

Part 3 SELECTING & USING HARDWARE

By Pete Scully

Introduction

In this release we will discuss the selection and use of hardware. **Correct decisions are imperative as poor selection will result in disappointment and cost more in the long run. Lots of research and looking at reviews on the internet will help significantly. If one compares taking up Golf or Astronomy, the costs are comparable.**

Mounts

Two types of mount will be discussed, namely the STAR Tracker and GEM or German Equatorial mount.

A star tracker is a relatively easy and cost effect means of getting into astrophotography. It is a device that supports both camera and small telescopes up to a max weight (load) of 5kg. My choice is the Skywatcher Star Adventurer. It will track objects for long exposure astrophotography. If properly setup and aligned, successful tracking can be done for several minutes per exposure.



A red and black surveying level is mounted on a silver tripod. The level is tilted upwards and to the right. It has a red body with black accents and a black lens. The tripod is silver and has three legs. The background is a grassy field with a wooden fence and some trees.



The image on the right was taken with a DSLR and 135mm lens. 20x20sec exposures stacked.



The GEM or German Equatorial Mount is the next step up. Approach your selection with caution as some mounts just don't perform as expected. By this I mean, poor GOTO function and Backlash. Some with bushes and some with bearings. To avoid disappointment later, rather opt for a good well known manufacturer. My choice is either Skywatcher or Celestron. The Skywatcher HEQ5 GOTO mount is my 1st choice followed by the Celestron AVX mount. There are other manufacturers out there as well.



Bearings on both RA & DEC shafts

Easy connection to all software

Very robust

Very sturdy Tri-Pod

Hand Controller can be bypassed for direct connection to PC

Pay Load 13 kg



Bearings on both RA & DEC shafts

Requires dedicated software

Appears a little less robust

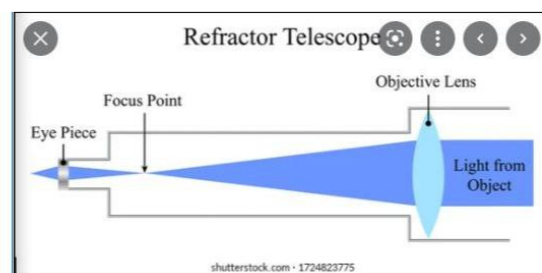
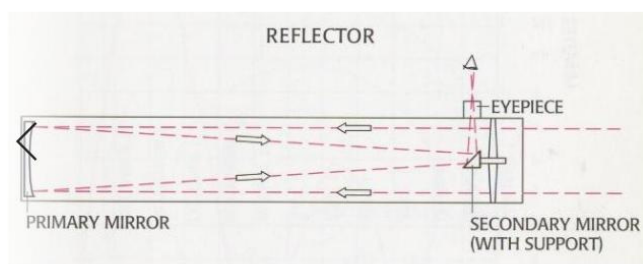
Very sturdy Tri-Pod

PC Requires access via Hand Controller


Pay Load 13 kg

Telescopes

This is split into **Reflectors** and **Refractors**. Refractors are split between Achromatic and Apo Chromatic. What is the difference. An Achromatic has two lenses and will produce chromatic aberration (blue/ purple Fringing around star and bright objects) while an Apo Chromatic corrects for this by using 3 lenses



Obviously an APO is the 1st choice but they are expensive. But the choice of an Achromatic does deliver good images and aberrations can be corrected very effectively with software. A relatively good Achromatic performer is the Meade Affinity 102



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The f-ratio is dependant on what your interests are. **Planetary** or **Deep Space**. For planetary work, an f-ratio of 8 and upwards is recommended. For Deep Space, an f5 wide field is recommended. But don't be mistaken: an f5 scope will still deliver stunning images of planets.

What should I go for is a big question. Again it is a matter of how you are going to use them. A Reflector is not easily transportable. **It also requires periodic collimation or alignment.**

A refractor on the other hand offers very good transportability as well as using it in a fixed position.

Does not require collimation. Good for trips into the mountains.

There are other types of telescope available for example the **Schmidt–Cassegrain** telescope. We will not discuss these here. **Image below (un-cropped) shows Cen A taken with the Meade Affinity 102.**



Cameras are our next bit of hardware. Webcams, DSLRs and Dedicated Astronomy Cameras.

A webcam has very limited use in astrophotography. Primarily used for Planetary use.

Recommended is a DSLR camera. These don't have to be the top of the range. An older Canon 1100d works exceptionally well. However to capture the Hydrogen Alpha (Red Spectrum) of nebulae, the IR/UV filter has to be removed. This can be done as a DIY project if you have the courage and patience to do it. There are detailed tutorials on the net explicitly for this.

However some Nebulae and Galaxies have no H/Alpha so good images can be obtained. This image of the Trifid Nebula was taken with a **stock** Canon 1300d and a clip in CLS filter. Filters are another discussion.



To connect a DSLR to a telescope requires a T-Ring Adapter. These are available for Canon & Nikon. A 1.25" nozzle screws into the front end and connects to the scope.



Dedicated astro cameras are not cheap and come in many packages. For the beginner though I would recommend the SVBony 305 Pro. Although designed for Guiding and Planetary use, it takes excellent images of smaller deep space objects. What I mean about smaller objects, this camera has a very efficient Sony backlit IMX290 sensor and is only 2.9mm x 5.6mm in size. This gives a larger image and smaller field of view. On the other hand the Canon sensor is large at 22.2mm x 14.7mm. This gives a large field of view and brighter image with lower “magnification”.



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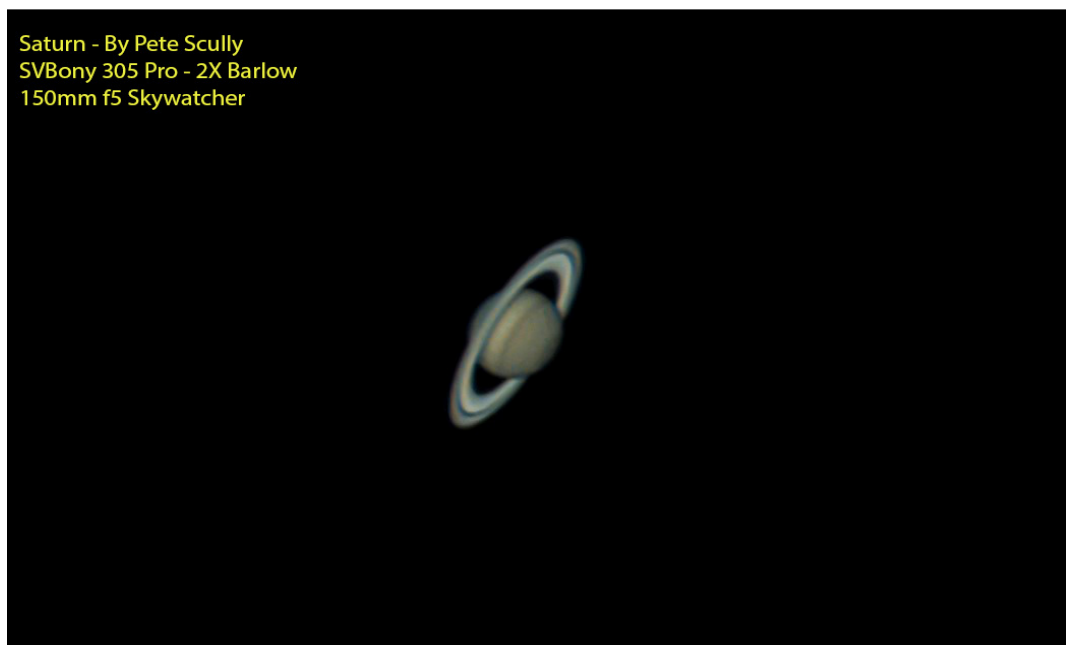
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We can talk for ages on camera's but as an introduction we will keep it short.

The same Trifid Nebula now taken with the SVBony 305 Pro is shown below.



Quite impressive for a 2 MP 12 bit camera. Because of the backlit IMX290 sensor, it offers greater sensitivity with a Quantum Efficiency of about 80% and reduced noise. DSLRs only offer a QE of 40% to 50% and have a much higher ISO noise.





In closing, we need to briefly discuss Barlow Lenses and Focal Reducers. A 2x Barlow lens is a unit that fits in front of the camera sensor. Its purpose is to DOUBLE the magnification. Ideal for Planetary use.

One word of CAUTION. This affects the OUT travel of the focuser and in some instances the focuser does not have enough out travel. In this case an extension tube is required.

The 0.5 Focal reducer's purpose is to reduce the effective focal length of the telescope and reduce the f-ratio, effectively giving a larger field of view and brighter image. Again, **CAUTION** must be applied. In some cases the focuser may not have enough IN travel. To overcome this a low profile T-Ring is required.



An advantage of the above Barlow is that it can serve two purposes. A Barlow and an extension.

In the next issue we will discuss software for telescopes and cameras. It will be split into 2 episodes. Pre-Processing and Post Processing. For any questions/advice, I may be contacted via email:-

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