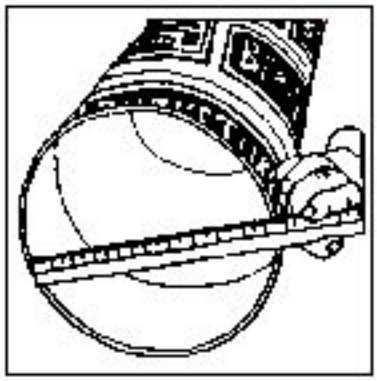
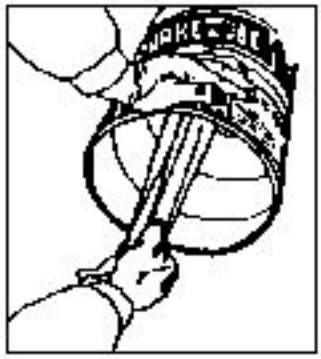
Section"A" of Making a Dobsonian Telescope

(Preparing the Tube; Making the "Spider" and Eyepiece Holder-Focuser)

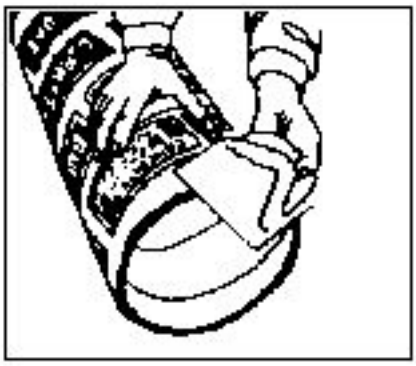
PREPARING THE TUBE



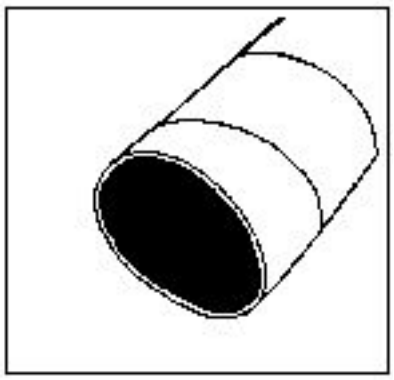
The diameter of the telescope tube should be about 2" larger in diameter than the diameter of the objective mirror



The plastic liner may be carefully peeled out of the inside of the tube.Slow, careful peeling helps keep the liner in one piece and makes it easier to remove.

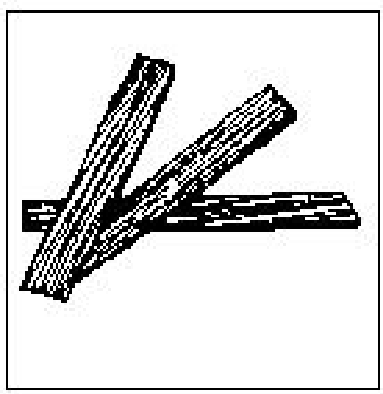


Some tubes are waxed outside. If you plan to paint the outside of the tube, a light sanding will remove some of the wax and make painting easier.



The inside of the tube may be painted black. Tape your paint brush on a broomstick handle if your tube is longer than your arm reach.

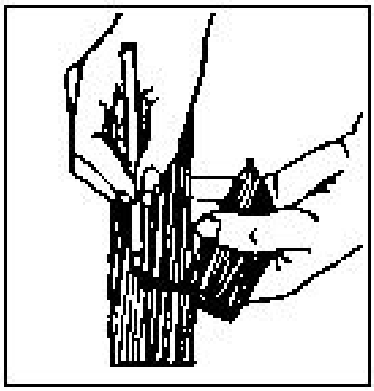
MAKING THE SECONDARY MIRROR MOUNT ("SPIDER")



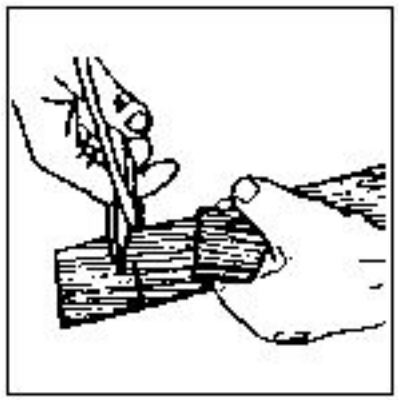
Dowel (closet pole, or handrail stock) with one end cut at a 45 degree angle. Three grooves should be cut (with a thin blade) at equal (120 degree) intervals (about 1/4" deep) as shown.

Note: How does one cut a cylinder at 45 degrees? Cut a strip of paper long enough to wrap around your "closet pole." cut both ends (of the paper strip) at 45 degrees so that you make a trapezoidal shape... wrap this piece of paper around the dowel so that the ends come together (trail and error cutting may be required here). The paper will **not** lay flat! Now trace the outline the edge of the paper makes. Cut close with a hand saw. Sand or file to line.

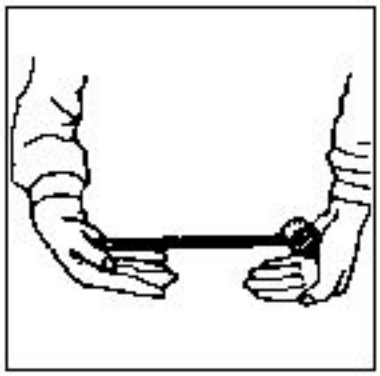
We will need three pieces of cedar shingle, each about 1 1/4" wide.



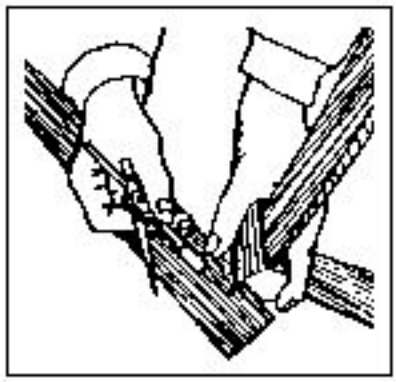
Marking the thin ends of the shingles where they fit snugly into the grooves in the dowel.



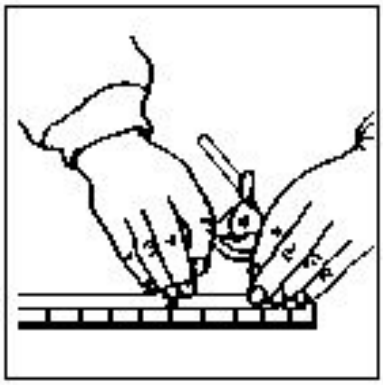
If the shingles are cut slightly concave (so they won't rock back and forth in the dowel and will fit snugly) they won't have to be glued in. Replacement will then be easy. If you do decide to glue them in, use black, 100% silicone adhesive.



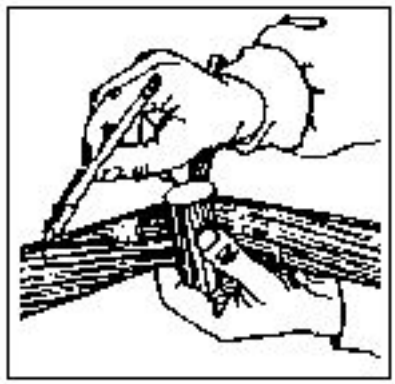
Shoving a shingle into the groove in the dowel.



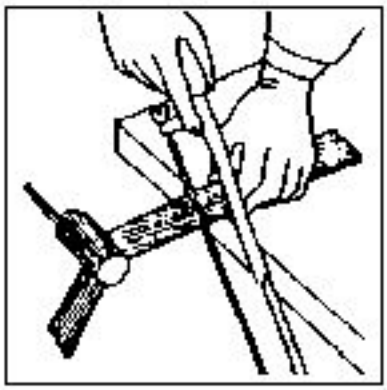
Doing the same with the other two shingles.



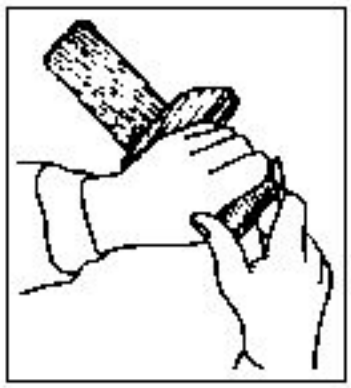
The compass should be set to the radius of the *inside* of the telescope tube.



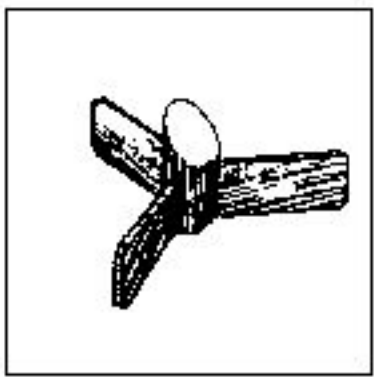
Placing the point of the compass at the center of the dowel, mark all three shingles.



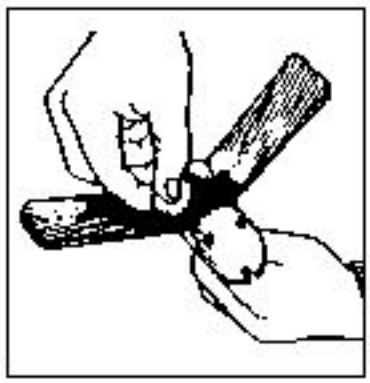
Sawing off the ends of the shingles at the marks.



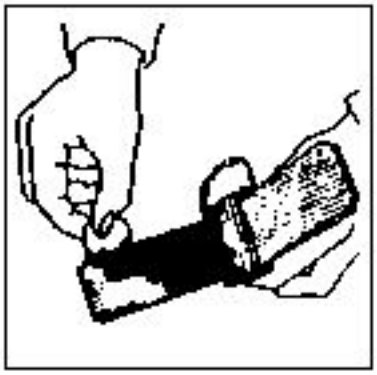
Beveling the corners so the shingles won't split when the position of the spider is adjusted in the tube.



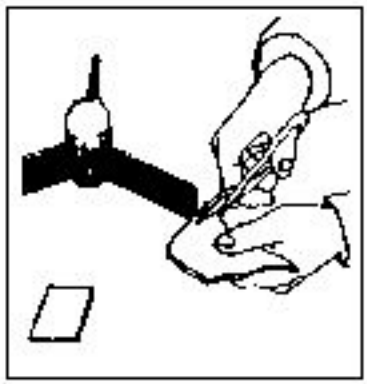
All corners beveled...



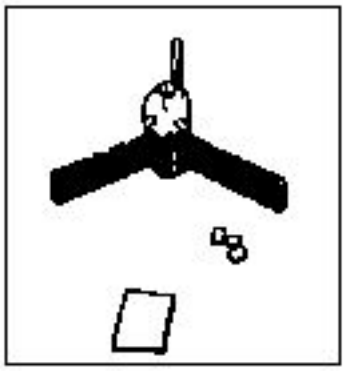
We may paint the spider black, or simply blacken the surfaces facing the eyepiece tube.



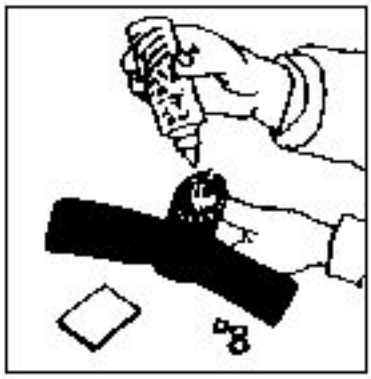
The slant-cut end should be left unpainted (to accept glue). If spray paint is used, be sure to cover the slant-cut end with masking tape while spraying



Cutting leather scrap. We will need three pieces about 1/2" square.

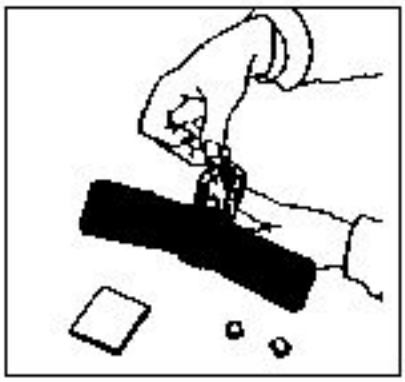


The secondary mirror (flat front-surface mirror). This mirror is also called a "diagonal." (Secondary mirrors are *usually* elliptical in shape; not rectangular like the one above).

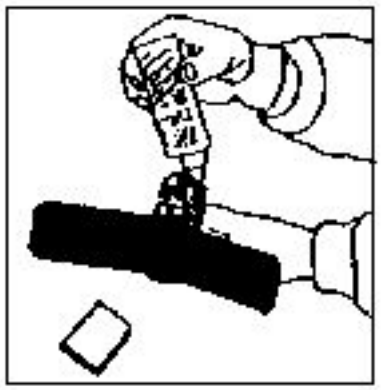


Applying glue at three points on the slant cut end of the dowel. (If masking tape was used, remove it first!). Leather pieces should be glued directly to the wood.

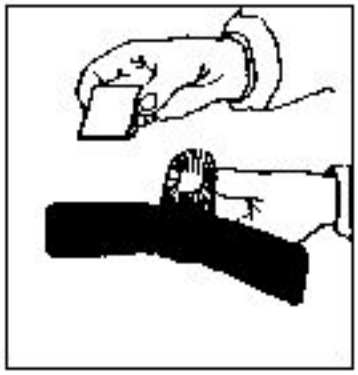
COMPLETING THE SPIDER



Leather pieces should be spaced evenly between the grooves. Be sure the leather gets good and wet with the glue.

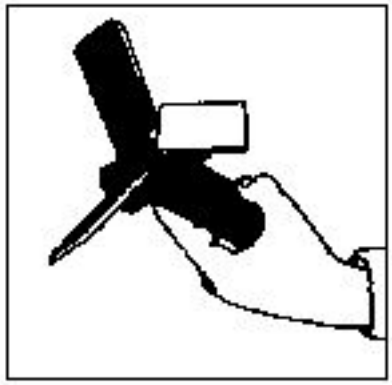


After the leather pads are glued to the dowel, we apply glue to the tops of the leather pads...

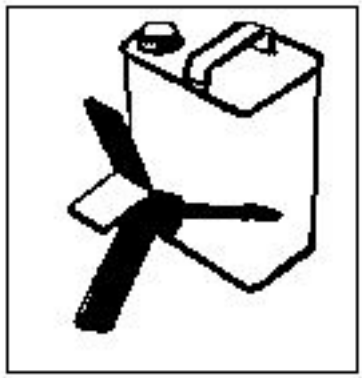


...and glue the mirror onto the pads.

Make sure the mirror is evenly centered over the dowel.

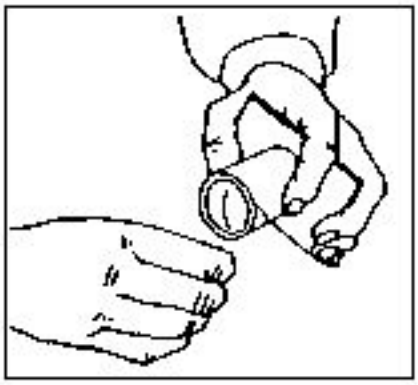


The mirror should be kept level while the glue dries.

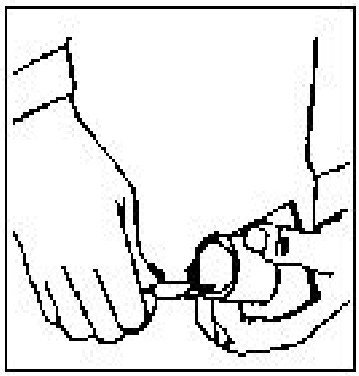


Propping up the spider while the glue sets.

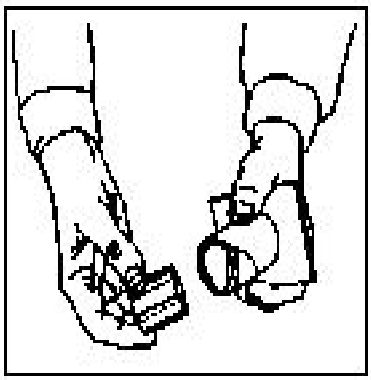
MAKING AND INSTALLING THE EYEPIECE TUBE



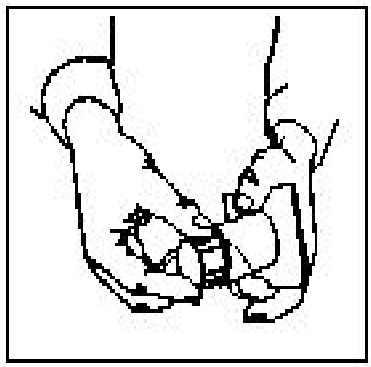
Gluing the cardboard eyepiece to a 3" x 4" piece of Masonite with a 1 1/2" hole cut in its center. Make sure to get the cardboard wet with the glue.



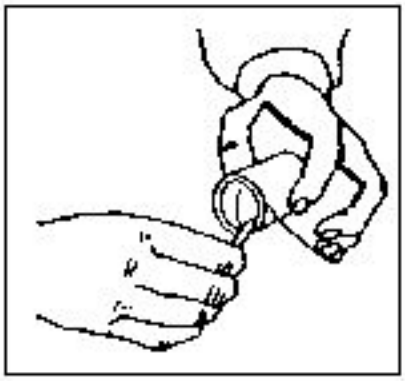
Beveling the inner edge of the tube with a pen knife so that the brass will fit in easily.



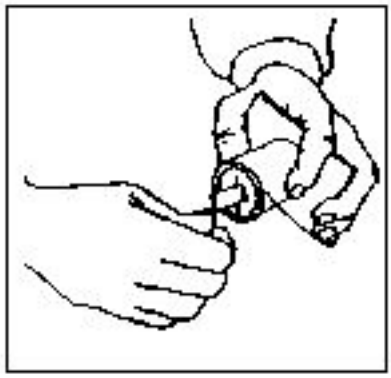
The brass tube should fit snugly inside the cardboard tube...



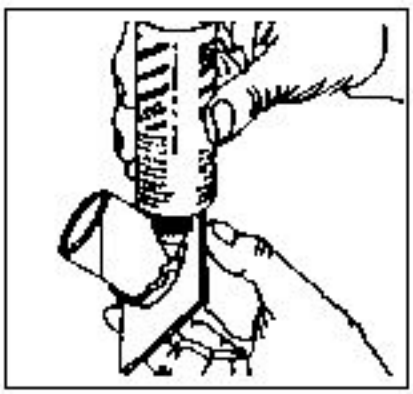
...and slide back and forth fairly easily.



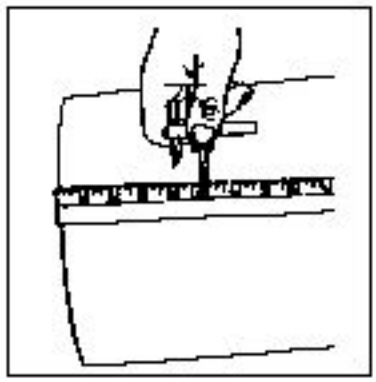
If the fit is too tight, we may peel out a thin layer of the cardboard on the inside of the eyepiece tube.



If the fit is too loose, we may glue in a strip of cardboard lengthwise down the inside of the eyepiece tube and let the end of the strip hang down over the end of the tube. (The strip should be glued down over the lip of the tube.)

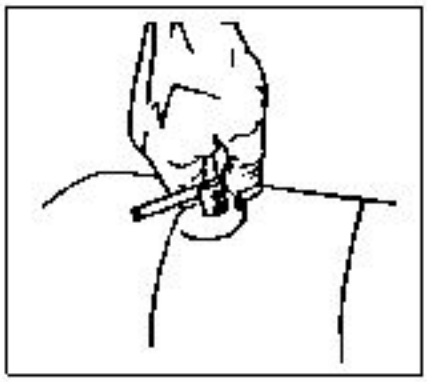


Running a thin bead of glue (100% silicone glue works well here) around the cardboard tube where it meets the Masonite.

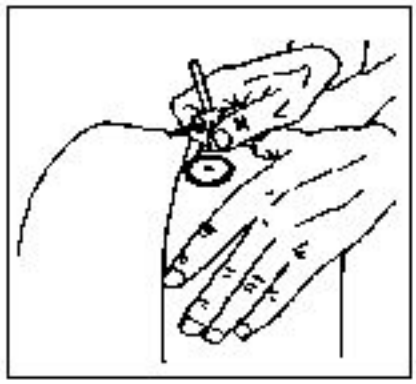


Finding the location for the eyepiece hole. See note—below:

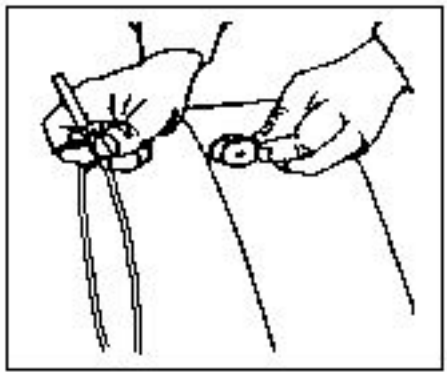
Note: Cut the telescope tube the same length as the focal length of your mirror. Then cut the eyepiece hole back from the front end of the telescope tube by the radius of the tube. That is, for a 10" diameter tube, cut the eyepiece hole 5" from the front end; for a 12" diameter tube, cut the eyepiece hole 6" from the front end. These distances are for mirrors about 1" thick. If you have a thick mirror (i. e. 2"+) the hole should be moved up toward the front end of the tube an extra 1" to compensate. (i. e., a 12" tube with a 2" thick mirror would put the hole 5" from the front end; a 10" tube with a 2" thick mirror would put the hole 4" from the front end.



The distance we have measured is for the center of the hole. We may cut the hole to the outside diameter of the cardboard eyepiece tube.

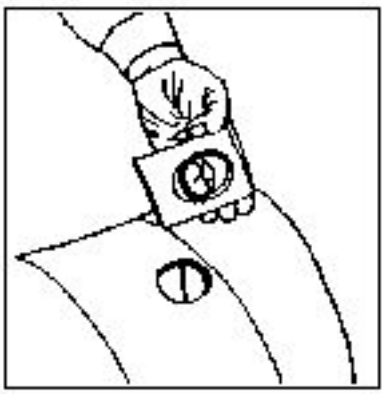


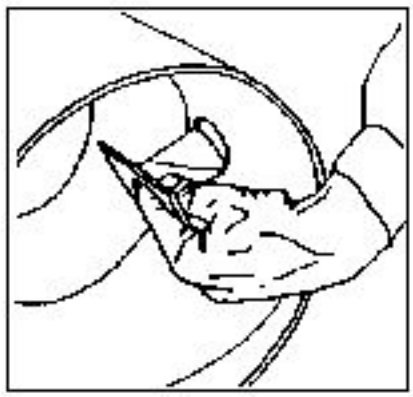
If a hole-cutter is unavailable, a mat knife may be used.



We may peel off layers of cardboard as we gradually cut through the tube.

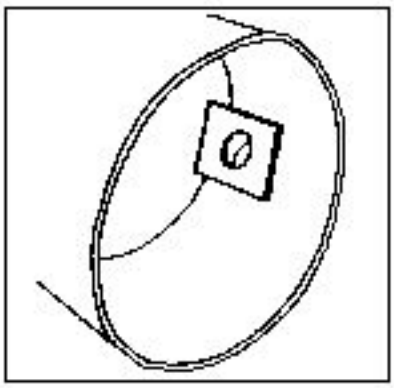
Hint: *Save this piece, it will be easier to patch up in case you cut it wrong.*



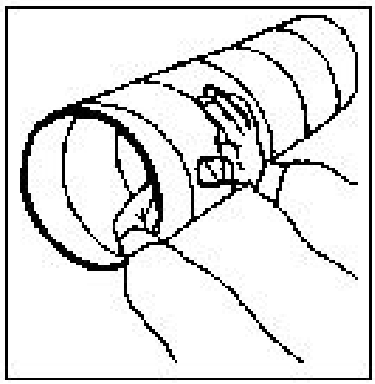


We are ready to install the eyepiece tube.

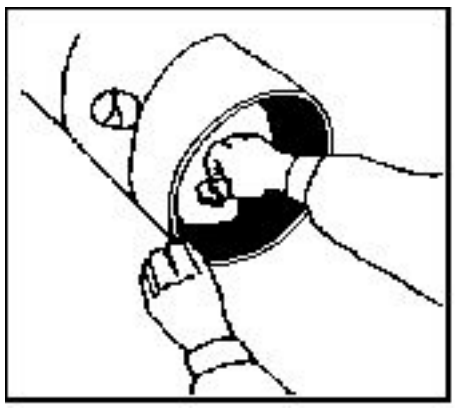
The cardboard eyepiece tube should fit snugly through the hole. If it is too tight, file or pare the hole a little bigger.



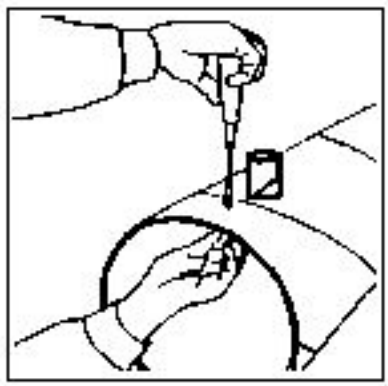
Eyepiece tube in place.



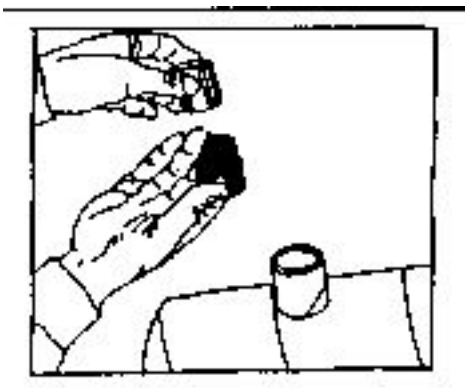
View from the outside of the telescope tube.



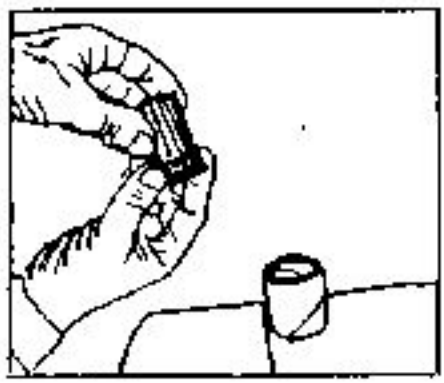
If we have not already painted the inside of the telescope tube, we now need to paint at least the section visible through the eyepiece tube black .



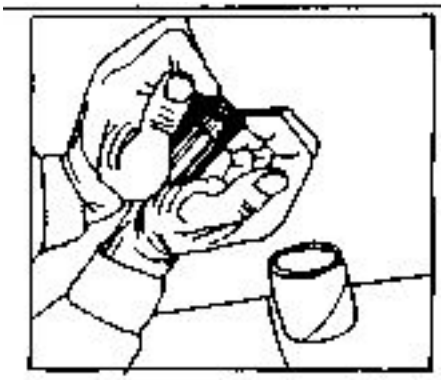
Two sheet metal screws (one on either side of the eyepiece tube) may be used to draw the Masonite rectangle snugly up against the inside of the telescope tube wall.



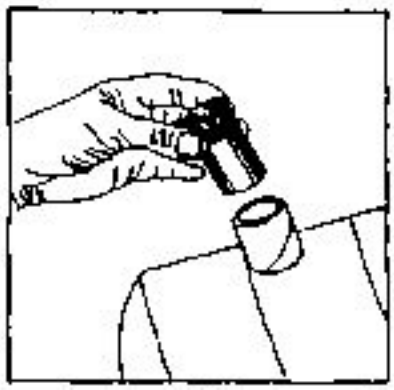
Fitting the eyepiece inside the brass tube. You can purchase an eyepiece, or salvage the eyepieces out of an old pair of binoculars.



If the eyepiece is too small to fit snugly in the brass tube, wrap it in a layer of two of corrugated cardboard.

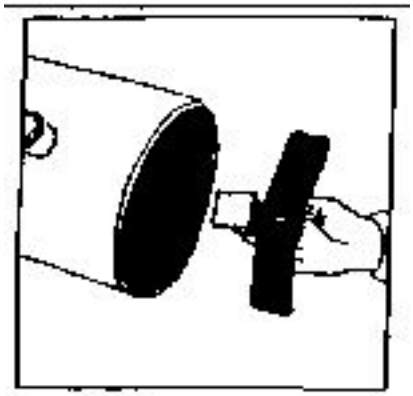


Adjust the amount of cardboard as needed so that the fit of the eyepiece in the brass tube is snug.

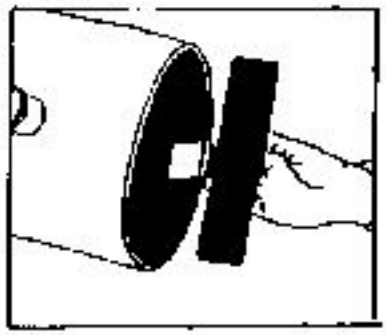


The eyepiece is ready for use!
Please Note: <u>It is very easy to whack your eyepiece holder as you move your telescope tube around: Be especially mindful of doorjambs and car loading/unloading!</u>

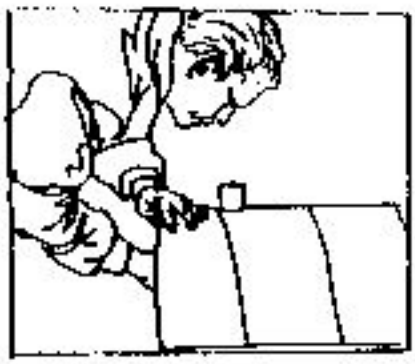
INSTALLATION & ADJUSTMENT OF THE SPIDER



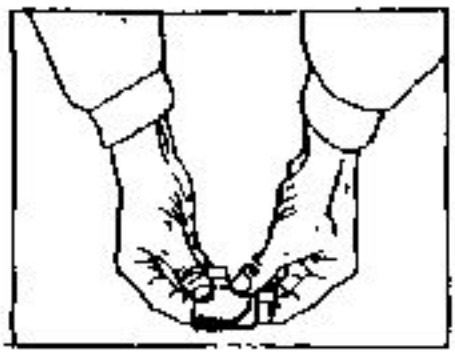
Trying out the fit of the spider in the telescope tube.



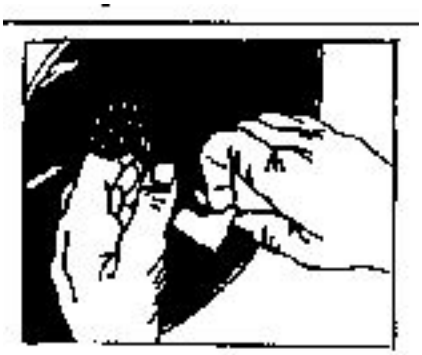
Adjust the spider so that the diagonal mirror is in front of the eyepiece hole. (The diagonal mirror should be <u>facing</u> the hole).



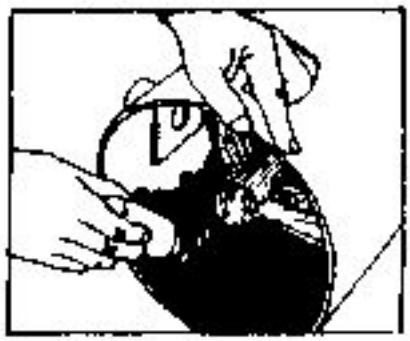
When we look through the eyepiece hole we should be able to see the reflection of the (open) bottom end of the telescope tube in the diagonal mirror.



If the fit of the spider is too loose, we may tighten the fit with cardboard folded to the necessary thickness...



Fitting cardboard under <u>one</u> shingle (the shingle <u>opposite</u> the eyepiece hole). Readjust the spider as needed after fitting the cardboard.



When installed, the <u>whole</u> objective mirror will need to be visible in the diagonal when we look into the eyepiece hole. Do not glue the spider to the tube until final adjustments are made on the alignment.