



Collimation Eyepiece— Model #94182

Collimation is the process of aligning the optical axes of all the optical elements in a telescope. When properly collimated, all the mirrors (or lens) will be centered and angled so that the light entering the telescope will form the sharpest possible image. The Collimation Eyepiece is a combination of a "sight tube" and a "Cheshire eyepiece." The sight tube portion of the Collimation eyepiece has cross hairs to accurately define the center of the optical axis, and is used to make sure that the secondary mirror is centered directly under the focuser. The Cheshire portion of the eyepiece has a polished 45° angled element that reflects light from the cutout hole in the side of the barrel down into the optical path. The polished flat element projects a bright ring of light, providing a target for aligning the primary mirror.

Identifying What You See

Figure 2 represents what a properly collimated Newtonian telescope would look like when looking into the focuser tube with the eyepiece removed. The figure labels the major parts of a typical Newtonian telescope. However, what you see when looking through your telescope will depend on the manufacturer of the telescope. For example, many Celestron models use a single stalk to support the secondary mirror instead of a four vane spider. Therefore, when looking through the focuser you would see a single vane leading out to the secondary mirror as opposed to four vanes.

Using the Collimation Eyepiece

1. Remove the eyepiece or any other accessory from the focuser and rack the focuser all the way in towards the tube.

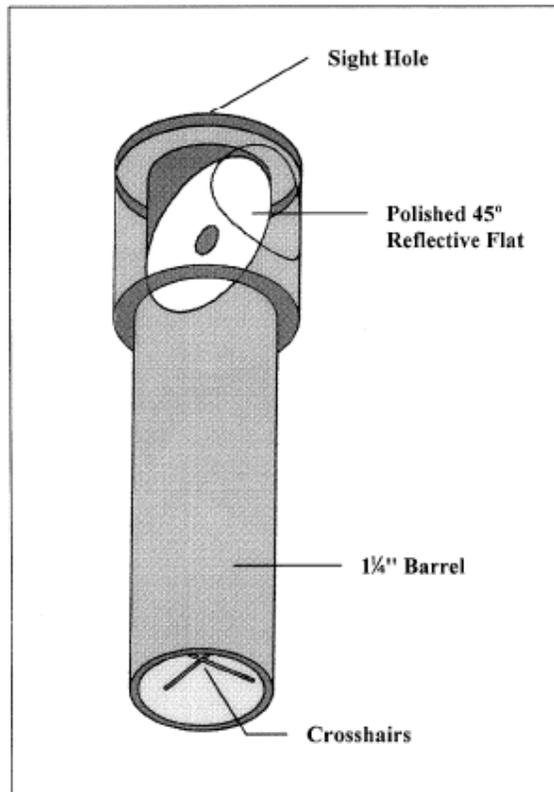


Figure 1

2. Insert the Collimation Eyepiece into the focuser far enough that the bottom edge of the barrel appears slightly larger than the outer edge of the secondary mirror when looking through the sight hole.

3. Rotate the eyepiece so that the cutout on the side of the barrel is towards an external light source. (If collimating at night, shine a flashlight through the cutout). **Never point the cutout side of the eyepiece at or near the sun; serious and instant eye damage can result.**

4. Look into the sight hole to determine if the secondary is positioned directly under the focuser tube. The center of the secondary mirror should be positioned directly under the intersection of the cross hairs. If the secondary is not centered in the cross hairs of

the Collimation Eyepiece, it will need to be adjusted. This is usually done by rotating the threaded rod that holds the secondary holder. Additionally, the threaded rod can slide up and down through the spider for adjustments in the other axis. To adjust a stalk-type secondary holder, there is usually a center bolt that can be loosened to allow rotation of the secondary holder.

5. Next, you need to adjust the tilt of the secondary mirror so that the entire reflection of the primary mirror is visible in the secondary mirror. Use the three collimation

screws located on the top of the secondary mirror holder to center the reflection of the primary mirror underneath the cross hairs of the Collimation Eyepiece.

6. Now that you can see the entire primary mirror reflected in the secondary mirror, you may notice that the reflection of the secondary mirror is not perfectly centered in the primary mirror (see figure 4). To correct this, you must adjust the primary mirror collimation screws located on the bottom of the primary mirror cell. Turn the collimation screws, one at a time, until the center of the bright ring reflected in the secondary mirror is positioned in the center of the primary mirror. For added ease and accuracy, a small black dot can be placed in the center of the primary mirror and be used to align the primary. Simply adjust the mirror until the dot on the primary is centered in the middle of the bright

ring. If the view seen through the focuser tube resembles that of figure 2, then your telescope is properly collimated and ready for observing. However, if the collimation is noticeably off, repeat steps 5 and 6 until aligned.

Collimating a Schmidt-Cassegrain Telescope

Insert the Collimation Eyepiece directly into the visual back of the telescope. The shadow of the secondary will appear as a dark circle near the middle of the field of view. Make adjustments to the three collimation screws in the center of the

corrector plate to center the secondary mirror on the cross hairs. This is the only collimation adjustment possible for this type of telescope. It should take only a fraction of a turn to make a noticeable change in collimation. Never loosen the screw in the center of the secondary housing; it may result in the mirror coming off its mount.

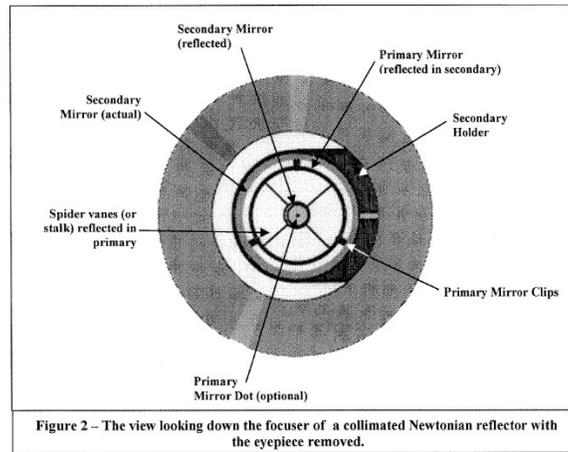


Figure 2 – The view looking down the focuser of a collimated Newtonian reflector with the eyepiece removed.

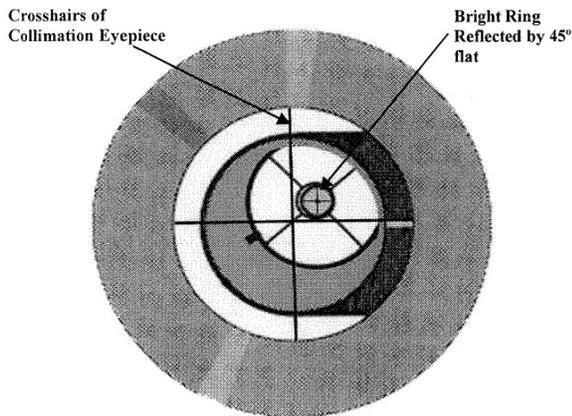


Figure 3 – Make adjustments to the secondary mirror until you can see the entire primary mirror reflected in the secondary mirror as in figure 4.

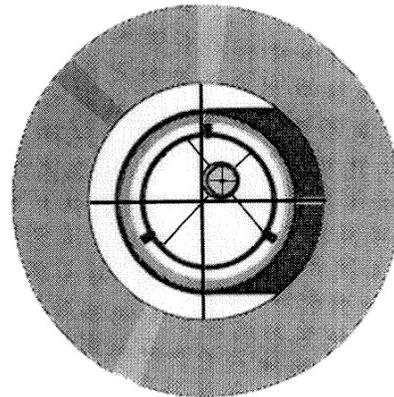


Figure 4 – Make adjustments to the primary mirror to center the reflection of the secondary mirror inside the primary mirror.

Warranty: Two-year limited warranty. For complete details, contact Celestron

#94182 (10-16).