

Modifying a Novak Secondary Holder by Jim Fitch

Field collimation of a Newtonian optical system with a laser is a pretty straight forward task. The secondary's collimation is adjusted by rotating and tilting the secondary. Rotation of the secondary mirror will move the laser spot on the primary vertically (up and down). Horizontal movements of the laser spot are accomplished by adjusting the knobs that tilt the secondary.

So what's the problem? The Novak design prevents unwanted secondary rotation by friction. Loosen the main bolt and the mirror is easy to rotate. Tighten it and the mirror is held stationary. The act of tightening the bolt will rotate the mirror, so the bolt must be tight before adjustment. But adjusting the rotation while the bolt is tight means twisting the mirror until the friction slips which means a series of overshooting adjustments, up then down. Just a little tedious in the dark.

The tilting mechanism is done with three adjustment screws that pull an aluminum plate against a second plate. The first plate has a concave area that a dome on the second plate fits into. The idea is that the dome will slide in the concave when the adjustment screws are loosened or tightened causing the mirror to tilt. The problem is that the adjustment screws are too close to the dome's wide and rather flat shoulder so the dome does not slide when the screws are tightened.

I decided to replace the dome part of the assembly. I used an acorn nut for the dome. The shoulders are steeper, allowing a little easier movement when the adjusting screws are tightened.

I added a post to assist with the rotation adjustment. The set screws can be tightened against the spider to rotate the secondary in small, controlled amounts. I used a thrust bearing on one end of the threaded rod to lessen friction making adjustments easier.

The photos will help to explain things. I welcome any suggestions or comments. Come check it out at the next observing session!



Parts and old assembly



New improved dome



Rotation adjustment post added



New adjustment plate ready for assembly



Completed secondary holder



Thrust bearing



Secondary holder installed into spider



Closeup of rotation adjustment screws