

## **CN Report: Orion SKYVIEW PRO 100**

**100mm f/6 refractor**

**MSRP: \$469**



The popularity of moderate aperture refractors has been increasing lately, and with the addition of the lower-cost Chinese instruments, the amateur now has a lot to choose from. Orion Telescopes (U.S.) has firmly entered the market with its SkyView PRO 100, a modest four inch refractor that has a lot going for it.

### **PRODUCT DESCRIPTION**

#### **The Optical Tube Assembly**

The SkyView Pro 100 is a 100mm f/6 refractor (2-element simple achromat) on a German Equatorial mount. The entire setup from the front of the dew shield to the floor is generally less than about 60 inches high and in use is often even lower. The scope and mount together weigh in at a modest 39 lbs.

The optical tube assembly is a dark grey tube about 27 inches long (focuser all the way in), and at its widest, about 5.5 inches wide at the "flange" of the objective cell, although much of the tube itself is 4 inch O.D. Aluminum tubing. The forward section houses the objective lens, and has a 6 inch long dew shield mounted just ahead of a 3-point adjustable objective cell that has three push-pull adjustment Allen screws for collimation. The objective is coated on all surfaces, but may not be multicoated. The back of the tube has an cast 2" I.D. rack and pinion focuser with 3 inches of focusing travel. A nice 2" to 1.25" adapter with a flange-like safety groove is provided that allows the rotation of the star diagonal without any danger of it falling out of the focuser if the screws are not totally tight. This adapter is also threaded on one end so it can serve as a T-adapter for a camera. The scope comes with a standard 1.25" mirrored star diagonal of reasonable quality. The top of the focuser casting also has a quick release dove-tail socket for a standard finder bracket. A 6x30 straight-through finderscope is provided on a 3 inch tall stalk which has the standard two adjustment screws plus spring and the forward retaining "O" ring in the finder bracket. The optical tube assembly also has a standard camera mount block on one side for putting the scope on a heavy duty camera tripod. The telescope comes with a 25mm Sirius Plossl eyepiece (24x, 2.1 degree true field of view) and a 10mm Plossl (60x, 0.76 degree true field).



## The SkyView Pro Mount

The telescope mount is a fairly rugged unit made mostly of Aluminum, Steel, and some plastic, and is fairly well constructed. In fact, the mount is so robust that it should be able to easily handle a six inch f/8 Newtonian, although putting an eight inch on it might be pushing things a bit. The telescope is held to its mount by a set of two mounting rings which are bolted to an 8.5 inch long dove tail rail. With a few turns of two knurled knobs, the rings will open up and the OTA can be lifted out of the mount for storage or transportation. Alternately, the rings and scope can be removed from the mount by releasing a knob and a set screw to free the dove-tail base. Each ring has a place for threaded camera rod so that a camera can be mounted piggy-back for astrophotography, and one rod and a plastic spacing disk are provided for that purpose. The right ascension and declination axes are both fairly broad, and the bearing surfaces are internal and cylindrical with wide hollow shafts. This cuts the weight of the entire

scope without sacrificing too much stability. Each axis is equipped with a movable setting circle about 3 inches in diameter. The R.A. circle has 10 arc minute Right Ascension markings, while the Declination circle is marked in degrees. Since this telescope is primarily intended for lower power use, the circles may be adequate, although they are a little hard to read in dim light. The declination axis has a 10 inch long counterweight shaft with a safety nut on the end, and a 7.5 lb counterweight for proper balancing. Both axes have locks and slow motions, with the slow motions acting when the locks are engaged. The version I have has the clock drive with hand controller electric slow motions that runs on 6V DC with the included 4 "D" cell battery pack, although a declination electric slow motion is available as an option.



The equatorial head is adjustable in tilt and is marked for latitudes from 0 to 90 degrees, but in reality is only tiltable to about 70 degrees due to the way the head is made. The equatorial head also has a fine-scale azimuth adjustment for proper polar alignment (one leg has a big "N" label for north), and the polar axis has an opening for a polar alignment scope which is only clear when the telescope is pointed directly at the celestial equator. The bottom end of this hole can be covered with a snap-on plastic cone to make the mount look a little more sexy, but it kept falling off during transport, so eventually, I just left it off. The head is attached to a 3-legged tripod with tubular legs that are three feet long. The ends of these legs have an additional nine inches of outward adjustment, although in practice, these ends are rarely used and only result in a slight increase in tripod height. Although I often carry the entire scope outside fully-assembled, the length of the legs and the awkwardness of the counterweight make this more difficult, so it might be best just to take the OTA out first and go back for the mount. Assembly of the mount was fairly easy, although the installation of the Clock Drive was somewhat difficult, as a long screw must be pushed awkwardly and turned into a hole underneath part of the head to put the right amount of pressure on the worm gear for proper drive operation. The mount also comes with a triangular eyepiece tray that is held underneath the tripod by a single long bolt designed to pull it up against the tripod legs for additional stability, but I usually did not put it on.

## PERFORMANCE

Overall, I was fairly pleased and often pleasantly surprised by the SkyView Pro 100. Its ease of setup and portability mean I get this scope out a lot for some quick observing sessions on my driveway or in my back yard when I don't want to bother with pulling out my 9.25 inch SCT. Mechanically, the mount is pretty much rock-stable, a really pleasing change from some of the smaller refractor GEMs I have used. The axes move fairly smoothly, although people have reported considerably better performance once the mount has been extensively "serviced" and the old lubricants replaced. The locks were a real help when the scope was unbalanced, like when I was changing from 1.25" eyepieces to 2" ones. Tube balance was easy to change by either sliding the scope forward or backward in its rings, sliding the dovetail up or down along its base, or a combination of the two movements. The slow motions worked, but the knobs which came with the scope to adjust the slow motions did not fit them very well, and one actually broke fairly early on. The tripod was stable, but again, the lack of a large adjustment range for the length of the legs was occasionally a problem, as the scope often was a little on the low side. I did try to use the setting circles and they did work with the 25mm Plossl in the scope (24x), but were kind of a pain to read, so usually, I ended up just star hopping with the finder.

My chief complaint with the mount was the clock drive. It uses a DC stepper motor, and its ability to track, while OK for visual low-power use, was less than adequate for something like long exposure photography. In order to get the drive to even track at all, I had to play with that long screw which went up the north side of the equatorial head. That screw was in a terribly awkward location, making adjustment for tracking rather difficult. Once I got things working, I discovered that the scope had to be fairly well balanced along the polar axis and the polar axis needed to be somewhat tensioned or locked for the tracking to work well much of the time. The small hand controller allows two speeds of both forward motion and reverse, although the speed tended to be rather slow except at high power. After pressing one of these tracking buttons, the drive showed a some excessive slack and play before the object in the field tended to stay put, often requiring a lot of button pushing and waiting for the drive to engage before I was satisfied with where things were.

Tracking showed a little periodic error as well, so for photography, it might be better to not bother with higher power exposures over long periods of time. Even when used as a 600mm telephoto lens with just a camera body attached, a lot careful manual guiding of the scope would probably be needed to get halfway decent images. However, for "piggy-back" astrophotography, the drive should be good enough for limited time exposures even with something like a 135mm telephoto lens. The 6 Volt DC power D-cell pack did support the drive quite well however, and lasted for a rather long time at least during the warmer months. During the cold of winter, the battery capacity drops considerably, so thought should be given to either keeping the pack warm or using a higher capacity 6 volt DC source of power. The hand controller also showed a curious lack of astronomical design experience, as the "power on" LED right in its center was a very bright green (turned red only when you pushed a button), rather than the more night-vision friendly dim red. Much of the time when using the scope, I had to put the hand controller face-down on the ground to keep it from ruining my night vision! One other major problem with the hand controller was with the little squarish telephone plug and jack (RJ-11) used to connect it's cable to the scope's drive (required just to get the drive to run). After a number of uses, once connected

again for another observing session, it abruptly became nearly impossible to get it **disconnected** from the scope!



The little jack simply would not let go without one heck of a lot of playing around. The plastic housing around the drive made things even more difficult to get the plug loose for storage. This problem was also noted on an identical SkyView Pro 100 that our Astronomy club bought for a "loaner" telescope, so it is definitely a design flaw.

### **The View Through the Scope: Not Too Bad!**

Optically, the simple f/6 achromat provided fairly good performance, especially at low to moderate magnifications. However, it was definitely not a high-end planetary scope, although it can be pressed into service for viewing the moon and planets with at least fair results. The star test at 234x showed that the achromat had noticeable (but expected) color excess and a little spherical aberration, although the diffraction patterns of stars were fairly clear and nicely symmetric. In short, for a 2-element simple f/6 achromat, it was doing about as I expected. However, the instrument's main talking point is the wide field and nice light gathering ability which make the scope a fine deep-sky performer, and this is where the scope really came into its own. The 1.25 inch star diagonal will limit the possible field of view to under 2.7 degrees, but that is plenty for scanning the Milky Way under a dark summer sky. With a 2" star diagonal, I was able to get over 4.2 degrees of true field with the scope using two wide-field 2" eyepieces I have. The field was fairly flat when using a quality wide-field eyepiece, but with the less expensive 2" models, eyepiece astigmatism tended to dominate any telescope-generated field aberrations. The views of the Milky Way and large open clusters were quite stunning, and I frequently use the scope with filters from my back yard with surprisingly good results. From my dark sky site, I have managed a few pretty amazing views with the scope. My best views of things like the North America Nebula, the Rosette Nebula, and M31 all have come using the SkyView Pro 100. Even at moderate magnifications, the scope performs quite well, although eventually, as power is increased, the "color excess" of residual chromatic aberration becomes more and more visible. The focuser did have just a little play in it causing a minor amount of image shift, although this was lessened by tightening the tension/lock screw on the focuser somewhat.

At magnifications under 100x, the SkyView Pro 100 shows only faint hints of the violet fringing, and is much better color corrected than my 80mm f/5 "Short tube" refractor. At higher powers, the violet halos become more visible on bright objects, but are generally at least fairly tolerable. For fainter objects, instead of a violet halo, small very faint diffuse glows perhaps nearly a minute of arc across are sometimes seen around brighter stars in things like tight rich faint star clusters at high powers. I had seen this on M11 with my 80mm f/5, but again, the faint glows were not as bad in the SkyView Pro 100 as they had been on the smaller Short Tube scope. M11 still resolved nicely in the 100mm f/6 scope, and stars were visible in many of the brighter globular clusters, although most were not fully resolved. On the moon, the views were very pleasing up to 150x although some of the violet fringing was easily visible. However, unlike the 80mm f/5's "violet haze" effect which extended over almost the entire moon, the fringing visible in the 100mm f/6 refractor was considerably less intrusive. In fact, I pushed the SkyView Pro to as much as 306x on the moon, although I did like the lunar view much better at powers under 200x. Using the "stop down" 60mm opening on the front dust cap of the scope, the color fringing nearly vanished, so if you don't want the color, you can use that stop to get a 60mm f/10 refractor's performance.

On the planets at high powers, the scope did not do quite as well, as I kept fussing with the focus trying to get the sharpest image possible and never being quite completely satisfied. The violet halos became very noticeable and a little annoying. Still, with a minus-violet filter, the scope became a passable planetary performer, showing 4 to 6 belts on Jupiter and the Cassini Division in Saturn's rings easily at 150x even when a filter was not used. During the last two close oppositions of Mars, in the SkyView Pro 100, the planet did show some of the larger dark markings (especially with a red filter), as well as the polar cap using powers from 120x to as high as 200x. On some tight double stars like Epsilon Bootis, the color halos made detecting the companion more difficult, but it still split many fairly tight doubles in the 2 to 4 arc second range with ease. In fact, on a number of occasions, I even glimpsed the "E" and "F" components of the Trapezium in the Orion Nebula using the SkyView Pro 100. Again, the thing to keep in mind is that this scope is designed mainly for lower powers and wider fields, so expecting high contrast and really good planetary performance with the SkyView Pro 100 is a little unrealistic. If you really want considerably better planetary performance in this aperture range, you should look at something like the 100mm f/9 ED or the 127mm Mak-Cassegrain that Orion puts on this very same mount.

The SkyView Pro 100 reached focus with all my 1.25" eyepieces when the 1.25" star diagonal was used, but with some adapters or Barlows, using a 2" star diagonal with an 1.25" adapter might cause some focusing problems with 1.25" hardware due to the limited focuser travel and lack of a drawtube. I ran into this problem with my 5-8mm Speers Waler eyepiece which focused just fine using the 1.25" diagonal but would not reach focus in my 2" star diagonal with the diagonal's 1.25 inch adapter in place. AstroSystems makes an "ultra-low" profile adapter which now allows the Speers Waler to come to a focus, but much of the time if I am using the Speers Waler, I will leave the 1.25" star diagonal in the scope.

As far as accessories are concerned, probably the first one to get would be a 2 inch diagonal for the wider field eyepieces which really make this scope shine. The f/6 f/ratio is a bit challenging for many of

the low-cost wide-field 2" eyepieces, although I have had fairly good luck with a University Optics 40mm Mk-70 Konig. Also, while the finderscope is adequate, in routine use it sometimes ends up rather low above the ground, making looking through a bit of a pain in the neck. I replaced it with a Right-Angle Correct Image 6x30 finder and that works fairly well, although sighting along that finderscope to get things in the right area of the sky is not as easy. I ended up also sticking on a Rigel Quickfinder reticle unit on the SkyView Pro's dew cap, which made gross pointing of the scope considerably faster and less neck-straining. More eyepiece are also a must, but if you are going to use a Barlow on the SkyView Pro 100, I would go with a Tele Vue Powermate, as it does not require the infocus travel that a standard Barlow does.

### **What I Liked About the SkyView Pro 100:**

1. Nice wide-field views.
2. Reasonably-good portability
3. Rugged stable mount
4. Good light gathering ability
5. Fair moderate power performance.

### **What I did NOT Like about the SkyView Pro 100:**

1. Cranky clock drive.
2. Limited focuser travel
3. Limited tripod height adjustability
4. Bright green LED on hand controller
5. Color Excess (well, what do you expect for such a low-cost instrument?)

### **SUMMARY:**

The Orion SkyView Pro 100 refractor is a nice wide-field instrument for casual viewing which is easy to use and modest in cost. It is not the greatest for high power use, but it **will** tend to perform well enough to make kicking the power on it up a little worth the effort.

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