



Installation tips for Protostar FlockBoard kits

for Aptura, Celestron, Hardin, Orion, Skywatcher,
Zhumell and other GSO & Synta telescopes

Flockboard kits include the necessary sheets required to line your entire tube, and are pre-cut to length for common GSO and Synta produced telescopes. Flockboard springs out against the tube wall, and does not require adhesives or tapes. Other hardware like spiders and focusers will also naturally fix the sheets in place. Note that all pieces of Flockboard in the kit are the same length, so it does not matter which piece you start with.

Always work on your telescope in a horizontal position to avoid accidentally dropping something onto the primary mirror.

Step 1. Strip the telescope tube of most components. Remove the focuser, spider, finderscope, primary cell assembly and altitude bearings from the tube. Leave the casted metal trim ring at the focuser end of the tube installed.

Step 2. Roll up and insert the first sheet of FlockBoard into the primary mirror end of the tube until it's about 3-inches from the end of the tube. Rotate the sheet as-needed to orient the overlap seam to be **approximately aligned with one of the side bearing set of holes**. (This is especially important for the 10" and 12" telescopes, as the mounting hardware for the side bearings will keep the overlapping seam snugly against the tube wall.)

Step 3. Working from outside the tube, mark the location of the bearing screw holes onto the Flockboard. Remove the Flockboard from the tube and drill the marked holes with a ¼" drill. Re-insert the FlockBoard and re-mount the altitude bearings.

Step 4. Roll up and insert the second piece of Flockboard into the focuser end of the tube. Position it up against the edge of the metal tube trim ring. Rotate the sheet as-needed to orient the overlap seam to be **approximately aligned with the focuser hole**.

Step 5. Working from outside the tube, mark the locations of the holes for the spider, finderscope, and focuser. Also trace the large cutout for the focuser. Remove the Flockboard and drill the marked holes with a ¼" drill. The large focuser cutout can be cut with a utility knife or most household scissors.

Step 6. Re-insert the upper piece of FlockBoard, and re-install the focuser, finderscope and spider.

Step 7. Re-assemble the telescope, and install the primary cell assembly last.

Optional Air-spaced Installation Method for Metal Tube Telescopes

Air-spacing Flockboard away from the tube's wall with foam strips creates a thermal insulation layer that prevents mixing currents inside the tube. The sky-facing portion of a metal tube will fall several degrees below ambient air temperature due to radiative heat loss to the clear night sky, and the inside wall of the tube "feels" this due to the high thermal conductivity of metals. This causes a churning of cool/warm air in the optical path that persists all night long. This inexpensive fix will solve the problem.

Installation

Cut approximately $\frac{3}{4}$ " wide foam strips from the supplied foam sheet material. Tape the strips to the outside of the Flockboard as shown to hold them in place as you insert the rolled sections into the tube. It's easier to do this with the Flockboard on a *clean* flat surface.

Note that only the lower rolled up section of Flockboard requires foam spacers at both ends.

The cutout holes for the focuser, spider, and other parts are not shown in this picture. If you plan to air-space your Flockboard, the layout and marking of these holes should be done with the foam strips in place to ensure the holes will line up properly.

Another potential advantage of air-spacing the Flockboard is that small nuts and screws for accessories like finderscopes can be smoothly covered and hidden in the air gap between the Flockboard and tube wall.

Insert the lower piece of Flockboard first until it reaches the primary mirror cell struts.

Insert the upper piece of Flockboard overlapping inside the lower piece.

