COLLIMATING AN ASTRO-TECH R-C

Your Astro-Tech Ritchey-Chrétien reflector was collimated at the factory before being shipped. Nevertheless, rough treatment in transit could potentially cause it to be knocked out of collimation.

To check the collimation, visually focus your Astro-Tech on a bright star at a reasonably high magnification. Insert your eyepiece directly into the focuser drawtube. Do not use a star diagonal in the system and be certain that the tension and drawtube lock knobs under the focuser are tightened firmly after focusing.

The diagram below illustrates the appearance of collimated (top) and out of collimation (bottom) images of the star being examined. The top left image is the diffraction pattern in a collimated scope. The center and right-hand images show what the star looks like when roughly focused and sharply focused. The bottom row of images show the same sequence through an out-of-collimation scope.

APPEARANCE OF A STAR DURING COLLIMATION

Scope in collimation

Diffraction pattern | Rough focus | Sharp focus

Scope out of collimation

Diffraction pattern | Rough focus | Sharp focus

Patterns have been exaggerated for clarity

When collimating, never loosen the Phillips head screw in the center of the secondary mirror holder. The location of this screw is shown in the illustration at the top of the next column. If it is loosened, the secondary mirror could tilt, or even fall into the primary mirror.

By the same token, *never adjust any of the three pairs of screws around the rear cell thread at the back of the scope.* These screws, shown below, are factory set to align the main mirror's optical axis with the optical tube and secondary mirror holder. *Any unauthorized change to these factory settings will void your warranty.*

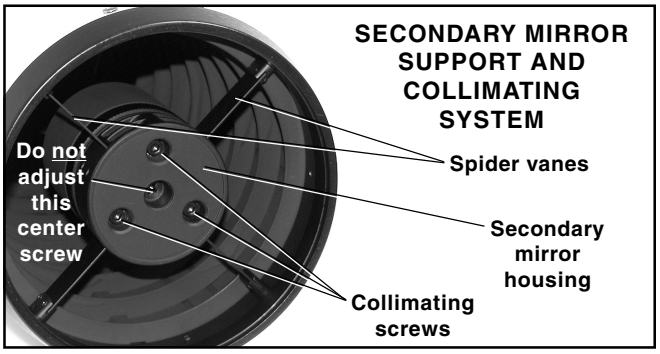
PRIMARY MIRROR ALIGNMENT SCREWS

Mirror alignment screws; six total in three pairs.
Do not adjust!

If collimation is needed, collimating a Ritchey-Chrétien reflector is best done by eye. The procedure is similar to collimating a Schmidt-Cassegrain catadioptric, as both are Cassegrain-type optical systems. If you have collimated an SCT in the past, you should have little trouble collimating an Astro-Tech Ritchey-Chrétien.

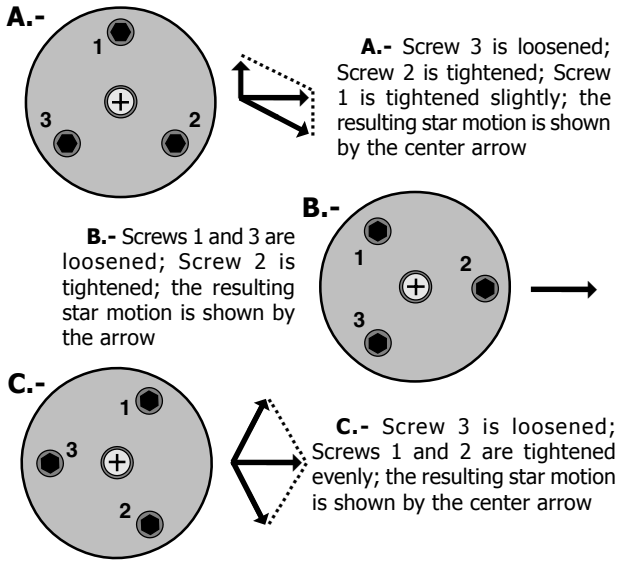
Begin by placing a bright star in the center of a low to medium power eyepiece field (again without using a star diagonal). Defocus the image until it is about the apparent size of a dime or nickel held at arm's length. This will show the diffraction pattern, which should look like a bull's-eye with the circular shadow of the secondary mirror holder in the center, as shown in the illustration at the top of this column. If the shadow of the secondary is not precisely in the center of the diffraction rings, adjust the three collimating screws to tilt the secondary mirror until the shadow of the secondary is centered in the diffraction pattern and the faint diffraction rings are concentric. The location of the collimating screws is shown in the illustration at the top of the next column.

A four millimeter Allen wrench will be needed for collimation. Always make adjustments to the collimating screws in tiny increments, only a fraction of a turn at a time. When collimating, as one screw is loosened, the two screws on the opposite side of the secondary should be tightened by the same amount. The opposite is also true. If one screw is tightened, the two opposing screws should be loosened. The image of the secondary shadow will move in the direction of the collimating screw that is being tightened. If the secondary shadow needs to be shifted in a direction between two screws, those two must be tightened to make the image shift in that direction, while the single screw on the opposite side should be loosened. As each adjustment is made, the secondary shadow will move off center. Recenter the star's image in the field before making the next adjustment.



Refer to the diagrams below, which graphically show the direction in which the star image will move when different combinations of collimating screws are loosened and tightened. In all cases, the star image needs to be shifted in the 3 o'clock direction. The screws that must be adjusted depend on the orientation of the three collimating screws in relation to the desired star movement direction.

FORCE VECTOR DIAGRAMS FOR VARIOUS ALIGNMENT SCREW ADJUSTMENTS



A.- Screw 3 is loosened; Screw 2 is tightened; Screw 1 is tightened slightly; the resulting star motion is shown by the center arrow

B.- Screws 1 and 3 are loosened; Screw 2 is tightened; the resulting star motion is shown by the arrow

C.- Screw 3 is loosened; Screws 1 and 2 are tightened evenly; the resulting star motion is shown by the center arrow

Repeat the collimation procedure several times, using successively higher power eyepieces, until you are sure the collimation is exact. Finally, after the final adjustments have been made, make sure that all of the collimating screws are snugged down tightly and evenly to ensure that the collimation will hold for many trips out into the field.

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