results. I tested the Panosaurus using a Canon EOS 5D DSLR with 17-40mm f/4L lens at 17mm, supported by a Manfrotto Carbon 440 tripod and the Kaidan levelling base. Panoramas were stitched on an Apple Mac using PTMac 4.1, and converted to cubic Quicktime VR movies using CubicConverter. To ensure images overlapped sufficiently, as required by the stitching software, I shot 360° spherical panoramas as three rows of nine images with the 17mm lens.



#### Consistent results

Given the 'home brew' feel of the Panosaurus, I had fairly low expectations prior to testing. However, I was surprised to get consistent results, obtaining spherical panoramas that stitched easily in PTMac. Doubtless, some inaccuracies were caused by assembling and disassembling the head when attaching and removing the camera, but these appeared to be within limits the software could handle. The Panosaurus was also quick to use. When photographing Sheffield's Weston Park Museum, I was allowed 30 minutes before the doors were opened; in that time I was able to set up the Panosaurus and make three 27-shot spherical panoramas.

#### Stability

My camera and lens weighed a little over 1.4 kg, very close to 1.5kg - the maximum recommended load for the head. Initially I was doubtful that the horizontal arm of the Panosaurus would be able to support them, but the head proved stable when used indoors. It coped less well outside on a windy day, visibly wobbling with each gust. Stability is a problem with most other panoramic heads, but I would think twice about using the Panosaurus outside in anything less than calm conditions.

**Above: Spherical panorama of Sheffield's Weston Park Museum, stitched from the 27 images shown right. This is an equirectangular projection of the panorama (ie, the horizontal axis represents equal steps in azimuth, and the vertical axis represents equal steps in elevation). The image has been slightly cropped to remove the tripod legs.**

#### Conclusion

In conclusion, the Panosaurus can be recommended as a low-cost option for shooting spherical panoramas, provided that you can live with its limitations: self-assembly, unsuitable for heavy loads, and poor stability in windy conditions. Corners have been cut in order to keep the price down, such as the lack of detents on the rotating base and the rudimentary 1/2ins bolt utilised to attach the camera to the head.

While these factors limit the degree of precision that the Panosaurus can deliver, in practice they are of relatively little consequence given the sophistication of current stitching software, which is quite tolerant of inaccuracies in the alignment of the head. I obtained impressive results from the Panosaurus, and found it efficient to use in the field. At under £100, it represents excellent value for money.

**Guy J. Brown FRPS**  
guy@guyjbrown.com

*UK supplier for Panosaurus and Kaidan,  
www.red-door.co.uk*

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