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# The New Baader Solar Filters (BSF)

By André Van der Elst



**Image 1 - An example of the ASTF version of the Baader Solar Filter. Note the unique adjustable mounting system. The slight wrinkles in the AstroSolar film are indicative of proper, strain-free installation.**

Most amateur astronomers are already familiar with the patented AstroSolar film sheets introduced 15 years ago by the German company, Baader Planetarium. Despite its low price, this unique filter material retains the true optical quality of the telescope optics amazingly well.

For the most part, this is not the case with many of the available Mylar-based films or thick, red darkroom films, nor most affordable single-side metalized float-glass filters. Baader's AstroSolar film



**Image 2 - A BSF-ASBF cell is shown mounted on a findercope. The frame cutoff accommodates the finder's proximity to the tube of its parent scope.**

is metalized on both sides and offers a secure solution to observing and imaging the Sun in white light at very high magnification. Also, unlike Mylar films or glass filters, AstroSolar renders the true white colour of the Sun. Additional filters placed near the focus position may then isolate any part of the visible spectrum for closer investigation.

Amateurs have made a variety of DIY

cells to affix these filters onto their telescopes. However, they often stretch the AstroSolar film like a drum-head to make it smooth like a piece of glass. This may look nice, but it destroys the image quality. Any AstroSolar sheet must be mounted entirely stress free – slight ripples are a sign of proper installation, not of a shoddy job.

Some AstroSolar mounting cells

## THE NEW BAADER SOLAR FILTERS (BSF)



**Image 3 - The author is shown using 15X60 binoculars fitted with twin BSF-ASBF 60 filter cells. The frame cutoffs allow ample clearance for even the narrowest interpupillary settings.**

made by amateurs may look a little crude and are not very well secured to the telescope, thus at risk of being blown away by gusts of wind. You can imagine the consequences. Finally, some DIY cells look ugly on some superbly crafted telescopes. OK, it's only esthetics, but why not make all accessories good looking? The new BSF AstroSolar filters address all of these issues.

There are three categories to choose from:

(1) The ASTF (AstroSolar Telescope Filter), an example of which is shown in **Image 1**, for high resolution views or pictures with high-end amateur telescopes up to 280-mm aperture.

(2) The ASSF (AstroSolar Spotter Filter) intended for applications where highest magnification is not the prime goal, such as spotting scopes, economy amateur telescopes and tele-photo camera lenses up to 6-inch aperture.

(3) The ASBF (AstroSolar Binocular Filter) is the same design as the ASSF.

These filters have one tangent side of the frame cut off to make the filter usable on any binocular, even when the bridge is nearly closed. This style is also more beneficial for camera lenses, because the camera and lens can be put down on a table without stress onto the filter cell. ASBF cells come for use with binoculars and camera-lenses from 50-mm to 100-mm front lens diameter. **Image 2** shows an BSF-ASBF cell mounted on a finder-scope.

All BSF filters are shipped as a kit with the film mounted behind a white, IR-rejecting aluminium frame – the film is suspended without stress within the aluminium frame. All additional hardware is included for mounting three adjustable centering bolts, made to have each BSF fit onto a wide variety of outer or even inner tube diameters.

A new safety feature is noteworthy: The design incorporates three additional safety straps, each of which mounts onto the top end of a centering bolt and has a Velcro-style patch sewn onto its end. The counterpart then connects onto the telescope dew cap or outer tube with removable self-adhesive pads. On my 15X60 rubber-armored binoculars (**Image 3**), the centering bolts alone give such a good fit, I felt I didn't need the adhesive pads. But this shows how serious Baader is about



**Image 4 - The BSF-ASTF version is shown with the mounting fingers gripping the outside of a dewshield. They can also be arranged to grip the inside of the shield for a cleaner appearance.**

your safety. Educators will really like the added level of security provided by the safety straps.

All parts ship securely packed in a cardboard box with very stiff double-card-

board inlay for a good protection of the mounted film.

While the ASSF and ASBF filters share the same design for fastening the Astrosolar film, the ASTF filter is quite dif-

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ferent and more complex. Both the ASSF and ASBF categories have the AstroSolar film mounted onto an injection-molded black ring which is fastened onto the powder-coated white aluminum front frame. This is a straightforward solution, and Baader claims that the black plastic will not stress the film within the common temperature range. This black plastic material is fiberglass-filled ABS, a material that provides maximum stiffness and an age-proof filter frame that will not break over time.

The ASTF filter range instead features a unique, free-floating carrier ring of white color to fasten the AstroSolar film in the cell. The thermal expansion coefficient of both ring and film is the same. In such a huge thickness, this special material becomes brittle and must be protected from all sides to not get pinched or bent. The other parts of the cell design are made of the same materials as the ASSF/ASBF filter cells. Since the white ring has no

connection to the rest of the cell, there is no stress induced onto the film, allowing high-resolution observation or imaging of finest Solar details.

In all cases, the backside of the BSF filters feature the black, fiber-filled ABS for eliminating reflections and stray light.

No tools are necessary to prepare the filter for use. Just thread the three injection-molded centering bolts onto the aluminium frame through three slotted cutouts. In fact, wherever necessary, the aluminium frame has two rows of three cutouts each, arranged on two different concentric circles (see Image 1). You can choose the circumference that best fits your tube diameter.

These bolts look like three fingers pointing away from the frame (**Image 4**). This fastening system keeps the frame snugly in place while centering the filter cell in front of the tube opening.

The bolts come in three different diameters, depending on the filter category. Each bolt features injection-molded rubber grip faces, Gecco-shaped to slide easily onto any telescope tube but to come off hard. This solution allows the BSF filters fit onto a wide range of tube diameters. Depending on tube design, you can choose to mount them to touch the outside or the inside of your tube.

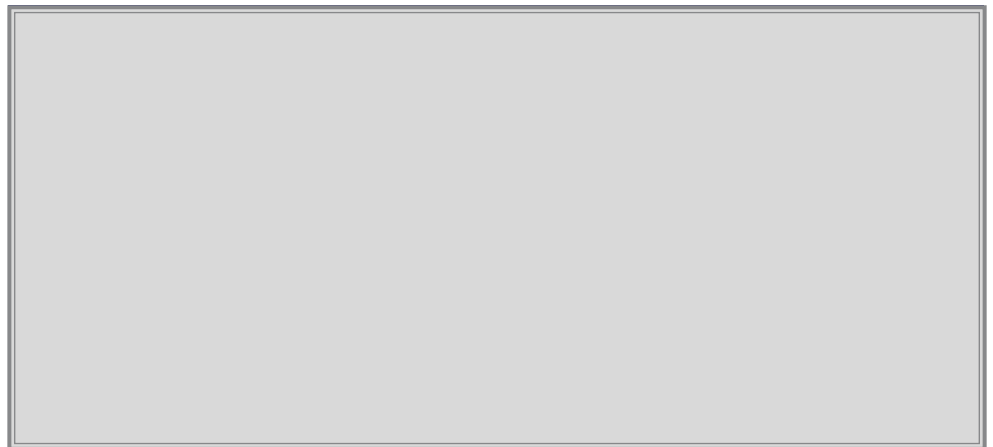
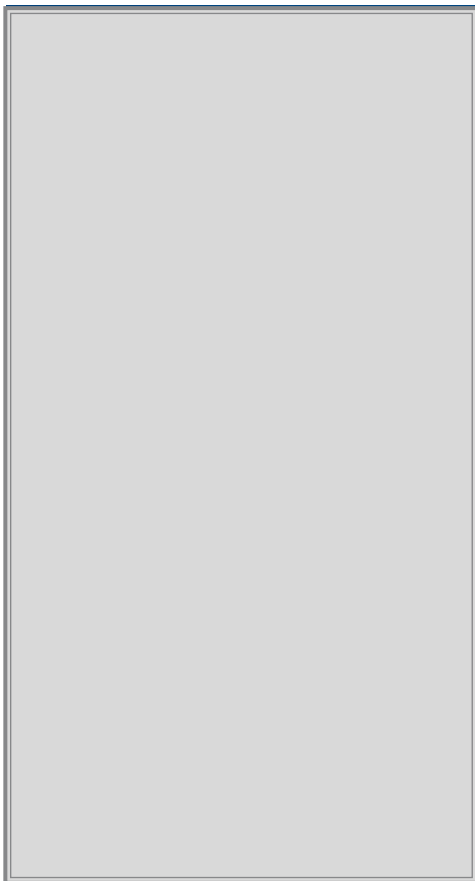
Non-rotating aluminium sliding fasteners hold the centering bolts in place. This non-rotation feature enables the no-tool fastening action. These metal sliders have a machined indicator to point to-

wards the adjustment index scale printed onto the top side of the aluminum frame. Additional Phillips screws fit into the sliding fasteners, so that the centering bolts can be firmly fastened with a screw driver, if necessary – for instance, when the bolts are mounted to contact the inside front ring of a Newtonian telescope. The index scale beside each adjustment slot allows fast and repeatable adjustment of the filter cell onto different telescope tubes with the above mentioned indicator.

Black sliding washers securely cover the full length of the adjustment slots in the aluminum frame blocking sunlight from passing through the filter cell beside the filter area. Where applicable, black rubber plugs close the three slots not in use for the same reason.

The filters come with complete, clear instructions and warnings, although the pictures on the box are self-explanatory enough – at least, I managed to assemble everything by just looking at the box illustrations (except for the safety straps). It takes only a few minutes to install the rubber centering bolts and a few more to adjust them to the tube diameter. It's a matter of choice, but I prefer the clean look with the centering bolts inside the dewshields of my refractors. Of course, on a catadioptric that is often used without a dew cap, the centering bolts must touch at the outside the OTA.

I can keep it short about the optical quality of the AstrSolar ASTF-filter: As



noted, it easily beats my older Mylar or float-glass filters, and I have tested dozens of them. In fact, AstroSolar mounted into the ASTF cell comes close in sharpness and contrast to the 1/10-wave optical-glass filters made by Lichtenknecker Optics that I use on my Zeiss 100- and 150-mm APQs.

You can find solar filters of similar quality made by Questar. There are, however, three obvious differences: At the aperture of a small Questar, the price of the glass filter is about five times that of the new AstroSolar option, the color of our star is orange in the Questar option, not white, and its weight is much higher. An ASTF filter will cause no balance issues on a Dobsonian.

The only device that betters all of them is a Herschel wedge or prism. I am talking about the version with a ceramic heat cage that is a completely safe device compared to older models that reject the heat and light outside at the back. Contrast and sharpness is phenomenal, seeing permitting (try it with a binoviewer) and the color of the Sun is maybe even more natural than with the AstroSolar sheet: a soft creamy white.

It's other advantage is that if you own several refractors, one Herschel wedge fits all. But Herschel wedges can only be used on refractors. For more on the Cool-Ceramic Herschel wedge, see my article in the January-February 2014 issue of *ATT*.

The BSF AstroSolar filters can be

combined with a Baader Solar Continuum filter at the eyepiece to increase the contrast even more, but then the Sun becomes entirely greenish, because just a small pass-band at 540 nm is entering the camera. But for refractors which are not so perfect in color correction, this monochromatic light offers a huge benefit: It erases any color aberration induced by an achromatic lens or by the residual color of SC-optical systems.

As with the Herschel wedge, the best results are obtained with a binoviewer. The power of your brain allows you to literally see through the turbulence of the Sun.

All three categories of BSF AstroSolar filters are available in a great variety of diameters. You can find more information on the website [www.astrosolar.com](http://www.astrosolar.com). In the U.S., check Alpine Astro at [alpineastro.com](http://alpineastro.com) for prices and availability. 