

PST Photography with a DSLR

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This article describes the setup that I use for taking photographs with my Canon DSLR and Coronado PST, and includes how to construct a PST to DSLR camera adaptor.

All of my solar photographs can be seen on www.astrosoft.co.uk.

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1 Overview

The PST solar scope by Coronado (now owned by Meade) is an excellent Hydrogen-alpha (Ha) scope for solar observing.

Having been wowed by the views I wanted to try taking photographs with my Canon EOS 550D (Rebel T2i). However, if you attempt to attach a DSLR you will very quickly discover that it is impossible to achieve focus due to the insufficient back focus that is inherent in the design of the PST focuser.

After searching the internet I found an article by Sylvian Weiller (who produces some excellent images) which described how he used a Barlow lens to construct the kind of robust and quality adaptor that I was envisaging.

This document is how I followed a similar principle to make an adaptor for fitting my Canon DSLR onto my PST.

The final result is shown below (Figure 1). The rest of this document explains how to get there.



Figure 1 – PST with a Canon DSLR

2 Camera Adaptor Construction

2.1 Components

You will need the following three items for making the camera adaptor; these are shown below in Figure 2 to Figure 4:



Figure 2 – Camera T Ring



Figure 3 – T Adaptor (1 1/4 “)



Figure 4 – Meade #126 2x Barlow (1 1/4”)

Note that the method described in this document is only possible due to the construction of the Meade #126 2x Barlow, it will probably not work with other types of Barlow due to different constructions.

2.2 Making the Adaptor

2.2.1 Step 1 – Disassemble the Barlow

The first step is to disassemble the Barlow lens; the Meade #126 2x Barlow is made up of three parts which all unscrew from each other as shown below in Figure 5 and Figure 6:



Figure 5 – Unscrew the lens assembly



Figure 6 – Unscrew the lens

2.2.2 Step 2 – Fit lens to T adaptor

The next step is to fit the Barlow lens into the T adaptor.

At this point you may find that the lens does not quite fit inside the T Adaptor as the outside diameter of the lens is a fraction larger than the inside diameter of the T adaptor.

If you have a lathe then skimming the inside of the T adaptor would be easy, unfortunately I do not possess that bit of kit so two options came to mind. The first was to simply use a file (a round rat tail file) to skim the bore of the T adaptor. However I chose another method of using my drill stand to simply press the T adaptor against a rotating drill (carefully!). I used a drill designed for drilling metal, but a wood drill would probably do the trick as the T adaptor is only made of aluminium.

By applying suitable pressure to the T adaptor against the rotating drill, the speed of the drill also slowly rotates the T adaptor whilst also skimming it in a nice and even manner.

I had to shave off probably a few tenths of a millimetre until I got a nice fit when pushing the lens into the T adaptor. Do **not** permanently fix or glue it yet – as some adjustment may be required later on.

The process is shown below, in Figure 7, and the resultant assembly is shown in Figure 8, Figure 9 and Figure 10.



Apply pressure against the drill and allow the T adaptor to slowly rotate under the drag of the drills rotation

Figure 7 – Skimming the T adaptor bore



Figure 8 – The finished T adaptor



Figure 9 – Slide the Barlow lens into the T adaptor



Figure 10 – T adaptor and lens assembled

2.2.3 Step 3 – Ready to try

The T adaptor is now ready; just screw it into the T ring and you are ready to try some imaging.

Figure 11 and Figure 12 below show how the adaptor slides all the way into the PST eyepiece holder. It is **critical** that the bottom of the Barlow lens is as close to the bottom of the PST eyepiece holder as possible as otherwise you will not get the back focus required. The critical dimensions are explained in the next section.



Figure 11 – The finished T adaptor on T ring



Figure 12 – Fitted to the PST

If you find that the lens is hitting the bottom of the PST eyepiece holder causing the T adaptor to be sitting up proud of the PST eyepiece holder you can cut or file a smidgen off the T adaptor, but be very careful not to make the T adaptor too short as you do need the Barlow lens as close to the bottom of the PST eyepiece holder as possible; a millimetre can make a big difference.

2.2.4 Adaptor dimensions

On my PST the eyepiece holder is 35mm deep therefore it is important to get the overall length of the T adaptor from its shoulder plus the Barlow lens as close to (but not more than) 35mm as possible. The image below of my finished adaptor shows an exact measurement of 35mm (37mm with the shoulder) which allows for an exact fit to the PST eyepiece holder and allows plenty of focus adjustment either side of focus with my Canon DSLR.



Figure 13 – Finished Adaptor Dimensions

3 Imaging

3.1 Setup

I use the following camera settings and features:

- I set the camera exposure controls as follows:-
 - Manual exposure;
 - 1/10 – 1/40 second exposure (try a wide range);
 - 400 ASA;
 - Auto white balance.
- Set the mirror lock up option to on (if your camera supports such a custom function). This reduces any vibration when taking the photo.
- Use a cable release (or a short self-timer setting) which again reduces vibration when taking the photo.
- If your camera supports a 'live-mode' view with zoom then that is an absolute gift. I always focus using live-mode and the 5x or 10x zoom setting – see more on this in section 3.2 below.

The final setup is shown in Figure 14 below. I use the mount from my Celestron SLT102 (that I use as a secondary scope piggybacked on my Meade LX200). This makes life easier as it tracks the Sun in Altitude/Azimuth mode, but a simple tripod would also suffice as shown in Figure 1.



Figure 14 – Imaging Setup

3.2 Image Results

A typical result is shown below in Figure 15, a white light photo that I took at practically the same time is shown in Figure 16. All of my solar photographs, and the setup that I use for the white light photos, can be found on my web site www.astrosoft.co.uk.

I find that even using Canon live view at 10x zoom you cannot see the fine solar detail on the camera screen that is visible on the final photo and when using an eyepiece. My guess is that the Canon screen does not have a fine enough resolution. I therefore always focus the camera screen on the features that are visible and then take lots of images with the finest of focus adjustments between each. This usually results in capturing at least one decent image.

Another tip is to drape a cover over your head and camera, just like the Victorian plate camera photographers, this greatly increases the visibility of the suns image on the camera screen and therefore helps you get focus.

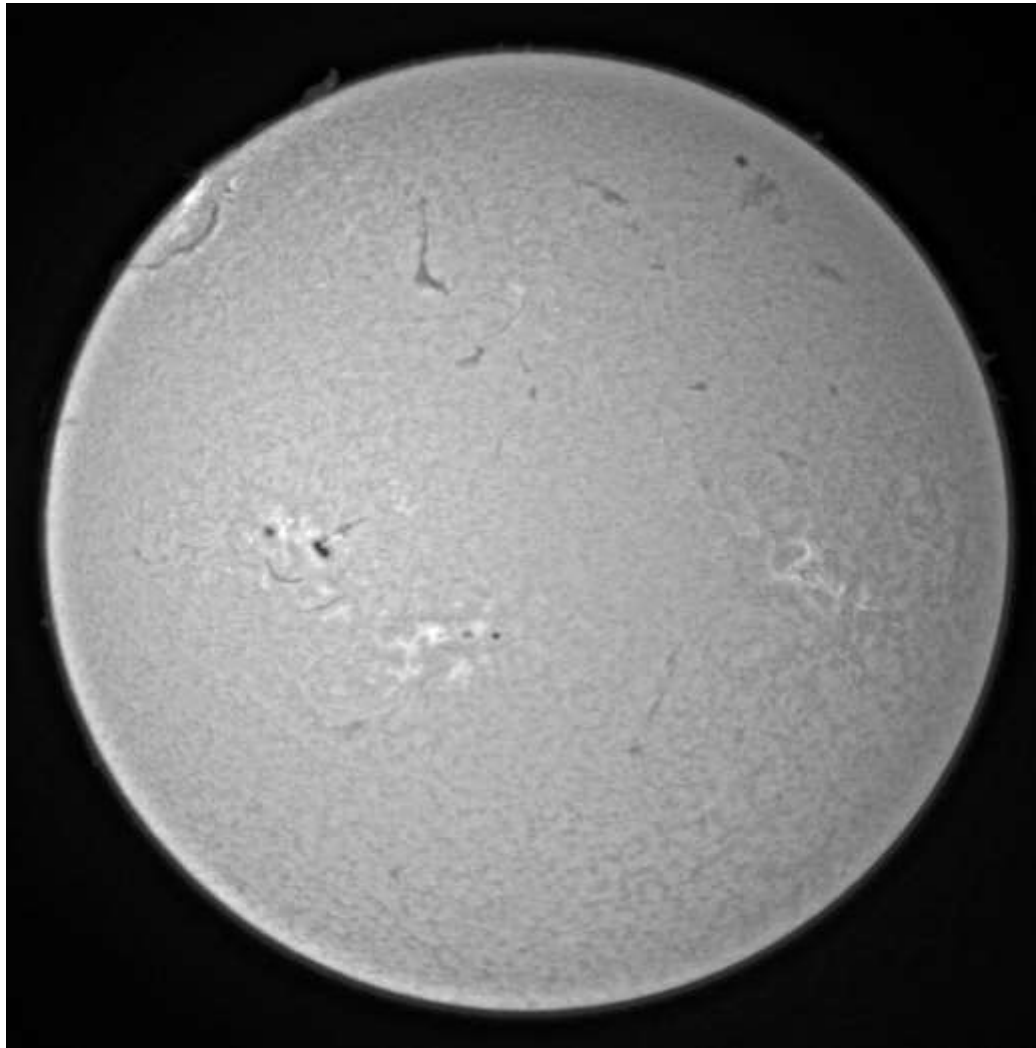


Figure 15 - The Sun in Ha – 3rd May 2013



Figure 16 - The Sun in white light– 3rd May 213