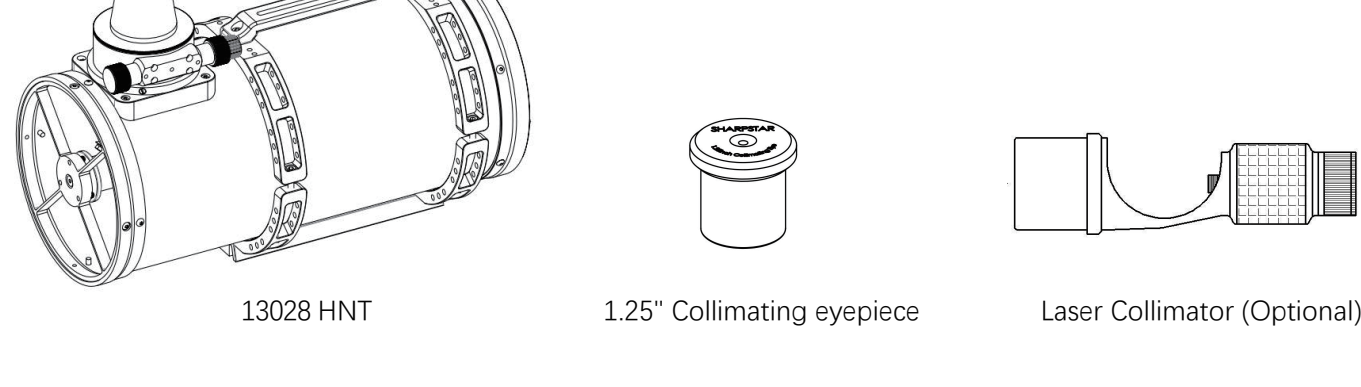


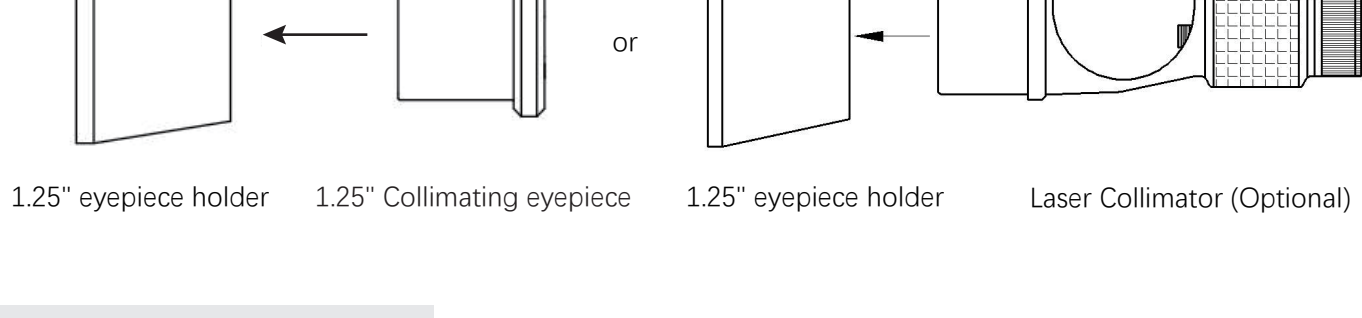
# • 13028HNT COLLIMATION INSTRUCTION •

## Part One Equipment and Tools Required

Equipment and tools: 13028HNT Newtonian Astrograph, collimating eyepiece or laser collimator



## Part Two Basic Connection



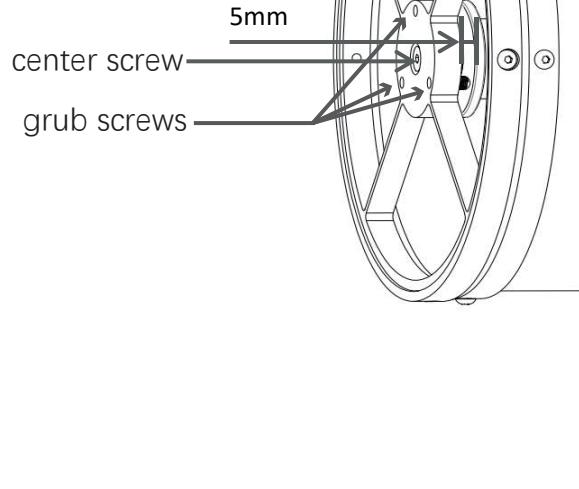
## Part Three Mirror Position Adjustment

### 1. Secondary mirror

Step 1: Securely hold the secondary mirror with its surface facing to the focuser tube;

Step 2: Turn the center screw located at the center of the strut to adjust the space between the strut and secondary mirror holder to 5mm (as shown on the right);

Step 3: Gently tighten three grub screws on the strut.



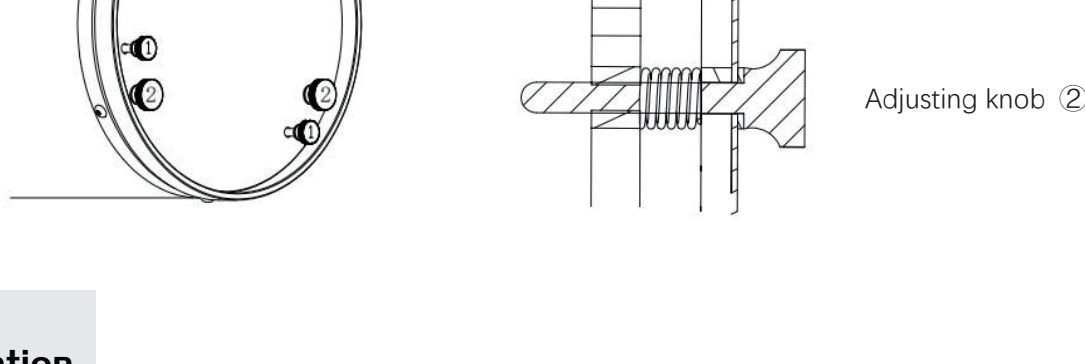
### 2. Primary Mirror

Step 1: Loosen adjusting knob ① if you want to adjust the primary mirror;

Step 2: Tighten or loosen adjusting knob ② to adjust the tilt of primary mirror;

Step 3: Gently tighten adjusting knob ① after adjustment.

Remember that any excessive adjustment of the adjusting knobs (shown as below) on the back cover plate may lead to undesired results. So never over-adjust them. Going too far is as wrong as falling short.



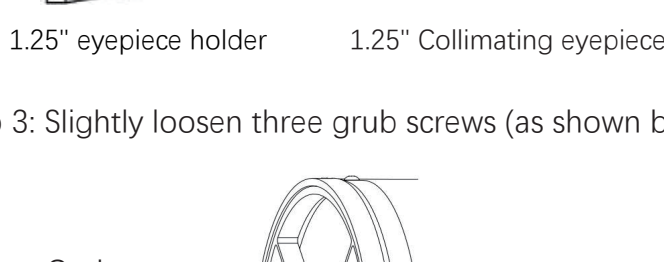
## Part Four Optical Collimation

Choose one collimation method from the two as described below

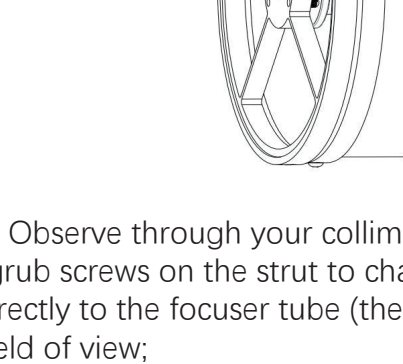
### 1. Collimating eyepiece

Step 1: Before any adjustment, be sure to put your telescope in a bright place, which is of a great convenience for your further collimation.

Step 2: Insert the collimating eyepiece into the 1.25" eyepiece holder;

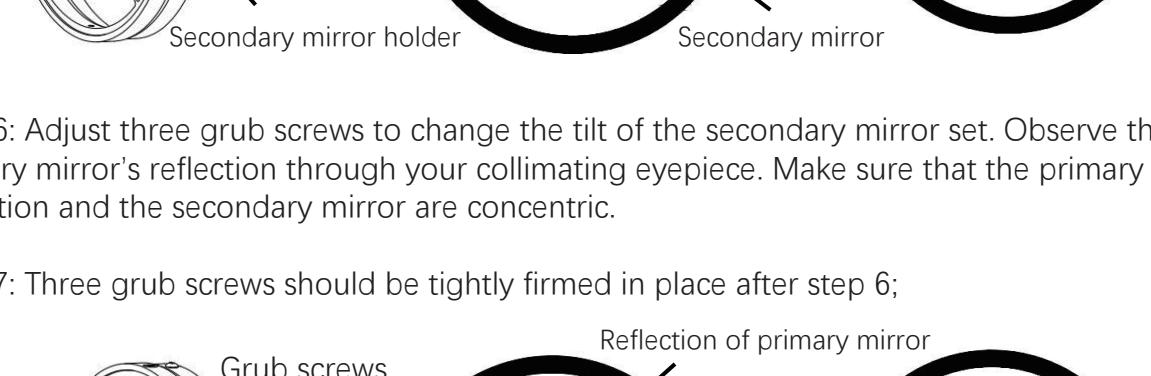


Step 3: Slightly loosen three grub screws (as shown below) on the strut;



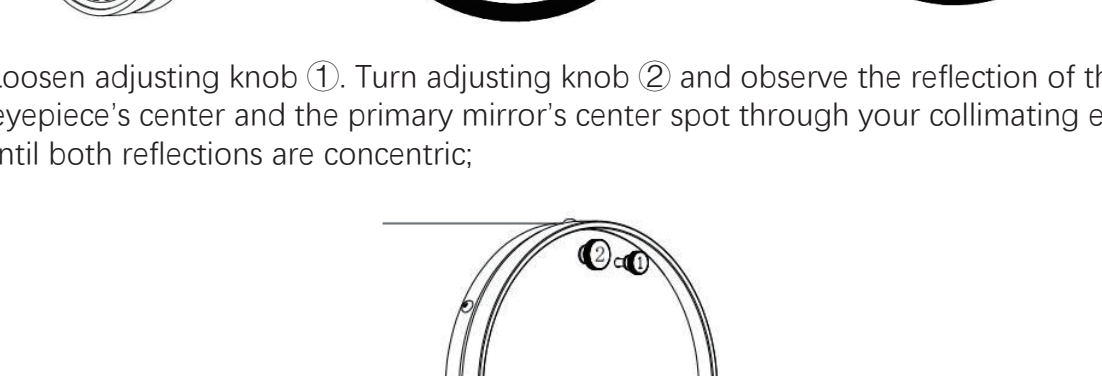
Step 4: Observe through your collimating eyepiece, slightly adjust the secondary mirror holder or three grub screws on the strut to change the secondary mirror's tilt to make the secondary mirror face directly to the focuser tube (the mirror will look like a perfect circle) and stay at the center of your field of view;

Step 5: Three grub screws should be tightly firmed in place after step 4;

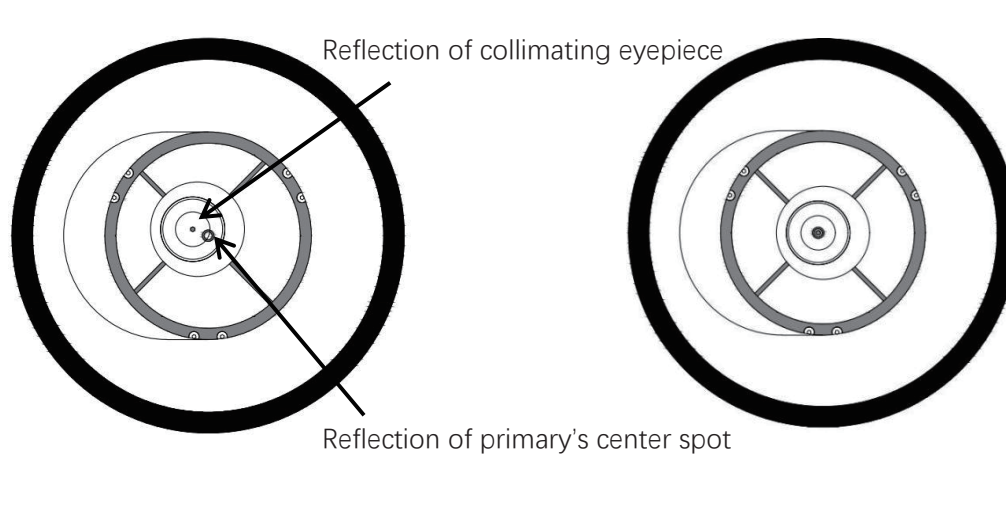


Step 6: Adjust three grub screws to change the tilt of the secondary mirror set. Observe the primary mirror's reflection through your collimating eyepiece. Make sure that the primary mirror's reflection and the secondary mirror are concentric.

Step 7: Three grub screws should be tightly firmed in place after step 6;



Step 8: Loosen adjusting knob ①. Turn adjusting knob ② and observe the reflection of the collimating eyepiece's center and the primary mirror's center spot through your collimating eyepiece. Adjust until both reflections are concentric;

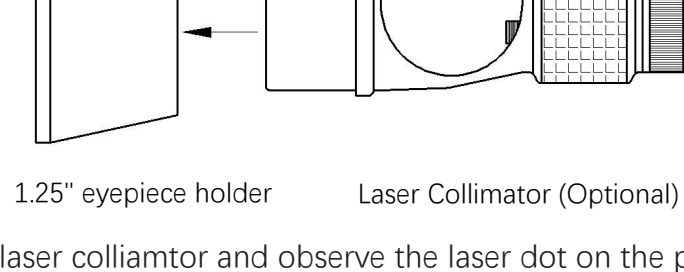


Step 9: Collimation accomplished.

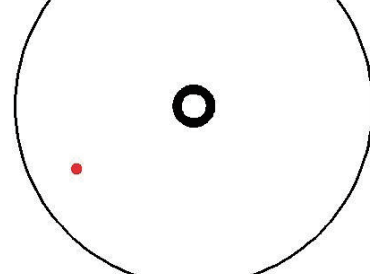
### 2. Laser collimator

Step 1: Observe through the focuser tube and adjust the tilt of the secondary mirror. Make sure that the secondary mirror faces directly to the focuser tube and stays at the center;

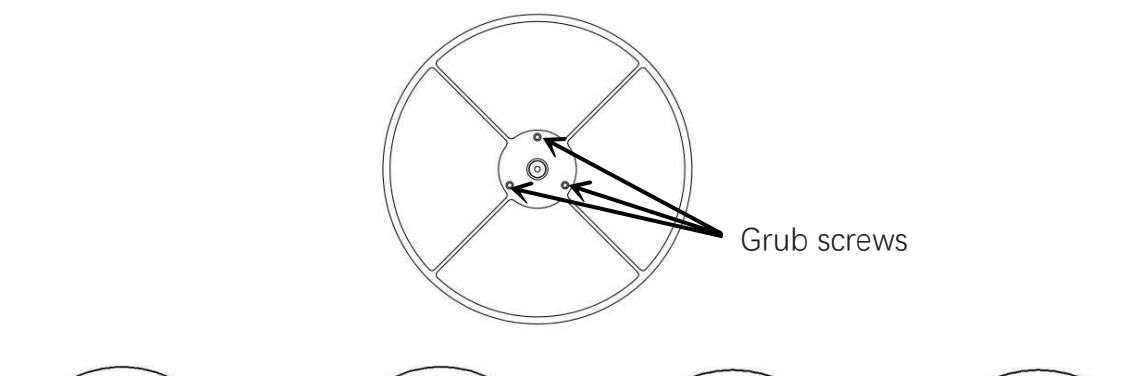
Step 2: Insert the laser collimator into the 1.25" eyepiece holder



Step 3: Switch on the laser collimator and observe the laser dot on the primary mirror;



Step 4: Turn three grub screws on the strut to change the tilt of your secondary mirror, moving the laser dot towards the primary's spot. These two spots should be concentric. Three grub screws should be tightly firmed in place after adjustment;

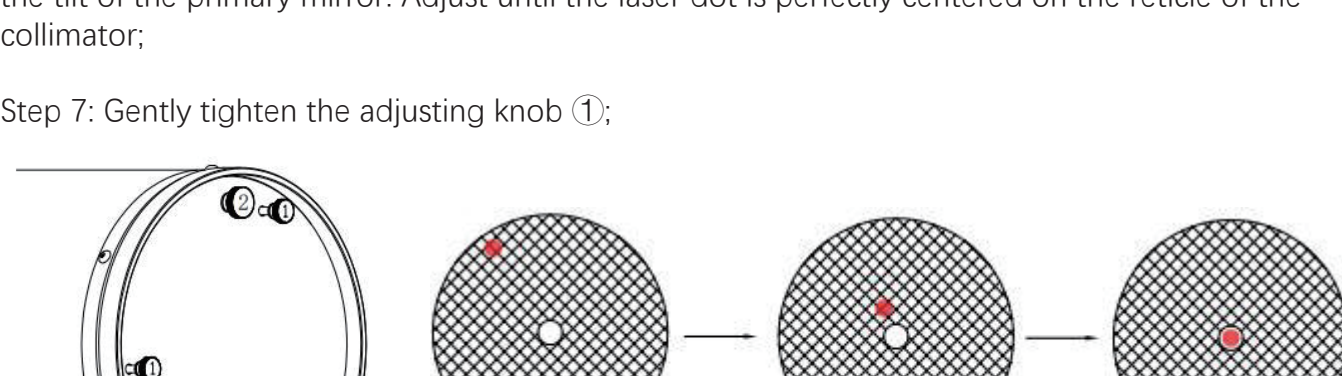


Step 5: Observe the laser dot on the laser collimator;



Step 6: Loosen adjusting knob ① on the back cover plate, and turn adjusting knob ② to change the tilt of the primary mirror. Adjust until the laser dot is perfectly centered on the reticle of the collimator;

Step 7: Gently tighten the adjusting knob ①;



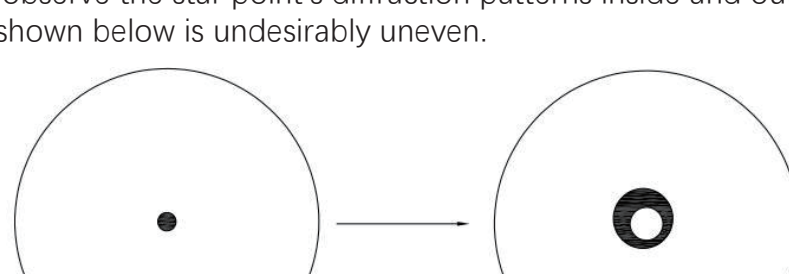
Step 8: Collimation accomplished.

## Part Five Star Point Adjustment

You can skip this part if there is no need for further adjustment.

In practical observation and astrophotography, you may still not obtain perfect star shapes after arduous collimation due to some undetectable mechanical or optical errors.

Step 1: Observe through your eyepiece or on your camera, move the star point to the center of your field of view. Adjust your focuser to make the star point best focused. Proceed to turn the focusing knob and observe the star point's diffraction patterns inside and outside focus. The diffraction pattern shown below is undesirably uneven.



Step 2: Turn the focusing knob to have the star point re-focused. Loosen adjusting knob ① on the back cover plate and turn adjusting knob ② to change the tilt of the primary mirror; (For example, if the diffraction ring stretches out to the top left, then you should change the tilt of the primary mirror and make the star point move a little bit towards the top left.)

Step 3: Adjust your equatorial mount to re-locate the star point to the center;

Step 4: Turn the focusing knob and observe if the diffraction patterns inside and outside focus are evenly displayed. If you detect no obvious deform in its diffraction patterns, gently lock the adjusting knob ① and finish your adjustment. If not, repeat the step 2 and step 3.

