TWENTY - Quick
Telescope Tips and Tricks

Tip 1 – Leveling A Mount

- The reason that you will all hear about leveling a mount before polar aligning or doing a star alignment may not be obvious when you consider that all stars rotate around the pole, so surely it shouldn't matter. This has been a controversial subject and while many say that it doesn't matter, other people say that it's imperative.

- I have done my own research and have come up with two very good reasons why a good level is important. Firstly is the issue of weight distribution. With a level mount, then both the telescope and the weights will counter-balance each other. This is mostly prominent with German-Equatorial style mounts. If the tripod or pier is not level, then the weight distribution will be off. I tried to see the difference with a 10 degree slop in the level of my mount even though it was polar aligned perfectly. On an hour of exposures using an autoguider, I didn't get anywhere near as tight a guiding scheme as I did when I tried again with a level mount.

Tip 1 – Leveling A Mount

- Secondly, for Goto systems, having a level base does make initial star alignment a lot easier and more accurate in the first instance. If you set a perfect level base, set the time right and start with a perfect home position of CWD (Counter-weight Down) then the first Goto should be much better than if you don’t level everything.

Tip 2 – Star Alignment

- When you are doing a star alignment, whether two or three star, choose your last alignment star close to the object you want to view or image. By choosing a close alignment star to the object, you can almost guarantee that it will be framed better when slewing to it.

Tip 3 – Manual Focus

- If you are manually focusing, then also focus using the last alignment star. Alignment stars are bright, and therefore are prime candidates for focusing on, especially if using a Bahtinov mask, as placing it on the tube and taking it off again can judder it. It also means that when you have finished your alignment process, you are all set and ready on whatever object you choose to point to thereafter.

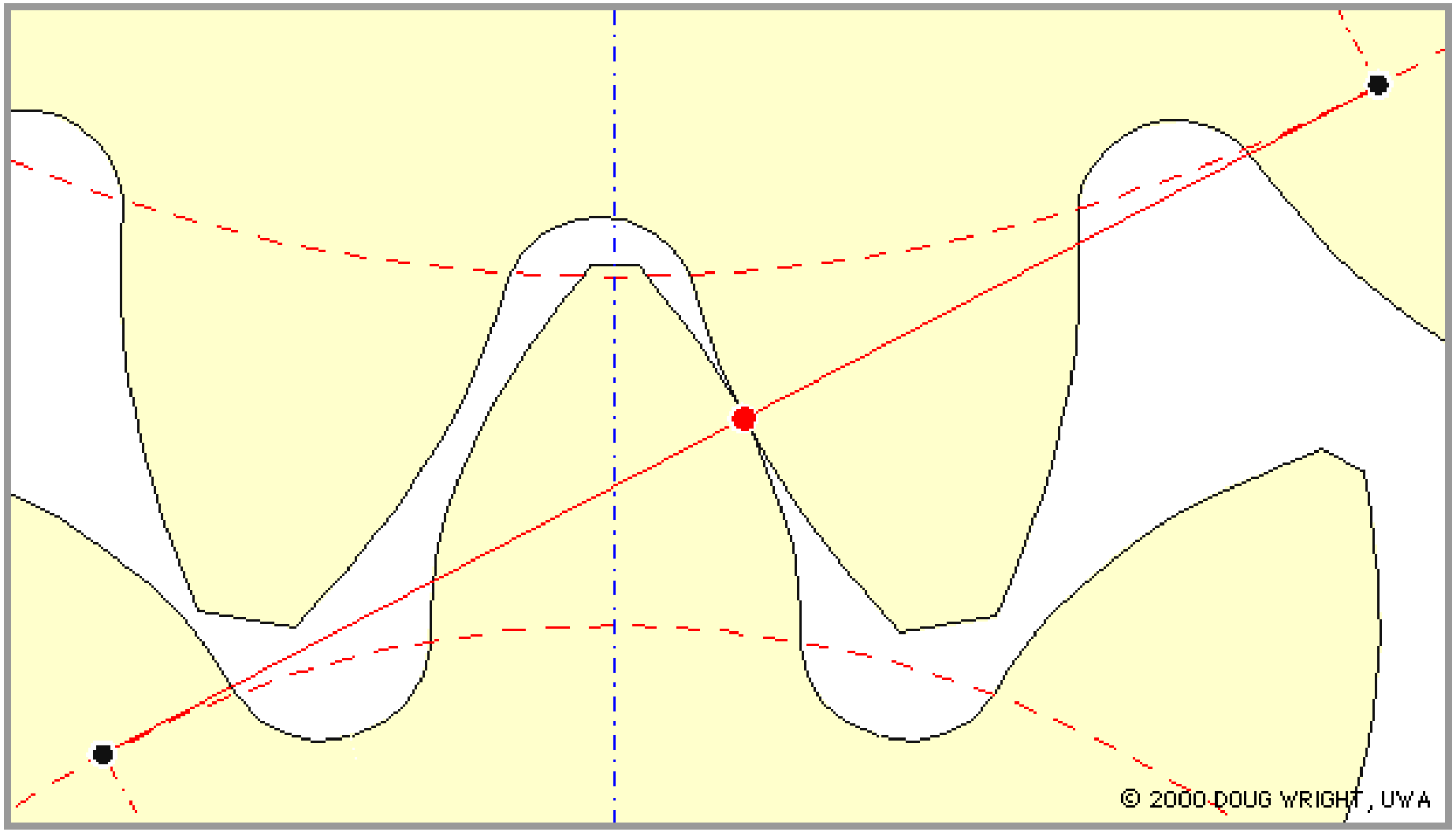
Tip 4 – Alignment Stars

- When aligning, pick stars that are widely separated from each other. If using three-alignment stars then try to get them in as wide a triangle in the sky as possible.
- This time of year I would suggest Vega, Rigel and Capella. By having a couple of alignment stars closer to the horizons like Rigel instead of Betelgeuse, then you are opening up that alignment triangle.
- Alignment stars near the zenith are always harder to work with without bending and dirty knees!

Tip 5 – Balancing your Scope

- Especially when using a German-equatorial mount, when pointing to an object to the east, have a little more weight towards the telescope to keep your RA gears meshed tight. When pointing towards the west, add a little bit more to the weight bar to also keep the gears meshed. This will dramatically reduce or eliminate backlash in your RA gears.
- For you advanced astro-imagers, you might do the same as me and think about a slightly un-levelled setup to rebalance automatically – intriguing?!

Tip 5 – Balancing your Scope



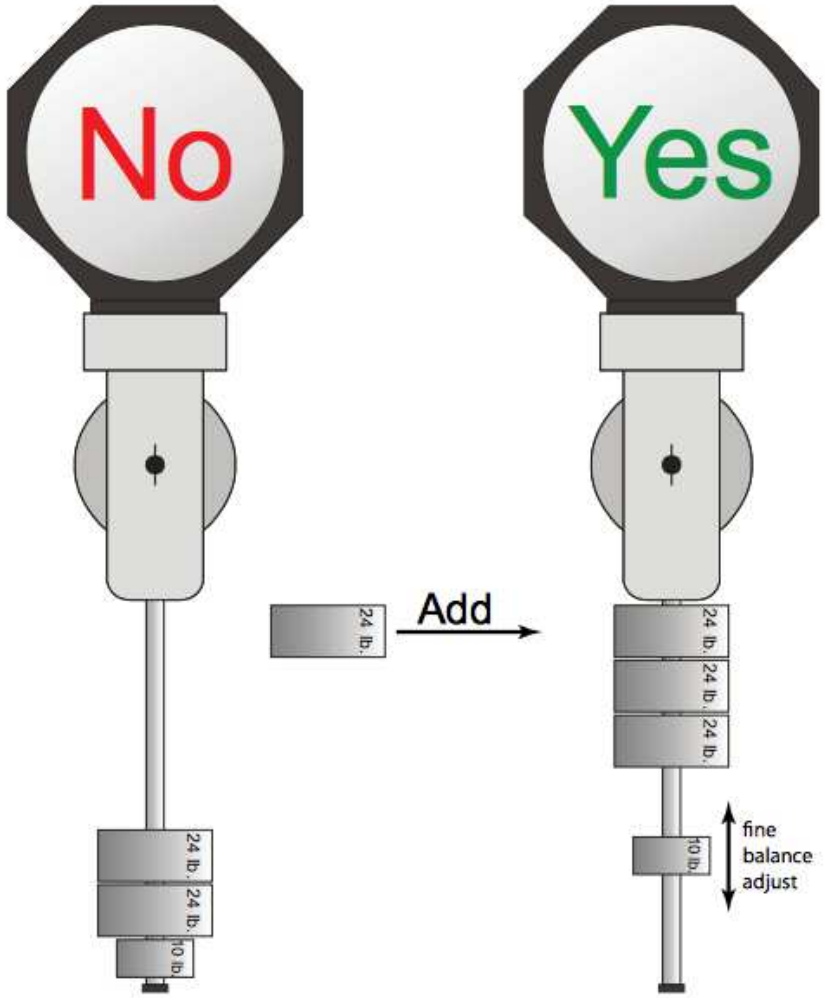
Tip 6 – DEC Gear Backlash

- To keep the DEC gear meshed and reduce backlash, especially if astro-imaging and guiding, then balance the scope so that the front (train objective) is slightly (and I mean slightly) heavier.

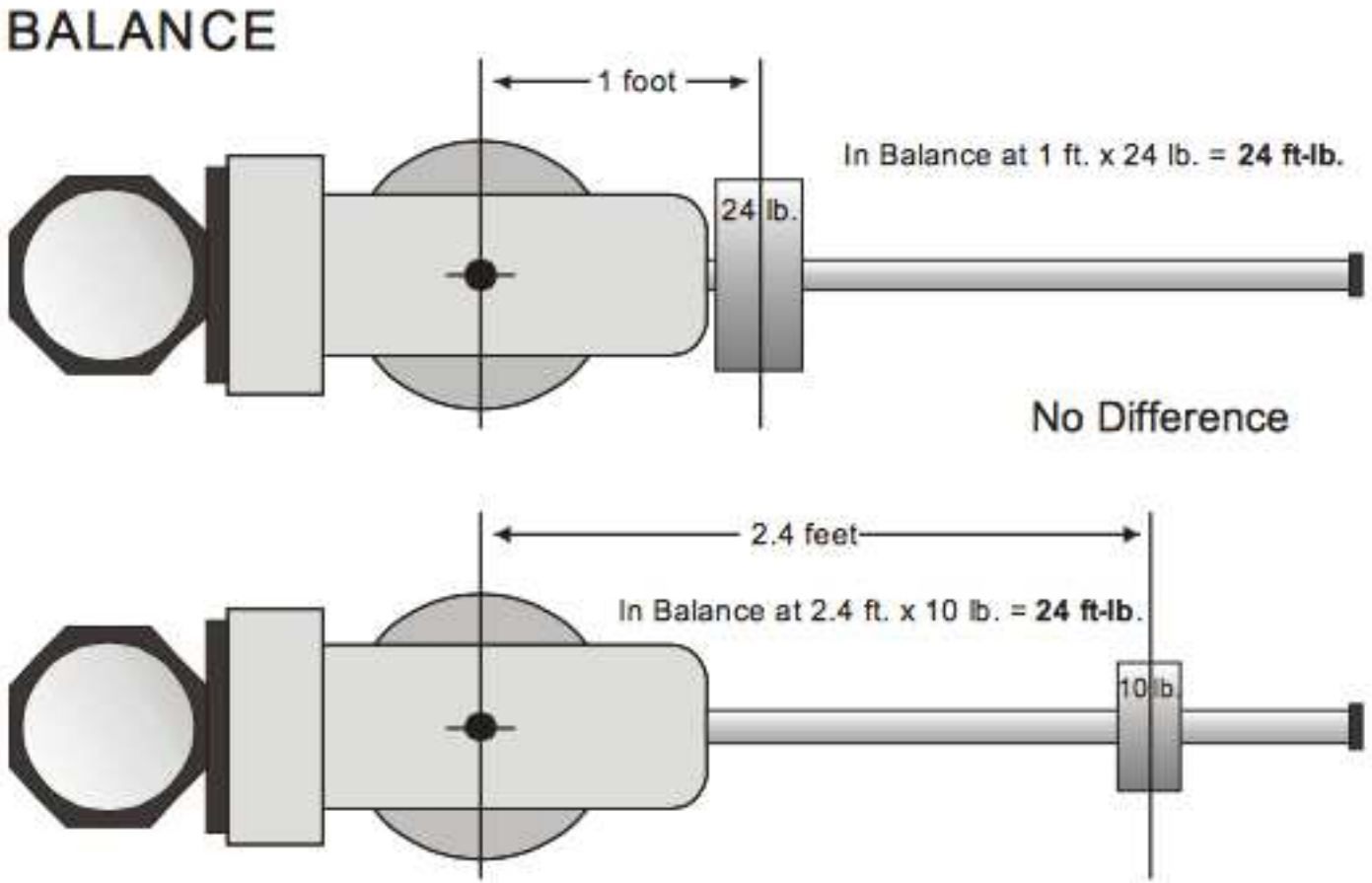
Tip 7 – Reducing Inertia

- To reduce the inertia force on the mount by almost half, make sure your weights are not at the end of the balancing bar, but as close to the mount body as possible (making sure there is no interference with motors or anything). This mean you will need more weight to balance the scope, but will cut down on the inertia force dramatically, and thus will improve any tracking and even more so any guiding.

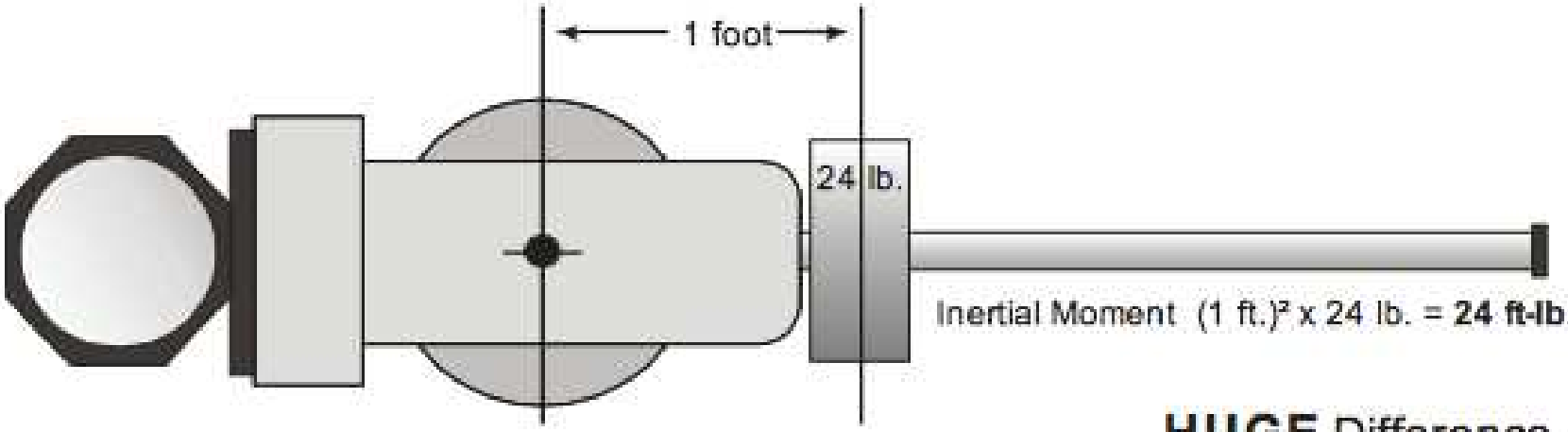
Tip 7 – Reducing Inertia



Why More Weight Higher Up the Shaft is Better!



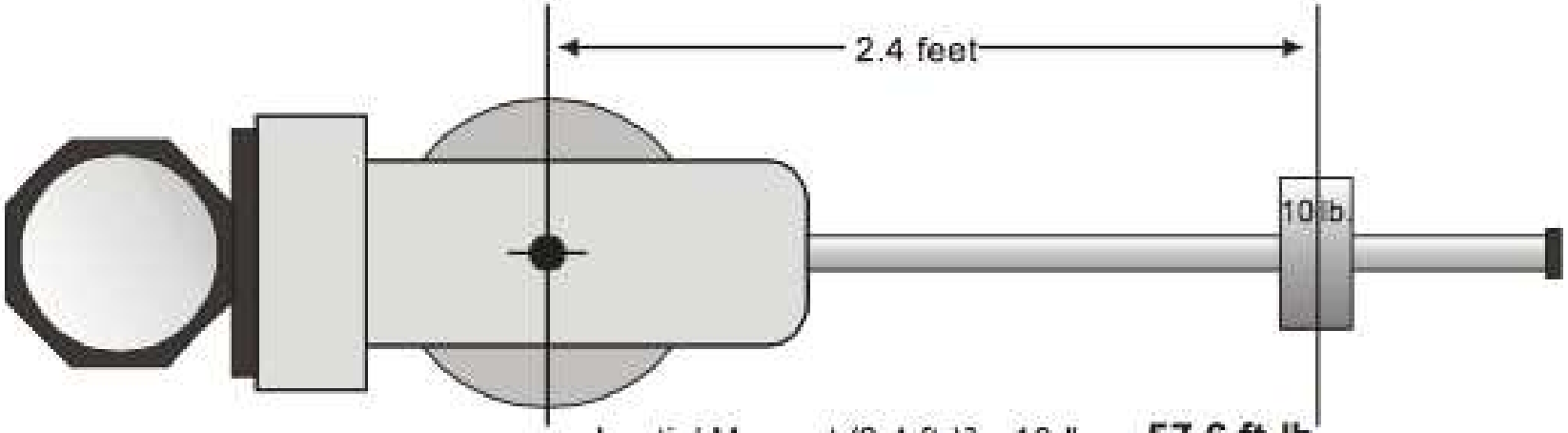
INERTIAL MOMENT ARM



Inertial Moment (1 ft.)² x 24 lb. = **24 ft-lb.**

HUGE Difference

Distance is squared!



Inertial Moment (2.4 ft.)² x 10 lb. = **57.6 ft-lb**

Tip 8 - Overtightening

- Do not over tighten anything on your telescope or mount, especially from the RA mounting upwards. Telescopes and mounts are precision items and over-tightening the clutches can put stresses on the gears, allow grease to be squeezed into places it shouldn't be, wear out locking mechanisms etc.

  Tightening tube rings can distort your optical tube and tightening a focuser can distort the precision plates that allow them to run and lock smoothly. Even Telescope weights should not be over tightened on the bar as they often have a plastic or rubber stop that can become distorted. Usually, finger tight plus a tweak is all you need if everything is set up correctly.

Tip 9 - Finderscope

- Make sure that you finderscope or Telrad is aligned in accordance with the telescope tube before observing. The best way of doing this is to adjust it in the daytime on a distant object, making sure that the centre of the view through the telescope matches the finder scope. This means you are ready when it gets dark, and can even use the easier finderscope for aligning, especially if it has a reticle view.

Tip 9 - Finderscope

- You can also stabilize a finderscope (they tend to float about a bit) by using cable ties. You can also squirt some silicone sealant between the finderscope tube and the holder. As silicone sealant is rubbery and so will still allow fine adjustment, but will keep the finder stable within it’s holder. Also, silicone sealant will peel off when necessary.

Tip 9 - Finderscope

Tip 10 – Copying a Pirate

- As most astronomers know, never use a white light when your eyes are adjusting or have adjusted to a dark sky. This includes laptop screens. Red torch light will help dramatically to keep your eyes stable after they are adjusted to the dark, and red filters over a laptop screen is invaluable.

Tip 10 – Copying a Pirate

- Another trick can be taken from the pirates of old. If you wear an eyepatch on your best observing eye, and keep it on long enough so that eye adjusts to the dark, then you have one eye for setting up and possibly writing down your observation notes etc, and when you want to look through the scope, move the eyepatch on your best eye to look through the eyepiece, and it will already be dark-adjusted.

Tip 11 – Temperature Balance

- If possible, choose your targets away from buildings or the sea. Heat haze over a building, especially during the winter months, is likely to distort any viewing because of heat haze rising up from the roof.

Tip 11 – Temperature Balance

- Also, observing through an open window can cause problems unless the indoor and outside temperatures are balanced. Especially an issue with SCT telescopes, any two differences in temperature around the tube will create a nasty air current that will encircle the tube and will distort any views. If you do want to observe through a window, especially in cold conditions, then keep the window closed and observe through the glass.

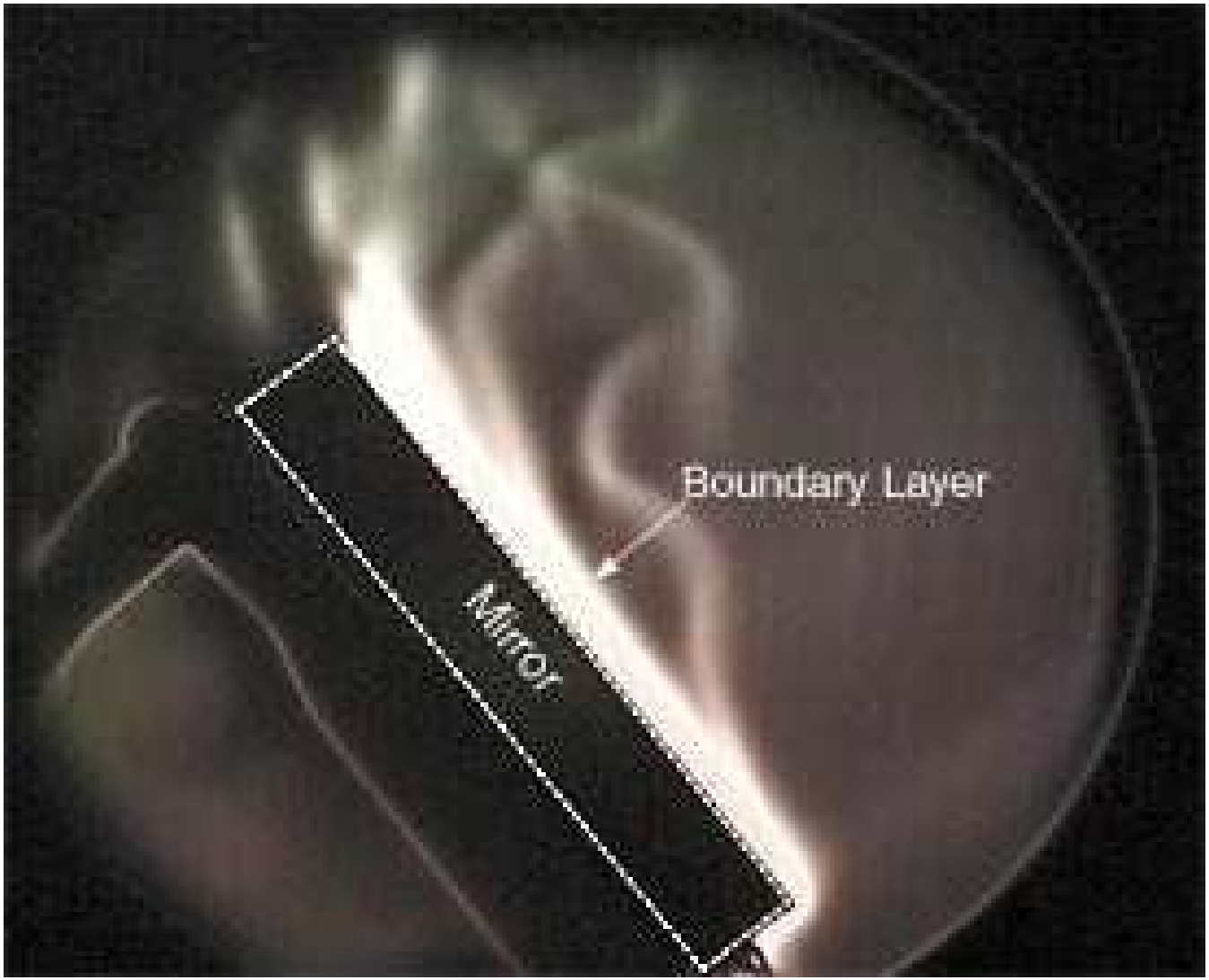
Tip 11 – Temperature Balance

- A minimum time for an SCT to acclimatize fully to the environment so that there is no turbulence inside the tube can often be a whopping two hours, whereas a typical Refractor will be half that, and a Newtonian (which is an open design) can often be half that again – i.e. ½ an hour. Not only do ‘closed’ telescopes suffer from turbulence, but it takes longer for the glass of mirrors to acclimatize long enough to stabilize.

Tip 11 – Temperature Balance

- I once put a dew strap on the actual primary mirror of my Newtonian. Even though the mirror glass is nearly 2” thick, I could see through my camera the vast distortions occurring even with the minimalist of heat. Most of the distortions were emanating from the mirror cell, holding the primary mirror, but it showed to me the massive differences that come from not balancing the air temperature inside the scope to the environment outside.
- Of course, you can use the telescope within during the temperature balancing, but the views/photographs will not be as good as when it’s been outside acclimatizing for a while.

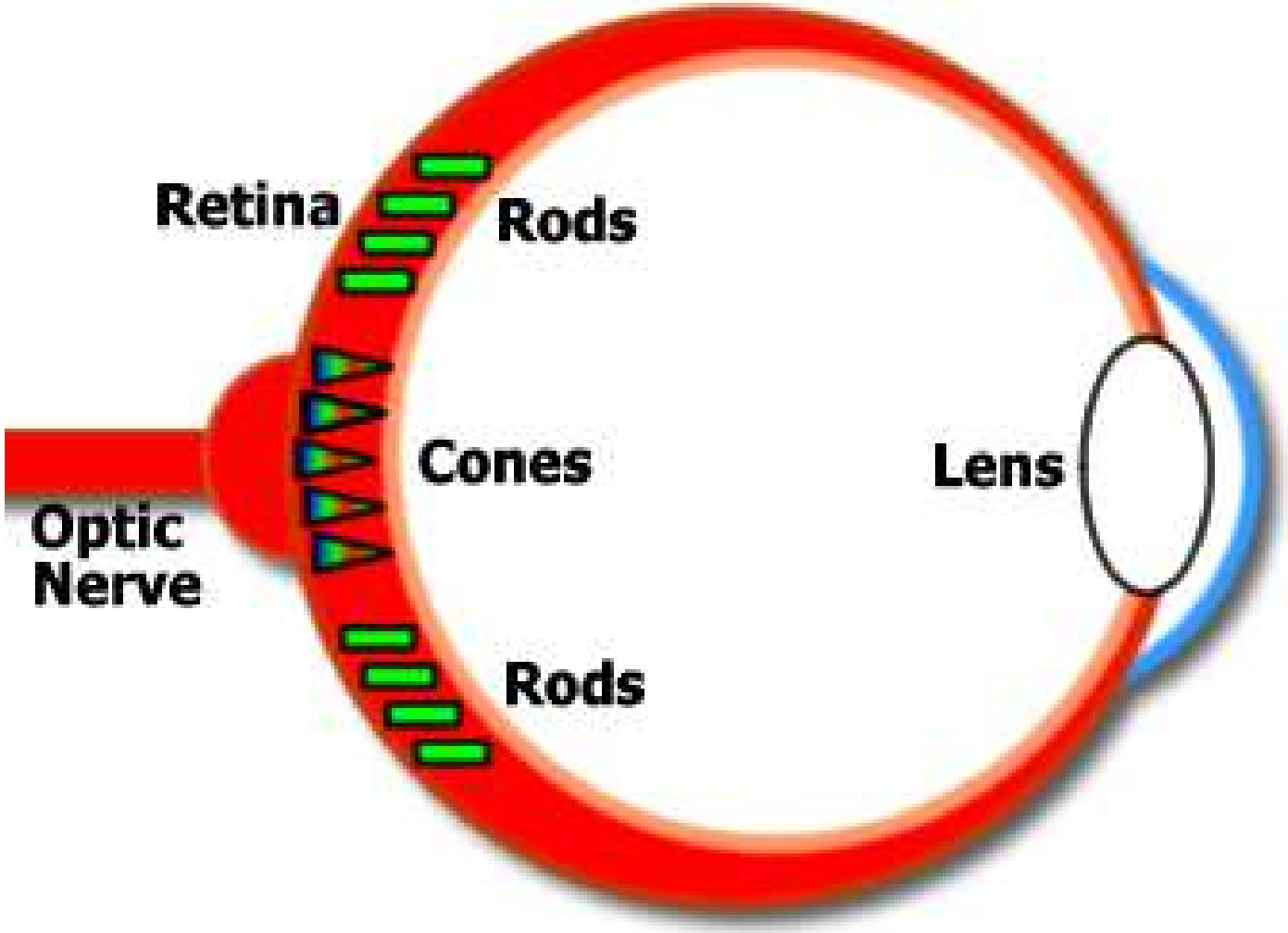
Tip 11- Temperature Balance



Tip 12 – Averted Vision

- Use what astronomers call "averted vision". Simply put, this means looking out of the corner of your eye (where your eye is more light sensitive because it works slower – yes, slower!), rather than the centre of your eye. In other words, don't stare directly at a faint object when trying to see it - glance at it from the side of your eye. It can mean the difference between seeing a difficult object and not seeing it.

Tip 12 – Averted Vision



Tip 13 – Increasing Magnification

- Always start viewing with a lower magnification eyepiece, and move up to high magnification. It is easier to find and centre something with a lower magnification eyepiece, and will often help in identifying the object prior to viewing closer.

Tip 13 – Increasing Magnification

- For beginners – Starting off using low magnifications allow the user to see how the telescope mount works. On an electronic mount, by pressing the slew buttons you can see how stars move in the eyepiece, and on manual ones you can perform small manual slews. This can help you when you move to higher magnifications.

Tip 14 - Collimation

- If you are viewing or imaging the planets, especially if you have a Newtonian design telescope, make sure you have good collimation.
- SCT telescopes can keep their collimation for years. A Newtonian telescope however will come out of collimation just through temperature differences.

Tip 15 – Laser Collimator

- If you are using a laser collimator, then make sure that the collimator itself is collimated. You can check this by looking at the point from the laser beam on your optical mirror as you turn the collimator inside the eyepiece holder.
- Polar scope reticules can also be collimated in a similar way by looking at a far off object and turning the polar scope to see if the centre point of the reticule holds on an object.

Tip 16 – Averted Autoguiding

- If you are mounting an imaging camera on top of a telescope and you are autoguiding, especially if your object is quite far north, i.e. Andromeda, M33, M51, M81 & M82, then to get the best pinpoint stars, point the telescope with the auto-guider fitted towards the centre of the ecliptic. Then, point the camera separately to the object you wish to photograph. The stars will be a lot tighter than if you choose a guide-star close to the object you wish photograph. Also, this works very well if photographing very long exposures of the Milky Way.

Tip 17 – UTC vs GMT

- If you have a dedicated computer that you use only with your scope, it is best to keep both the computer and the telescope mount set for Universal Time (UTC), rather than Greenwich Mean Time (GMT). The reason for this is that the UTC and the night sky are perfectly in sync. If you find something unexpected and want to ever identify it, you will need to have the UTC settings.
- Also, it solves the issues with automatic Meridian Flips when some get confused with British Summer Time.

Tip 18 – Focusing with Barlow

- If you wish to use a Barlow lens for astrophotography, especially if you plan to photograph the planets, remember that as soon as you introduce an extra lens in the optical train, then you will introduce a further focusing point. Most Barlow lenses parfocal out the observer's side for eyepieces, but this is different when using a camera. Cameras are not parfocal with anything. Therefore, during daylight point to a far-off object like a streetlamp or chimney, and find the focal point behind the Barlow lens by taking test shots. This can save a good hour of your observing time in the dark as you will be closer to infinity focus.

Tip 19 – Dust Caps

- Don’t put the dust caps on the lens of a telescope for at least an hour after bringing a telescope indoors. The difference in temperature from outside to inside, or if there is dew on the lenses from time observing can turn to mold if not dried out before enclosing.

- I place a couple of sheets of paper over the front of my telescopes after use for a few hours and leave them so that any moisture is sucked up into the paper and then dried before I place the dust cap back on it. Blotting paper would be even better.

Tip 19 – Dust Caps

Tip 20 – Cleaning Optics

- Never touch with your fingers or any cloth washed using household detergent any of the lenses in your system. The salt (sodium chloride) on your hands and from washing powders will take off the coatings that are found on many modern-day telescope optics.
- The coatings used now-a-days help bring contrast and in-effect fill minute imperfections in the glass itself. By removing the coatings, stars will look blown-out in comparison to dimmer objects in view.

Tip 20 – Cleaning Optics

- Another no-no is using toilet tissue as this is loaded with chemicals that can/will strip coatings. Most kitchen tissues however are ok.
- Cleaning the lenses of a scope should really only be done with bought micro-fibre cloths.

Tip 20 – Cleaning Optics

- Don’t spray any dedicated telescope cleaning solution directly onto the optics. Spray the cloth you are using, and then let it almost dry before applying to the optics. Repeat many times until the optics are clean, leaving the drying process for longer each time. Any cloth that is not partially/mostly dry before applying to the optics can find micro cracks in the coatings and over time lift them.

Tip 20 – Cleaning Optics

- Always clean from the centre of the optic outwards towards the edge, never from side-to-side.
- This is to make sure that if you introduce any imperfections in the cleaning process, that it won't affect the whole projection.

Thank you

I do hope that one or more of these tips that I have picked up over the years will be of use.

Just remember, telescopes and their accessories are precision ‘scientific’ instruments, and should be treated as such.