Collimating Your SCT For Optimal Binoviewer Images

Q: Should I collimate my SCT with the Binoviewer in place?
A: The collimating of your SCT must be done with the binoviewer in place if the best possible images are to be produced. This is because the primary mirror of your SCT must be moved toward the secondary convex mirror (negative) in order to push the focal out of the exit aperture of the tube assembly in order to reach focus with the binoviewer/eyepieces. This is to be done with the binoviewer in "normal" focus. In other words, the Multiplier and reducer of the Power x Switch should not be introduced into the light path. I have seen a very big difference in the quality of planetary images after fine tuning the collimation of our company's Celestron SCT with a Denk Binoviewer in place. I will outline my procedures below. The reality is that the scope becomes a different instrument when switching from single eyepieces to binoviewer usage. This must not be ignored if you want the best images possible with the binoviewer setup.

You should certainly have collimation instructions/diagrams that came with you telescope and we assume that you have some familiarity with the collimation procedure. After-market collimation devices may or may not work but our outline below is quick and easy and very accurate and requires no lasers, just a bright star high in the night sky. Bob's Knobs are very highly rated by SCTs because they allow the secondary to be tilted without the use of hex tools.

1. Place binoviewer in the scope and focus on a star near zenith. Use a bright star such as Vega, Capella, Acturus, Regulus etc.

2. Center the star in the field of the eyepiece. This is very important. magnification is really not that important and I collimate using our Denk 21s. You simply are looking at the geometry if the defocused stellar image and as long as you can see the outer bright diffraction rings and the central shadow produced by the secondary mirror, you can achieve a very fine level of collimation.

3.Rack the star out of focus so that it is expanded to approximately the size of a pea.

4.Note the secondary shadow (a circle of darkness in the center of the diffraction pattern). The extra-focal star image will look like a donut. The bright outer rings will surround a dark "hole" in the central region.

5. Turn the screws on the secondary mirror until the dark hole is exactly in the center of the bright rings of the extra-focal stellar image. This entire star image will shift anytime the secondary screws are turned. You must re-center the star image before you assess whether the shadow is truly in the center of the star image or not. The advantage of using a wide field eyepiece pair is that the star will not exit the field of view and can be re-centered quickly without you having to move the scope around trying to find it again. The only disadvantage is that it can be more difficult for you to estimate the exact center of a large field of view. Adjusting the secondary mirror gradually will help keep the star pattern within the field of view and make things easier.

6.Once the shadow looks exactly in the center of the diffraction pattern of the defocused star, you must now look for the Airy Disc of the star that is located within the dark shadow in the center of the defocused star. It is a tiny spec of light that may be off center at this point. Positioning this spec of light to the exact center of the "hole" in the extra-focal image is extremely important if sharp tight images

are to be produced!

7. It may be easier if the defocused star image is focused down a little bit as this tightens the dark hole and the Airy Disc may be easier to see and center. Once the Airy Disc is seen, it should be moved to exact center of the shadow by adjusting the secondary and be aware that this requires very little movement of the secondary! The smallest turn will move this spec of light quite a bit.

8. Once this collimation procedure has been accomplished, your images with the binoviewer will be as good as they can be. While moving to "reduction" and "multiplication" requires movement of the primary mirror once again, the differences are not as great as those needed when going from single eyepiece usage to binoviewer observations. However, an argument can certainly be made for collimating in "reduction" or "Multiplication" modes if one or the other are going to be used extensively and exclusively during a night's observations.