

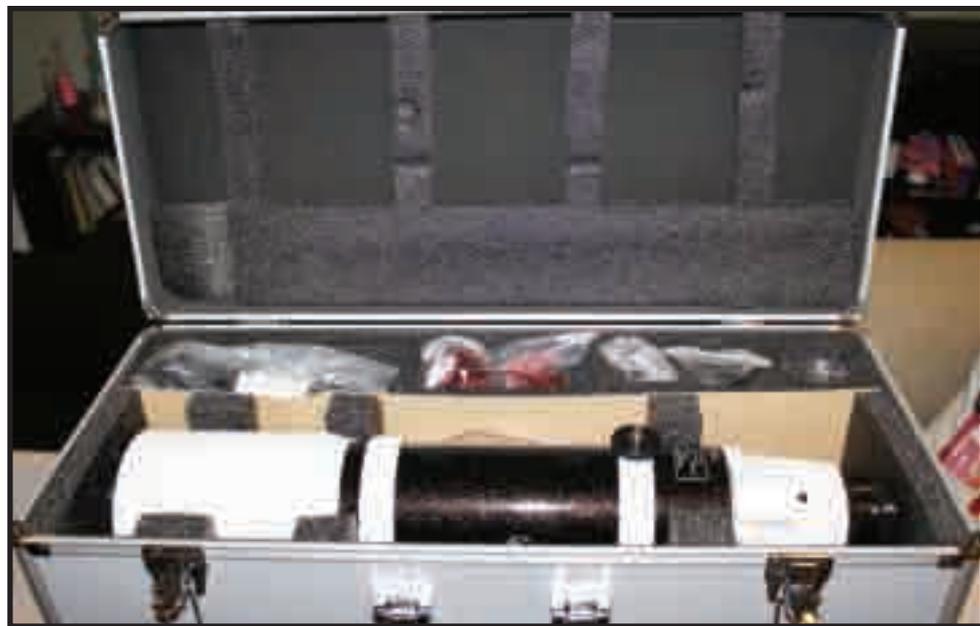
# Sky-Watcher USA ProED 80-mm and 100-mm Apo Refractors

By James R. Dire, Ph.D.

In the November/December 2013 issue of *ATT*, I introduced the Sky-Watcher USA 120-mm ProED Doublet Apo refractor. In this issue, I will review the two smaller aperture sizes in the same series, the ProED 80-mm and the ProED 100-mm telescopes.

To recap, the Sky-Watcher ProED refractors come with doublet objectives utilizing the finest extra-low dispersion (ED) glass available, Schott BK-7 (front element) and FPL-53. This combination of glass results in the best color correction for a doublet refractor, virtually eliminating chromatic aberration. The telescopes were designed for visual use, concentrating on the superb optics in this two-objective lens design.

Like the ProED 120, the ProED 80 and ProED 100 include sturdy aluminum cases packed with all the accessories you could possibly need except for a mount (**See Images 1 and 2**). Each case contains an 8x50 image-erect finderscope with mounting bracket and a 99-percent reflectivity dielectric diago-



**Image 1 - The ProED 80, case and accessories.**

nal with a 2-inch compression ring clamp. The diagonal comes with a 2-inch to 1.25-inch adapter, also with a compression ring clamp. The diagonal and the adapter are threaded on the inside to accept 2-inch filters. The fo-

cusers on all three models are identical: two-speed focusers with plenty of back focus and a locking screw underneath.

The telescopes also include a set of matching aluminum tube rings attached to a dovetail plate, ready to attach to

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Image 2 - The ProED 100, case and accessories.

most commercial German equatorial mounts. While the larger scope comes with a Losmandy-style dovetail plate, the two smaller models come with

Vixen-style dovetail plates. I mentioned in my last article that each telescope included a second 2-inch to 1.25-inch adapter, but that I was unsure of its

function. This adapter actually contains T-threads to attach it to any DSLR camera with a matching T-ring, or onto a CCD camera. The adapter can also be used with certain style 1.25-inch eyepieces for eyepiece projection photography.

The smaller models also come with the same two eyepieces (20-mm and 5-mm) that I described in the previous article. Both eyepieces are modified Plössl, and each has 20-mm of eye relief. The 20-mm eyepiece has a 50-degree field of view, while the 5-mm has a 58-degree field of view.

**Table 1** contains the specifications for each instrument and the magnifications obtained with the eyepieces. As the table indicates, the ProED 100 and 120 both have the same focal length. The difference is that the ProED 100 is an  $f/9$  telescope, while the ProED 120 is a faster  $f/7.5$  optical system. The ProED 120 has 44 percent more light-gathering power than the ProED 100 and has

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a greater resolving power. The two configurations allow the buyer to weigh several options: optical speed, aperture and price.

I find the ProED 100 to be an excellent choice for lunar, planetary and double-star observing, while the ProED 120 is the best choice for viewing galaxies and nebulae, and for doing long-exposure imaging. The ProED 100 also makes an excellent piggyback guide scope. Its 4-inch aperture will pick up plenty of potential guide stars, while the 900-mm focal length will allow for accurate guiding for longer focal length imaging instruments.

Like the 120-mm model, the ProED 80 is an  $f/7.5$  optical system. Its 600-mm focal length is still plenty long enough to obtain high magnification with the 5-mm eyepiece, yet the optical tube is small enough to make a great grab-and-go telescope. The dovetail plate contains a  $\frac{1}{4}$ -20 threaded hole so that the telescope can be mounted on a regular camera tripod for terrestrial use!

**Image 3** shows all three models set up on German equatorial mounts. The ProED 120 (right) is obviously the largest telescope, in diameter and length, and appears on an iOptron EQ45 mount. I have the ProED80 mounted piggyback on the ProED 100 aboard an Orion Atlas mount (**Image 4**). Neither mount is near its maximum payload capacity with these Sky-Watcher USA refractors onboard. Each of these telescopes would operate quite well on smaller go-to German equatorial mounts, such as the Celestron Advanced VX mount.

My first views through the ProED 100 were on the first-quarter Moon (**Image 5**). With the 20-mm eyepiece, I did see some false color on the lunar edge. However, when switching to my own 26-mm eyepiece, no false color was observed, attesting to the great color correction of the ProED optics. The views of the lunar terrain were outstanding. Switching to the 5-mm eye-

TABLE 1	ProED 80	ProEd 100	ProED 120
Aperture (mm)	80	100	120
Focal Length (mm)	600	900	900
Focal Ratio (f/)	7.5	9	7.5
Optical Tube Length (inches)	23.82	36.22	37.79
Optical Tube Weight (lbs)	8.0	10.0	11.3
Magnification 20mm eyepiece	30x	45x	45x
Magnification 5mm eyepiece	120x	180x	180x

piece increased the magnification to 180-times, allowing superb views of lunar mountains and crater central peaks! The first-quarter Moon was imaged with a Canon 600D camera at prime focus with a 1/250-second exposure.

One night in my backyard (**Image 6**), I pointed the telescope at the Dou-

ble-Double, Epsilon Lyrae, to test the resolving capabilities of the 100-mm telescope. Epsilon Lyrae is a pair of fifth-magnitude stars separated by 210 arc seconds, but each of these stars is actually a close binary pair. Epsilon 1 consists of two stars separated by 2.4 arc seconds, while Epsilon 2 consists of two stars separated by 2.3 arc seconds. The

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Image 3 - The complete ProED series of telescopes set up at the KEASA roll-off roof observatory (<http://www.keasa.org/>).



Image 4 - A close up of the ProED 100 and ProEd 80 telescopes.

cool thing about these binaries is an imaginary line passing through the Epsilon 1 pair is perpendicular to an imaginary line passing through the Epsilon 2 pair. My seeing was the typical Kauai sea level one arc second, so the ProED 100 had no difficulty splitting both close pairs. However, using the 5-mm eyepiece, I saw more dark space between the close pairs than I have ever seen before in any telescope! This is definitely a great instrument for binary star observers.

I also viewed several star clusters, with the ProED 100: M13, M22, M28, M92, M8, M11, to name just a few. While not quite as fantastic as in the ProEd 120, this telescope has superb optics for its class. It also provides good views of brighter nebulae and galaxies.

The ProED 80 only collects 64 per-



**Image 5 - The author took this image of the first-quarter moon with the ProED 100 and a Canon 600D DSLR camera, 1/250s exposure.**

cent as much light as the ProED 100 and 44 percent as much light as the ProED 120. However, the telescope's smaller size may appeal to someone looking for a light grab-and-go telescope, or a travel scope. The fully loaded case weighs well under 20 pounds and easily fits in most airline overhead compartments.

While smaller in size, the ProED 80 offers nearly as much excitement in dark skies as the larger telescopes in this series. My first target observing with the ProED 80 was the Double Cluster in Perseus (NGC869 and NGC884). With my 26-mm Nagler eyepiece, I was able to see astounding color in the clusters' stars, ranging from red to blue! The Andromeda Galaxy (M31) and its two satellite companion galaxies (M32 and M110) all fit into the eyepiece field of view. Brighter nebulae, such as M1, M27 and M42, were easily captured in this telescope using my 12-mm Nagler eyepiece. I even spotted the faint emission nebula NGC1999 in Orion!

The ProED 80 also does a great job showing off planets. With the 5-mm UWA eyepiece, Venus' 30 percent-illu-

minated crescent was sharp and thrilling. I spied Jupiter and its four Galilean moons with a 3.7-mm Ethos eyepiece (162x). The planet's belts and zones all clearly stood out.

The Sky-Watcher USA ProED Doublet refractors have superb optics and offer thrilling visual experiences. The three models range from a small, easy-to-transport 80-mm to the impressive 120-mm large refractor. Sky-Watcher USA's efforts to package each with a hard case filled with myriad accessories makes these telescopes definite winners for hobbyists looking for a complete refracting telescope system. **AT**



**Image 6 - The ProED 100 set up for observing in the author's backyard.**

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