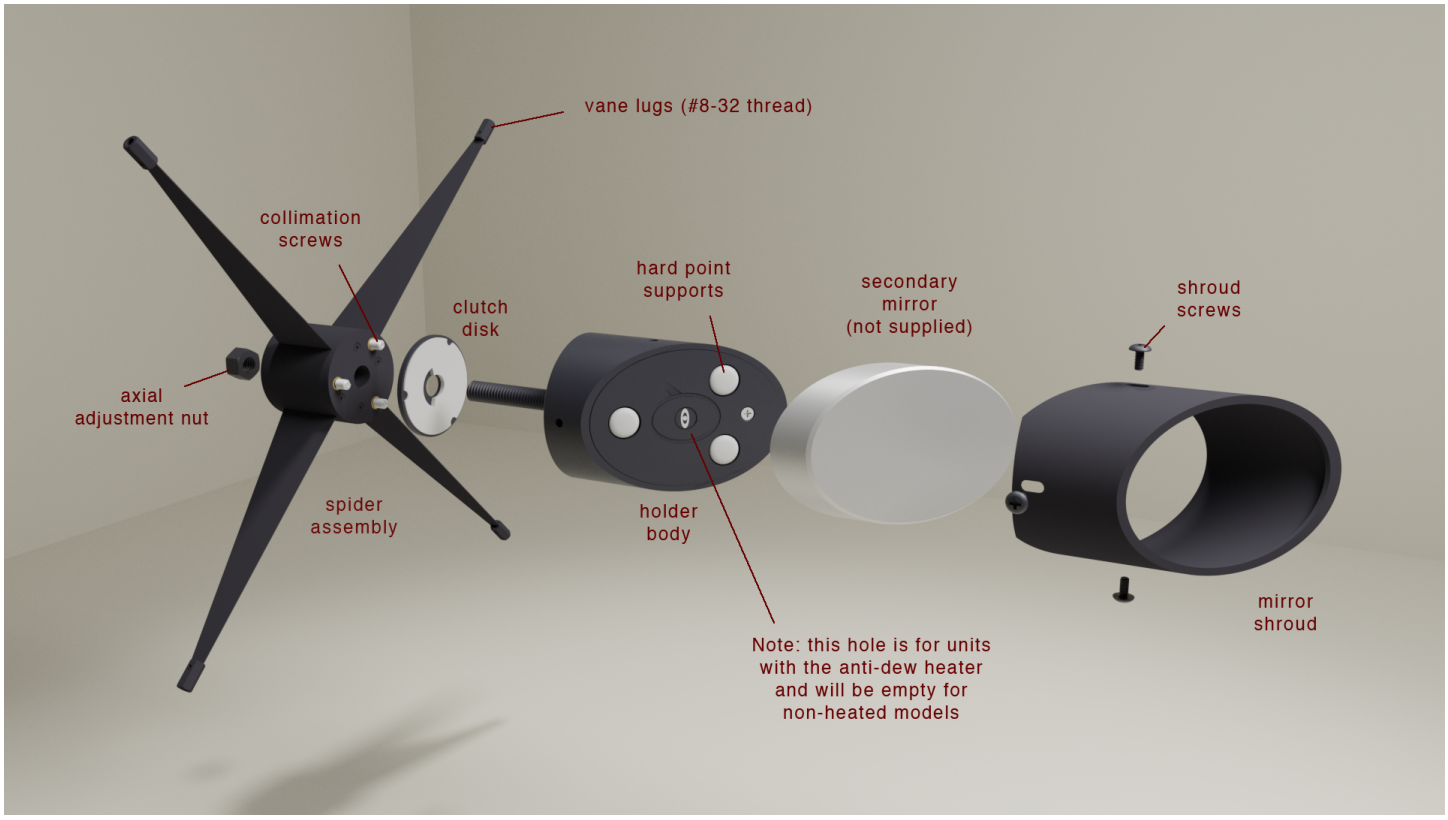
Model 2 Straight-vane Spider (GSO Replacement Model)
Installation & Use Guide

Rev 11/23



Step 1: Install your secondary mirror into the holder

1. Remove the shroud screws and shroud.

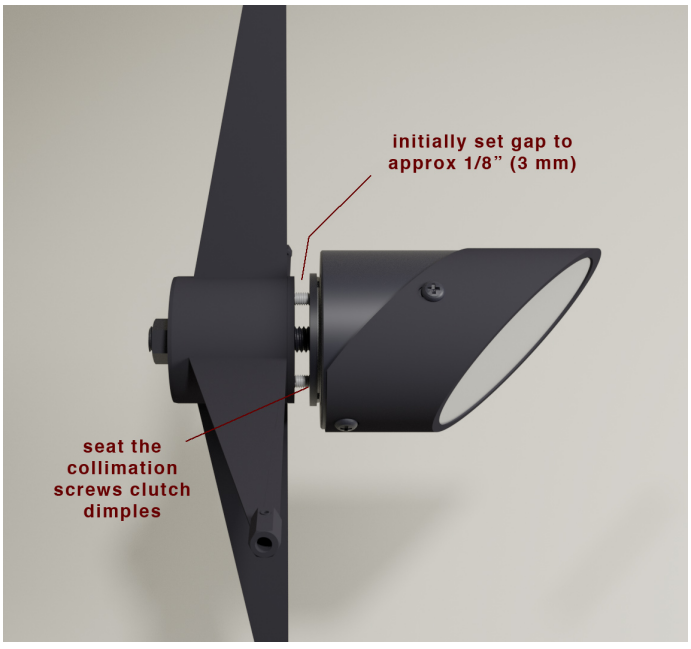
2. Wash your hands and trial fit the secondary mirror into the shroud. The mirror should slide freely within the shroud. If it does not, contact us (**protostar@fpi-protostar.com** or **614-375-3146**). Secondary mirrors are sometimes slightly larger than advertised, and we can provide a custom shroud. *Forcing the mirror to fit can cause severe optical problems.*

3. Slide the mirror and shroud together over the holder body. Reinstall the shroud screws, and only lightly tighten the shroud retaining screws.

4. Wiggle the shroud to ensure the mirror is seated on the hard point supports and the shroud's slotted holes line up with the holes in the holder body.

5. Tighten the shroud screws.

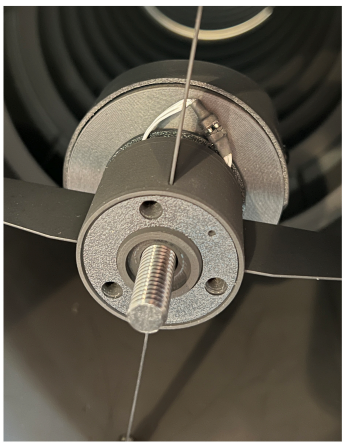
Step 2: Join the holder and spider assemblies



6. Install the spider into the telescope tube using the supplied bushings and screws. There are two styles of

bushings provided labeled "GSO" and "JSO". Use the bushings that fits the tube hole without any slop or play.

7. Insert the secondary holder into the spider. Position the secondary mirror to where it appears centered under the focuser. Spin the axial adjustment nut onto the center stem until it makes contact with the spider's hub as shown in the photos below. The secondary holder will be loose and not hold its position at this point, but this step sets the axial position of the secondary mirror. The next two steps will fix the mirror into place.



9. Turn the collimation screws in (clockwise) until they make contact with the clutch disk and are are seated in the dimples of the clutch disk. A good way to do this is to completely remove one collimation screw, and sight down the empty hole. If you see bright shiny metal, that's the dimple. If you see black, rotate the clutch disk until the shiny dimple is centered in the hole. (Hint: Your cell phone's flashlight feature is helpful here.) Once one collimation screw is properly engaged with the dimple, the others will seat on their own automatically.

10. Hand tighten the collimation screws inward until they snug up against the clutch disk and you feel some resistance when rotating the mirror holder.

First-time collimation

First-time collimation includes the extra steps of making the secondary mirror's axial and rotational adjustments. After the initial collimation, only minor tip-tilt tweaks with the collimation screws are typically needed in the field.

1. Using a sight tube or laser projection collimation tool, slide the the position of the secondary mirror until it appears centered under the focuser. Set the position with the axial adjustment nut.

Note that the purpose of the axial adjustment nut is only to set the position under the focuser. It does not need to be locked down after your delicate tip/tilt collimation adjustment, and only needs to be finger tightened. This is an advantage of the Protostar design, since tightening the center nut usually throws off the collimation.

2. Rotate the mirror holder until the secondary mirror appears circular. When the secondary mirror appears circular and centered under the focuser, tighten all three collimation screws about one full turn to create tension in the holder's stem.

3. The telescope is now ready for your standard collimation practice. Tip-tilt adjustments with the collimation screws can be made independently (i.e., you don't have to loosen one in order to tighten another). Maintaining tension in the holder's central stem keeps your precise adjustments locked into place, and it works well under a wide range of stem tension.