

Adjustment of Ritchey-Chrétien telescopes with the **TSRCKOLLI**



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Prerequisites

The procedure described below assumes that the telescope to be adjusted is mechanically OK and roughly pre-adjusted, i.e. that, for example, the position of the parts corresponds to the nominal values/specifications.

For RC telescopes, the distance between the main and secondary mirrors plays a decisive role. This is determined during the design of the telescope and should be set correctly upon delivery. The setting of the mirror distance is not part of the adjustment procedure and is not described in this manual.

Preparation

- Remove the dew shield or tube cover.
- Set the tilt of the focuser or tilt adapter to zero (if this adjustment option is available).
- If the outer light ring (see below, *What can be seen when looking through the TSRCKOLLI?*) is not visible, the tube, which is located in the center of the main mirror, must be unscrewed. To do this, place the tube horizontally and take care not to touch/damage the primary mirror.
- Remove any spacer rings present between the tube and focuser and retract the focuser completely.
- Insert the TSRCKOLLI into the focuser and clamp it carefully. Make sure that it is not tilted.
- Rotate the TSRCKOLLI until the positions of the three letters on the ground glass match those of the adjustment screws of the secondary mirror.



This will make it easier to select the correct screw during adjustment.

- Point the telescope at a flat, homogeneous and well-lit surface, such as a white wall.
- Switch on the red illumination.

What can be seen when looking through the TSRCKOLLI?

At first glance, what you see when looking through the TSRCKOLLI seems confusing, so the individual elements will first be explained using the adjacent graphic.

The circles mark (from outside to inside):

1. Edge of the secondary mirror baffle
2. Secondary mirror with the reflection of the primary mirror
3. Reflection in the secondary mirror: Focuser with the TSRCKOLLI

The somewhat blurred dark ring in the center of the image is the center mark of the secondary mirror.



Look through the central hole of the TSR-CKOLLI and check whether an adjustment is required. If the secondary's mark is exactly in the center and all elements are concentric/symmetrical, the adjustment is OK. If this is not the case, your telescope needs to be adjusted.

On some telescope models, the main mirror adjustment can be judged by the outer annular light gap. If this gap is not visible, you need to pay attention to the tube-side attachment points of the secondary.

These must protrude about the same distance into the field of view. In both cases, due to mechanical tolerances, the achievable accuracy may not be sufficient for a perfect image. Therefore it is necessary to check the alignment on an artificial or real star and correct it if necessary.

The picture below left shows the contradiction due to the possible tolerances: If you use the light ring as orientation, the alignment is perfect. If, on the other hand, one pays attention to the mounting points of the secondary, readjustment is necessary.



well aligned RC telescope



misaligned RC telescope

Adjusting the secondary mirror

The secondary mirror is adjusted by means of the three adjustment screws, which are arranged at a distance of 120° from each other around the retaining screw.

IMPORTANT: The retaining screw in the center must not be loosened under any circumstances!

Turn the adjustment screws in small increments to move the secondary's mark exactly to the center. If your telescope has adjustment and counter screws, you will need to loosen or tighten the counter screw associated with each adjustment screw as needed. After the first few tries, you will quickly see the effect of the adjustment and more easily recognize which screw to turn in which direction to cause the desired movement of the secondary mirror mark.

The markings on the ground glass of the TSR-CKOLLI help you to select the correct screw for the desired setting.

Always make sure that the adjustment screws are not too loose or too tight. If this is the case with one screw, the other two screws may have to be loosened or tightened minimally.

If the screws are too tight, the mirror cell will be distorted, and if the screws are loose, the adjustment will not be permanently stable.

If all elements are now already concentric, the telescope is collimated and an adjustment of the primary mirror is not necessary.

Often, however, this picture appears:

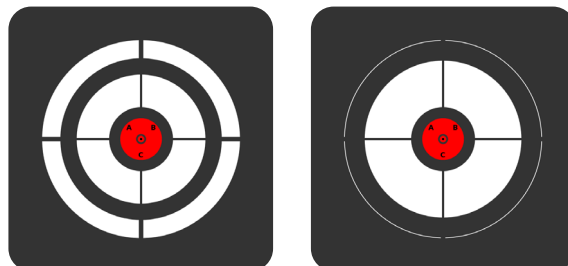


RC telescope with correctly adjusted secondary but misaligned primary mirror.

Adjusting the main mirror

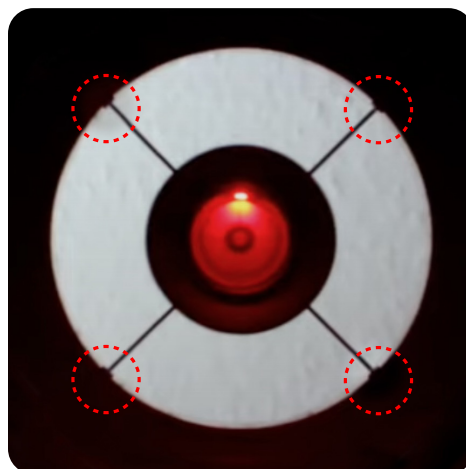
When adjusting the primary mirror, you must pay attention to the outer bright ring. To the inside, this gap is limited by the stray light protection of the secondary mirror, to the outside by the front tube aperture. In order to perform the adjustment precisely, the light slit/ring must be as narrow as possible, because this is the only way to detect minimal deviations. The width of the ring changes with the position of the focuser: the farther you move the focuser outwards, the narrower the ring becomes. In this way, if necessary,

you can gradually adjust the ring width to the decreasing deviation in the course of the adjustment process.



The main mirror is adjusted via three pairs of screws (adjustment and counter screw). Here, too, proceed in small steps until the optimum result is achieved. This is the case when the light ring has the same width all around. Here, too, make sure not to tighten the screws too much.

If you use the secondary mirror mounts as a reference, they should appear at the end of the adjustment process as shown in the image below.



Reviewing and correcting the result

It is not uncommon to see a deviation in the secondary mirror again after adjusting the primary mirror.

If this is the case, simply repeat the steps of secondary and primary mirror adjustment until no deviation is seen. This procedure is common with RC telescopes and is not an indication of a defect or error.

Very good results can be achieved with the TSRCKOLLI. As with any adjustment,

a certain experience in handling the instrument and also the behavior of the telescope is necessary for this. Therefore, it is usually useful to check the adjustment in the starry sky and eliminate any residual errors.

This also reveals any tilt of the sensor. This can be compensated – depending on the telescope model – either with the tilting mechanism provided at the focuser flange or a separate tilting flange.