Astro-Physics

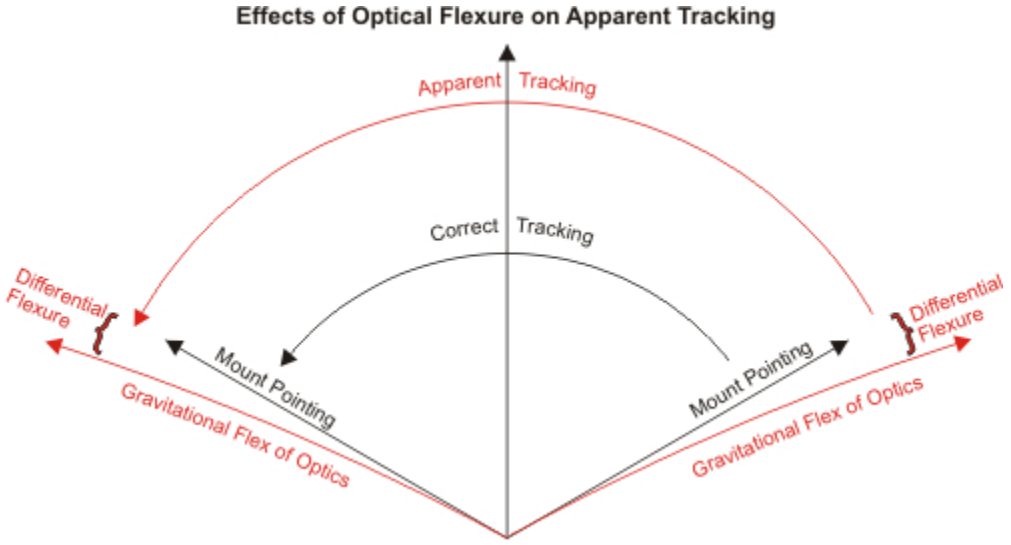
Potential Causes of RA Drift and How to Find Out What is Causing It

One of our frequent support issues pertains to RA drift or claims that the sidereal rate is not correct. This document explores possible reasons for this phenomenon.

The wear of the worm and worm wheel will never change the basic tracking rate since the number of teeth do not change and the gear ratio is always exactly the same regardless of tooth wear.

RA drift is highly dependent on polar alignment and can be made to drift East or West (slow or fast) simply by raising or lowering the altitude axis. This is well known and should be the first thing to try.

RA drift is also dependent on differential flexure of the telescope optical axis with respect to the mechanical axis. This occurs as the telescope is slowly tracking against gravity when the scope is on the east side and the direction of the drift may switch when the scope is on the west side. Many of the carbon fiber astrographs have this inherent drift as well as all larger SCTs. Refractors can also have differential flex as they move slightly inside their rings.



Another reason for drift is that the actual rate that a star moves across the sky is not a fixed value, but varies according to where it is in the sky as well as what the temperature and barometric pressure of the air is. This is due to atmospheric refraction and there is a good explanation and a handy calculation of the drift rate at this site: http://www.bbastrodesigns.com/equatTrackingRatesCalc.html

The 1600 mount tracking rate is sidereal and it is very accurate to a few arc seconds per day. However, since the star's motion can be different from exact sidereal due to the above items, either guiding or modeling with APPM (part of our APCC Pro software program) will be required to remove the drift rate. Since there is also periodic error, then guiding is always needed anyway for critical imaging, and the drift as well as PE is automatically eliminated.

Finally, the actual drive rate can be modified in APCC (Standard or Pro version) and also in the AP driver. A custom drive rate can be entered that can slow down or speed up the basic sidereal rate as needed. However, because of the above variables, this custom rate would need to be different for different parts of the sky. Our APPM modeling program can do this automatically.

In order to isolate the cause of your drift, we provide two procedures below – one to verify the mount tracking rate and the other to explore the possibility of flexure in your optical system.

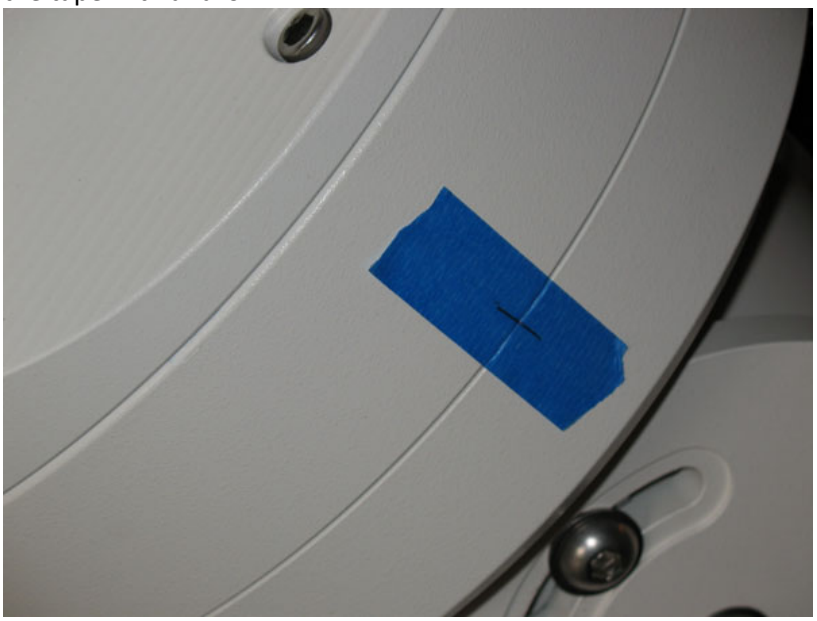
Verify that Your Mount is Tracking Correctly at Sidereal Rate

Occasionally, we hear from customers who are concerned that their mount is not tracking correctly at the sidereal rate. Invariably the mount is tracking correctly, but there is some other reason, most commonly polar misalignment and/or optical system flexure of the optics that are causing the rate to appear incorrect.

In order to satisfy yourself that the mount itself is tracking correctly, we suggest that you perform the following test. Please note that it requires that the RA run in a full 360 degree circle so your scope may have to be removed. Evaluate this carefully before starting.

- Start by moving the mount roughly six hours ahead of the meridian in an eastward direction. Scope (if attached) will be underneath - counterweights up.

- Set tracking to stop. Place a piece of blue tape across the RA axis. Draw a reference line and cut the tape with a razor.



- Take a stopwatch or accurate timer and start the timing the moment that you set the tracking rate to sidereal.

- Come back in 23 hours, 56 minutes and 4 seconds (sidereal rate) to see if the mount has returned to its precise starting point.

Could There Be Flexure in My System?

Another other possible source of the drift to consider is flexure in the optical system. Large Cassegrains can, and almost always do flex in a way that very closely mimics incorrect sidereal tracking. The flex can be remarkably even as opposed to "mirror flop," which would show up in the tracking graphs as more sudden drastic movements. This is actually a commonly observed phenomenon in the amateur community. Refer to the graphic earlier in this document to understand how this manifests itself.

Tighten all the fasteners and mounting rings since slight movement at any point can cause flexure.

If you still have flexure, the easiest way to test this is to attach a smaller lighter weight refractor DIRECTLY TO THE CRADLE PLATE and measure your tracking again. Do not attach to the scope that is in question!

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