

## Sextant Sun Shades and Custom Filters

All sextants have two sets of shades, the main ones used for all sun sights called the index shades, that cover the index mirror, and another set of usually much thinner shades called the horizon shades that cover the horizon glass, in direct line with the telescope. These are intended for removing glare on the water, which is often an issue to deal with. These horizon shades, however, are usually never thick enough to protect against a direct view of the sun as required in this measurement. I have seen sextants with a thick horizon shade likely intended for this purpose, but this is rare. Also we have a sextant with a pair of cross-polarized shades for both index and horizon (Figure 5). These can in principle be set dark enough for this application, however...

...after using very many sextants of all types and price ranges, I have never seen a sextant that totally blocks out a view past the shades along one of their edges. This means that a standard sextant without a custom sun filter or eyepiece is not likely to be safe for this measurement.

In some older sextants we find an eyepiece cap that is thick like a welder's glass. These are presumably intended for these solar IC sights. You cannot see anything through them but the sun, and they go on the eyepiece end of the scope so both suns get shaded this way, resulting in two suns of the same color. Sometimes a colored sextant shade can be inserted that will alter the tone or color of one of the suns, which helps when possible.

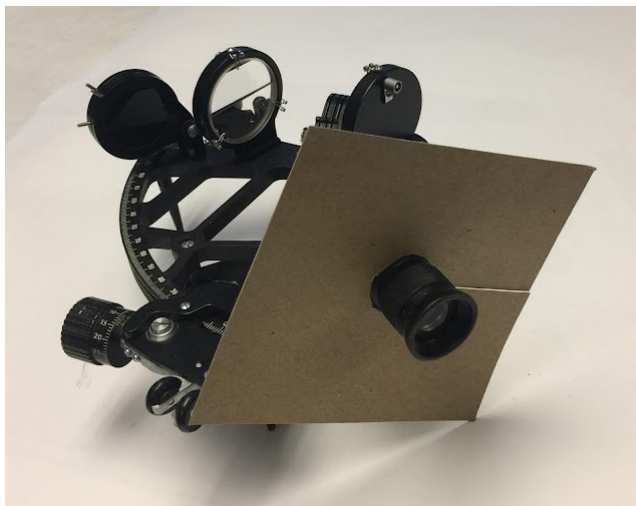


**Figure 5.** A Tozaki sextant with several features oriented toward the solar IC measurement. The sextant shades are crossed polarized films, which rotate for varied shading.

This sextant does include the welder's shade eyepiece that fits over the main telescope, but even with this, we need an extra screen around telescope so we cannot inadvertently glance at the sun. It is not just during the sight times we need protection; we must also lift the sextant and point to the sun, and that step also needs to be protected.

The 10 power scope is intended for IC measurements using the horizon, but this one also includes a welder's eyepiece, which must imply some optimistic thought on using it for the solar IC as well. This measurement is hard enough with a 4x40 or 7x35 scope; it takes a stronger arm and more patience than I have to succeed with the 10-power scope with its very small field of view.

The procedure for making a "Baader solar filter" for the end of the scope is given below. Figure 6 shows one way to make a simple extra screen to prevent looking around the corner of the scope into the sun as you set up the sights.



**Figure 6.** *"It may be sometimes convenient to provide an umbrella of pasteboard, about six inches square, with a hole in the middle to receive the telescope, in order to defend the eye from the direct light of the sun, as well as from the ambient brightness of the sky, which would otherwise render this practice in many cases too painful and difficult."* —Nevil Maskelyne, 1766

It could be that telescope or camera stores have ready made filters that can be used on either the eyepiece or object side of the telescope for this purpose, but we have found it easy to construct our own that custom fits the various scopes we have, which vary from 7x35 on down to a Davis 2x20. The procedure was first presented in our book [How to Use Plastic Sextants: With Application to Metal Sextants and a Review of Sextant Piloting](#).

### **How to Make a Baader Sun Filter**

The filter is named after the museum that originated the solar filter film we used. Alert: these films are expensive. See also [links on related films](#) as well as our earlier note on [using your eclipse viewing sunshades](#) for this—which is actually another approach, maybe even best. Make a pair of these that will stay securely in place, and do all the sights that way—short of reading the dials!

First check your sextant-telescope geometry so you know how much room you have. Generally the filter tube assembly must be made fairly thin to allow the index arm to move past it without hitting it.

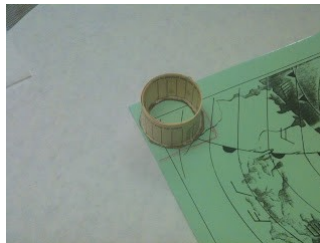
**Step 1.** Wrap several strips of thin cardboard around the telescope, to form a small tube about 1" tall

that just fits on your telescope. Glue these layers together to make the tube.



This shows the final filter, including how it started by wrapping layers around the telescope to get the right dimensions. We used our [Smart Mark](#) book marks for this, showing once again how smart they are. There is another finished filter shown in Figure 5.

**Step 2.** With the Baader foil between two thin cardboard or paper sheets mark the size of piece that will be needed to cover the tube and cut this out. Here we used card stock that was originally the cover of a booklet on weather.



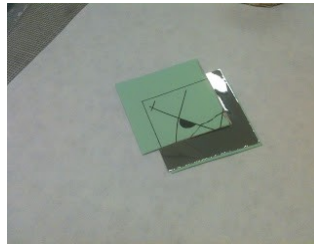
**Step 3.** Make two cardboard base plate rings that have inside and outside diameters just a few mm smaller and bigger than the diameter of your tube. The film will be secured between these.



**Step 4.** Glue the tube to the center of one of the rings. Below we show a pocket watch being used as a weight as this glue dries. We used Gorilla glue, that dries white in 15 min or so.



**Step 4.** Put a trimmed layer of double-sided adhesive tape on the top of the ring. This will be used to hold the foil on the end.



**Step 5.** Carefully place this adhesive side down onto the foil to stick it to the ring, then add the second ring on top of that using the same adhesive tape to protect the edges of the foil. Small wrinkles in the foil will not matter, but you can usually do this with very few wrinkles.

**Step 6.** Trim the edges of the rim as much as you can, and be sure that at least one orientation of the filter will allow the index arm to pass below it.

**Step 7.** Look for some fortuitous container that can serve for storage and protection. We found a plastic pill jar just right for this one, with a few pieces of foam inserted to hold it in place.



With one of these filters on the end of the telescope and one of the extra screens mounted around the body of the telescope you are protected during the process.

Info from David Burch [Starpath.com](http://Starpath.com)