NOVAC

THE NEWSLETTER OF THE NORTHERN VIRGINIA ASTRONOMY CLUB

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UPCOMING NOVAC EVENTS

Club Observing Dates

July 16, 17, 23, 24

August 13, 14, 20, 21

Monthly Meetings

July 21

August 18

Editor's Note

by Thomas S. Parry

As summer settles over the region, hot muggy days and stagnant air often give way to excellent seeing conditions for visual astronomy at night. Although prevailing haze may attenuate some fainter deep sky objects such as galaxies and nebulae, steadiness of the atmosphere is at its best for the entire year. Such conditions can yield exceptional high resolution images of the moon and planets. Close double stars, open clusters and globular clusters can also penetrate the haze and provide magnificent views.

I recently set up my 14.5 inch reflector in my backyard late on a warm and very hazy afternoon. I wanted to see what I could through a very opaque sky. I really didn't think I was going to see much but when I turned the scope to Jupiter, the detail I saw was incredible. Details in the upper cloud deck and the Great Red Spot were razor sharp! Later in the evening I viewed several close double stars and could cleanly split them down to two arc seconds. Globular cluster M13 was still impressive even if muted by the opaque sky.

The lesson I learned from this experience was not to discount observing on a given night just because the sky looked extra hazy during the day. There is more to see than one can imagine. Take advantage of these summer months to get out, feel the warmth in the evening air and enjoy the splendors of the summer sky.

A great opportunity comes to us this August as the Perseid Meteor Shower reaches maximum. With the recent flyby of Comet Swift/Tuttle, it is possible that this year's Perseids could storm! Two articles by Jon Stewart-Taylor in this issue examine meteor watching and provide hints for watching the Perseids during the peak display of August 11/12. The August issues of *Sky and Telescope* and *Astronomy* each contains excellent articles on the upcoming Perseid event. I hope many of our club members can get out and watch the event this year even if the skies are a little hazy.

Finally, as Jupiter descends toward its annual conjunction with the sun in August, it is replaced by magnificent Saturn ascending in the southeast. Saturn reaches opposition on August 19 and will be visible all night. I know I will be spending many hours behind the eyepiece monitoring this gem of the solar system.

Inside This Issue:

July and August General Meetings

As this issue of the NOVAC Newsletter

goes to press, topics for the July and August General Membership Meetings had not been determined. We do, however, anticipate some interesting programs for the summer months and we hope you can join us for them. **The monthly General Membership Meetings of the Northern Virginia Astronomy Club are held the third Wednesday of every month at 7:30 P.M. at the Arlington County Planetarium, 1426 N. Quincy Street, Arlington VA.** Admission is free and open to the public. Call the NOVAC hotline (703) 256-8359 for upcoming events, special announcements, or to leave a message for additional information.

Upcoming Special Events

The 1993 Northern Virginia Telescope Meet

This year, the Northern Virginia Telescope Meet will be held **September 18 (one night only) at C. M. Crockett Park. Rain date is September 25.** Make plans now to attend NOVAC's biggest event of the year. Full details will be provided in upcoming General Membership Meetings and in the September/October edition of the NOVAC Newsletter.

The Virginia Association of Astronomy Societies Meeting

NOVAC will host The Virginia Association of Astronomy Societies Meeting at the U.S. Naval Observatory in August. Times and dates are yet to be decided but will be announced in the July General Membership Meeting.

Highlights of May and June NOVAC General Membership Meetings

by Bob L'Hommedieu

General Meeting May 19, 1993

Myron Wasiuta called the meeting to order at 7:30 P.M. Thirty-nine members and guests attended at the Arlington County Planetarium.

Old Business:

1. A star party for homeless children in Arlington County is slated for 8:15 PM on May 28, 1993 at Roundtree Park in Arlington. For more information call Lynne Haber at 934-3126.

2. On May 21, 1993 there will be a star party for the *Young Astronauts* program in Warrenton. Call Jerry Wolczanski for more information.

3. Several NOVAC members attended the recent USNO open house and hosted a display of telescopes and information about NOVAC. Nearly 4,000 people attended the open house and many expressed interest in NOVAC. Some received information and membership application forms.

New Business:

1. Dr. Wallin from George Mason University has contacted NOVAC about the possibility of establishing a joint GMU-NOVAC observatory. NOVAC officers held preliminary discussions with Dr. Wallin about the project and will soon meet for more in-depth discussions. This may be a big opportunity for NOVAC.

2. A volunteer is needed to help out at the Arlington Outdoor Lab on May 22,1993. Anyone interested should call Brenda Jones.

3. A person is needed to be coordinator for the Northern Virginia Telescope Meet. Jim Schaeffer has had to drop out due to family and business commitments.

4. Fred Holmes presented the monthly observing report.

The program for this month was unique and special. Diane Temple, a professional storyteller, told of the legends used by ancient peoples to explain the stars and heavens. She used the planetarium projector to graphically illustrate her stories.

General Meeting June 16, 1993

Myron Wasiuta called the meeting to order at 7:30 P.M. Thirty-five members and guests attended at the Arlington County Planetarium.

Old Business:

1. George Mason University contacted NOVAC about the possibility of establishing a joint observatory. The two most important questions we must ask are: (1) does NOVAC need an observatory/observing site of its own? and (2) are we willing as a club to do the work required to build and maintain such a facility? NOVAC officers will try to determine the opinion of the membership over the next few months as we explore the opportunity with GMU (See President's Column in this issue.).

2. NOVAC will host The Virginia Association of Astronomy Societies meeting at the US Naval Observatory in August.

New Business:

1. The annual Stellafane convention will be held August 13 & 14, 1993 in Springfield Vermont.

2. Fred Holmes presented the monthly observing report.

Myron Wasiuta and Bob L'Hommedieu presented the program for the evening. Myron showed slides of his recent trip to New Mexico and Star Hill Inn. Bob described how to make a battery powered LED observing light.

President's Column: A Permanent Observing Site for NOVAC?

by Myron Wasiuta

Before I get into this month's column, I would like to express my sincerest thanks to Steve Smith for his continued support of NOVAC. By allowing us to use Arlington Planetarium, NOVAC has a first-rate meeting facility in which to conduct business, workshops, and our regular monthly meeting programs. I would be hard pressed to think of another site that offers so much! On behalf of NOVAC, thanks Steve!

As many of you know, NOVAC is evaluating the feasibility of obtaining its own permanent observing site. The site (yet to be determined) would give

club members a place to set up telescopes under a reasonably dark sky. There would be no time limits on how long one could stay, and access would be available any night of the year. The site would offer safety and security to observers. At some time in the future, should NOVAC desire to build an observatory on the site, it could be done.

Such luxuries come with a price, however, and as a club we must ask ourselves whether we really need an observing site. Are our current needs being adequately met with NOVAC's "leased" site at Crockett Park? What about the future? Encroaching light pollution at Crockett Park is becoming a more acute problem each year. We must also consider the bottom line operation and maintenance costs of a site, even if only an acre or two. These include taxes, grounds maintenance, site improvements, insurance, etc.. All of this will require money and donated time from NOVAC members. This means NOVAC will need to run an ongoing fundraising campaign to meet annual tax and maintenance costs that could amount to as much as a thousand dollars per year with an observatory on the site.

Although it will require a great deal of work, the rewards of such an endeavor could be equally great. An observing site with a permanent observatory under dark skies would allow NOVAC to further its public outreach efforts by hosting public programs and fostering individual member observation and research projects.

I want to encourage all of us give careful consideration to this idea. At the next several General Membership meetings, we will discuss more details and decide as a club if this is something we want to do. The Astronomy department of George Mason University has expressed interest in working with NOVAC in a joint effort and both parties are presently looking into possible sites.

The time has come for NOVAC to act! Do we want an observing site, and if so, are we prepared as a club to put in the time and money needed? I encourage you to express your thoughts either at the meetings, or give me a call.

Sky Sweep for July and August 1993: Nebulae of the Summer Milky Way

by Kevin Jones

I recently spent a night at the Star Hill Inn in northern New Mexico, hoping to enjoy the Inn's pristine black skies and find an idea for this issue's Sky Sweep. Unfortunately, my stay at the Inn fell on one of their busiest nights ever, with many telescopes and binoculars positioned on the observing platform waiting for night to fall. As some of us already know, just like picnics attract ants, telescopes attract clouds. I enjoyed a spectacular lightning display that night, but unfortunately not the dark skies I'd hoped for. I did come up with a Sky Sweep idea, though. I thought I would focus on pretty, celestial clouds called nebulae found in the summer Milky Way (instead of atmospheric ones covering the sky).

The first of these clouds is the Pipe Nebula. This nebula is visible to the naked eye on dark, transparent nights as a black pipe-shaped form in the Milky Way about three degrees southeast of Theta Ophiuchi. The Pipe is a dark nebula, an opaque region of gas and dust in space that blocks or dims starlight shining through it. The Pipe Nebula is seen effectively silhouetted against the more distant star clouds of the Sagittarius and Ophiuchus Milky Way.

Dark Nebulae abound in the Sagittarius Milky Way. Many of these nebulae are only visible on long-exposure photographs of the area, where they stand out against the bright background of the Milky Way. Certain areas of the Sagittarius Milky Way contain dark nebulae that are large enough and in front of bright enough portions of the Milky Way to be visible telescopically. Try sweeping the region about three degrees to the north of the spout (Gamma Sagittarii) in the "teapot" asterism of Sagittarius. Using low power, dark nebulae here will show up as starless areas against the backdrop of faint Milky Way stars. Good, dark, transparent skies are quite helpful for finding these objects.

Several degrees north of Gamma Sagittarii is the famous Lagoon Nebula, M8. This nebula is an emission nebula, a large cloud of hydrogen gas that has been excited into emitting light by ultraviolet radiation from nearby young stars. The Lagoon Nebula is about the same angular size as the full moon and is bright enough to be seen with the naked eye as a conspicuous spot in the Milky Way. Through a telescope, the nebula may appear greenish, with much visible structure. A dark dust lane, similar to the dark nebulae discussed above, cuts across the bright background nebulae. This is known as the "lagoon" from which the nebula gets its name. The eastern portion of M8 is involved with the open star cluster NGC 6530. This cluster's stars have only been shining for a few million years, making it quite young in galactic terms.

A degree and a half north of the Lagoon is the Trifid Nebula, another famous Sagittarian nebula. The Trifid Nebula, also known as M20, is quite a bit fainter and smaller than the Lagoon, but is still bright enough to be easily visible in amateur telescopes. M20 is split into two portions. The lower and brighter portion is an emission nebula, similar to M8. It contains a triple star at its center and three dark lanes radiating outward from the central star system trisecting the nebula. This three-sectioned form, detectable in amateur telescopes, gives this nebula the name "Trifid."

The upper part of M20 is about the same size as the lower, but not quite as bright. This upper portion is a reflection nebula. It does not emit light like an emission nebula does, rather it reflects light from nearby stars. Some astronomers think that the emission and reflection parts of M20, although they appear through the telescope to be in contact, are not actually touching in space.

M8 and M20 are both located around twenty-five hundred light-years from the Solar System, and are part of a larger cloud of gas and dust. Other components of this cloud are visible a degree or so to the east of M20. From

north to south, NGC 6546, IC 4684, IC 1275, and NGC 6559 make up a line about one degree in length of small and relatively faint emission nebulae. These four nebulae are among the brightest members of this complex of gas and dust besides M8 and M20.

Embedded in the Milky Way in northernmost Sagittarius is an intricate emission nebula/open cluster combination. This is M17, also called the Omega, Swan, or Horseshoe Nebula. M17 is another bright nebula, sometimes appearing greenish through the eyepiece. It has a wealth of wonderful structure and shape, easily visible through telescopes. Take the time to study this nebula as you observe it. The longer you look at M17, the more complexity and structure you will see. I can easily imagine the nebula to be swan-shaped, lending the name "Swan Nebula." Seeing a horseshoe or the Greek letter omega, however, takes more imagination than I seem to have.

The final destination on this tour of summer Milky Way nebulae is M16, the Eagle Nebula. M16 is located three degrees to the north of M17, just across the Serpens Cauda border from Sagittarius. Visually, this nebula is primarily a star cluster of quite a few relatively bright stars. Its surrounding nebulosity is dimly visible through the telescope, but is much more impressive photographically. Photographs show the star cluster surrounded by an emission nebula, with a dark nebular protrusion whose shape bears an amazing resemblance to a flying eagle with talons extended. This nebula requires very dark, transparent skies, and dark-adapted eyes to be seen through amateur-sized telescopes.

I hope most of the clouds visible during summer observing sessions will be bright or dark ones of gas and dust thousands of light-years away in our Milky Way galaxy. They surely beat the opaque water vapor clouds considerably closer to home in Earth's atmosphere. Clear skies!

Sky Calendar
July/August 1993
by Thomas S. Parry

July

3	*Full Moon.*
4	*The Earth is at aphelion, its farthest point from the sun for the year at a distance of 94.5 million miles.*
7	*Look to the lower right of the waning gibbous Moon for Saturn late in the evening.*
11	*Last quarter Moon.*
12	*Uranus and Neptune come to opposition just 11 hours apart. Located in Sagittarius, the two planets will appear one degree apart shining at magnitude 5.5 and 8 respectively.*
15	*Venus appears in the dawn sky 3 degrees north of Aldebaran.*
16	*Venus has a beautiful conjunction with the crescent Moon in the dawn sky.*
19	*New Moon. A splendid time for deep-sky observers!*
22	*Mars shines faintly to the upper right of the waxing crescent Moon in evening twilight. Jupiter is to the upper left and much brighter than Mars.*
23	*The Moon is close to Jupiter this evening.*
24	*The Moon is near Spica (Alpha Virginis) at Jupiter's left in the southwestern sky during and after twilight.*
25	*First quarter Moon.*

August

1	*Full Moon.*
3	*The waning gibbous moon is at the upper left of Saturn.*
4	*Mercury is at greatest elongation and visible in the dawn sky 19 degrees west of the sun.*
10	*Last quarter Moon.*
11	*The Perseid Meteor Shower peaks during the early morning hours of August 12.*
14	*Venus is to the lower left of the waning crescent Moon in the eastern sky at dawn.*
15	*Venus above the waning Moon at dawn.*
17	*New Moon. Faint fuzzies beckon!*
19	*Saturn is at opposition and is brightest for the year.*
20	*The waxing crescent Moon is near Jupiter and Mars in southwest at dusk.*
21	*The Moon forms a line with Spica, Jupiter, and Mars to its right.*
23	*First quarter Moon.*
30	*Saturn below the Moon.*
31	*Full Moon (Blue Moon for North America).*

The Recreational Astronomer #3: Meteors and Meteor Showers

by Jon Stewart-Taylor

Welcome back. This time we'll discuss meteors: what they are, and ways to observe them. This column is intended mainly for beginning and intermediate astronomers, but I hope it will have something for everyone who enjoys watching these evanescent streaks of light.

Here's a Flash...

Meteors (also known as shooting stars or falling stars) are streaks of light in the night sky; some bright, some faint, some long, some short. Meteors are usually debris in the form of dust and pebbles left behind by comets. When dust and pebbles in space hit Earth's atmosphere, they heat up until they glow. Depending on the size and composition of the particles, meteors may be different colors, leave glowing trails, or even explode.

Meteors can be seen on any clear night. Depending on how dark your sky is, you may see five or so per hour, appearing unpredictably. Comets may have left these meteors so long ago that they were dispersed at random, leaving no clear pattern or order. Besides sporadic meteors, there are meteor showers that are traceable to particular comets. These showers vary in intensity. Some appear as weak showers barely distinguishable from sporadic meteor flashes while others appear as (very rare) meteor storms in which thousands of meteors are seen per minute.

There is another characteristic of *shower* meteors that distinguishes them from *sporadics*. All of the meteors in a shower are moving in the same orbit and hit the earth in a parallel stream. Because of our perspective on Earth, they appear to radiate from a particular point in the sky called the radiant. You may have seen a similar effect driving in a car on a snowy (or rainy) day. All the flakes (or drops) seem to come from directly in front of you and fan out to the side. Although meteors don't always appear to begin at the radiant, if you extend the line of their flight backwards, it will cross through the radiant.

One of the most reliable showers, the Perseids, occurs in August. For 1993, the Perseids will start around July 25, peak the night of August 11/12, and end around August 18. The peak is short (lasting only a day or so) and pronounced--giving a meteor per minute compared to one every five to ten minutes a day before or after. We're fortunate this year because the moon will be past last quarter and should not interfere with seeing the shower.

There are about ten other reliable showers throughout the rest of the year. You can find their dates and intensities by looking in a reference such as *Peterson's* or the *Astronomical Calendar*. Particularly good ones are the Quadrantids in January (brrr!), Aquarids in May, and Geminids in December. Each of these should produce a meteor at least every minute or two. November's Leonids is a mediocre shower most years, but every 33 years they produce an astonishing storm with thousands of meteors per minute. The next one is due in 1999.

How to Prepare

Watching meteors is simple, but there are a few things you should do before watching a meteor shower. First, figure out where the radiant will be in the sky. The name of the shower will normally tell you the constellation the radiant is in (except the Quadrantids, whose radiant is in Bootes). Find out where the constellation will be in the sky during the shower.

Next, pick your site. The ideal site will have a clear view of the horizon in the direction of the radiant, will be well away from lights (the darker the sky, the more meteors you'll see), and will be in a safe area. If you have to choose between sites, go for safety, darkness, and finally wide horizons.

Equipment required for watching meteors is minimal. You should take a chaise-lounge or a pad (like a sleeping bag) to lie on. Everything else is optional. Drinks and snacks can help keep you comfortable (and awake!). You may want to take a radio, or a watch with an alarm, so you can figure out what time it is without needing to look. A pad of paper and a pencil for taking notes or sketching can be useful.

What you wear during a meteor session depends in part on the time of year. If you plan to be out long it can get quite chilly, even during the summer. The best plan is to bring lots of layers that can be added or subtracted as needed. Dry towels (and a way to keep them dry) are great on nights of heavy dew.

"Catch a Falling Star..."

Although meteors can be detected with binoculars, telescopes, and cameras, the best way to observe showers is to simply lie back and enjoy the show. If you have time (and nowhere to go the next day), you should watch all night. Otherwise, choose a time when the radiant is at least 30-40 degrees above the horizon. Take your pad or recliner out, lay back, and watch. Don't fix your eyes on any one place (not even the radiant). Instead, keep them moving around at a comfortable pace in the region between the radiant and the zenith, or around the radiant. This will prevent you from developing "tunnel vision," which is important because meteors occurring directly where you're looking will be rare-. Most appear out of the corner of your eye.

Depending on the shower, you may see one every minute or so, or one every ten to fifteen minutes. If you see a Zenithal Hourly Rate (ZHR) number listed for a shower, be aware that this is a rounded-up estimate. The ZHR assumes the radiant is directly overhead, sky conditions are perfect, and all portions of the sky are visible simultaneously. Obviously, this won't be true most of the time, so the actual number observed will be quite a bit lower. For example, the 1993 Astreonomical Calendar lists the ZHR of the Perseids as 68, but the usual maximum number of meteors observed under good conditions is 50-60.

These numbers are the maximums--before or after the peak. Even at peak, the number of meteors observed will be lower. In addition, meteor showers tend to appear in bursts. You may

watch for ten minutes and see no meteors at all, then see five or ten in the next five minutes.

Keeping Records

If you'd like to record your observations there are several methods to try. You can write down what you see as it happens, diary fashion. Use a radio or countdown timer (watch, kitchen timer, etc.) to keep track of the approximate time, and record everything you can about the location, path, brightness, color, duration, and so on. The main drawback is that you spend too much time writing in the dark, rather than watching meteors.

Another method is to use a tape recorder and narrate what you see. This allows you to keep your attention on the sky. A third method is to make time-coded charts of the sky, and draw the paths of the meteors directly on the charts. Use a new chart every half-hour or so and you'll have a very good record of the location, time distributions and lengths of the meteors. A computerized star atlas program would be helpful.

All these methods have their advantages and disadvantages. Of course, you may decide you don't want to go to the trouble of recording your observations at all. Pick a good site, lean back, and watch the celestial fireworks.

Acknowledgments and References

The Astronomical Companion by Guy Ottewell, has lots of information about types, origins, orbits, and distributions of meteors and meteor showers.

The annual ***Astronomical Calendar*** also by Guy Ottewell, gives the exact dates, expected intensities, and sky conditions for the meteor showers in a given year. Minor showers producing only a dozen meteors per day are also included. The 1992 issue contains an interesting graphical representation of meteor showers during a year in which it is obvious why August is the best month for meteor watching.

Peterson's Field Guide to the Stars and Planets by Pasachoff/Menzel covers meteors, meteor showers, and meteor observing briefly, but from a different perspective than the Companion.

That's it for this time- go watch some meteors!

The Perseids are Coming!

by Jon Stewart-Taylor

The Perseids are coming! Over the last few years, meteor watchers have noticed an enhanced peak of meteor activity during the Perseid maximum lasting about an hour. Because this will be the first shower since the 1992 return of parent comet *p/Swift-Tuttle*, there is anticipation that material recently ejected from the comet will produce a meteor storm. Studies of past meteor storms suggest that newly ejected material will produce many faint meteors. There will still be large particles, but the proportion of faint to bright meteors will be higher than usual.

The best place to observe the Perseids this year will probably be Europe, although they will probably put on a fine display under dark skies everywhere. The moon will rise as a waning crescent about 1:00 A.M. EDT, but is better placed than last year. If sky conditions are good, the shower should be visible.

Although it is difficult to predict how long the display will last and the extent of peak activity, the shower should peak around 1:00 UT on August 12. Meteor storms generally last for just a few hours, but the 1833 Leonids showed strong activity for nearly six hours. The largest meteor storms on record produced about 100,000 meteors in less than an hour. As for this year's display, it's anyone's guess!

There will be an all-night Perseid watch at Crockett Park beginning at 8:00 P.M. August 11 to 6:00 A.M. August 12. Besides simply watching the shower, we'll collect data for the International Meteor Organization (IMO), using techniques outlined in the August 1993 issue of *Sky & Telescope*. If you would like to participate contact Jon Stewart-Taylor (703 476-8949, or maunaloa!jstewart @telenet.com) for more information. If you don't want to collect data, come out anyway and enjoy the show.

Here are some Perseid details from the IMO1993 Meteor Shower Calendar, prepared for Usenet/Compuserve by Andre Knoefel:

Active: July 17 to August 24

Maxima: August 12, ZHR = 95, 4h UT (lambda=139.6 deg) and 15h UT (lambda=140.1 deg)

Radiant: alpha=46 deg, delta=+58 deg, **diameter:** 5 deg
V = 59 km/s, r= 2.6

For telescopic viewing, field centers are:
alpha=019deg, delta=+38deg and alpha=348deg, delta=+74deg ***before*** 2h local time

alpha=043deg, delta=+38deg and alpha=073deg, delta=+66deg ***after*** 2h local time (beta >20deg N)

Information contained here was taken from three articles posted to the ***Usenet sci.astro news group***:

International Meteor Organization ***1993 Meteor Shower Calendar***, prepared for Usenet and Compuserve by Andre Knoefel

Press Notice from *Royal Astronomical Society News and Information Service*, 17 May 1993, Ref. PN 93/4. Issued by: Dr. Jacqueline Mitton, RAS Public Relations Officer

Perseids 1993: Shower Or Storm? by Peter Brown, published in the *Electronic Journal of the Astronomical Society of the Atlantic*, Courtesy of Paul Dickson, Editor of the Saguaro Astronomy Club's newsletter, SACNews.

Reflections in the Eyepiece

by Robert Bunge

For years Tom Burns and I gave many talks about astronomy and answered hundreds of questions about buying a first telescope. After much debate and

consideration, we usually recommended the 8-inch f/4.5 Dobsonian sold by Coulter Optical--due largely to the low price (about $250).

The Coulter is a good telescope to *grow* into, but because of the fast f/4.5 focal ratio, it's not really designed for the lunar and planetary observing that most beginners want to do with their new-found hobby. Mirrors with such a short f/ratio are difficult to make and often don't perform as well as other 8-inch telescopes of longer focal ratio on the moon and planets. Since these are the objects most beginners want to look at, we were always torn between the Coulter and another type of telescope.

Some time ago, Tom and I teamed up to write an editorial for Sky & Telescope magazine. It described the need for a good 6-inch f/8 Newtonian optical tube, on a simple Dobsonian mount, for less than $300. We asked that this telescope be sold not only through the magazines, but marketed to K-Mart and similar outlets. We felt the marketing strategy was most important. Selling these telescopes at K-Mart might finally kill off the cheap refractors sold in department stores. We got a nice rejection letter from S&T suggesting we contact some telescope companies. Since we HAD mentioned it to most of the existing telescope manufacturers, we gave up the project.

Four years later, the magazines seem filled with advertisements for Dobsonian telescopes with f/ratios greater than f/4.5. I am very happy to see these telescopes available: run-of-the-mill 6-inch f/8 or 8-inch f/6 Newtonians on Dobsonian mounts are good telescopes. They provide fine resolution of the moon, show serious detail on the planets, and split double stars, and can pick up thousands of galaxies and star clusters.

All that was left was to analyze the advertising in detail. I looked through catalogues including one I recently received from Orion Telescope Center. I had read on a computer network that Orion was selling a new line of Dobsonians. Apparently they are getting the telescopes from a smaller company (Pirate Instruments), which had been advertising heavily. It seems that Pirate won't sell telescopes to individuals anymore. Orion refuses to say who is supplying their new line and the new Orion telescopes look very much like the old Pirate Telescopes. Mmmm.

In a way, this pleased me. From the beginning, I had been dubious of Pirate. Who trusts a company named after thieves? Orion is a very good company: they sell quality subdiameter eyepieces, even if they do sell 60mm refractors. After reading the description in the Orion catalogue I wasn't so sure. "Optics guaranteed to be the finest available, hand-figured and corrected to within 1/8 wave, diffraction-limited performance," the ad states boldly, right at the top of the page.

I moaned when I saw this. My wife, sitting across the room, asked if I was ok. "Nope," I replied. "Why do these companies insist on promising the Earth, Moon, planets, and entire universe, and do it in hard-to-understand language?"

"Oh, it's a telescope thing," my wife said, and went back to her book.

"One eighth wave" doesn't really mean anything, since it doesn't say WHAT 1/8 wave is. It could be the surface of the mirror, or the shape of the light reflected by the mirror (the wavefront). If it's the latter, it's a very good mirror. If it's the former, the mirror would be of acceptable quality. The rule of thumb is that a mirror with no more than 1/4 wave error on the *wavefront* is acceptable. Because a telescope mirror doubles the actual error on the surface of the mirror, a 1/4 wavefront mirror must be 1/8 wave on the *surface*.

"Diffraction limited" means that the mirror is perfect. The mirror will absolutely perform as well as any mirror of its size can. The only limitations on such a mirror are the laws of physics. I know from bitter experience that diffraction limited mirrors are hard to make. In the 6- and 8-inch range, it can be done, but it's hard. In the larger 10- and 12-inch range it's very difficult. My own 12-inch is 1/12 wave on the wavefront, but isn't diffraction limited. I suffered to make that mirror. I can just imagine the suffering that is going on in the optical shop of Orion's hidden supplier. I once heard a professional optician comment that a diffraction-limited 12-inch mirror is worth at least $2,000, yet Orion asks $699 for the entire 12-inch telescope.

Most of the mirrors in this new line of low-cost telescopes are probably not diffraction limited. When S&T tested mirrors from several companies (not including Orion) a couple of years ago, they found that most of the mirrors were not the "acceptable" 1/4 wave on the wavefront. Mirrors figured to 1/4 wave are just fine: a 1/4 wavefront 6-inch f/8 will show you tons of detail on the planets, moon and so on. It takes an experienced observer to use a better mirror. So what's the problem? The problem is Orion advertises that these mirrors are *perfect*. Wouldn't it make more sense to advertise the truth instead of the riches of the Pharaohs?

Consequently, I picked up a magazine and found a Coulter ad. Coulter recently announced a sweet deal on a new telescope: an 8-inch f/7 for about $250. I scanned the ad for optical quality information. Uh-oh. *-One-eighth-wave optics, guaranteed!-* appeared right in the little box with the 8-inch f/7. "One-eighth wave what?" I cried. Our dog looked up from its nap. My wife just sighed. The dog followed suit and went back to napping.

So, are Coulter mirrors 1/8 wave on the wavefront, or on the surface?

I called the next day and got a cheery voice on the other end.
"Coulter Optical."

"Hi, I have a question about your new 8-inch f/7s," I said.

"Ok," was the cheery reply.

"Is the 1/8 wave guarantee applied to the wavefront or to the surface of the mirror?" I asked.

"To the surface," slightly less cheery.

"Oh, so these mirrors are 1/4 wave on the wavefront."

"Yes, that's right." even less cheery.

Mmmm. Coulter isn't promising the universe, although by not specifying surface accuracy in the ad, they might bamboozle some people into thinking the mirrors are better than they really are. At least Coulter makes their mirrors from Pyrex, the famous stuff you can take from the refrigerator and put straight into the oven.

Rereading the Orion catalogue, I noticed the following phrase: "Our primary mirror is 8:1 thickness ratio fine optical glass..." So what's "fine optical glass?" A look in the components section of the catalogue cleared it up. Orion sells mirrors made from "soda-lime" (better known as "green" plate glass) as well as the Pyrex glass that most modern reflecting telescopes use. The question was, which is Orion using in the new line of Dobsonians? A call to Orion brought a straightforward reply: they use the plate glass.

Few amateur telescope makers would describe plate glass as "fine optical glass." Most telescopes use Pyrex because the Corning glass doesn't warp out of shape very much as the temperature changes. If a plate-glass mirror is carried from a cool house to warmth outside it may warp and give poor images until it warms up. This clearly is a bigger problem for the larger telescopes. I don't feel too bad about a plate-glass 6-inch mirror, but a plate-glass 12-incher? No thanks!

Besides, it's a matter of principle. It's wrong to mislead consumers. It's even more wrong to promise something that probably can't be delivered in practice. Is it so hard for the commercial companies to advertise truthfully? Is it so hard for Orion to just come out and say that the telescopes use plate-glass mirrors? Would it be too hard for all of the commercial companies to agree to use a standard format and wavefront ratings when describing optics?

If I were buying a starter telescope today, I'd probably go for the Coulter. They've been selling Dobsonians for a long time and are well known. I feel it is a serious detraction that Orion is promising perfect telescopes in their ads and not revealing that they are made from plate glass. I have to wonder where else they might be stretching the truth, and what else they're not telling us. Nonetheless, if I did order a telescope from Orion, I'd be sure to test the mirror. If it had any sort of defect, I wouldn't hesitate to send it back, repeatedly, until it met their guarantee of "diffraction limited."

NOVAC Financial Statement

by Brenda Jones, Treasurer

Financial Statement for
January 1, 1993 to June 30, 1993

INCOME	
Dues, renewals	1036.00
Dues, new members	458.00
Donations to NOVAC BBS	520.00
Astronomical League Book Sales	292.18
Interest on savings account	38.20
Interest on checking account	10.06
Donations to NOVAC	34.00
TOTAL INCOME	2388.44
EXPENSES	
NOVAC BBS phone lines & power	452.95
Newsletter expenses	398.90
Astronomical League Books	282.18
Astronomical League Dues	235.45
Crockett Park user fee	200.00
Hotline phone line	73.32
Equipment purchases (eye pieces for club telescopes)	50.00
Postage for welcome pkgs, observing passes	44.03
Lock and chain for Crockett gate	27.01
State Corp. Commission reg. fee	25.00
Printing (welcome letters)	10.45
TOTAL EXPENSES	1799.29
BEGINNING BALANCE	3218.07
NET GAIN	589.15
ENDING BALANCE	3807.22

It's a Brand New Ball Game: The Odyssey Continues

by Al Schumann

There are always a few things you need to find out about a new telescope, especially a big one. How will it fit in the car? What kind of accessories will you need to support it? How will it travel? Perhaps most important is how it will work in the field after jostling around in the back of a vehicle for 50 miles? Well, the new Mark II Odyssey went through it's first real test at Crockett Park on 17 April. Lynn was the designated *Daddy* sitter for the evening, so I was off on my own.

From leftover stock I made a pallet/skid arrangement for the telescope tube. I glued big foam rubber pads at tube points of contact. A bungee cord holds the tube to the pallet, and the tube nestles in position nicely. The whole works travels beautifully. The pallet also makes loading and unloading very easy. Jim Schaeffer noted the pallet would make a fine body board if someone breaks a leg or neck while observing. Set up at the park was a breeze: it took less than a minute. In that respect, Dobs are really great. Despite the crude eyeball collimation we wrote about last time, star images were very nice. The out-of-focus Airy disk was a bit oblong so it will take a little more tweaking on collimation. We'll get it.

The weather was kinda shaky on the 17th. We had a lot of mid-level cloud cover and a brisk wind that chilled the bones, so for a while the evening was

more a social event than an observing session. Brent Archinal, Bob Bunge, George Uhl, Gus, and Myron Wasiuta joined Jim and me in lengthy discourses on everything of cosmic relevance. Holes in the clouds began to open and offer tantalizing views of the sky before closing again. Telescope tubes swung wildly around the compass while operators attempted to get a look at any target of opportunity. Eventually the holes stayed open longer, and finally the skies cleared. We all took a long look at the new supernova in M81. It's hard to believe it is a star within so distant a galaxy. It looks more like a run-of-the-mill foreground star right in our own Milky Way. The supernova's position was ideal. If you can find the galaxy, there is no problem seeing the supervova. It is one of a distinct triangle of stars at the "end" of the galaxy. Make sure you give it a look while it is still bright enough to see with backyard telescopes.

Then it was off to more familiar items. I first worked on the Messier galaxies in Leo, and it took a bit longer than usual to find them; a first little omen of things to come. M65 and M66 were very pretty, and a lot brighter than in the C-8. Myron swung the telescope to a small cluster of galaxies in the sickle. Faint, but there they were: I could make out only three of the four. It took quite a while to find one of my favorites, NGC 2903, a beautiful little galaxy off the southern tip of the sickle. Then I dropped in on the Big Dipper for the Owl Nebula (M97), M108, and M109. Working up north with the fork-mounted C-8 was always a painful operation. It seemed I was constantly getting wrapped around the fork. Not so with the Dob; it was just another patch of sky. While in the area, I stopped off at M51 and M94. Whenever I'm around there I visit M63, but I couldn't find it. Next it was cluster time. First, a few open clusters: M35, M41, and M37. They were all low in the west and not that impressive. Thence to globulars, M3, M53, M92, and M13. The latter was a knockout though it was low in the east. I can't wait to see it when it's much higher in the sky. The brightness of everything dazzled me. In motor racing there is no substitute for cubic inches. Obviously, the same holds true with inches of aperture in telescopes.

I viewed a good cross section of about 25 deep sky objects, most of which I knew very well. There were many things I looked for and couldn't find. I never did try to get into the Coma and Virgo clusters of galaxies. Frankly, I wouldn't have known where to start or what I was looking at. Yes, friends, it's a whole new ball game. What is really north and south? Where are east and west? For more than ten years I had become accustomed to sweeping my equatorial-mounted telescope straight up and down the sky for north and south, just like the charts. East and west on the charts were directly related to left and right sweeps of the telescope. To find the Dumbbell Nebula I would locate Altair and move the telescope north until M27 appeared in a low-power field. I could find scores of other deep sky objects quickly by starting from an easily identifiable star on the same line of declination or right ascension as the object. With the Dobsonian, north seems to go shooting cattywampus across the chart.

None of this caught me by surprise, by the way. Lynn and I knew what was in store for us when we built the telescope, so we employed a full array of visual aids during construction. When Bob Bunge examined the scope he said, "Wow, a Telrad and a finder!" Bob then lauded Brent Archinal's spooky ability to find faint objects without a Telrad or a finder. He can peek down the length of whatever shape tube and locate what he wants. Brent doesn't fool me though: I think he can temporarily change the proper motion of objects so they come to him. During two tours of duty in the Orient I saw mystics and holy men who could do all sorts of weird stuff like that.

Anyhow, in recent weeks I've been pouring over the charts taking note of straight lines of stars, looking for right angles, triangles, rhomboids, truncated pyramids and every combination imaginable. Why? So I can have reference guides for sweeping a Dobsonian across the sky toward a target. I've used a compass to draw four-degree Telrad circles all over my charts to narrow things down still further. I think by the time I've finished there will be more pencil marks on the charts than stars. If that's what it takes, so be it.

How's it working? Well, a straight line extending from Orion's head and continuing southeast through Betelgeuse leads to the Rosette Nebula, NGC 2255. The open cluster M67 is one Telrad circle north of the midpoint between Regulus and Procyon. Globular cluster M53 is almost halfway between Arcturus and Denebola. The big Hyades star cluster in Taurus is shaped like an arrowhead, and that arrow points to the head of Cetus the Whale, and from there, M77. Also, a straight line projected eastward from Mirzam through Sirius will get within a degree of M46, M37, and a couple other faint objects in the NGC catalog. One Telrad diameter below and outside Merak will put you right on the Owl. In his May/June '93 Skysweep column, Kevin Jones explained that you can find M81/82 by drawing an imaginary diagonal from Phecda and Dubhe, two of the bowl stars in the Big Dipper, and extending that line the same distance toward to the North. Extend that same line in the opposite direction by two Telrad diameters and you end up at M106. Alpha and Beta Cassiopeiae are directly in line with open cluster M52. Extend that line one-and-a-half Telrad diameters, and there you are. There are scads of others; all you need to do is sit back and look at the big picture.

So, the first outing was a big success. The telescope is a beauty. Fact is, I received a note from the chap who sold it to me. In its original form it was a prize winner at the Burke Lake Telescope Meet many years ago. The only shortcoming is the operator, but this new ball game isn't over yet.

Software Review: EZ Cosmos

by Al and Lynn Schumann

***EZ Cosmos*, Future Trend Software, Inc., 1508 Osprey Dr., Suite 103, Desoto, TX 75115. IBM compatible, 512K RAM, VGA, EGA, CGA, or Hercules. $49.95**

Version 3.0 has 10,000 celestial objects, including the solar system. Users can vary the magnitude of stars or deep-sky objects from zero to 20.0

and can view the full sky as it would be seen from anywhere on earth. The sky, including the sun and planets, can be set in motion and seen as they were from as long ago as 4,000 BC, and as far ahead as 10,000 AD. The sky can be viewed for any number of significant dates in history. For example, one can recreate the occultation of Jupiter by Venus in 2 BC, which is thought by many to have been the star of Bethlehem.

A zoom feature is especially useful, enabling one to see a full sky view, or narrow the field to a single constellation, or even a tiny segment of it. The sky can be zoomed in to one degree or out to 270 degrees. When viewing the sky plot one can include the planets or leave them out. Similarly, constellation lines can be shown or deleted: a nice touch. Both solar and lunar eclipses can be animated, but only solar eclipses can be predicted. There is a bank of 40 pictures that includes the sun, the planets, and a representative cross section of deep sky objects.

EZ Cosmos can be a little tricky. While looking at the whole sky, we put the cursor where the Crab Nebula (M1) should have been and clicked the mouse button. What the hey? No Crab! Turned out we had the magnitude set at 5.5. We then changed the magnitude to 11.0. Several thousand more stars appeared! This time a click of the mouse revealed a pop-up window identifying the Crab Nebula and giving its catalog number, constellation, magnitude, right ascension, declination, altitude, azimuth, and rising and setting times. We picked out Leo from the sky plot and zoomed in on the Lion's haunches. With an exploded view we were readily able to locate and identify M65/66 and NGC 3628. We then moved a bit to the west and did the same thing with M95/96/105.

The program prints specialized star charts using a dot matrix or laser printer. Just for fun, we tried it with our HP Desk Jet 500, and got gibberish. Isn't that always the way things go? We blow more than two grand for a computer/printer, and we can't even print a lousy star chart!

EZ Cosmos is a neat piece of software, but not a good choice for someone new to or unfamiliar with astronomy. To get the most out of it one needs to know something about the sky and what is out there. It could be a good aid in planning a night's viewing, especially if one has a compatible printer. Finding asteroids and tracking faint comets probably would be easier with charts specifically made for the target area. Now that sounds like fun.

There is an updated version (4.0) that adds lunar eclipse history and predicting. It also increases the celestial objects to 20,000, and enables one to print color star charts. MSRP for the new version is $69.95.

NOVAC Notices

Sky & Telescope Discounts

As a member of NOVAC you can get a subscription to Sky & Telescope for $20.00 instead of the regular $27.00 rate. To start a new subscription or renew an established subscription, make your check out to SKY & TELESCOPE for $20. Note on the check if this is a new subscription or a renewal. Send your check to Brenda Jones, 883 N. Kentucky St., Arlington, Va. 22205.

You can also order any publication directly from Sky Publishing at a 10% discount. Just mention the Club Discount Plan and that you are a member of NOVAC.

Club Telescope Available for Use

NOVAC makes available a six-inch (f-5) Newtonian reflector for club members to check out free of charge and use for a limited time. The scope is a *Celestron model SP-C6* on a Super Polaris German equatorial mount and wood tripod. It will readily fit disassembled in any car and is easily transported and setup at remote observing sites. The scope comes with an *Orion Ultrascopic* 10 mm and *Meade* MA 25 mm- eyepieces with 1.25 inch barrel sizes.

If you are interested in borrowing the scope, contact Steve Bodner at (703) 243-1722 (until 10:00 P.M.) or leave a message on his answering machine. He will schedule a time for you to pick the scope up at his home. Steve resides at 1557 N. Danville Street, Arlington, VA 22201. You will need to show your NOVAC observing pass and leave a $500.00 deposit to take the scope out. Make your check payable to NOVAC. Checks ARE NOT deposited and will be returned to the originator when the scope is turned in. The scope may be checked out for two to four weeks at a time depending on demand.

1993 NOVAC Meeting & Observing Schedule

The schedule below lists the NOVAC General Membership Meeting and NOVAC Observing Schedule for the remainder of 1993. The dates in **normal bold** text are the observing nights and the dates in ***italic*** are the monthly meetings. General Membership Meetings are held at the Arlington Planetarium on the third Wednesday of every month. Trustee Meetings are held on an *as needed* basis, usually the Tuesday before the week of the General Membership Meeting. Non-Trustees interested in attending should contact a Club Officer or Board Member for further information. The NOVAC Observing Sessions are held at C.M. Crockett Park in Midland, VA.

JUL. 16, 17, ***21***, 23, 24
AUG. 13, 14, ***18***, 20, 21
SEP. 9, 10, ***15***, 17, 18
OCT. 8, 9, 15, 16, ***20***
NOV. 5, 6, 12, 13, ***17***
DEC. 10, 11, ***15***, 17, 18

Observing Site Rules

Crockett Park:

NOVAC members may use Crockett Park for observing on nights other than those scheduled for club observing; However, YOU MUST HAVE PRIOR APPROVAL FROM RODGER PENCE, THE PARK MANAGER. Call early in the day on which you wish to observe; the telephone number is 703-788-4867. If you reach the answering machine, leave a message saying that you are a NOVAC member and you wish to observe that night. Also, leave a telephone number where someone can reach you. If you do not receive a return call, you MAY NOT use the park. THERE ARE NO EXCEPTIONS! Use of the park is limited to NOVAC members only. Park management locks the entrance gate at sunset and you may use the combination shown on your Observing Pass to gain access. Do not reveal it to anyone. You must lock the gate behind you after entering and please remember to lock it after you leave.

During EDT, you must set up on the large field to the left of the park entrance. During EST, you must set up on the paved col-de-sac 200 yds. past the gate.

No loud radios, alcoholic beverages or loose

pets. Do not leave trash or debris behind. We are guests of the park and park management may revoke our observing privileges any time due to the carelessness of one person.

The Kilpatrick's:

NOVAC members may use Jim and Sheree Kilpatrick's property for observing on any night - BUT, YOU MUST HAVE PRIOR APPROVAL FROM THE KILPATRICKS. Call early in the day on which you wish to observe; the telephone number is 703-547-3501. If you reach the answering machine leave a message saying that you are a NOVAC member and you wish to observe that night. Also, leave a telephone number where the Kilpatricks can reach you. If you do not receive a return call, you may not use the site. THERE ARE NO EXCEPTIONS! Use of the site is limited to NOVAC members only.

No loud radios, alcoholic beverages or loose pets. Do not leave trash or debris behind. We are guests of the Kilpatricks and they reserve the right to revoke our observing privileges any time due to the carelessness of one person.

Directions to Crockett Park

From the Washington DC/Northern Virginia area, go west on I-66 to the 47-a exit. This is 234 South to Manassas. Continue on 234 for 2.8 miles then turn right on Godwin Drive at the "Po Folks" restaurant. Follow Godwin Dr. for 1.8 miles to where it merges with Rt. 28 West. Once on Route 28 continue driving for another 13.7 miles through the towns of Nokesville, Catlett and Calverton until you turn right on Rt. 643 toward Warrenton. There is a small country store (Mayhugh's) on the corner of the intersection. Go on about a mile up Rt. 643 to the Park Entrance road. Look for a small sign for C.M. Crockett Park on your right directing you to turn left. Once on the park entrance road, go one-half mile to the park gate.

Directions to The Kilpatrick's

From the Washington DC/Northern Virginia area, go west on I-66 to Route 29. Take the Route 29 South exit to Warrenton. Continue on 29 past Warrenton and Culpeper. When you pass the last exit for Culpeper, stay on Route 29 for 8 miles. At Route 631, turn left, and go 2.5 miles. At Route 630, turn right and go 1.5 miles until you come to Route 632. Turn left, go about 100 yards up the hill. On the right there are three mailboxes. Turn right onto the driveway, go straight to the Kilpatrick's home. Let them know you have arrived and they can help you find a spot to set up.

Advertisements

For Sale: CAPS, baseball type, mesh back, adjustable, NOVAC logo, $5.95 (you pick up), $7.75 (UPS ship); JACKETS, nylon/satin, NOVAC logo on front & back, elastic at sleeves, neck, and bottom, very good quality, sizes S, M, L, XL, $29.95. Contact Jim Schaeffer during working hours only at 370-9033.

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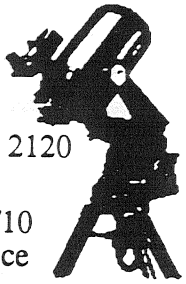

Super Wedge Tripod	9 x 60 Viewfinder
Electronic Command	Telerad Sight
Electric DEC motor	Camera Adapters
Electric RA motor	Luminicon Filter
Setting Circles	Color Filters
Eye Pieces 2 & 1.25"	110v - 12v
Quartz Drive	12v lighter plug

Robert A. Owen
4856 Woodie Ct.
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703 590-3884

The NOVAC Newsletter is published six times a year. Subscriptions are a benefit of membership in NOVAC. Dues are $18.00 per year.

For club membership information contact:

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NOVAC NEWSLETTER

Inside This Issue:

NOVAC

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