Mounts

Contents

Overview

You can purchase a telescope mount that has built-in motors for tracking, or a simple mount. There is a huge price difference and it is important to understand the difference.

Tracking mounts are designed for two reasons:

1. To track (i.e. keep the telescope pointing to the same object) stars as the earth rotates.
2. To automatically "find" stars and point the telescope towards them.

Item (1) is really only critical when you are taking pictures of very distant and dim objects that require camera exposure times longer than 3 seconds. This is because the earth does not rotate enough in 3 seconds to cause the image to blur.

If you are just getting started with photography (or just want to look with your eye), you will be wasting your money buying expensive tracking mounts just to take pictures of the moon, Jupiter, Saturn, etc. You can do this just as well with a manual mount.

When you eventually get to the point of photographing deep space objects you will want to invest in a quality tracking mount.

Item (2) is often a matter of convenience. Having a computerized tracking mount – which typically comes with the "GoTo" feature – allows you to quickly find all the major stellar objects with the press of a button. You can do the same thing using a manual mount but it involves a lot more work because you need to look up the object's position on an astronomy program (ex: Stellarium) and then adjust your mount manually to point to those coordinates, and you will need to manually track the object after you have found it.

However, if the objects you are looking for are too dim to be seen in a finder scope you may waste hours of time trying to get a good picture (and would benefit from buying a good tracking mount.)

Portability

Many of the really expensive tracking mounts are expensive because they are lighter and easier to carry to your viewing site. If, however, you are only planning on observing in your back yard you can save money by purchasing a cheaper heavier mount, that is assuming you don't have back issues.

Weight Capacity

Each mount will be rated for the amount of weight (scopes, cameras, etc..) that it can support. Generally, if you want it work smoothly for photography you should try to stay under 50% of the rated weight on traditional geared mounts so that the mount movement remains smooth.

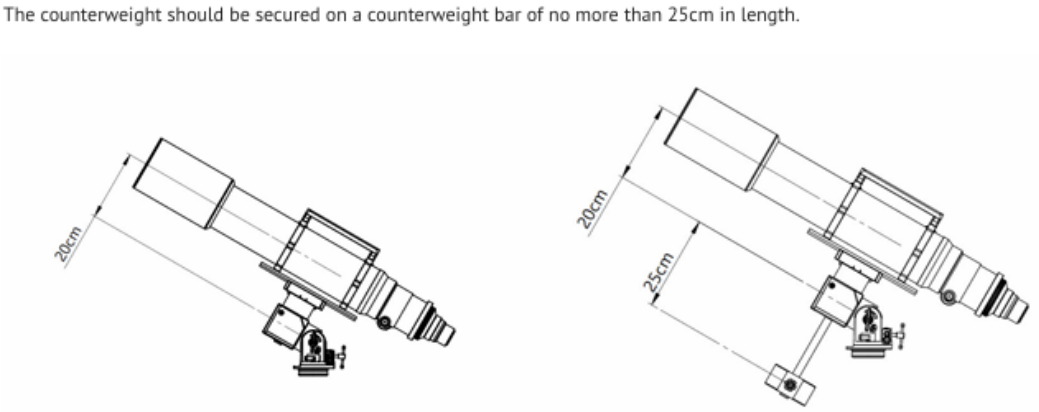
Strain Wave Mounts

Strain wave technology is relatively new in astronomy mounts and offers many benefits:

- Lower mount weight
- No backlash
- High Torque and repeatability
- Don't have to stay under 50% of rated load for stable imaging

These mounts can carry a reasonable amount of weight with no counter balance weights (which are essential with traditional mounts), and even more weight with a counter balance weight. For example, the ZWO AM5 mount I have can carry 33lbs with no counterweight and 44lbs with an 11lb counterweight.

I was having problems (even with 11lbs of counterweight) with the mount failing to move in certain positions (generally when pointing straight up.) After much frustration, I finally realized that I was not, in fact, using the correct counter weight bar! I had borrowed the bar (which was 12mm) and weights from my old AstroMaster 130EQ and then forgotten about it. The correct bar is about 1" longer (providing more counter-torque) and 20mm (which accommodates standard weights.) Make sure you use the real AM5 bar!



Additionally, for large SCTs (like my C11) the scope center axis is about 12" (30.48cm) above the AM5 center of rotation so some portion of the AM5 load capacity is lost. So perhaps 1/3 of the load capacity is lost (if the relationship is linear) giving it a load capacity of only 29lbs, and explaining why some extra counterweight is needed in this application.

Integrated Tracking vs Add-Ons

There are two ways to get a tracking mount: 1) you can buy a mount that has built-in tracking, or 2) you can buy a basic mount, and later add tracking hardware. I highly recommend that you NOT use option (2) as you will likely find that it is a giant waste of time and money. Getting an integrated mount is the way to go because everything is designed to work together.

I tried two add-on tracking solutions: 1) Celestron CG-4 Dual Axis Motor Drive $193 and 2) EQStarProEQ3 – EQ drive upgrade kit for EQ 3-2, CG-4, Orion Astroview mounts $309.

The Celestron kit was one step above a toy and had no computer tracking at all, only a four button "joystick." It did work but was difficult to control and position with the manual buttons. It often took several minutes to get it centered on the object, and this was after you eventually found the object because there was no "goto" functionality. However, after about two months the hardware stopped working and I wasted several days trying to figure out what was wrong and fix it. I eventually gave up and decided to get a better solution.

The EQStarPro kit was much more promising as it included better motors, and an actual computer control so that you could guide the mount with "goto" functionality – however this still required an external guide computer such as an ASIAIR or laptop. The first drawback was that the unit was shipped from the Ukraine and there was a war going on there so it took just over 3 weeks to receive the product. The instructions for assembling the unit were unclear and I had to reconfigure the gear/belts multiple times before I got them in a working state. Even at this point as I slewed the mount on the RA, the RA gear hit the CG-4 RA clutch handle stopping the motion and sending the motor into an overcurrent state. I had to file down part of the clutch handle to allow the gear to clear. Although the RA motor worked fine, I was never able to get the DEC motor to work for more than a few seconds before it would shut down. I worked with the kit's creator – Alexander who was very helpful – to overcome this problem for almost 3 days to no avail. His final suggestion was to change some motor configuration values, but the Windows driver needed to run his configuration utility kept failing to load on my PC. I was never able to use this product and it is now collecting dust in a box.

I ended up purchasing the ZWO AM5 tracking mount $2,298 which worked perfectly the moment I took it out of the box and has been working great ever since. It costs more, but when you consider all the time I wasted on the other solutions, I think it was actually cheaper AND it works MUCH better.

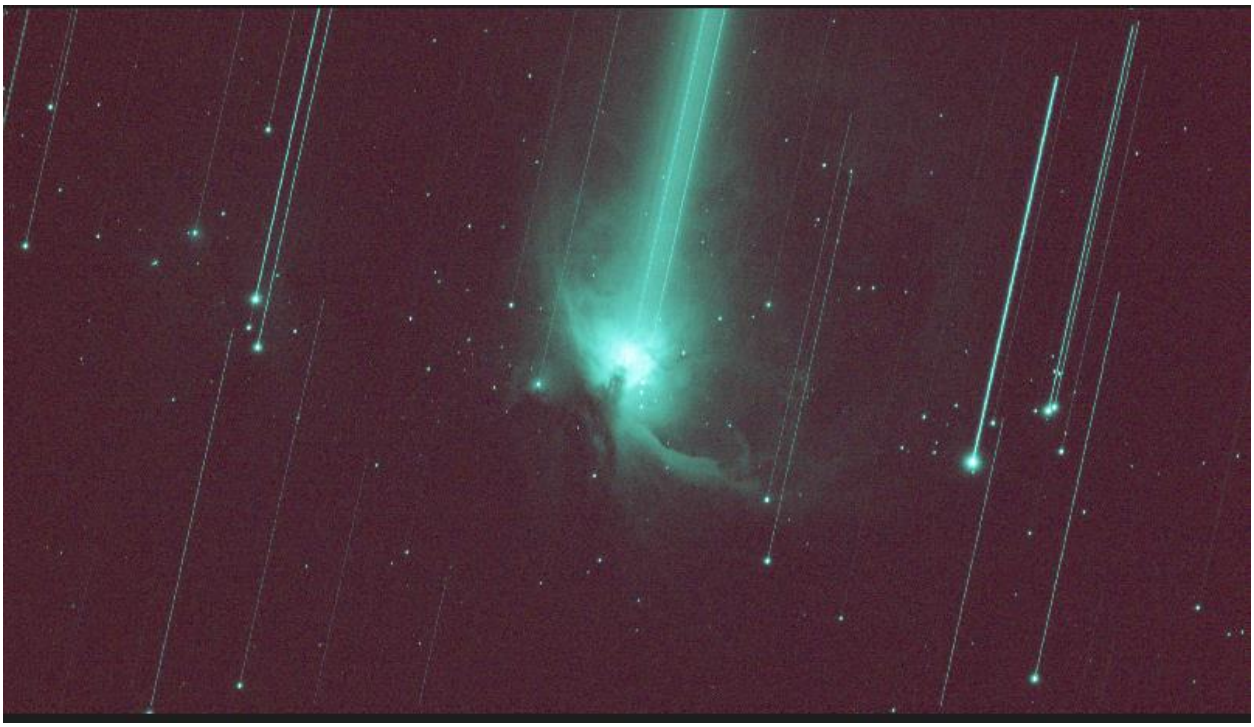
Tracking Issues

Crossing the Meridian (Equatorial Mounts Only)

The meridian is an imaginary line in the sky stretching from the north to south poles in the middle of the sky. This line separates the east half of the sky from the west half. Because of the way equatorial mounts work, you will need to flip your telescope from one side of the mount to the other as you track an object across the meridian.

A good tracking mount will have a feature to automatically flip the telescope from side to side as it crosses the meridian. On a cheaper mount, you will have to manually watch for this and flip the telescope by hand.

On my AM5 mount this feature exists but is turned off by default (in mount settings.) I ran into this tracking the Orion Nebula across the meridian while stacking images. The target crossed the meridian after the second stacked image – which resulted in the mount turning off tracking. This resulted in the third stacked image showing highly noticeable streaking as this was using 3-minute exposures. You can see the results in the image below.



At first, I thought that I had captured the shot of a lifetime – a meteor shower in front of a nebula! Only after I tried to take more shots did I realize that the telescope had stopped tracking!

Cable Management

It is important that you route any cables going from the mount head (which moves during tracking) to any outside connections. This includes power, USB, control, etc.… cables. I failed to do this during one of my tests and was surprised to see the results of my image after a 3-minute exposure.

What had occurred was that my USB camera cable had gotten caught on the mount head and was stretched to the limit and keeping the mount from rotating properly – and probably damaging the cable.

I originally had all of the cables loose dangling everywhere (image on left below), and resolved the issue by bundling all of the cables in a cable harness (image on right below – different scope but you get the idea.)

I also had to move where the ASIAir was mounted as it and the cables coming out of it would hit the tripod in extreme cases. Additionally, I wanted the ASIAir mounted to the tripod so that I wouldn't have to move it between telescope mounts when switching telescopes for different targets.

In extreme cases, you may also need to add a pier extension to raise the telescope higher above the tripod as can be seen in the picture below.

This really helps when the telescope is pointing straight up and the camera tends to hit the tripod legs as it rotates. Needless to say, the pier raises the center of gravity and makes the whole assembly less stable, so you should consider adding extra weight to the tripod (in the hanging bag below) to make it more stable.