East Valley Astronomy Club

July *Newsletter* *1994*

EVAC HIGHLIGHTS

The June 22nd meeting got of to somewhat of a late start. The main speaker was Rick Blakley, an expert in optical systems. Rick's topic for the evening was collimating a Newtonian telescope. Most of the procedure can (and should) be done in daylight. Start by roughly aligning the primary by sighting down the telescope tube. Then center the diagonal in the focuser and adjust the diagonal's tilt and rotation so that the reflection of the primary is centered in the diagonal. Use a Cheshire eyepiece to refine the alignment of the primary. The last step is to center a moderately bright star and use the Fresnal rings to perform the final alignment of the primary. Rick stressed the importance of understanding the geometry of the Newtonian reflector and encouraged Newtonian owners to make a sketch to help them understand better what is going on inside their telescopes.

About a dozen people attended the local star party at Florence Junction on July 2nd. Six people and four telescopes were present at the deep sky star party at Vekol Road the following weekend. Everyone was treated to some truly impressing views through Don Wrigley's newly completed 16" reflector. Especially impressive was the Veil Nebula viewed with an O III filter. By 2am, everyone was ready to pack it up for the night and the entire group left together. This was an excellent, clear night, especially considering the time of year. Those who chose not to go missed some great observing and fellowship.

JUNE'S SPEAKER

Our speaker for the July 20th meeting will be Michael Janes, who will speak on double star observing.

SPECIAL STAR PARTY

An organization called "Meetings and More" has asked our club to do a star party on Friday, July 22 at Pinnacle Peak. The exact time and location will be discussed at the July 20th meeting. There is also a possibility for another star party in September. So, set the 22nd aside and plan to bring your scope.

PERSEID METEORS

August is best known for the annual Perseid meteor shower, which is caused by debris from Comet Swift-Tuttle. The Perseids have been very strong in recent years because of the relatively recent return of Swift-Tuttle. Although many of the "meteor storms" forecast in the past couple of years have turned out to be rather sedate, this year's display is expected to be strong. The conditions are even favorable for those living in western North America! The strongest peak is expected sometime between 7 and 11 hours UT (that's midnight and 3 am MST) on August 12th. EVAC is planning a "meteor party" at the Tortilla Flat site on the night of August 11-12. More information will be available at the meeting or you can call Frank Kraljic at 991-5105.

WANTED

12½" f/6 tool for mirror grinding, similar to the ones used in the mirror making class last summer. Please contact Bill Peters, 844-8172.

UPCOMING EVENTS

EVAC Business Meeting
July 20, SCC Room PS172, 7:30pm

Local Star Party
July 30, Florence Junction Site and Carefree Site

Deep Sky Star Party
August 6, Vekol Road Site

More on Collimation

by Rick Blakley

A question was raised at my presentation on collimating the Newtonian reflector during the June 22 meeting. Someone asked what the units were for an equation that provided a figure for the off-axis tolerance of the Newtonian primary. This tolerance indicates the maximum perpendicular distance the optical axis of the primary can be away from perfect alignment at focus. The formula is:

Off-Axis Tol. = $0.00043(\text{F ratio})^3$,

and comes from J.B. Sidgwick's *Amateur Astronomer's Handbook*, page 160. The constant in the formula determines the units, and, because the wavelength of yellow-green light at 5600 angstroms is involved in establishing that constant, I replied that the units were metric. However, I have reviewed Sidgwick's derivation and found that he converts the wavelength to inches before he states the equation's final form. The units are therefore, inches. Please accept my apologies for the error.

Here are some other suggestions that may help you in aligning your Newtonian.

Set up a priority list for the duties that you will perform. I suggest the following (1-5 to be done in daylight):

(1) Align the primary using the technique I described to you; viewing it from the front of the telescope. Having a friend's help here in adjusting the primary can be a considerable time saver. Also remember that if the primary is collimated, the reflections of the spider vanes will fall directly behind the actual vanes as seen from the front when you look through the geometric center of the diagonal cell.

(2) Ensure that the diagonal is located on the center of the focuser. Use a pinhole "peeper" if needed; its manufacture is described immediately below. You may need to relocate he diagonal after adjusting its angle in part 3.

(3) Check the angle of the diagonal by viewing it through a pinhole centered in the eyepiece tube. Stretch and tape a piece of aluminum foil over the end of the eyepiece tube and carefully measure and make a pinhole in the center of the tube. The primary and the reflection of the telescope tube in it should appear concentric, and all edges of the primary should be seen at once in the field.

(4) Pull the eyepiece tube back and view the diagonal again to see if the reflection of the primary in the diagonal has shifted. If it so appears, tilt the focuser with shims until the image no longer appears to shift when viewed with the eyepiece tube pushed in or pulled out.

(5) Check the alignment of the primary with a Cheshire or autocollimation eyepiece if you have one. A dot located on the center of the primary may assist you.

(6) Do a final alignment at night using the Fresnel rings. Everything should be close enough that only the primary should need adjustment.

Amateurs tend to confuse directions when viewing the optics through the eyepiece tube. I described the technique of using threads stretched and accurately centered over the open end of the telescope tube. One may also occasionally place one's finger over the edge of the telescope tube with the intent of seeing it when peering through the focuser at the diagonal. These techniques work better when one is viewing through a focuser that is truly horizontal with respect to the floor. To judge direction around the region of the primary in the "business" end of the telescope, locate the safety clips that keep the primary from tipping over so that they can be used to judge vertical, horizontal, right and left. You may even wish to color code them (and the adjusting screws). One may alternately add colored points or variously shaped objects aside of the mirror cell for guides.

However, as I emphasized at the meeting, there is no substitute for learning the geometry of your Newtonian. Make sketches of what you see through the focuser using the technique I described and the learning process will quicken. The telescope gives you *all* of the information you need to collimate its optics accurately. Learn its language, and you will be a happier observer.

The Deep Sky Notebook

by Robert Kerwin

Looking for Dark Nebulae

Dark nebulae are probably one of the most neglected classes of deep sky objects. This neglect could be due in part to the fact that they are *dark*; most observers tend to equate darkness with lack of observable objects. This philosophy seems to be borne out by the complete exclusion of dark nebulae from Tirion's Sky Atlas 2000. Dark nebulae do indeed represent a reversal of thinking: instead of looking for something that emits light, we are looking for something that obscures light. Nonetheless, the interplay between a dark nebula and its surrounding star field can be both fascinating and striking. In some cases, the view even looks three-dimensional.

Dark and bright nebulae are actually very similar. What makes a dark nebula dark is simply the lack of an illuminating star. A dark nebula is just a cloud of gas and dust that absorbs the light of objects behind it.

Dark nebulae present the observer with some interesting challenges. The visibility of a dark nebula depends on two major factors: the opacity of the nebula and the brightness of the background. A very opaque nebula that is juxtaposed against a poor star field will be much harder to see than a less opaque nebula against a rich star field. The opacity of a nebula is rated on a scale of 1 to 6, with 1 being the least opaque and 6 being the most opaque. The opacity rating loosely corresponds to the number of magnitudes the region is dimmed by the dark nebula.

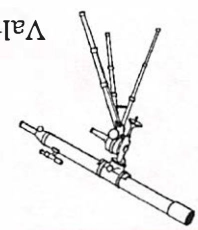
As with other types of deep sky objects, dark skies are essential. Most dark nebulae tend to be rather large, so low to moderate magnification usually works best. I usually use 60 - 100x with my eight-inch reflector. Your ability to detect a nebula hinges on whether you can see fewer stars in one area of the field than in other areas. Try different magnifications to see which one gives the best view. As in bright nebulae, look for details, which in this case means areas of differing opacity.

One of the most interesting dark nebulae is **Barnard 72** in Ophiuchus. Often known as the "Snake Nebula," the photographic appearance is quite striking. It is located about 1.5° north of θ Ophiuchi and appears to be connected to the much larger Pipe Nebula, easily visible in binoculars or with the unaided eye. Visually, the "S" shape is moderately difficult. The nebula seems to be darker to the east. Just to the south of the Snake are three small dark blotches: B68, B69 and B70. B68 is perhaps the easiest of the three and appears as a small dark oval. B69 is similar in appearance, whereas B70 is more irregular and less opaque.

Just 2.5° north of γ Sagittarii in some of the densest and most beautiful star fields of the summer Milky Way lies **Barnard 90**. I "discovered" this object while searching for NGC 6565, a planetary nebula only ½° to the east. B90 appears as an oval dark patch about five arc-minutes across oriented north-south. A diffuse dark area fans out to the southeast for about 13 arc-minutes. Overall, the object looks like a dark comet.

Just north of the spectacular star cloud M24 are two nice dark nebulae. **Barnard 92** is the westernmost of the two and appears as a 16 x 12 arc-minute dark patch with a single star shining through. **Barnard 93** is just to the east and appears as a complex, irregular dark cloud. The main body is about 24 arc-minutes across and is very dark in the center. Dark tendrils extend to the north, south and east. I was able to trace a dark lane extending to the east for about 50 arc-minutes. This area of the sky is fascinating and will certainly reward the observer's explorations with views unmatched anywhere else in the sky.

Name	Type	Opacity	Dimensions	Const	SkyAtlas	U2000	R.A.	Dec
B72	dk neb	6	4'	Oph	---	338	17h 24m	-23° 38'
B90	dk neb	5	13'	Sgr	---	377	18h 10m	-28° 19'
B92	dk neb	6	15' x 9'	Sgr	---	339	18h 16m	-18° 14'
B93	dk neb	4	15'	Sgr	---	339	18h 17m	-18° 04'



Valued EVAC member since 1/17/92!

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Vekol Road Site