Askar

N160

详细版使用说明书
Detailed User’s Manual

警告

请勿通过本望远镜直接观测太阳，这样做可能导致瞬间失明，请购买专用太阳观测滤镜或滤膜，来获得最安全的观测指导。

WARNING

DO NOT LOOK AT SUN THROUGH TELESCOPE.
IT WILL CAUSE IRREVERSIBLE DAMAGE TO YOUR EYES.

www.sharpstar-optics.com

English

Instructions for use

This detailed user manual is intended for N160 units whose primary mirror cell, secondary mirror cell, or focuser have been disassembled.

If you have not disassembled the above components, and only need to correct slight optical misalignment caused by factors such as cleaning, external impact, or other uncontrollable events, please refer to the N160 Concise User Manual included with the telescope. Follow the quick alignment steps provided there.

If you have only disassembled the primary mirror cell or adjusted the primary mirror height adjustment knobs, you simply need to re fine tune the primary mirror outdoors. For specific procedures, refer to step (2) on page 40 of this manual.

The Askar N160 is a cost-effective Newtonian reflector with a 160mm aperture and a native focal ratio of f/3.6. When used with the included 2-inch 0.95x coma corrector, the system focal ratio is optimized to f/3.4.

The Askar N160 supports APS-C format imaging and delivers excellent star performance.

The primary mirror of the Askar N160 features a high-precision parabolic design. Both the primary and secondary mirrors are made of high borosilicate glass, which has an extremely low coefficient of thermal expansion and excellent stability. The mirror surfaces are coated with enhanced aluminum, providing high reflectivity and crisp, clear image quality.

On the bottom of the primary mirror, there are three sets of height adjustment knobs and three sets of locking knobs, used respectively for adjusting the primary mirror angle and for securing the mirror position after adjustment to prevent any shift.

The secondary mirror of the Askar N160 has a minor axis of 61mm and a major axis of 86mm, providing ample illumination coverage for APS-C sensors to ensure uniform brightness across the frame. The secondary mirror bracket is manufactured using an integrated CNC process, ensuring rigidity while reducing weight. Three tilt adjustment screws are fitted on the bracket base, enabling fine angle calibration of the secondary mirror.

The Askar N160 comes standard with a 2-inch 0.95x coma corrector, which features a triplet air-spaced design and effectively corrects coma aberrations. The corrector is equipped with threaded connections for greater stability.

The focuser of the Askar N160 is a dual-speed rack-and-pinion type with 25mm of focus travel, and it supports the installation of an electronic focuser. The focuser body can be rotated entirely, effectively preventing interference when attaching accessories such as an electronic focuser. The focuser base features angle adjustment screws and angle locking screws to ensure precise alignment between the focuser axis and the primary mirror optical axis.

The tube rings of the Askar N160 are equipped with hand-tightened locking screws, allowing for tool-free installation and removal for quick and convenient operation. The top handle includes a multi-function finder base slot, which facilitates carrying and provides additional mounting positions for other astronomy accessories.

The dovetail plate of the Askar N160 is a standard Vixen-style dovetail, 230mm in length, with pre-drilled 1/4-inch and 3/8-inch threaded holes, allowing direct connection to most commercially available mounts or tripods.

The tube of the Askar N160 is made of high-quality carbon fiber. A finder base is pre-configured on the side of the tube, allowing you to mount a finder scope or other accessories as needed.

* The focuser base of the Askar N160 is locked at the factory. The base is equipped with six rotation locking screws. If you need to rotate the focuser body, be sure to loosen the locking screws before use to avoid mechanical damage.

N160 Specifications:

Aperture size: 160mm

Focal length: 576mm (without Corrector)
544mm (with Corrector)

Focal ratio: f/3.6 (without Corrector)
f/3.4 (with Corrector)

Primary mirror type: Parabolic mirror

Format specifications: APS-C

Tube material: Carbon fiber

Corrector type: Triplet design

Secondary mirror short axis diameter: 61mm

Lens tube outer diameter: 193mm

Lens tube total length: 467mm

OTA weight: 3.97kg

Gross weight(including handle, tube ring, dovetail plate, and corrector): 5.2kg

Corrector weight: 0.22kg

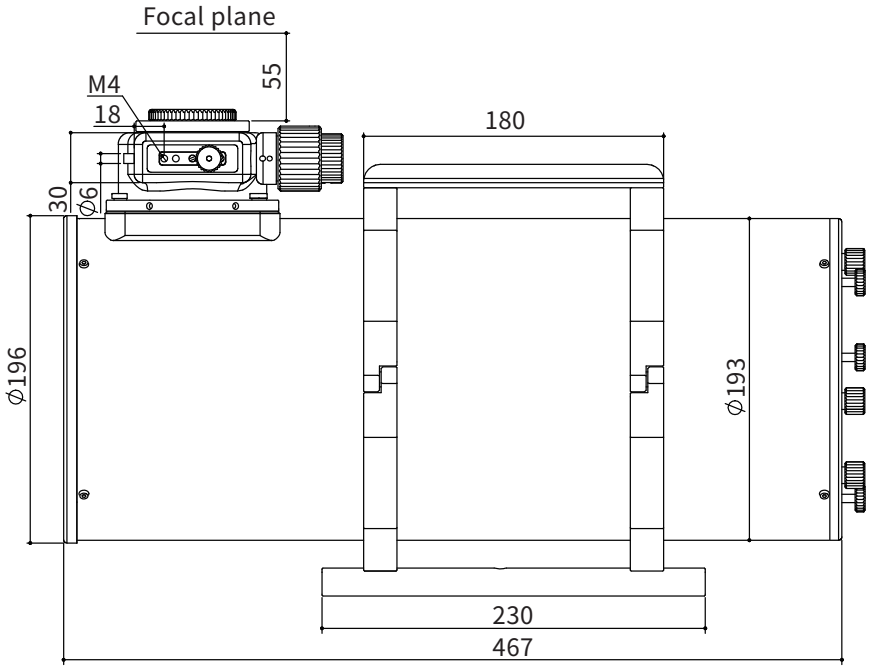
Resolution: 0.73 arcseconds

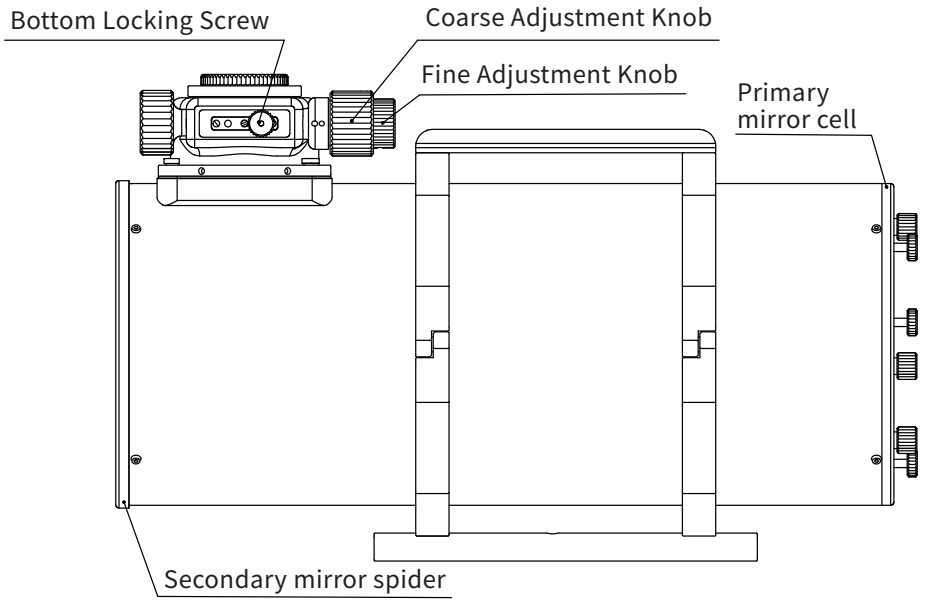
Back focus: 55mm (from the M48 thread)

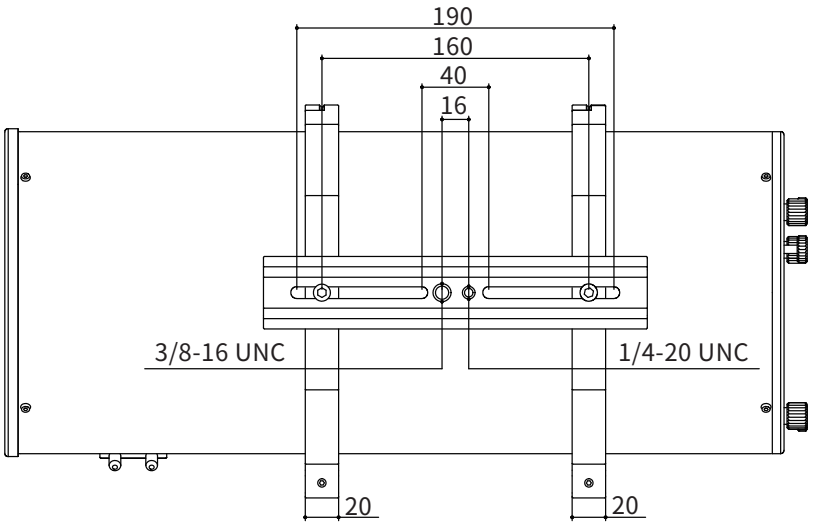
Rear-end thread type: M48*0.75

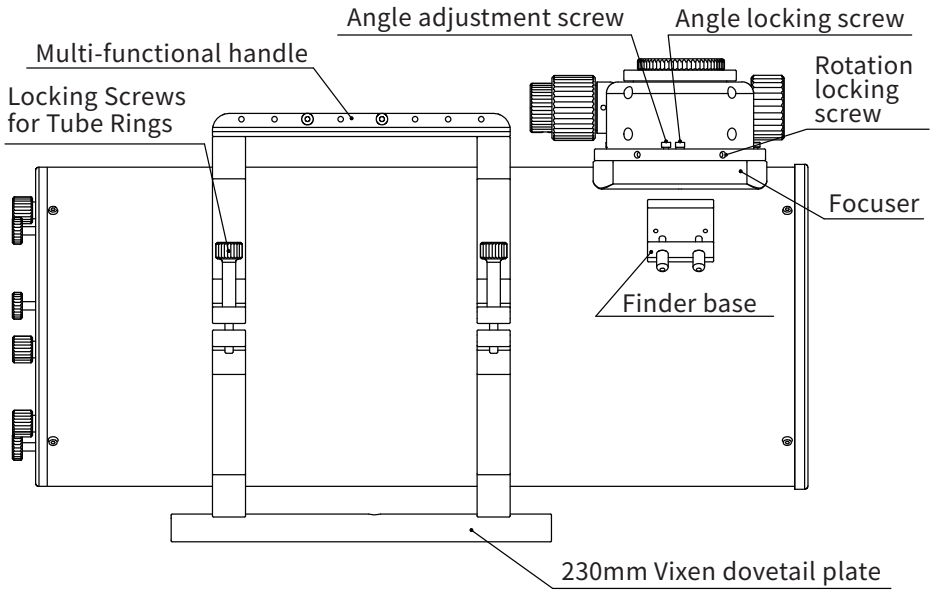
Standard package items: a N160 OTA, M58 to M48 adapter, a T10 Torx Wrench, 2mm hex key, 3mm hex key, a Warranty Card, a Manual

Product Size Diagram

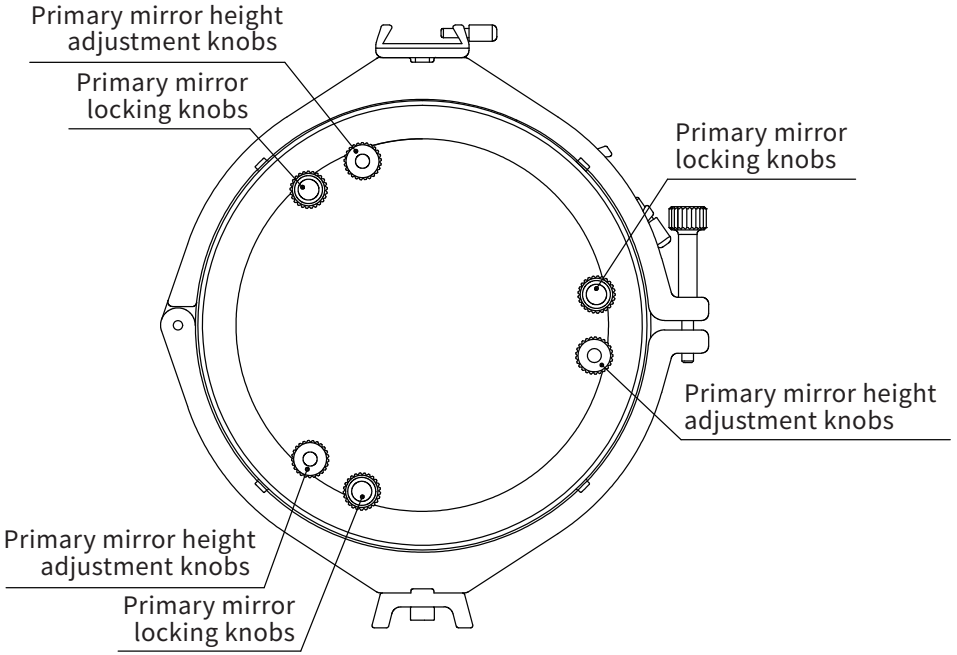




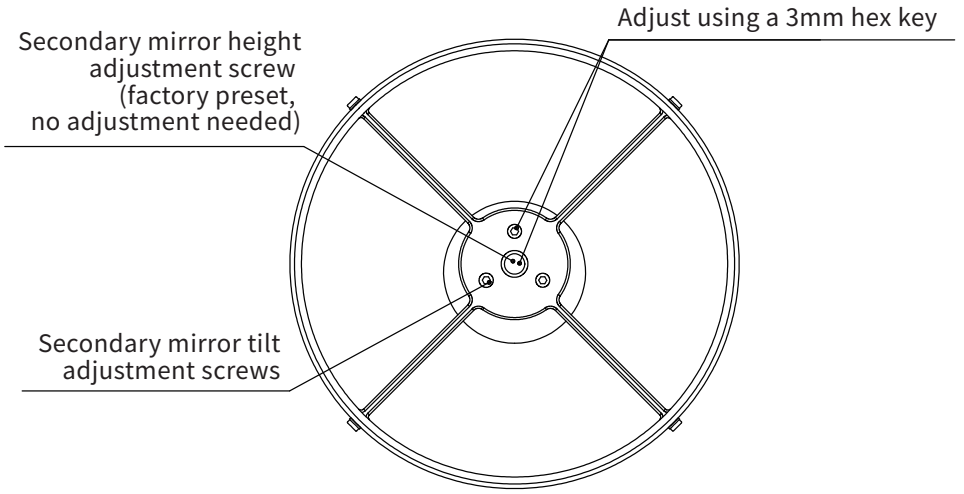




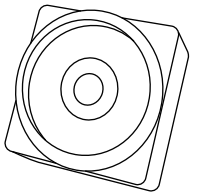
The primary mirror adjustment screw instruction



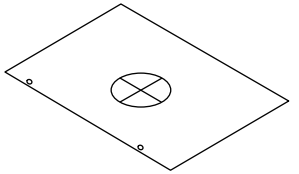
The secondary mirror adjustment screw instruction



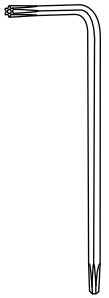
Tools Required



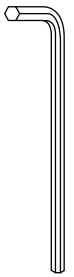
OCAL collimator (optional)



Focuser calibration aid (A5)[1]



T10 Torx wrench

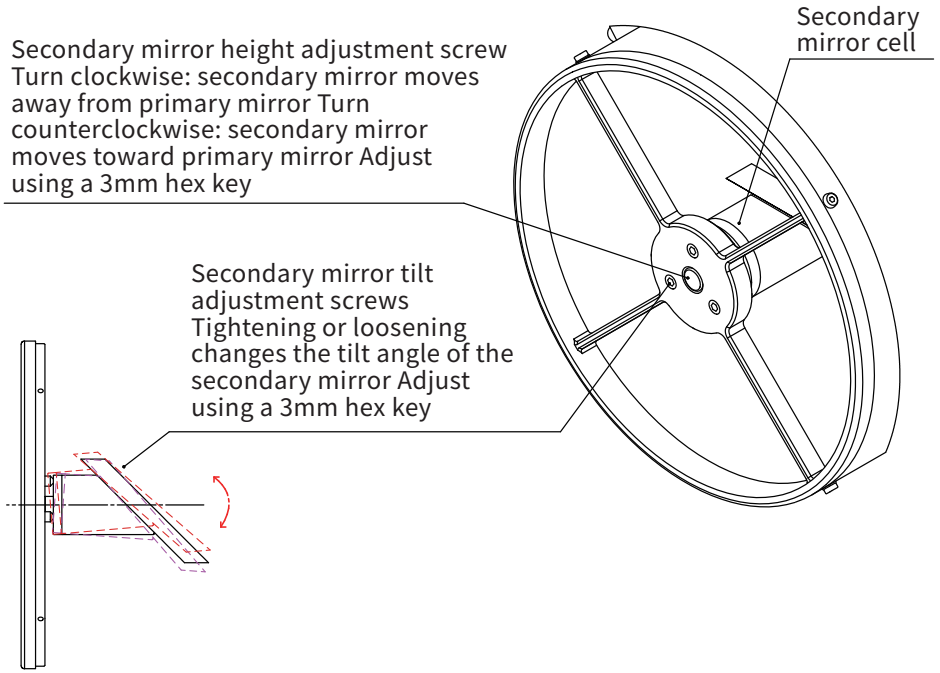


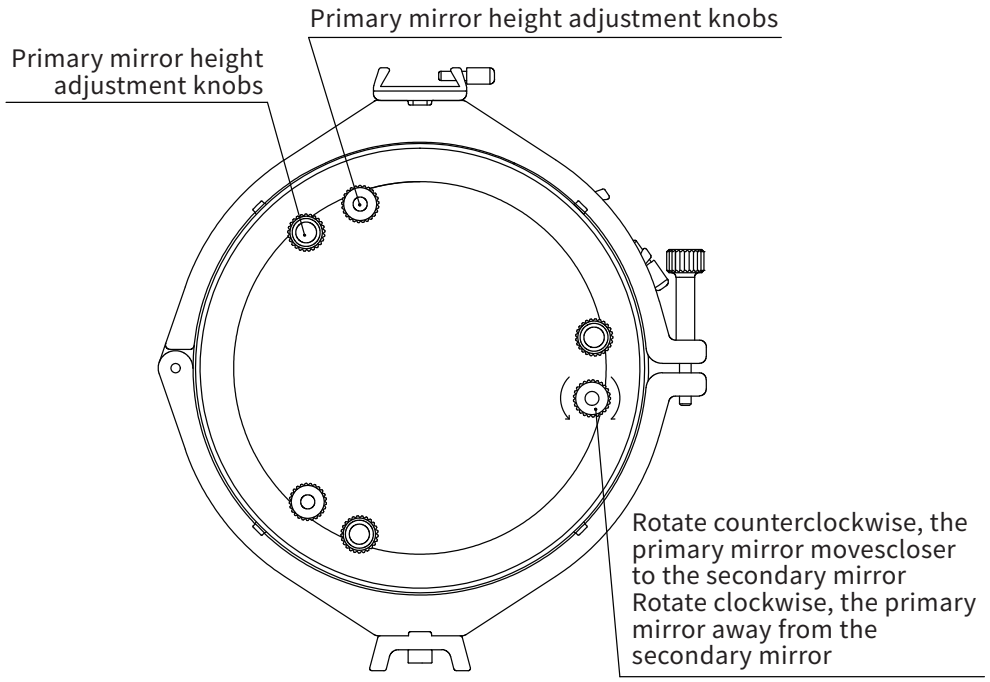
2mm hex key

3mm hex key

[1] If you need the focuser calibration aid (A5), please visit the Sharpstar Optics official N160 product page - Product Downloads - "Focuser Calibration Aid Electronic File" - download and print at 1:1 scale, then cut out

Structure Introduction



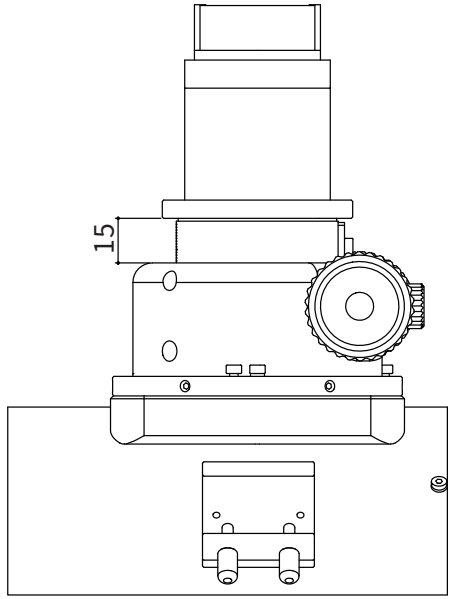


Collimation Steps

① Preparation

(1) Mount the N160 horizontally on an equatorial mount. Do not mount it vertically to avoid the secondary mirror falling or being knocked during collimation.

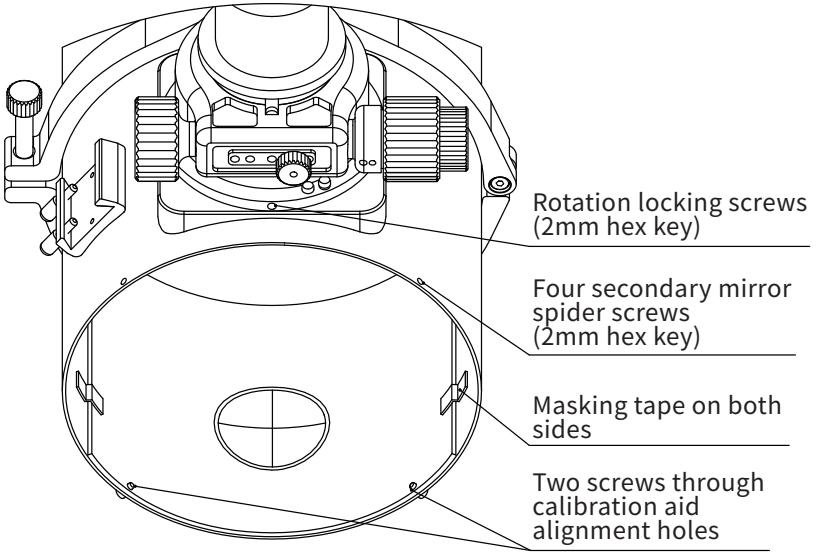
(2) Extend the focuser by about 15mm. Connect the OCAL collimator to the M48 thread at the rear of the telescope's coma corrector. Turn on the OCAL collimator and observe its display. Adjust the extension distance until the primary mirror projection is fully visible within the outline of the secondary mirror. Then proceed to the next steps.



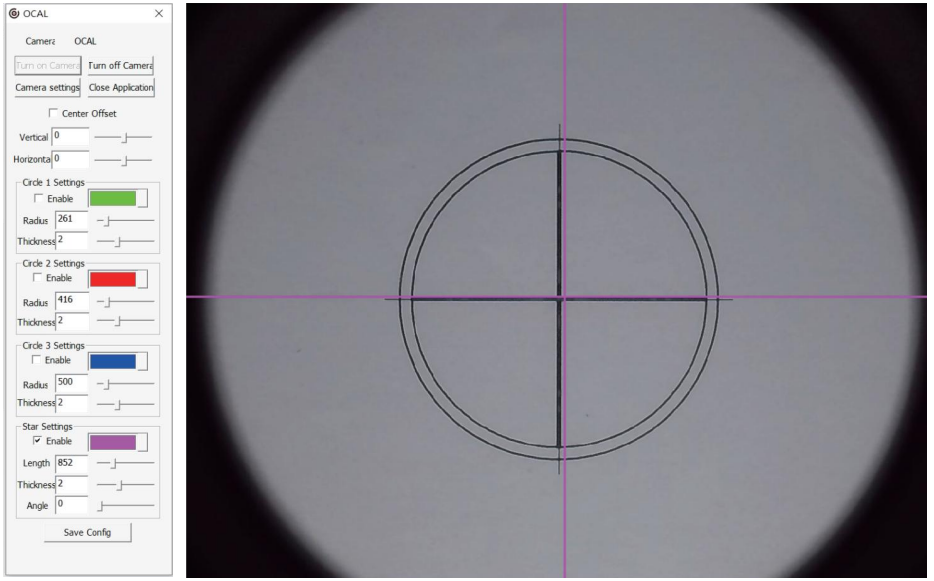
② Focuser Calibration

(1) Use a 2mm hex key to remove the four screws securing the secondary mirror spider. After removal, place the focuser calibration aid in the center of the carbon fiber tube. You may use two screws through the alignment holes of the calibration aid for initial positioning, then secure both sides of the calibration aid with masking tape to ensure it is firmly installed (see Figure 1).

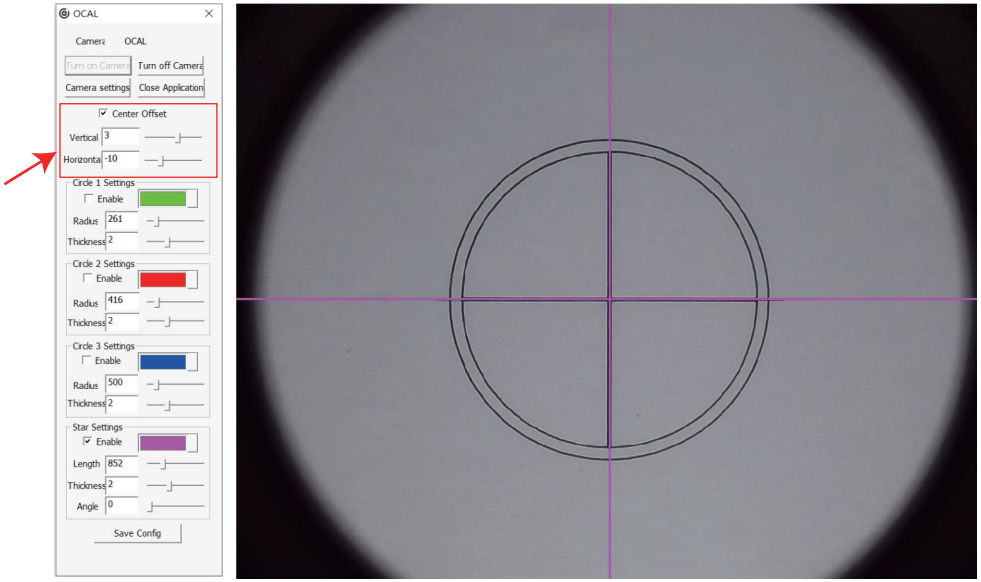
(Figure 1)



(2) Use a 2mm hex key to loosen the side rotation locking screw. Open the crosshair settings in the OCAL software. Use the "Center Offset" function, drag the slider to move the crosshair, align its center with the center of the calibration aid, and record the first center offset data. (e.g., 3, -10)

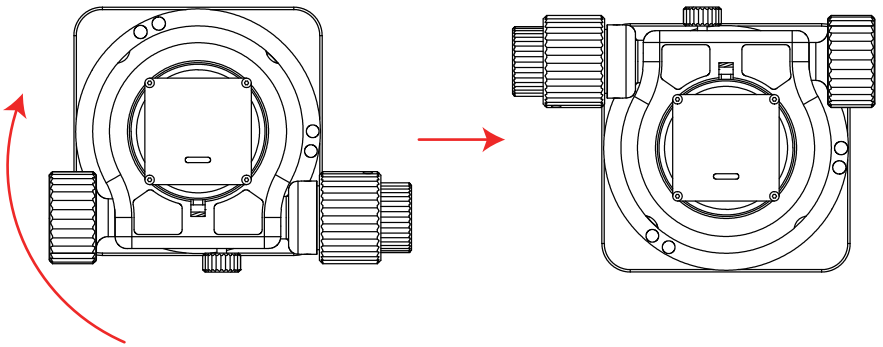


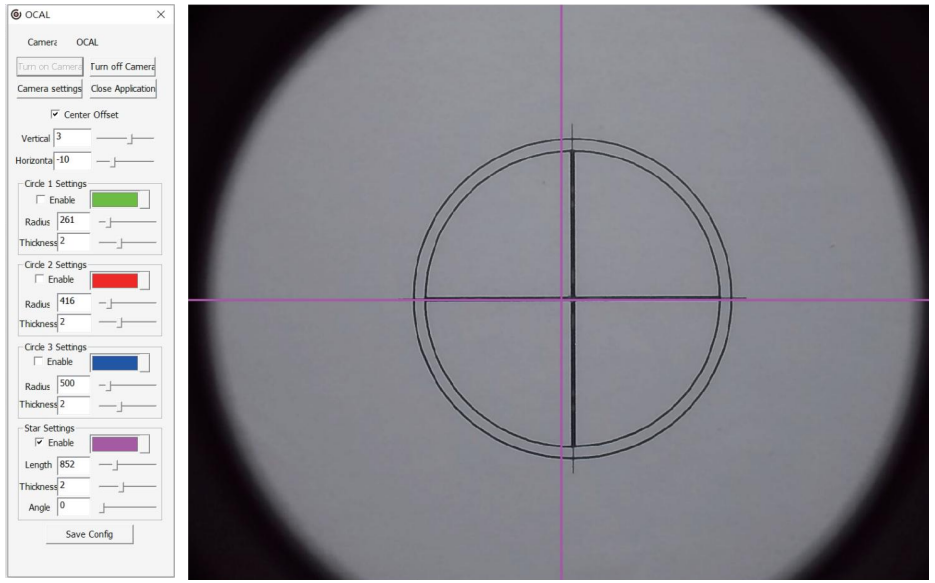
(OCAL collimator connected)



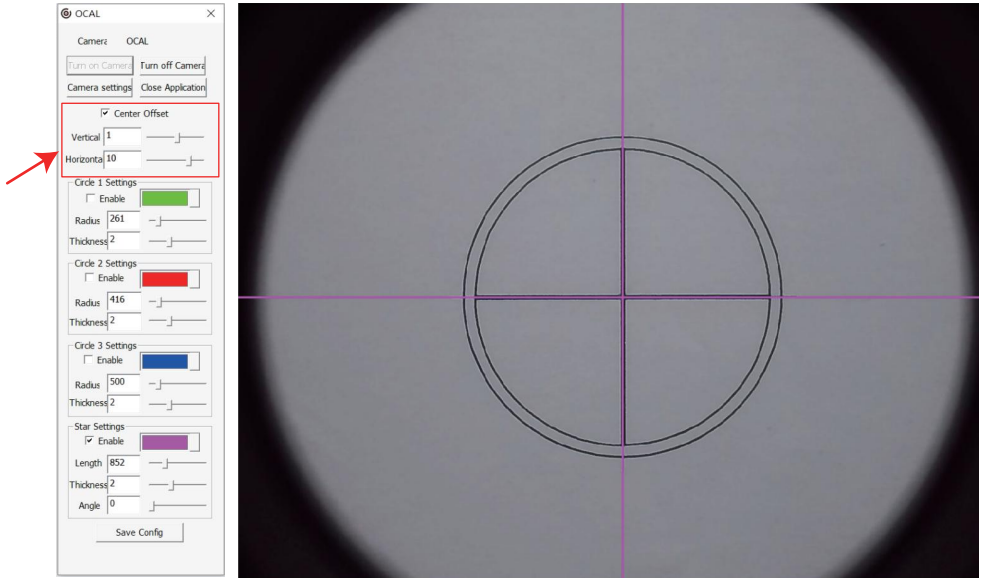
(First center offset)

(3) Manually rotate the focuser 180°. After the image stabilizes, again use the "Center Offset" function to move the crosshair to the center of the calibration aid, and record the second center offset data. (e.g., 1, 10)





(Focuser rotated 180°)



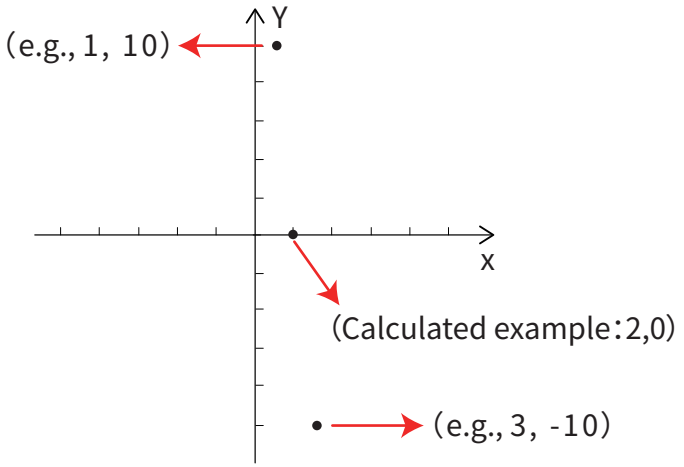
(Second center offset)

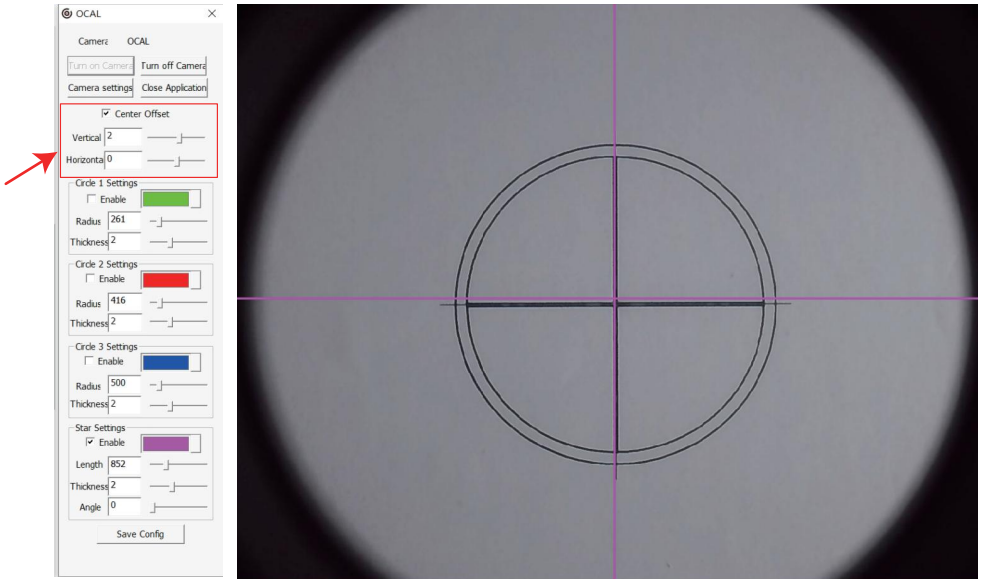
(4) Calculate the average of the two recorded data points to obtain the actual center coordinates that need correction. Adjust the "Center Offset" coordinates to this calculated value. (e.g., 2, 0)

Refer to Figure 2 for the adjustment principle.

Calculation formula: ($X=\frac{X1+X2}{2}$, $Y=\frac{Y1+Y2}{2}$)

(Figure 2)

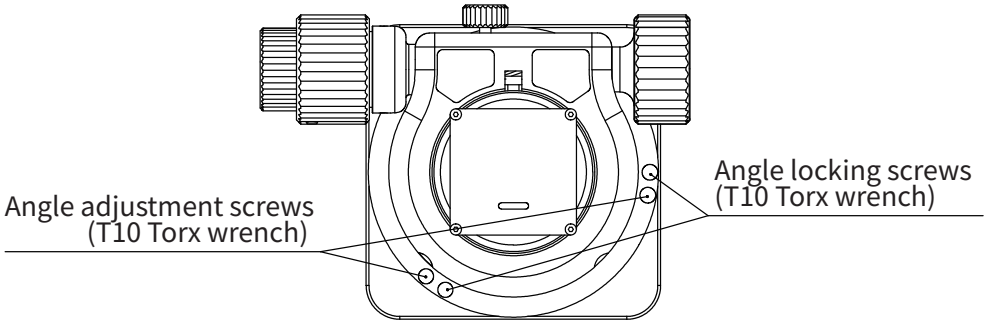


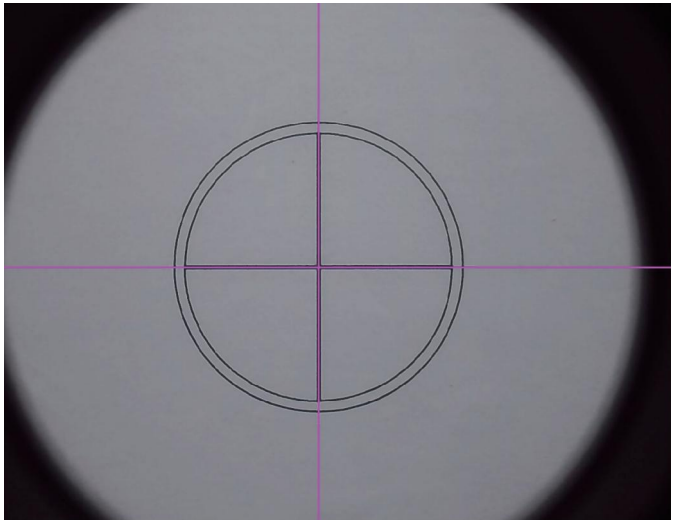


(Average of the two center offsets)

(5) Use a T10 Torx wrench to loosen the three angle locking screws, then adjust the three angle adjustment screws until the software crosshair is centered on the crosshair of the calibration aid. Rotate the focuser 360° and observe whether the software crosshair remains concentric with the crosshair of the calibration aid. If it remains concentric, tighten the angle locking screws and also tighten the side rotation locking screw. If not concentric, repeat steps (1)–(5) above.

(6) After the corrector calibration is complete, remove the focuser calibration aid. Reinstall the secondary mirror spider in its original position. Use a 2mm hex key to insert the four screws with nylon washers, then smoothly tighten them into the mounting holes, ensuring the spider is secure with no looseness or misalignment.



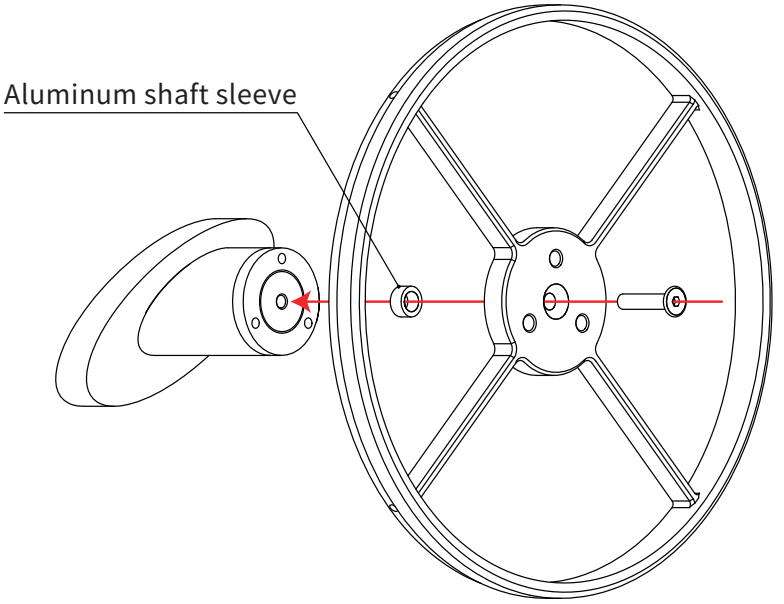


(Adjust angle adjustment screws until image matches reference)

③ Secondary Mirror Collimation

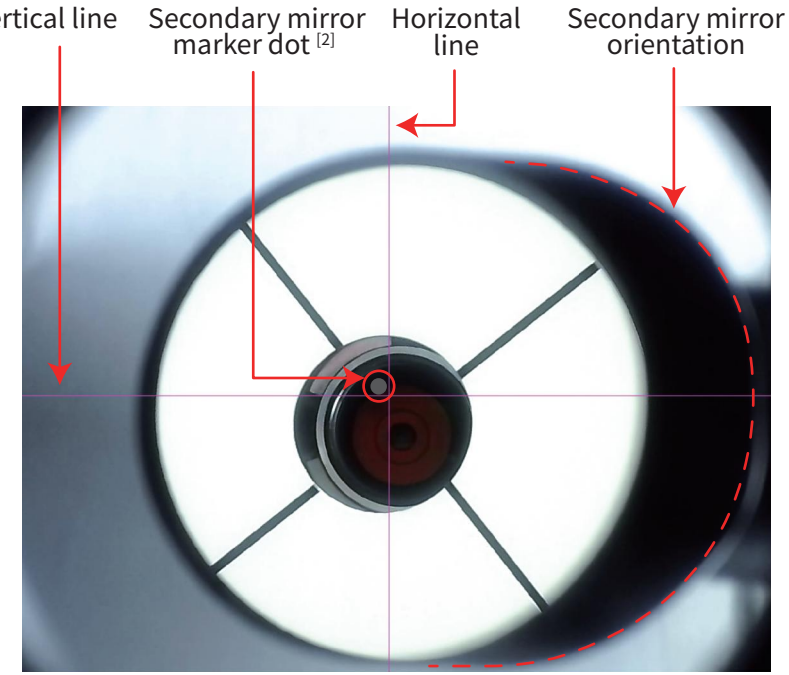
(1) Secondary mirror height positioning

Using a 3mm hex key, tighten the secondary mirror height adjustment screw through the aluminum shaft sleeve. Focus the OCAL software on the surface of the secondary mirror until the marker dot on the secondary mirror is clearly visible. After the image stabilizes, observe whether the marker dot lies on the horizontal line of the software crosshair. If not, continue to fine tune the secondary mirror height adjustment screw until the marker dot is on the horizontal line (see reference image below).



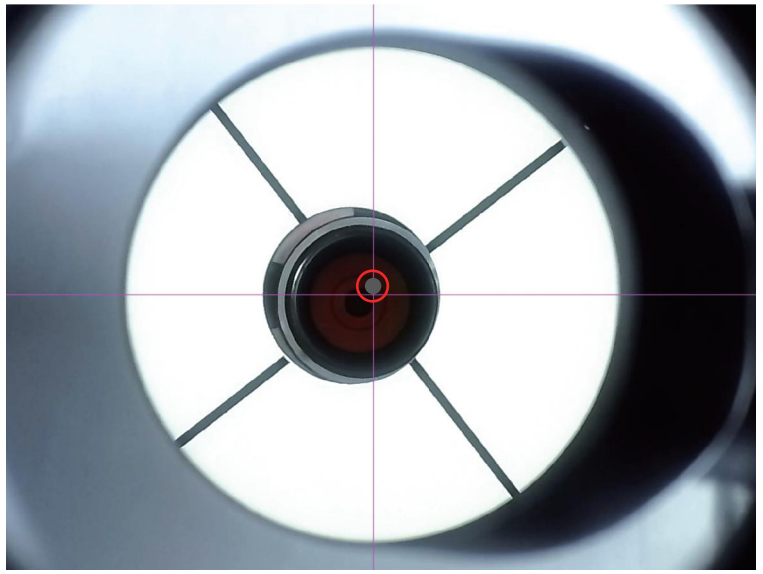
Tips:

- You may place a piece of white paper inside the carbon fiber tube to aid observation, positioned similarly to the focuser calibration aid.
- If the marker dot is not clear, add additional light, such as from a flashlight.
- The software crosshair is referenced to the secondary mirror orientation. The line parallel to the secondary mirror orientation is the horizontal line; the perpendicular direction is the vertical line.



(Before adjustment)

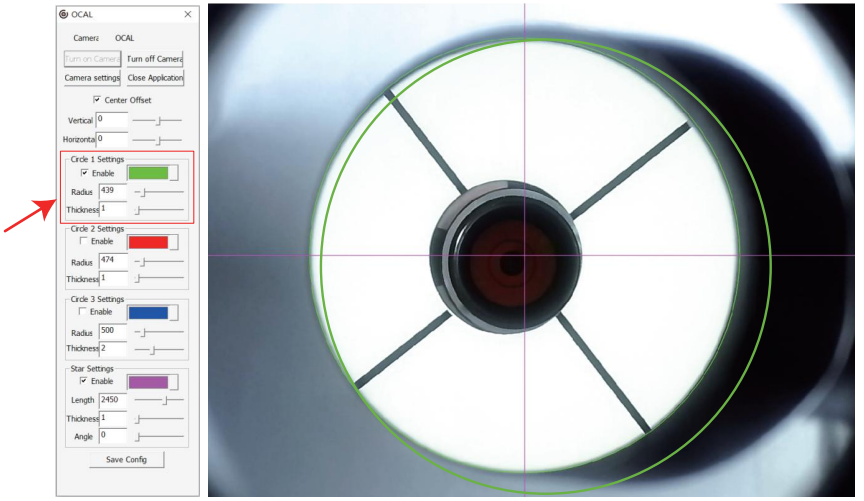
[2] The secondary mirror marker dot shown in this manual is for illustration only. In actual operation, the marker dot is black.



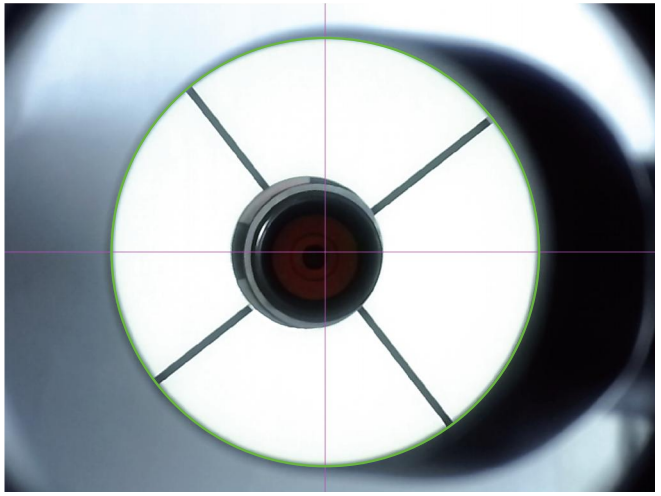
(After adjustment)

(2) Secondary mirror tilt positioning

After the secondary mirror height is set, proceed with tilt calibration: Turn on the green auxiliary circle (Circle 1) in the OCAL software. Use a 3mm hex key to adjust the three secondary mirror tilt adjustment screws while observing the software display in real time. Collimation is complete when the primary mirror projection is concentric with the green auxiliary circle. If not concentric, continue fine adjusting the three tilt screws until concentricity is achieved.

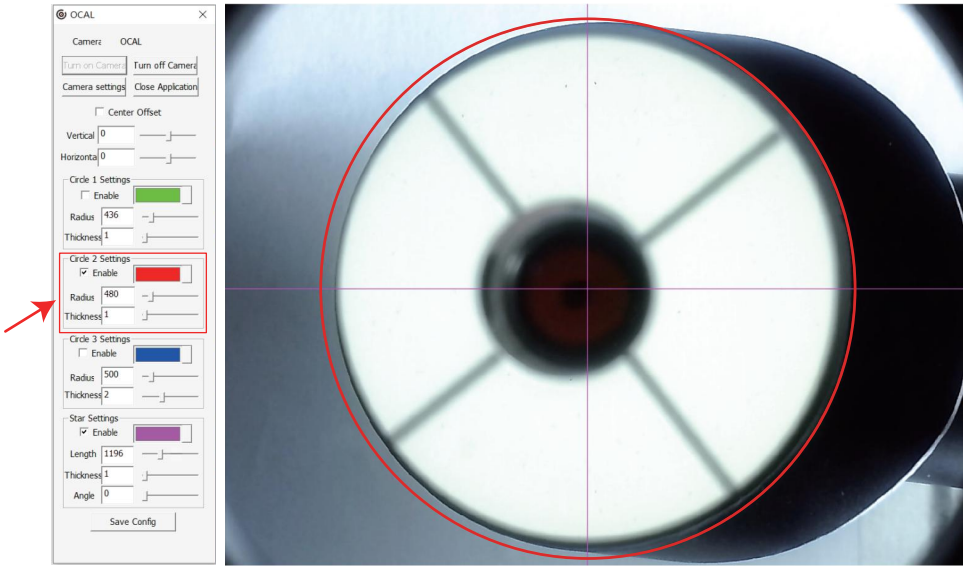


(Before adjustment)



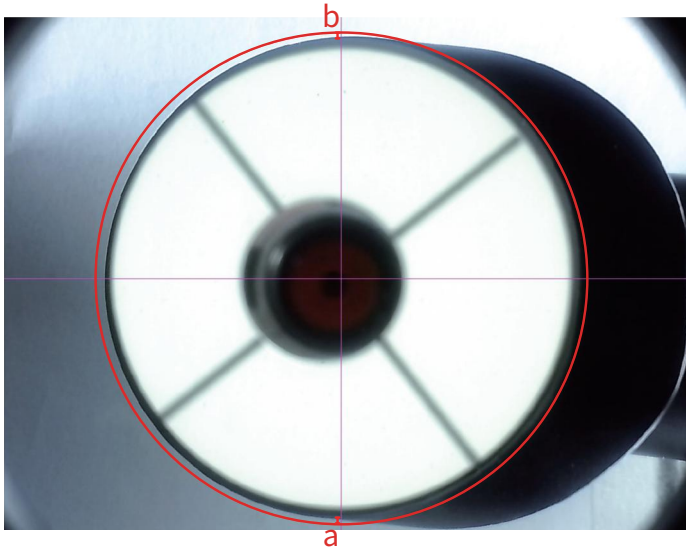
(After adjustment)

Next, adjust the rotational angle of the secondary mirror: Adjust the OCAL software focus until the edge of the secondary mirror holder is clear. Turn on the red auxiliary circle (Circle 2) in the OCAL software. Use a 3mm hex key to loosen the secondary mirror height adjustment screw, then rotate the secondary mirror cell by half a turn along its thread while observing the software display. Adjust until the gaps on both sides between the edge outline of the secondary mirror and the horizontal position of the red auxiliary circle are approximately equal (refer to the distance between segment a and segment b in the image below). After adjustment, tighten the secondary mirror height adjustment screw.



(Before adjustment)

(After adjustment)

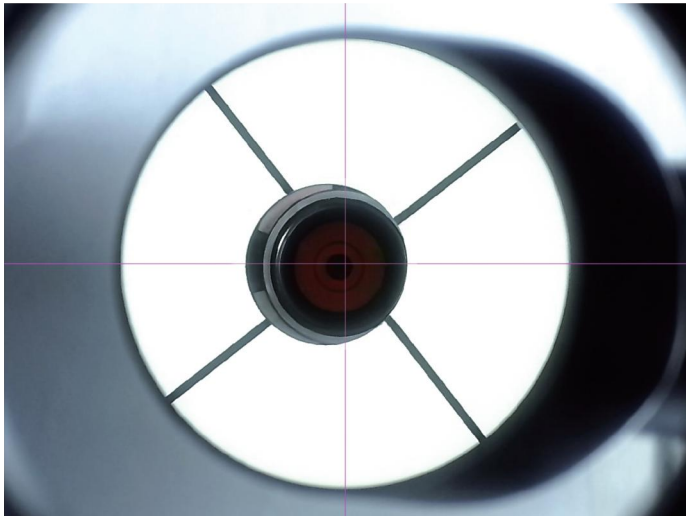


④ Primary Mirror Collimation

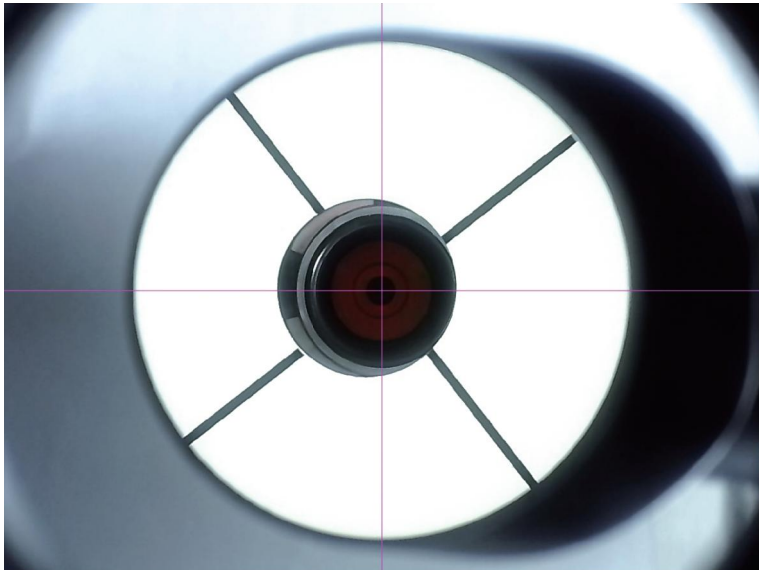
（1）Coarse adjustment of primary mirror

Adjust the OCAL software focus to focus on the OCAL eyepoint. Loosen the primary mirror locking knobs, then adjust the three primary mirror angle adjustment knobs while observing the software display. When the OCAL eyepoint is centered on the software crosshair, gently snug the three primary mirror locking knobs against the mirror cell.

(Before adjustment)



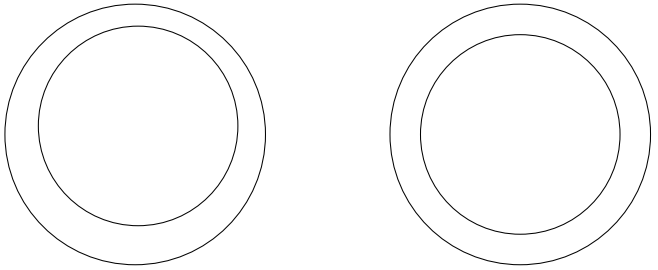
(After adjustment)



(2) Fine adjustment of primary mirror

Choose a clear night with good seeing and no moonlight interference (not a full moon night). Securely connect your camera or other imaging equipment to the rear of the N160 telescope's coma corrector.

Rotate the focus knob to defocus a star until it appears as a bright halo in the frame. Check whether the spacing of the defocused star halo is uniform (as shown in the image). If not uniform, loosen the three primary mirror locking knobs and fine tune the three primary mirror angle adjustment knobs until the star halo becomes concentric. Then tighten the three primary mirror locking knobs to complete the primary mirror fine adjustment.



(Before adjustment) (After adjustment)

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