

AstroSystems

Spider and Secondary Mirror Support System

The Newtonian telescope secondary mirror must be mounted, positioned and adjusted properly for optimum telescope performance. Follow these instructions carefully and you will avoid the common problems encountered when installing the secondary mirror. Proper installation of the secondary will eliminate astigmatism from a pinched mirror, severe coma and diffraction from poor collimation and loss of image illumination from improper mechanical layout.

Spider

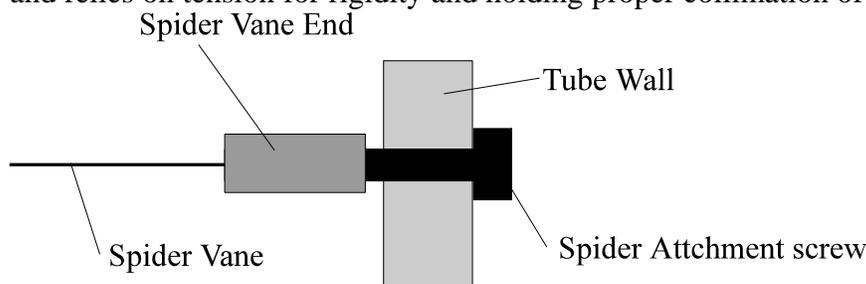
The spider mounting holes must be located accurately to minimize diffraction. To position the four mounting holes, wrap a piece of paper that is at least 1 1/2 times the circumference of the tube around the tube (adding machine paper works great) and make sure the edges line up squarely where they overlap. Mark the paper on the bottom layer at the end of the top layer where the paper overlaps. This will be an accurate measure of the circumference of the telescope tube.

The portion of the paper representing the tube circumference can now be folded in half and then half again. Each of the folds and the end mark will give the hole positions at 90 degree increments around the tube. Wrap the paper around the tube at the proper distance from the front end of the tube. Using a 13/64" drill bit, drill the holes at the marks on the paper. The holes should be positioned relative to the focuser as in Figure 1 and Figure 2 (over).

Installation

Always thread a screw in each vane end before installing to clear any obstruction of the threads. After the dry fit, apply a tiny drop of oil to the end threads of each screw before installing into vane end. This insures a consistent "feel" so each vane is tightened equally.

Install the spider, tensioning it so that moderate pressure at the center body won't deflect any of the vanes. If the telescope tube doesn't retain its shape after tensioning (often experienced with cardboard or other non-metallic materials), it may be necessary to reinforce the tube with several layers of epoxy/fiberglass inside or wood or metal end rings at the tube ends. The following drawing shows the correct installation of the spider. The spider should be 0.1-0.15" smaller than the tube inside diameter to allow enough tension. A thin vane spider offers the best optical performance and relies on tension for rigidity and holding proper collimation of the secondary. If the spider touches the tube wall it is too large or the tube is too flexible and should be corrected.



Adjustment

Stand back a few feet from the front of the telescope and check that the reflection of the spider vanes in the primary are as narrow a line as possible. As you are looking in the front of the tube you can rotate the vane ends to accomplish this. Slight vane deformations will usually be pulled straight when the mounting screws are tensioned. If some should remain they are easily worked out with some judicious adjustment by hand while the spider is under tension.

Secondary Holder



The secondary mirror can be installed in the holder by first removing the four side screws holding the bezel. Carefully slide the secondary into the bezel. The bezel is made from 0.030" aluminum to minimize diffraction. Be careful when handling it to avoid bending.

Larger holders (>5") are supplied with a foam insert and some fiberfill. The fiberfill is placed against the secondary and the foam plug is installed last. This supports heavier secondary mirrors properly and still leaves some space if you use an AstroSystems Dew Guard.

Place enough fiber packing behind the secondary to hold it snugly in place but don't over-pack. Replace the bezel on the back plate with the four screws and install the holder in the spider, orienting the collimation screws so they are evenly centered between the vanes. Make sure that one of the collimation screws is positioned at the top of the holder (towards the focuser).

This rotational alignment can be made by loosening all the collimating screws a small amount and rotating the mirror, bezel and back plate relative to the adjustment plate and mounting stud. Retighten the collimation screws to hold in place. The rotation of the entire holder assembly can now be done by loosening the mounting nuts on the stud and rotating the entire unit. When adjusting tilt, loosen one screw and then tighten the opposite screw. This "push - pull" will move the secondary accurately in increments and make tightening after each adjustment minimal or unnecessary. Secondary Holders 2.14" and smaller can mount into 1/4" or 3/8" ID spiders. Use the supplied phenolic tube in a 3/8" spider for a 1/4" secondary holder shaft.

Minor Axis	A*	B**	C	A+B	A+B+C	Weight (lbs.)
1.3	2.7	0.75	1.6	3.45	5.05	0.14
1.36	2.75	0.75	1.55	3.5	5.05	0.14
1.52	2.7	0.75	2.0	3.45	5.45	0.16
1.83**	2.9	0.75	2.75	3.65	6.4	0.19
1.83	2.9	1.25	2.25	4.15	6.4	0.19
2.14**	3.3	0.75	2.9	4.05	6.95	0.24
2.14	3.3	1.25	2.4	4.55	6.95	0.24
2.6	3.8	1.25	2.25	5.05	7.3	0.44
3.1	4.2	1.25	2.0	5.55	7.55	0.55
3.1	4.2	1.5	2.0	5.7	7.7	0.55
3.5	4.5	1.5	2.7	6.0	8.7	0.78
4.0	4.9	1.5	2.75	6.4	9.15	0.91
4.25	5.65	1.5	2.75	7.15	9.9	0.96
4.5	5.4	1.5	2.5	6.9	9.4	1.25
5.0	5.8	1.5	2.75	7.3	10.05	1.35
5.5	5.9	1.5	3.00	7.4	10.4	1.58

* This is the actual dimension plus 0.2" for 1.3 - 3.5" holders and plus 0.4" for 4" and larger holders, allowing lateral adjustability to position the secondary mirror under the focuser.

** The half-width (B) of these two spider/secondary holder combinations is using the "A" spider with the 1.5" center body. AstroSystems spiders have a half-width of 0.75" for spiders up to 11" and 1.25" for larger spiders. The table above reflects the most common size combinations used for visual telescopes. You may have to modify the above dimensions before drilling mount holes if you use a relatively large secondary, for say photography, or a small secondary as in a planetary or CCD scope. Just use the actual half-width of your spider and change the other dimensions accordingly.

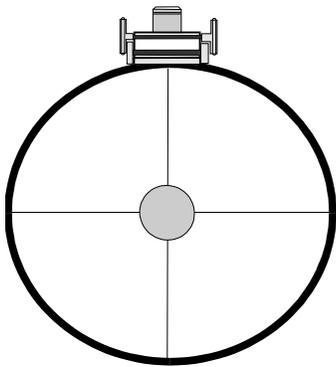
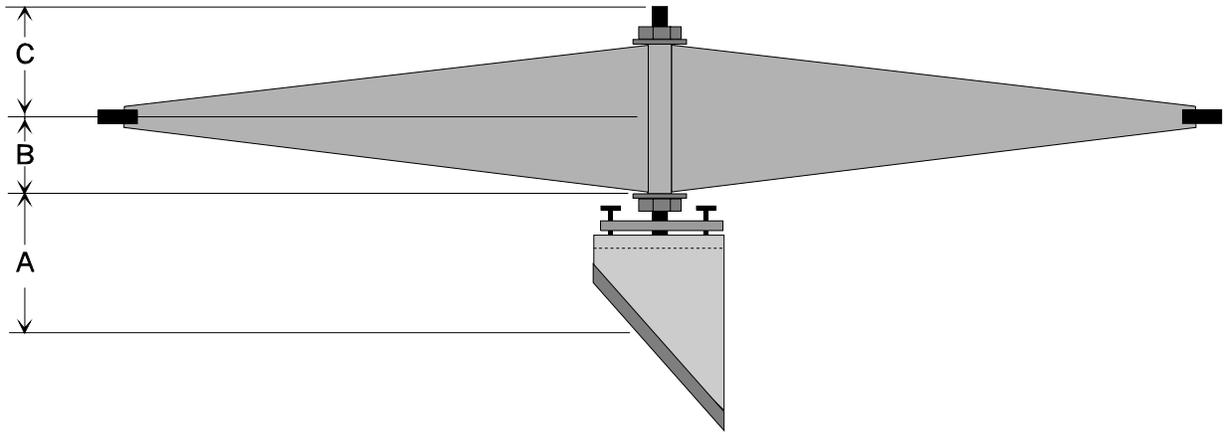


FIGURE 1 End View

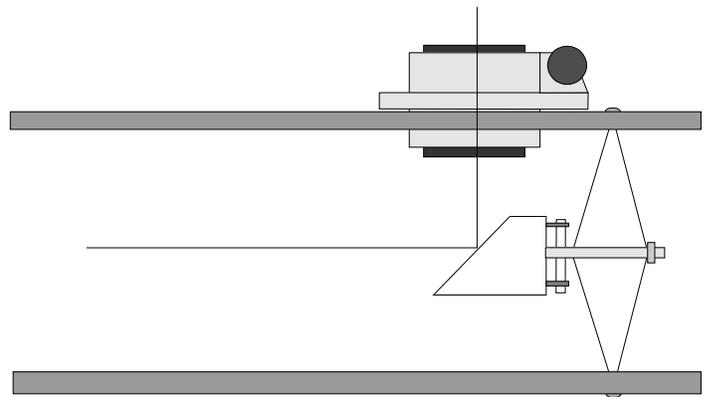


FIGURE 2 Side View

AstroSystems, Inc.

124 N. Second St.

LaSalle, Co. 80645 USA

970-284-9471 / 970-284-9473 fax www.astrosystems.biz