

# The Star Adventurer Part 1

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## Longer exposures with a DSLR Camera.

### Purpose:

Simply mounting a camera to a standard (i.e. non-motorised) tripod will limit the exposure time which can be achieved in night sky photography before star trailing occurs.

In order to take longer exposures of the night sky, a tracking device is desirable. The motorised **Sky-Watcher 'Star Adventurer'** enables longer night sky exposures for a DSLR camera by following the apparent motion of the stars as the Earth rotates.

### The 500 Rule

To avoid star trailing due to the Earth's rotation, the 500 Rule will approximately predict the number of seconds ( $t$ ) that a static camera with a lens of focal length ( $f$ ) will start to show star trails at, using the formula  $t=500/f$ .

So, for a 10mm focal length lens, 50 seconds is theoretically possible but a 50mm lens will begin trailing at 10 seconds and a 200mm lens will trail after only 2.5 seconds.

However, with a tracking mount, these times can be extended.

That's the good news.

The bad news is that your ability to produce long exposures will instead be determined by your ability to polar align the mount.

### **Early use**

I bought my *Star Adventurer* in 2015. It's a robust and reliable device, enabling longer exposures for wide-field imaging. I achieved some limited success with it.

At the time, I failed to overcome the polar aligning problem which we endure here in the Southern Hemisphere. I was still learning astronomy with a large telescope and decided to concentrate on that.

### **Interim period**

So, I shelved the *Star Adventurer* and concentrated on improving my technique with a telescope, a 120mm refractor.

Long story short, I discovered a modern polar aligning solution which wasn't available before and now I routinely obtain an excellent polar alignment with my telescope. I am now adapting this method to my *Star Adventurer*.

More about polar aligning later.

### **Setting Up the Tripod**

I own a Sky-Watcher tripod which is sold specifically (but separately) for the *Star Adventurer* – and I am glad I did. Mounting it on a standard (adjustable) photographic tripod with a ball head is way too risky!

The tripod looks like this (although the yellow reflective safety tape was my add-on, to make the all black tripod more visible in the dark):



*Star Adventurer tripod, with added reflective safety tape.*

Before you assemble the *Star Adventurer*, use a magnetic compass to determine the direction of the celestial pole as accurately as possible. Don't forget to take into account the magnetic declination. You can find this for your location by visiting this link.

Adjust the tripod until the leg with the spirit level is pointing towards True South (Southern Hemisphere) or True North (Northern Hemisphere).

Using this initial rough alignment procedure should bring the alignment of the tripod to within two or three degrees East or West of True South (or True North if you live above the Equator). This approximation will be accurately fine-tuned later in the set up.

*Star Adventurer* tripod attachment head.

The circular spirit level should be facing True South.

The handle on the underside is used to secure the wedge and it could also be used to hang a weight to stabilise the set up and lower its centre of gravity.

Spread the tripod legs and use a spirit level to provide a perfectly horizontal surface to attach the equatorial wedge:



*Level the tripod head before adding the equatorial wedge.*

Then check the small spirit level on the tripod and if it does not match the large spirit level, make a note of the direction of any inaccuracy.

## The Equatorial Wedge

Here is the wedge attached to the levelled tripod:



*The Wedge fitted to the tripod, showing the altitude knob (left) and the two azimuth knobs (right).*

The large knob on the left will be used to adjust the elevation angle during polar alignment. Using an inclinometer, aim the cradle accurately at the same angle as your latitude.

The two smaller knobs on the right will be used to fine adjust the azimuth.

There are two hexagonal screws to adjust the tension between the mount and the wedge. They need to be generally firm but not tight, although they could be tightened after polar alignment is achieved.

## The Body

The *Star Adventurer* body is clamped to the wedge by means of an intermediate attachment, as shown below:



*The Star Adventurer body, with the cradle attachment fitted (left).*

Then attach the body firmly to the cradle of the equatorial wedge:



*The Star Adventurer body attached to wedge and tripod.*

## Polar Aligning

It is at this point of the setup procedure that the polar alignment is fine-tuned after dark, prior to attaching either the Fine-tuning Mounting Assembly or the ball joint attachment.

Polar aligning is a crucial element in the set up process which, for the standard setup, is covered in detail in the [Star Adventurer Instruction Manual](#) and is beyond the scope of this article.

If you live in the Northern Hemisphere, the rough alignment described above should get you within close reach of Polaris and you can find the north celestial pole quite easily through the polar-scope by adjusting the altitude knob and the pair of azimuth knobs on the wedge.

Here in the Southern Hemisphere, we do not have a bright pole star, meaning polar aligning is less simple. However, it is not impossible and with more accurate rough aligning and a bit of practice, it should be achievable.

My polar aligning difficulties with my main telescope were just as difficult and I tried various methods before hitting on a solution, which I have since adapted for use with the *Star Adventurer* and I will cover this in *Part 2* of the article.

## Fine Tuning Mounting Assembly

After polar aligning, attach the rod to the counterweight and fit it to the fine tuning mounting assembly:



*The fine tuning mount with adjustable counterweight.*

Fit the fine tuning mounting assembly to the body and then attach the camera to the Dec adjustment pad.

Equalise the balance between the camera and the counterweight by adjusting the position of the counterweight.



*The Star Adventurer with the fine tuning mounting assembly installed. Ready to go!*

### **The Ball Joint**

A simple alternative to the fine tuning mounting assembly is to purchase a photographic ball head and fit it using the supplied dovetail connector.



*The dovetail connector (left) and a Sirui ball head with arca Swiss mount female attachment.*

Fit them to the centre of the Sky Adventurer body, then attach the camera to the ball head using a Swiss arca clamp, which may have come with the ball head.



*DSLR camera with arca Swiss male dovetail attachment*

The camera will then be securely fitted to the ball head and if you've polar aligned, then you're ready to go!



*DSLR camera and ball head attached to the main axis of the Star Adventurer body.*



Now the *Star Adventurer* is fully assembled for general use:



*Star Adventurer, fully assembled for general use.*

Note the addition of a suspended weight, which stabilises the tripod and lowers the centre of gravity.

## Conclusion

Apart from the difficulties of polar aligning here in the Southern Hemisphere, there is nothing to dislike about the *Star Adventurer*. Provided all the knobs are tightened and you don't use a really heavy camera lens, it will provide you with some great images.

Unlike telescopes, the tracking is in RA only, not in Declination. However this is enough to extend the exposure time – and maybe the the 500 Rule will become your own “5000 Rule”.

In Part 2, I will document a more advanced set up which can provide:

- computer assisted polar alignment.
- dew heating.
- automatic image downloading to a laptop
- live image stacking.
- USB power
- computerised guiding.

## Further Information

This article was first published on [Cosmic Focus](#)