# NOVAC

THE NEWSLETTER OF THE NORTHERN VIRGINIA ASTRONOMY CLUB

**Issue Number 85** **Volume 19** **September/October 1999**


## President's Message

**Tilly Smith**

Just a couple of short notes to pass on at this time.

First, is that we are in our new home at GMU. So far so good, however, we are still trying to get the feel of the new surroundings and of all the new capabilities. We have had a fair turnout in July (50) and August (33). A bit lower than normal, but with vacations and new location, new night and new time, it was to be expected. I will say that the crowds so far look pretty small in a 200+ seat facility. We have plenty of room, so come on out and join us.

Second, our main event for 1999 is coming up - the NOVA Star Party on Saturday, October 16. Jeff Cook is the Head of this event just as last year. This is NOVAC's major event for the year and we need your help to make it just as good a success as last year. Please contact Jeff to assist. I know all that attended last year's event will agree; it was one of the best ever. Let's make this one even better. // tilly

## NOVA STAR PARTY & TELESCOPE MEET 1999

The Northern Virginia Astronomy Club will host the 17th Annual NOVA Star Party & Telescope Meet on Saturday, October 16, 1999 at our Crockett Park observing site. This is a public education event offered by the members of NOVAC. Updated information is online at http://www.cookstudios.com/nova.htm . Our promotional flyer is also there for you to download, or to print out directly from the web page (color or black & white). Please distribute this flyer

*(Continued on page 2)*

## What's Up?

**Al Schumann**

"Roll out those lazy, hazy, crazy days of summer. You'll wish that summer could always be here." When the late Nat "King" Cole sang those lyrics many years ago, I'm sure he was not thinking of that crazy heat wave we had this past July. Walking outside was like stepping into an oven. Even the nighttime temperatures were very uncomfortable. So, the telescopes stayed in the garage, and we spent most of our time indoors where it was cool. Holy Pete, first it was the ice storm, then a heat wave, and now a severe drought. What's next, locusts? At least we had some rain down here on the peninsula during the worst of the heat. You might say that we were being parboiled in Williamsburg while you folks in the D.C. area were taking a dry roasting.

Anyhow, Mother Nature cut us some slack in

*(Continued on page 2)*

## The NOVAC Next-Generation Light-Pollution Map Project

**Bill Burton**

NOVAC needs your help! Almost five years ago, the club produced a map showing star counts and limiting magnitudes in the Washington, D.C. area, as part of a cooperative effort with the *Washington Post* dubbed "Project Orion". *Sky and Telescope* writer Fred Schaff called this project the best light-pollution study ever conducted in the United States. The map clearly shows the severe impact of the Washington-area nighttime sky glow on our ability to see fainter stars and deep-sky objects, and outlines "islands" of darker skies within the urban region. Now, using a slightly refined technique in cooperation with a different organization, we are aiming to do it again, with potentially farther-reaching impact. Our cooperator this time is NOAA's National Geophysical Data

*(Continued on page 9)*

## NOVAC Programs at George Mason University

*Pete Johnson*

***All meetings start at 6:00 P.M.***

**September 12**

Eclipse 99 — Members' experiences with the last eclipse of the millennium

**October 10**

Ancient Astronomy of the Mayans, Sioux, African Traditions — Marc DeFrancis

**November 14**

How to Buy a Telescope — A Guide for Christmas

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# NOVA Star Party

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further by mail, fax, Internet, in person, or any other way you can think of to help promote the single largest annual event of your astronomy club!

Please arrive early! The day begins at 3 p.m. with talks and demonstrations by fellow club members. Evening presentations begin at dusk, then public observing continues through 11 p.m. Club members are welcome to continue observing through the night. Bring warm clothes and a red-filtered flashlight (preserves your night-vision). There will be snack foods and drinks for sale, and portable facilities. Activities are located on a grassy hill.

Sorry, no pets, no camping. In case of rain or overcast, we will still hold the afternoon talks, displays, demos, and raffle under a small outdoor canopy. There is no rain date.

We expect to have a Sign Language interpreter for the daytime talks and evening sky tours.

Join us in the afternoon (bring a blanket to sit on) to learn about: Recognizing the Constellations (with slide show); Buying, Making & Using Telescopes; Review of Telescope Accessories; Observing Sunspots; Photo, Video, CCD & Radio astronomy; Your Place in Space; Satellites, Space Stations & Other Orbiting Spectacles; and a new team-presentation on Light Pollution (with slide show). Then stay through the evening for: More than 100 telescopes and binoculars (bring your own or share ours); Sky Tours every hour; Kids' program, Personal help with your own equipment (yes, bring it!); Free raffles of astronomy items for all ages; Live sightings of orbiting satellites; Live TV views through the telescope of Jupiter, Saturn, and the Moon (bring your camcorder and plug in!). PLUS there'll be surprises you won't want to miss!

Returning this year are the very successful Observing Stations, where people can quickly identify and compare the full range of celestial objects, including the Moon, Sun, planets, galaxies, nebulae, star clusters, asteroids, and meteors. We need 10-20 club members to staff the Observing Stations for at least part of the evening. You'll be the first scopes people see when they arrive, so it should be fun. Please consider volunteering.

SPECIAL NOTE TO NOVAC MEMBERS: We share a unique relationship with Crockett Park which allows club members to observe there without the normal admission/parking fee ($5/carload). Members who bring their NOVAC Observing Pass (issued when you joined) will have their car admitted without charge, no matter who else is in the car. So bring your family & friends...and your observing pass! (Contact Club Secretary Kevin Brown at kevinb@cais.com if you haven't received yours.) Crockett Park continues to offer tremendous support to NOVAC, by staffing admission, parking, concessions, setup and cleanup functions. Assistant Park Manager Bonner Davis will be on hand to again provide a smooth evening. Thanks, Crockett! The park is open for normal functions earlier in the day as well. Check out their web page at: http://co.fauquier.va.us/services/parks/crockett.html

Last year's NOVA Star Party was a big step for NOVAC. With a new format, a new name, and the direct help of dozens of club members, we shared the skies with nearly 500 people from around the area. This year, we expect much greater attendance, and we'll seriously need the participation of many more club members.

Please help us to preplan the event, or by staffing the day's activities, or giving a public talk. Contact Jeff Cook at jeff@cookstudios.com or 703/524-5333 if you'd like to help us pull off NOVAC's largest single public event of the year!

# What's Up?

*(Continued from page 1)*
early August, and I took full advantage of the break. One night I rolled the 13-inch telescope onto the driveway and took as much of a grand tour as my tree shrouded area would permit. I was able to visit Hercules with its two nice globular clusters, M-13 & 92; Cygnus for that lovely double star Albireo, open clusters M-29 & 39, the Veil Nebula, which I could barely make out even with a UHC filter, and made yet another failed attempt to see the Crescent Nebula, NGC 6888. It just isn't dark enough to get that little fellow. I looked at a few other globular clusters here and there: M-56 in Lyra, M-71 in Sagitta, M-15 in Pegasus, and M-2 in Aquarius. Also in Aquarius is one of my favorite planetary nebulae, NGC 7009, the Saturn Nebula. It is a cute little ole thing which gets its name from the bulges, or ansae, on either side of its disc. Supposedly, it looks like a tiny Saturn when viewed edge on. It is right next door to M-72 & 73, an open cluster and a globular cluster respectively. I tried for some time to see those two but was unsuccessful. Again, it just isn't dark enough from home.

If you have ever had a yen (or a hankerin' as we say down south) to see Uranus and Neptune, now is the time. Whilst I was gazing at the Saturn Nebula, I recalled that Uranus and Neptune were not far away. So, after clocking out for the night, I dug into *Sky & Telescope* to check on their locations. It turns out that both of those distant planets are well placed. Both are in Capricornus and each has a readily identifiable star nearby. I used the C-8 for the quest since, with its equatorial mount, it is easier to deal with the Up-Down-Left-Rights on the sky charts. To go after Neptune first was to risk suffering a humiliating defeat early in the game. Therefore, I figured on tackling Uranus at the outset. It is a bit bigger and brighter, 3.7 seconds in diameter and magnitude 5.7, easy through binoculars and finderscope. The last time I looked at Uranus was back in the 80's. At the time it was a very easy find as it kinda made up an extra star in the teaspoon asterism near the teapot in Sagittarius. Since then, it has been drifting along on a path somewhat devoid of bright stars. The coordinates for mid August were RA 21 hrs 08.7 and Dec. -17.09. This was only a degree away from Theta Capricorni. Also, Theta is just about same RA as the Saturn Nebula. With the Saturn Nebula centered, I swung the telescope 6 degrees due south and voila...Theta and Uranus were in the finderscope. The blue-green tint was the tip-off, and under high power, Uranus resolved into a disc. Easy as falling off a log. However, don't expect to see very much; it's pretty blandt.

With Uranus tucked away, I went after Neptune. At Magnitude 7.8 it is a lot dimmer than Uranus, and it is a tiny 2.3 seconds in diameter. That is to be expected since it is more than 29 AUs away. The mid-August coordinates were RA 20 hrs 18.7 and -19.20 declination. Neptune is right next to Sigma Capricorni, a fifth magnitude star. I could barely make it out with the naked eye, but it couldn't be seen through the glass of the Telrad. So, my approach was to hop down a few degrees from Alpha Capricorni to Beta, which is on the same RA line as Sigma, my jumping off point to Neptune. Everything worked perfectly, but the tedious part was about to begin. I knew that Neptune was off to the left (east) of Sigma, so that reduced the number of possible candidates. There were still several potential targets in the area which had to be checked out. The finderscope gave me no clue. There were just a bunch of tiny star-like dots, and I went after them one at a time. Center one dot in the finderscope, go to a low power eyepiece and center the target in the main telescope, increase power and see if the image gets a little bigger and has a bluish tint. If it remains as a pinpoint, you've got a star. Sorry Charlie, try another one. Actually, I got lucky and found Neptune after only a couple shots. At 200X I had a tiny blue disc. At 400X it was shimmering too much to get a good focus, but it was still blue and mostly round. I looked at Neptune for a long time and recalled how awe inspiring it was to see television images beamed back from a NASA spacecraft on its own grand tour of the solar system. I might have trouble remembering what I had for breakfast, but I do remember vividly seeing that deep blue orb, the Great White Spot and the Scooter.

I can't imagine a better opportunity to see both of those gas giants than this year, so take advantage of those lazy, hazy, crazy days of summer. Check it out.

# Ease into Outreach

Jonathan Bein

Would you like to get involved in our public outreach events, but you aren't sure that you have enough astronomical expertise? The NOVA Star Party is the perfect occasion to ease into public outreach. If you bring your telescope or binoculars onto the field, you will get to answer questions from all kinds of people. Maybe you could take it a step further, and volunteer to staff one of the "Observing Stations". Here you will focus on one type of object for a couple of hours. Just do a bit of research and become an 'expert' on globular clusters or the planet Mars.

If you have been out observing recently, and you know your way around the night sky, why not give one of the hourly sky tours? It is not that hard to read up on a couple of the constellation myths to spice up a tour. One of the best resources for any of this type of information is *Burnham's Celestial Handbook*, by Robert Burnham, Jr. In three volumes, Mr. Burnham covers each constellation's myths and history, he describes the most prominent objects, and cogently explains all things cosmological and astronomical (given the state of knowledge circa 1977).

For a more detailed grounding in cosmology and astrophysics, try *The Whole Shebang*, by Timothy Ferris. Mr. Ferris is one of the pre-eminent popularizers of science writing today. His style is so clear and accessible that you will find yourself aching to explain what you have just learned about the big bang or about black holes!

Whatever your level of knowledge, you can do public outreach. All you need is an eagerness to share the night sky and astronomy. You don't have to know the answer to every question. After all, I can easily think of twenty astronomy and cosmology questions that an eager nine year old might ask that still have no answer. One of the most exciting answers that these kids can get is "We don't know that yet, maybe you can discover the answer"

# New Sky Tour

**Pete Johnson**

When we moved to GMU we lost our planetarium, so we need a new tour format. I have an idea I want to try. Here it goes: Every month we will highlight a single constellation, one that is currently viewable over the next month, with overheads, charts and an observing list compiled by club members. We will review the constellation as part of the meeting and have handouts with a sky chart and observing list.

We could include circles for members to draw and note their observation. We're going to start with Cygnus. I'll do the map but I want member contributions for favorite objects for the viewing list. If you want, you can include sample observations from your own logs. If you do so, remember to include the location, date, and scope you did it with, e.g., Crockett, July 12, 1997, Celestron C8 at 150x — that sort of thing.

As a club activity, I was thinking about having members turn in copies of their observing reports/handouts for each month's constellations and giving club observing awards at the end of the year for their accomplishments. I think it's a good idea and would be a fun club activity. Comments and observation lists are welcome. Tell me what you think. Thanks

Pete

# Tidewater Lighting Workshop and VAAS Meeting

**Brent Archinal**

I've received word from Glendon Howell (GlendonHowell@compuserve.com) that on Friday, November 5, there will be a "Tidewater Regional Outdoor Lighting Workshop" at the Virginia Beach campus of Tidewater Community College - and on Saturday, November 6, there will be a VAAS meeting at the Chesapeake Planetarium in Chesapeake, VA. A copy of the announcement about the VAAS meeting is attached below. Further details will be announced later at the cited web sites. Both of these sound like worthwhile and important meetings, so NOVAC members may want to plan ahead, make a weekend of it, and attend these events.

Brent

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Virginia Association of Astronomical Societies
Preliminary Announcement
Saturday, November 6, 1999
10:00 A.M. - 4:00 P.M. (Registration begins at

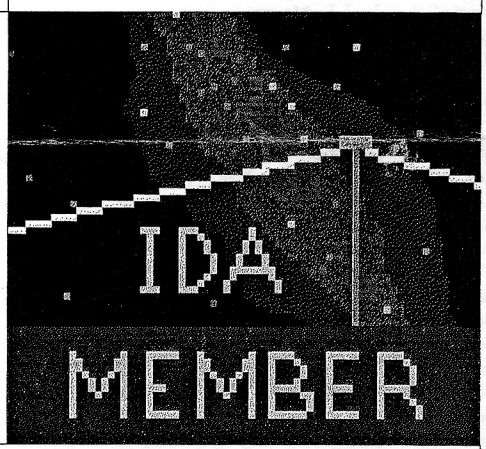
*(Continued on page 8)*

See you all at the **Nova Star Party**.

Jonathan

P.S. Here is a list of the upcoming outreach events.

| Date | Location | Expected participants |
|---|---|---|
| September 11 | Fairfax Baptist Church — Star program | 20 |
| October 16 | Nova Star Party! — | multitudes |
| November 16 | Loudoun Wildlife Conservancy Club program | 40-80 |




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**Important NOVAC Numbers**

| | |
|---|---|
| NOVAC Information Hotline | 703 803-3153 |
| Crockett Park (Bonner Davis) | 540-788-4867 |
| | bdavis.cmcp@juno.com |
| Savage Park (Paul McCray) | 703 729-0596 |
| | wodtrail@erols.com |
| Arlington Planetarium | 703 358-6070 |

NOVAC's Web Page
http://astro.gmu.edu/~novac

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# Jeff's Observing Report

**Jeff Stetekluh**

Jeff's astronomical calculations are made for the Northern Virginia area. See credits at the end of this article.

| The Sun | rises | sets |
|---|---|---|
| Aug 18 | 6:24 AM | 7:59 PM |
| Sep 15 | 6:49 AM | 7:17 PM |
| Oct 10 | 7:12 AM | 6:38 PM |
| Nov 14 | 6:49 AM | 4:56 PM |
| Dec 12 | 7:17 AM | 4:47 PM |
| Jan 9 | 7:27 AM | 5:04 PM |

| The Moon | |
|---|---|
| Aug 18 | First Quarter |
| Aug 18 | First Quarter |
| Aug 26 | Full Moon |
| Sep 2 | Last Quarter |
| Sep 9 | New Moon |
| Sep 17 | First Quarter |
| Sep 25 | Full Moon |
| Oct 2 | Last Quarter |
| Oct 9 | New Moon |
| Oct 17 | First Quarter |
| Oct 24 | Full Moon |
| Oct 31 | Last Quarter |
| Nov 7 | New Moon |
| Nov 16 | First Quarter |
| Nov 23 | Full Moon |
| Nov 29 | Last Quarter |
| Dec 7 | New Moon |
| Dec 15 | First Quarter |
| Dec 22 | Full Moon |
| Dec 29 | Last Quarter |
| Jan 6 | New Moon |

| Events | |
|---|---|
| Sep 8 | Mercury at Superior Conjunction (*) |
| Sep 8 | Mercury at Superior Conjunction (*) |
| Sep 23 | Autumnal Equinox (from Espenak) |
| Sep 23 | Fall begins at the equinox, 7:31 a.m. EDT (†) |
| Oct 21 | Orionids ZHR=20, active Oct 02 to Nov 07 (from IMO) |
| Oct 23 | Jupiter at Opposition (from Espenak) |
| Oct 24 | Mercury at Greatest Elong: 24.3?E (*) |
| Oct 30 | Venus at Greatest Elong: 46.5?W (*) |
| Oct 31 | EST starts |
| Nov 6 | Saturn at Opposition (from Espenak) |
| Nov 15 | Mercury at Inferior Conjunction (*) |
| Nov 15 | Transit of Mercury across the Sun's disk, visible from Hawaii at midday and western North America in late afternoon (from S&T) |
| Nov 17 | Leonids ZHR=100+, active Nov 14 to Nov 21 (from IMO) |
| Nov 28 | Neptune is 1.75 degrees N-NW of Mars (†) |
| Dec 2 | Mercury at Greatest Elong: 20.4?W (*) |
| Dec 5 | Earliest end of evening twilight (†) |
| Dec 8 | Earliest sunset (from S&T) |
| Dec 14 | Geminids ZHR=120, active Dec 07 to Dec 17 (from IMO) |
| Dec 22 | Shortest day, 9h 20m at lat. 40°N (†) |
| Dec 22 | Winter Solstice, 2:44 a.m. EST (†) |

(*from Espenak; †from S&T

| The Planets | | | |
|---|---|---|---|
| Sep 15 | rises | transits | sets |
| Mercury | 7:19 AM | 1:28 PM | 7:36 PM |
| Venus | 4:18 AM | 10:50 AM | 5:23 PM |
| Mars | 1:15 PM | 5:56 PM | 10:37 PM |
| Jupiter | 8:59 PM | 3:43 AM | 10:22 AM |
| Saturn | 9:40 PM | 4:34 AM | 11:24 AM |

| | mag | diam | notes- |
|---|---|---|---|
| Mercury | -1.1 | 4.8" | W, 3* |
| Venus | -4.5 | 44.6" | |
| Mars | 0.5 | 7.4" | SSW, 25* |
| Jupiter | -2.8 | 47.4" | |
| Saturn | 1.9 | 19.3" | |

| Oct 10 | rises | transits | sets |
|---|---|---|---|
| Mercury | 9:01 AM | 2:12 PM | 7:23 PM |
| Venus | 3:36 AM | 10:07 AM | 4:38 PM |
| Mars | 12:58 PM | 5:33 PM | 10:07 PM |
| Jupiter | 7:14 PM | 1:55 AM | 8:31 AM |
| Saturn | 7:58 PM | 2:51 AM | 9:39 AM |

| | mag | diam | |
|---|---|---|---|
| Mercury | -0.2 | 5.5" | WSW, 8* |
| Venus | -4.5 | 30.8" | |
| Mars | 0.6 | 6.6" | SSW, 24* |
| Jupiter | -2.9 | 49.4" | |
| Saturn | 1.7 | 19.9" | |

(* degrees elevation at sunset taking into account atmospheric refraction)
(mag = apparent magnitude, diam = apparent equatorial angular diameter)

Jupiter Eclipse Events on Principal Club Observing Nights

| | | |
|---|---|---|
| Sep 4 | 6:10 AM | Europa Eclipse Start |
| (S -6 J 234 55) | | |
| Sep 4 | 11:12 PM | Ganymede Eclipse Start |
| (S -37 J 95 16) | | |
| Sep 5 | 1:32 AM | Ganymede Eclipse End |
| (S -44 J 120 43) | | |
| Sep 12 | 3:13 AM | Ganymede Eclipse Start |
| (S -38 J 165 61) | | |
| Sep 12 | 5:32 AM | Ganymede Eclipse End |
| (S -15 J 232 55) | | |
| Sep 18 | 11:25 PM | Io Eclipse Start |
| (S -44 J 107 30) | | |
| Oct 3 | 3:14 AM | Io Eclipse Start |
| (S -43 J 211 60) | | |
| Oct 10 | 5:09 AM | Io Eclipse Start |
| (S -25 J 257 38) | | |
| Oct 16 | 9:47 PM | Europa Eclipse Start |
| (S -39 J 112 34) | | |
| Oct 17 | 7:03 AM | Io Eclipse Start |
| (S -4 J 282 10) | | |
| Oct 17 | 11:21 PM | Ganymede Eclipse Start |
| (S -54 J 136 51) | | |


References for Jeff Stetekluh's Observing Report

Sun and moon rise and set times, moon phases and Galilean moon events are calculated using my software that is based on algorithms from the book "Astronomical Algorithms" by Jean Meeus, 1991. This includes Bretagnons and Francou's VSOP87 (the 1987 version of Variations Seculaires des Orbites Planetaires) planetary theory, the Chapront ELP-2000/82 (ELP means Ephemerides Lunaires Parisiennes, although this work is not an ephemeris (a list of calculated positions), but rather an analytic theory (a series of periodic terms)) lunar theory and Lieske's theory E2 and E2x3 of Jupiter's satellites.

The Preliminary NOVAC Observing Reports are created using my software. Some of the algorithms are listed above and in the following as noted; from Espenak: Fred Espenak's Twelve Year Planetary Ephemeris: 1995 - 2006 (NASA Reference Publication 1349, available at http://www-lep.gsfc.nasa.gov/code693/TYPE/TYPE.html); from S&T: Sky & Telescope's Evening and Morning Highlights for Skygazers (available at http://www.skypub.com/whatsup/whatsup.shtml; from IMO: the International Meteor Organization calendar

# Review of the Intes MK66 f/12 Maksutov Cassegrain

**Ralph Kantrowitz**

This winter I decided to purchase a scope that I could use on my apartment balconies. My 5-inch f/8 Starfire was too large, there were too many stray reflections to use my 6-inch Newtonian on a regular basis, and my 4-inch apo didn't gather enough light for high power views of the planets. After reading about the Intes Maksutovs at the Earth and Sky Adventures web site, I decided to order the 6-inch f/12 MK66 model. I also ordered a 2-inch Intes Sital mirror star diagonal and a 2-inch coupling needed to attach accessories to the scope's back plate.

The scope arrived well packed in bubble wrap but without the coupling. I called and complained immediately, since the scope came with a 30-day money back guarantee and I had no way of testing the scope. The following article is my initial diary and subsequent summary observations to date.

Monday 2/22/1999 – I finally received the 2-inch coupling needed to attach the star diagonal to the scope.

The skies were clear, Moon near half in Taurus, Jupiter and Saturn in the tree line at dusk. Temperatures were below freezing. I put the MK66 and 4-inch f/6 Astrophysics Widefield apo on the balcony to cool at 6:30 P.M. The 4-inch is the 1986 precursor to the Traveler, with a hint of color on bright objects. Within about 15 minutes, the MK66 had cooled down enough to show the equatorial belts on Jupiter through the trees (75x). Venus showed a gibbous disk at the same power, lots of stray diffraction from the tree branches. I let the scopes cool off a bit and ate dinner.

At 7:15 P.M., I tried some more tests. Rigel was barely resolvable at 225x. 4-inch showed bad seeing, but companion to Rigel was easier. Saturn appeared brighter in the Mak, with slightly more detail. Seeing still bad. In both scopes Titan and Rhea were visible. Two stars formed an obtuse triangle with Titan. In the 4-inch only one of these stars was visible. At 260x, in better seeing, Tethys was seen between Rhea and Saturn. Tethys was not visible in the 4-inch. I switched the Intes and Vernonscope 2-inch diagonals between scopes. There wasn't a noticeable difference. Both diagonals have enhanced coatings.

By now it was about 9:30 P.M. Disgusted with the seeing, I switched to my homemade 2-inch low power eyepiece in the Mak. I looked at M41, no diagonal shadow visible, nice view. I tried a variety of eyepieces on M42 and was rewarded with the cloud details I usually see in my 6-inch Newtonian and 5-inch refractor. The view of M42 was better in the MK66 then in the 4-inch. I looked at the Moon, nice view of Hyginus and the Hyginus rill in both scopes, brighter in the Mak. I used 225x on the 4-inch, 260x on the Mak.

At 10 P.M., decided to look at double stars some more. The seeing had improved. The companion to Rigel was easy in both scopes. I had some trouble focusing the f/12 MK66 which had a greater range of good focus than the f/6 apo. Other than the Mak, all my scopes are f/8 or less, so this was an observer rather than a scope problem. I looked at Zeta, Sigma, Lamda and Eta Orionis. The refractor showed a classic Airy disk with only one bright diffraction ring on stars of 4th magnitude or less. The MK66 showed smaller and brighter Airy disks as well as two to three bright diffraction rings. Under good seeing conditions, the MK66 had the better resolution, since the Airy disk and diffraction rings were separately visible. I tried for 52 Orionis, a 5th magnitude double southwest of Betelgeuse. These are very evenly matched stars separated by 1.1 arc seconds. In the 4-inch refractor this is usually difficult and tonight only a dumbbell could be seen. In my 5-inch refractor, this is usually only moderately difficult and noticeably better resolved than in the 4-inch. The 6-inch MK66 did an excellent job on this, since the diffraction rings were dim. Two small, bright stars separated by black sky were visible in good seeing. I judged the MK66 the better scope in good seeing conditions.

Wednesday 2-24-99 - I got a few moments of good seeing tonight on the Moon. Spectacular view of the craterlet chains around Copernicus. For a couple of seconds I was sure that I could see the center craterlet in Plato clearly. However, the seeing tonight was fairly crummy. Saturn was nice but too many heating currents killed the image. I did manage to see three moons - Titan, Rhea and Dione. Tethys was too close to the disk to see this evening. I estimate that Dione was about 25 arcseconds from the rings, with Tethys midway between the rings and Dione. Observing session ended at 10:15 P.M.

Saturday 2-27-99 - I unscrewed the eyepiece from the finder and carefully applied four dots of luminous paint around the center of the back of the finder eyepiece reticle. I put the finder back together and readied the scope for some morning observations. I had put the MK66 in its case, left the top half open, with the Intes 2-inch star diagonal on top of the tube assembly and left it to cool on the balcony at 9:30 P.M. on Friday night 2-26-99.

I woke at 4:15 A.M., set up the balcony light shield and mounted the scope on the SP mount. Mars was just past transit. At 260x (7mm Nagler), the image was boiling, probably due to heat trapped inside the corrector lens cell by the scope cap. I let the scope cool a bit and started up my Mars emphemeris program. Mars was about 82 million miles away with a disk of just over 10 arcseconds. Central meridian at 9:50 UT was calculated to be 68 degrees. I went back out and looked at the image of Mars through various filter combinations. The #56 green did not enhance the view much. However, the #21 orange filter did show a dark feature partially in the terminator in the southern half of the gibbous disk. A slightly lighter dark feature showed a somewhat quadrilateral appearance in the northern half of the disk, below the polar cap.

The seeing was free from home heating currents about 50% of the time, so I decided to test what magnification Mars would tolerate before getting fuzzy. I took out the filters and tried a 12mm Brandon and 2.4x Dakin Barlow, 300x magnification. Still focusable. I put in the 7mm Nagler (624x) and was still able to focus the image without really fuzzing out. In fact, the polar cap was more noticeable, now that the relative brightness had decreased. There was no increase in detail, but it was reassuring to know that the scope could tolerate unreasonable magnifications.

I was about to put the scope away (5:15 A.M.) when I noticed that Antares was near transit. I aimed the scope at Antares and noticed a small blue companion in moments of better seeing. The companion was also visible at 260x and 300x. The determining factor was the seeing, since the bright diffraction rings of Antares would fall on the airy disk of the small companion. I tried out my Celestron and Lumicon 1.25-inch diagonals. The Celestron prism diagonal gave the same results as the Intes 2-inch diagonal, but the Lumicon fell short and only showed the smaller star in the best couple of seconds of seeing. This is probably due to a slight misalignment of the diagonal mirror. Dawn was now upon me and I aimed the scope at Mars once again. There was little difference in views with the same three star diagonals, but the seeing had worsened, so any slight differences were masked.

**Summary**

I read the April Sky and Telescope article on Russian Maksutovs just after I ordered my scope, so I was quite dismayed, wondering if the Intes MK66 would be only as good as a 4-inch apo. I was pleasantly surprised that the Intes MK66 was much better than the Orion Mak, which corresponds to the MK67 model from the same manufacturer. The reticle in the finderscope was a sore spot and I finally gave up and substituted one of my homemade finders on an Orion removable bracket. I also purchased a pair of aluminum rings to attach the scope to my Super Polaris mount. I had originally used the dovetail mounting plate that came with the SP mount for C8s; however, I wanted to be able to keep the finder in different orientations. The Orion rings are too tight to allow free rotation of the scope, but for $25, they're good enough.

Subsequent observations have been made on Mars and additional double stars. I also had the opportunity to compare the MK66 to my 5-inch apo and 6-inch Newtonian as well as scopes owned by other club members.

*(Continued on page 8)*

# A Hands-On Approach for Young Students

John A. Combes

Teaching astronomy by using student participation can be a fun and effective learning experience for students in the elementary grades. One of the purposes of this approach is to convert the sizes of the planets and stars as well as the immense distances to the planets and stars to an understandable scale.

I have been asked by a number of teachers of third through eight graders to give my presentation on astronomy to their science classes. In many instances, several classes from the same grade have been combined for this presentation.

Based on my observations and the feedback that I have received, the students' attention level and interest in astronomy were high

The whole presentation takes between 60 and 90 minutes, depending on how much time I am allotted. About two-thirds of the time is spent in the "hands-on" activities, and in the remaining time, I give a talk during which I show large pictures of astronomical objects and ask questions of the students. More about this later.

**The Home Planet**

I show the students a photograph of the Earth taken from space; give a brief description of the Earth; and explain why it is ideal for supporting life. I place a globe of the Earth mounted on a stand with the equator inclined 23 degrees from the ecliptic on a table in front of the class. I hand a flashlight to one student, and ask him/her to stand at one side about 10 to 15 feet away from the globe and aim the light at it. I explain that the flashlight represents the Sun. I arrange the globe so that the northern hemisphere and the locale on the globe in which this presentation is given, is inclined toward the flashlight. I point out that this demonstrates summer, when the light is the most direct and intense.

Then I ask the student to walk over to the opposite side of the globe while I rotate the globe one half turn. The student points the flashlight at the globe again, and I say that this demonstrates winter, when the sunlight is spread over a much larger area and therefore is less intense. I also explain how this demonstrates why one season occurs in one hemisphere and the opposite season occurs in the other.

**The Solar System**

Then I show the students pictures of the Sun, the nine planets, some of the moons of the planets, a close-up of an asteroid, Halley's comet, and a picture of a meteor streaking across the sky. I ask the students if they can identify what they see in each photograph. I give a brief description of each one of the objects shown, after it has been identified.

Then we demonstrate the relative sizes of the Sun and planets. I ask for a volunteer to come to the front of the class and hold a large cardboard disk representing the Sun. The disk, painted yellow, is 17.3 inches in diameter and portrays the Sun at a scale of 20 inches to one million miles. Then I dig out some other objects: disks cut from cardboard to represent planets, heads of machine screws, and a piece of a coat hanger, for its cross-section, - all at the same scale as the Sun's disk. I ask another student to stand next to the student holding the Sun disk, and I give him the section of the coat hanger to represent Mercury. Then I give eight more students objects representing the other planets and ask the students to stand next to each other in front of the class. The student holding the machine screw representing the Earth also gets to hold a toothpick whose end represents the Moon. I point out that the relative sizes of the Sun and planets is now apparent. The immensity of the Sun to the planets amazes the class. I tell them that over 100 Earths can be lined up across the face of the Sun and over a million Earths can fit inside it.

Next we next demonstrate the relative distances between the Sun, planets, and nearest star. We take the class into a long hallway or preferably outside to a field or parking lot. Then I use a scale of one inch to one million miles. I give a student a nickel to represent size of the Sun, and the end of a 100-foot surveyor's tape. Mercury, at a distance of 36 million miles from the Sun, is represented by another student standing 36 inches from the student "holding" the Sun. I then place students along the tape in order to show the positions of the planets: Earth at 7'9", Mars at 11'9", Jupiter at 40'3", Saturn at 73'9", Uranus at 148'9", Neptune at 233'1", and Pluto, if there is room, at 305'10" (an average distance).

The remaining students are assembled near the student at 0 inches. I tell them that Pluto has an orbit that takes it to a close-in point of 230 feet from the Sun that is inside the orbit of Neptune, the "perihelion" of the orbit, and that 148 years later, Pluto's orbit takes the planet out to 382 feet from the Sun, the "aphelion" of the orbit.

I ask the students if they notice anything peculiar about the placement of the planets. They usually notice a large gap between Mars and Jupiter. I ask why there is a gap, and if they do not know, I tell them the asteroid belt is located there. I ask for a volunteer to walk the orbit of Halley's comet and direct him or her to walk on a slightly curved path out to and around the student representing Neptune and then on a slightly curved path back again.

Next, I ask for a volunteer to represent the nearest star to the Sun. I hand the student another nickel and tell him or her that you represent Alpha Centauri, the brightest star in a triple star system where all three stars revolve around each other. (Actually, one of the other stars in the system, a small dwarf star named Proxima Centauri, is slightly closer to the Earth.) Anyway, I tell the student to have his or her mother or father buy a plane ticket from Washington, D.C. to Boston since the nearest star is about 400 miles away at this scale of one inch to one million miles. I mention the first planet discovered outside of the solar system circles a star named 51 Pegasi once every four days. At a distance of 235 trillion miles, 51 Pegasi would be 3,700 miles away using this scale. This is about the same distance London, England is from Washington.

The Moon is only one-quarter inch from the Earth and therefore man has traveled only a quarter of an inch into space to date. This demonstrates that man hasn't ventured very far from home. This also demonstrates the difficulty to find life on planets outside of our home solar system because of the immense distances.

**The Milky Way Galaxy**

Then I give a description of our home Milky Way galaxy. I show photographs of M 74 and NGC 4565 which depict a front and edge view, respectively, of a galaxy similar to our home galaxy. I point out the approximate position of the Sun as if these photographs represented our galaxy. I relate this to what they would see if they went out on a clear dark night. Then I show photographs of the Milky Way, star clouds, and gas and dust clouds. I point out that the Sun is an average star and just one of the one hundred billion stars in our galaxy.

*(Continued on page 8)*

# Eclipse

Marc DeFrancis

## For Young Astronomers ages 8 and up

On August 11, the Moon's shadow fell across the face of Europe in broad daylight. It was the last solar eclipse of this century. People crammed cruise ships and trains, booked hotels, and got out their cameras and telescopes to enjoy the rare spectacle. Fun was had by all.

But it really wasn't so long ago that such an event — the blocking out of the sun's bright face by the passing moon — struck terror into the hearts of most people around the world.

Roughly 2,500 years ago, on a grassy plain in Turkey, two great armies, the Medes and the Lydians, were so terrified by a sudden solar eclipse that they dropped their weapons in mid-battle and fled the field. That ended the war.

A thousand years ago, the Aztecs of ancient Mexico strongly feared that such an eclipse could permanently blacken the Sun. To prevent that from happening, they carried out on-the-spot human sacrifices. This was a logical enough thing to do if you believed as most people in ancient times did, that the Sun was kept in its daily path by a god, and that this deity needed some kind of special gifts from us to stay healthy and happy.

But what did these people believe caused the eclipses? It was not so long ago that we first learned, thanks to Isaac Newton, that the Sun is 'kept in its path" by simply staying put in space, while we swing round it through the tug of gravity, and that the Moon likewise swings round us in such a way that it occasionally blocks the Sun, by mere accident. One ball crossing in front of another, so to speak.

But we can hardly expect most societies before the age of modern science to have figured this out. The ancient Chinese, who built a vast civilization, invented printing, gunpowder, and the compass (not to mention egg rolls), and even predicted solar eclipses, believed that an eclipse happened when the Heavenly Dog got too hungry and tried to eat the Sun.

The Vikings of Northern Europe told a similar story about two Sky Wolves, named Repulsion and Hatred, who chased the Sun and the Moon and tried to overtake them---once in a while they succeeded, and blocked out their light.

For the Chinese, the Vikings, and many other peoples, the way to make sure the Sun wasn't swallowed up completely or blocked forever, was to make noise — lots of it. In ancient Babylon, the astronomer-priests learned how to predict solar eclipses (a very difficult thing to do). When the eclipses did occur, the same priests instructed the good citizens to bring the copper horns, harps, and other musical instruments out of the sacred temples and parade them around the city, to get the Moon to behave better and leave the Sun alone.

The Vikings and Chinese believed in making a big racket, banging pots and pans and singing with choruses, in order to scare the dogs and wolves of the sky into leaving the Sun alone.

All of this sounds awfully silly, doesn't it? But again, ask yourself what you would do in the following situation: You are wise enough to understand that every living thing depends on the rise and set of the Sun - including your farms, your warmth, your health. The Sun itself is a blazing fire so great that despite its incredible distance, you must shield your eyes to look at it, yet somehow the Sun is carried across the sky.

All the astronomical measurements show that it rises from the Eastern ocean and falls each night into the Western ocean, so the divine power that raises it each morning must be great indeed, since it also keeps the flame alive through its nightly dunking. But, once in a while, the Sun's light is blocked and darkness falls. Who can be sure that it is only temporary? Can you prove that? If one god moves the Sun, and another the Moon, who is to say which god is more powerful, or if they will get into a hammerlock during the next wrestling match? The wisest thing to do would be to please the gods, whose powers are beyond our understanding, or perhaps to trick the gods, so that they will put everything back the way it usually is.

We do not need to do that today. We now know that gravity is in charge, rather than a collection of heavenly spirits, animals, or gods. And like a god, gravity is so powerful that it acts equally all across the universe, affecting the way two twin stars orbit each other at the other end of our galaxy just the same as it affects the way the Moon swings in front of the Sun.

Now you know that the Moon circles around our planet in one month's time, and in fact that is how we decided, long ago, to measure the length of a month. If the Moon circles us once a month, then why doesn't it pass between us and the Sun one day every month? Why are eclipses of the Sun so rare? The answer is that the Moon's motion is a bit more complicated. For 10 out of the 12 times each year that it passes between us and the Sun, the Moon is a little too high or a little too low to cause an eclipse.

Think of the Earth's orbit round the Sun as a solid ring, and imagine a great sheet of cardboard that the orbit ring is glued onto. Now the Moon's orbit round the Earth, a much smaller ring, does not sit nicely on that cardboard, but cuts through it at a slant. The Moon can only make an eclipse shadow on the Earth when two things happen at the same time: it must be at that spot in its orbit where it passes through the cardboard, and it must also be in a straight line between the Sun and us. In addition to that, the shadow must land where we live, and this will change depending on the season, since we are tilted differently. Putting all of this together, the right combination is a rare thing for any given person watching from his home country.

So the next time a solar eclipse takes place, and you can get on a boat or train to go to see it - do it!

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Ed. Note: Mark Twain wrote a story about a man who went back in time and found his knowledge of Solar Eclipses to be very important. The name of the book is "A Connecticut Yankee in King Arthur's Court". See if you can find it in your local public library. You'll enjoy reading it!

## A Hands-On Approach for Young Students

*(Continued from page 6)*

I tell them that light takes 100,000 years to cross our galaxy. In one year. light travels nearly 5.9 trillion miles and this is called a light year, which is a convenient way to measure the vast distances to the stars and galaxies. Using the scale of one inch to one million miles, light travels nearly 93 miles in one year. Using the same scale, the distance across our galaxy is 9.3 million miles or the same as going around the Earth 370 times.

Then, I show them pictures of the constellations Ursa Major and Orion. I ask the students to identify these groupings of stars. I tell them that the five central bright stars in the Big Dipper are about the same distance from us and are moving in the same direction around the galaxy, while the two end stars are moving in the opposite direction. I display a large drawing showing the appearance of the Big Dipper today and how it will appear 100,000 years from now.

I mention that the winter constellation Orion, the mighty hunter, is a very prominent array of bright stars, that one member of the constellation, Betelgeuse, is a large, cool reddish star called a red giant and is about 360 million miles in diameter. It is so large that if it were placed where the Sun is, the orbits of Mercury, Venus, Earth, and Mars would easily fit inside the star. Using our scale of one inch to one million miles, the Sun is represented by a nickel while Betelgeuse would be a disk 30 feet in diameter. The stars in the belt and sword of Orion are young stars. They were formed from the clouds of gas the stars are imbedded in. Photographs of the Great Orion Nebula and Horsehead Nebula are shown.

The students are asked to identify the Horsehead Nebula when that photograph is presented.

I tell them about the birth and different kinds of death for stars of different sizes. I show them a photograph of the Crab Nebula, and talk about neutron starts and black holes.

**Going Beyond the Milky Way Galaxy**

Finally, I talk about other galaxies and show them a photograph of the Andomeda galaxy. I show them photographs of different kinds of galaxies including a cluster of galaxies.

I explain that this concludes our brief tour from the Earth through the solar system and then outwards through our Milky Way galaxy and finally to the outer depths of the universe. This tour demonstrates the immensity of our outer space surroundings and the extraordinary events that are taking place. It also demonstrates the challenges of space exploration and travel that face our students in today's world.

## Review of the Intes MK66 f/12 Maksutov Cassegrain

*(Continued from page 5)*

Compared to 8-inch Newtonian and SCs on Mars, the MK66 is aperture-challenged. Mars requires lots of contrast, so I was really disappointed. However, the images were sharp and closer oppositions will be better for 6-inch and smaller scopes. The 5-inch was also more contrasty, the MK66 presented a much brighter, clearer view than a 4-inch refractor. The Newtonian's view of Mars was slightly brighter than that in either the 5-inch apo or the MK66; however, the absence of tube currents in the MK66 made for a much cleaner view of Mars.

Nu Scorpii is a difficult double-double, but was well resolved with the MK66. Globular cluster views in the MK66 are more similar to those in the 5-inch apo than to a 4-inch scope. Views of Milky Way nebulae are good, but I haven't had that many clear nights this summer to do comparisons with other scopes.

Besides the reticle on the original finder, my only complaint is the focusing mechanism. Focusing on this scope is by primary mirror movement. The focusing is very fine, but too stiff. Turning the knob to achieve a fine focus is difficult when too much in-travel is required. Image shift is unnoticeable, but that's because the spring loading of the mirror movement is so strong.

The interior of the 7-inch diameter tube is painted a very flat black with fine ridges. Unlike the MK67, the MK66 comes with an integral 4.5 inch dew cap, also non-reflective, with an interior lip to further cut down on tube reflections. Views of the lunar edge had no wash-out effects due to interior reflections.

**Conclusions**

Overall, I'm pleased with my purchase. I've had the scope six months and haven't needed to re-collimate it. Images are sharp, but not as good as a 5-inch Astrophysics apo. Low power views of bright objects are compromised by the diagonal obstruction, but the central obstruction is not a problem on deep-sky objects. Planetary images are definitely brighter than those in a 4-inch refractor. Unlike the *Sky & Telescope* review, my experience is that the MK66 is closer to a 5-inch refractor than a 4-inch. But not enough for me to sell my AP apo scopes just yet.

## Tidewater Lighting Workshop and VAAS Meeting

*(Continued from page 3)*

9:00 a.m.)

Registration Fee $5.00

We hope you will be able to attend the 22nd annual convention of the Virginia Association of Astronomical Societies. This year's convention will be hosted by the Back Bay Amateur Astronomers and held at the Chesapeake Planetarium, 300 Cedar Road in Chesapeake, VA on Saturday, November 6. We will also be hosting the Tidewater Regional IDA meeting the day before at a nearby college in Virginia Beach.

Please, try to attend both, if possible.

Several speakers are lined up to discuss various topics of space science and astronomy, as well as exhibits and contest awards for submitted astrophotographs. Swap tables will also be set up. There is no charge if you wish to bring items to sell. Vendors are invited to set up their wares to display.

Weather permitting, we will have several telescopes viewing the sun during the day. These will include our 14" Celestron SCT and a pair of 20x120 "Big Eyes" fitted with glass solar filters. If you have a telescope bring it along, as we are planing a big star party that night.

After the day's activities we'll all meet back at the Planetarium to caravan down to our dark-sky observing site at Hampton Lodge Campground in Coinjock, NC. This is a 45 minute drive south of the Planetarium. You may register for the night at the campground ($10/night), or just stay a few hours viewing through the many telescopes, including Kent Blackwell's 25" f/5 Dobsonian and Ted Forte's 18" f/4.5 Obsession.

Load up your vehicle and plan to attend the 1999 VAAS convention. We would prefer to know if you plan to attend, but notice is not absolutely necessary.

Sincerely,

Kent Blackwell, VAAS 1999 Chairman

c/o Chesapeake Planetarium
300 Cedar Road
Chesapeake, VA 23320-5514
757-547-0336

You are also encouraged to visit the VAAS and Va-IDA web sites for information as plans progress. Those who send a SASE to the Planetarium address above should receive a copy of the final convention literature roughly 3-4 weeks before the event. Roughly the same info will be posted on the web sites.
http://members.tripod.com/vaas99/
http://proxima.astro.virginia.edu/~pai/VaIDA/
If you should have any additional questions, you may e-mail either Kent Blackwell or Glen Howell for further information.
kent@exis.net
glendonhowell@compuserve.com

# The NOVAC Next-Generation Light-Pollution Map Project

*(Continued from page 1)*
Center (NGDC), in Boulder, Colorado. Working with the Defense Meteorological Satellite Program (DMSP), Chris Elvidge and others at the NGDC have produced a map of the United States showing nighttime visual and near-infrared emissions. The map is similar to the familiar one of the US at night displayed by the International Dark-Sky Association (IDA) and other organizations, but at much higher resolution: 30 arcseconds, or about a kilometer. Elvidge and others have taken great pains to assure that the DMSP data represents cloud-free, moonless conditions. A technical paper on their technique, and downloadable nighttime maps, can be found through an NGDC web page at http://julius.ngdc.noaa.gov:8080/production/html/BIOMASS/night.html The DMSP data for the D.C. area looks quite similar to the Project Orion map published in the June 1996 issue of *Sky and Telescope* — remarkable, since the two maps were produced using completely different techniques. So, if the whole country is now covered by this DMSP nighttime-lights database and map, why do we need to make a new light-pollution map? Because we don't know what the DMSP values mean exactly for the average skygazer and amateur astronomer in terms of sky brightness and limiting magnitude (LM). The goal of the new project, then, is to translate DMSP visual and near-infrared nighttime emission values, measured from orbit and represented by different colors and brightnesses on the map, into equivalent LM for ground-based observers. This "ground-truthing" by NOVAC members will then make the DMSP data more meaningful for other astronomers and skygazers around the country, who could then easily determine from the map the limiting magnitude for their area. A map that displays the degree and extent of light pollution in an area can make a compelling argument for good lighting practices, as recent experience by NOVAC members at DC-area hearings has shown. Successive versions of the DMSP database will be used to monitor the advance— or, hopefully, retreat! — of light pollution in the US in terms of changes in LM.

For this project we need accurate determinations of LM, under cloud-free, moonless conditions, for accurately determined locations. In the beginning, participation in the project should probably be limited to NOVAC members and other experienced area amateur astronomers, in order to assure high-quality data. (For Project Orion, which involved the general public, much screening of unreliable data was necessary.) Once we have a good database solidly in hand we can open it up to more people. I will collect the observations from participants and send them on to Elvidge at NGDC, who will use them to produce a spatially-oriented digital "layer" to compare with the digital DMSP data.

The three principle activities for this project are: 1) determining your location; 2) determining limiting magnitude; and 3) submitting your data.

**1. Determining location**

In order to provide data that can be usefully integrated with the DMSP data, the location of the LM observation needs to be known to better than 30 seconds of arc, or about half a kilometer, or .008 degrees of latitude and longitude. This is well within the capabilities of most standard Global Positioning Satellite (GPS) receivers, as well as MapBlast, a Web-based map utility that will give the coordinates of any residential address in thousands of a degree. A test of MapBlast for my house with a high-accuracy military GPS receiver showed a difference between the two of only .001 degree. Therefore, NOVAC participants doing LM determinations from their homes for this project can get the necessary latitude and longitude coordinates from the Web. Presumably MapBlast works for non-residential addresses as well. The URL for the site is http://www.mapblast.com. You can also do what I plan to do, and go to a wide range of locations, both urban and rural, with a GPS device, to do LM determinations. If you are submitting LM data with coordinates obtained with a GPS, please convert them to thousands of a degree, and give the accuracy (plus or minus meters), if possible. Our NGDC cooperators would particularly like accurately-located LM measurements from sites that show up as isolated bright spots on the DMSP map, such as small outlying towns, which will help them spatially register the two data sets.

**2. Determining limiting magnitude**

The preferred method for determining LM in this project is to do star counts for selected areas of the sky. These areas are bounded by triangles or quadrilaterals made up of the brighter stars of familiar constellations. Charts have been made for these areas that correlate number of stars visible within the area to limiting magnitude, to a tenth of a degree. Twnety charts that span the sky are available through the NOVAC web site: on the bottom of the home page, click on "Links"; on the Links page, go to the "How To" column, and then click on "Limiting Magnitude", or call me at the phone number at the bottom of this article. Select the charts you need for the time of year you are working in, and print them out. Use areas as close as possible to the zenith for your determination. Procedures originally outlined for the Project Orion star counts apply equally well here. Pick a perfectly clear, moonless night, preferably a cool one with low humidity, such as in late fall or winter following the passage of a cold front. Outside, avoid any direct glare from lights shining into your eyes, and spend at least 10 minutes allowing your eyes to get dark-adapted. Use a red flashlight to illuminate the charts while you make your star count. Counts from two or more areas may yield a more accurate LM determination, if the areas are in equally dark patches of sky.

**3. Submitting your data**

After you have made your LM determination and accurately located yourself, e-mail the LM (to tenths of a magnitude), location (to thousands of a degree), locating technique (e. g., GPS or MapBlast), and date and time of observation to me at bburton@usgs.gov. (Those who do not have e-mail can use the address or fax number shown below.) You may also include notes on conditions such as temperature and humidity, but I will assume that all submitted measurements were taken in meteorological conditions that were as ideal as possible. Of course the degree of light pollution will be another factor, but that, after all, is what we are measuring! It is September as you read this, which is traditionally the beginning of the season for clear nights that are accompanied by low humidity and good transparency in our region. Hopefully by next spring, thanks to your efforts, I will have an accurate database for a wide area to send to NGDC in Boulder. Let's make NOVAC the innovators once again in the nascent field of light-pollution mapping!

William C. Burton

Work address and phones:
M.S. 926A, USGS
Reston, VA 20192
703 648-6904
703 648-6953 (fax)
bburton@usgs.gov

## Letters to the Editor

Elliott,

I noticed in the July/August NOVAC Newsletter that the map for GMU states that it was originally produced by GWU. There is also a GWU mentioned elsewhere.

So as not to confuse people in the area familiar with George Washington University (GWU), do you think it worthwhile to point out the typographical error, i.e., GMU in lieu of GWU?

Cheers,

Harold Geller

Ed: No.

Elliott:

I would be grateful if you could correct an error in my article on the AL's Urban List that appeared in the March/April 1999 newsletter. I wrote in the second to the last paragraph:

"Trivia question: did you know that M22 is south of M8." Well, that is wrong! I meant to say that M22 is north of M8.

Steve Blake

Northern Virginia Astronomy Club
Statement of Cash Received and Disbursed
For the period January 1, 1999 through July 27, 1999

| | | | |
|---|---|---|---|
| CASH RECEIVED: | | | |
| Membership Dues: | | | |
| Regular and Additional: | | | |
| Renewals | $2,256.00 | | |
| New Members | 1,062.00 | | |
| Patron Members-New | 100.00 | $3,418.00 | |
| Interest Income | | 154.77 | |
| Library Book Sales | | 1,138.75 | |
| Calendar Sales for 1998 | | 169.65 | |
| Donation | | 0.00 | |
| Kalmbach Book Discount | | 0.00 | |
| Total Cash Received | | | $4,881.17 |
| CASH DISBURSED: | | | |
| Newsletter: | | | |
| Printing & Assembly | 1,184.78 | | |
| Postage | 754.05 | 1,938.83 | |
| Astronomical League | | | |
| Astronomical League Dues | | 1,024.00 | |
| Observing Site Expenses: | | | |
| NOVAC Picnic: | | | |
| Picnic Permit | 0.00 | | |
| Baroque Food & Supplies | 127.72 | | |
| Invitation-Printing & Postage | 0.00 | 127.72 | |
| Observing Site Improvements: | | | |
| Crocket Park-Light Shield | 39.00 | | |
| Mickey Gordon-Light Shields | 78.00 | | |
| Savage Farm Grass Seed & Chain Saw Blades | 96.10 | | |
| Savage Farm-Portal-Jon Rental | 73.15 | | |
| Extra Light Shield on Reserve | 78.00 | 364.25 | |
| Library | | | |
| Supplies & Postage for Library Book Sale | | 38.15 | |
| Arlington Planetarium: | | | |
| Reception Food | | 61.94 | |
| General Meeting Signage-GMU Site | | 186.60 | |
| International Dark-Sky Association (IDA) | | 100.00 | |
| Astronomy Day Star Party: | | | |
| Publicity | 16.72 | | |
| Parking/Telescope Station Signs | 121.22 | | |
| Lightsticks | 27.75 | 165.69 | |
| NOVA Star Party: | | | |
| Lightsticks | | 27.75 | |
| Printing-"Getting Started in Astronomy" | | 100.31 | |
| Administrative: | | | |
| Printing - Membership Applications | 40.76 | | |
| Printing - Administrative | 48.07 | | |
| Printing - Business Cards | 52.25 | | |
| Postage | 154.17 | | |
| Supplies | 66.37 | | |
| Bank Service Charge | 8.00 | 369.62 | |
| Total Cash Disbursed | | | 4,504.86 |
| EXCESS OF CASH RECEIVED OVER CASH DISBURSED | | | 376.31 |
| Cash at beginning of period: | | | 9,595.81 |
| CASH AT END OF PERIOD | | | 9,972.12 |
| Checks Received, Undeposited | | 0.00 | |
| Checking Account | | 1,133.56 | |
| Savings Account | | 2,585.45 | |
| Certificate of Deposit Due 1/7/2000 | | 2,680.32 | |
| Certificate of Deposit Due 11/2/99 | | 1,535.52 | |
| Certificate of Deposit Due 5/2/2000 | | 2,037.27 | 9,972.12 |

Respectfully submitted,

/s/

Pedro Martinez,
Treasurer

# The 1998 NOVAC Membership Directory

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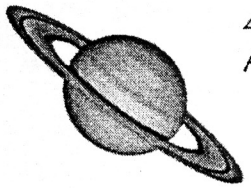
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17TH ANNUAL NORTHERN VIRGINIA ASTRONOMY CLUB'S

# NOVA STAR PARTY

AND TELESCOPE MEET • A PUBLIC ASTRONOMY EVENT

## SATURDAY OCTOBER 16, 1999



40 MILES SW OF WASHINGTON DC BELTWAY
AT CROCKETT PARK, FAUQUIER COUNTY, VA

RT.66 WEST, RT.234 SOUTH BYPASS (EXIT 44),
RT.28 SOUTH, RIGHT ON RT.643
PARK ADMISSION FIVE DOLLARS PER CARLOAD

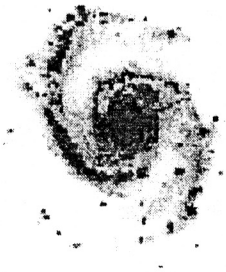
**AFTERNOON TALKS BEGIN 3PM • EVENING OBSERVING TILL 11PM**

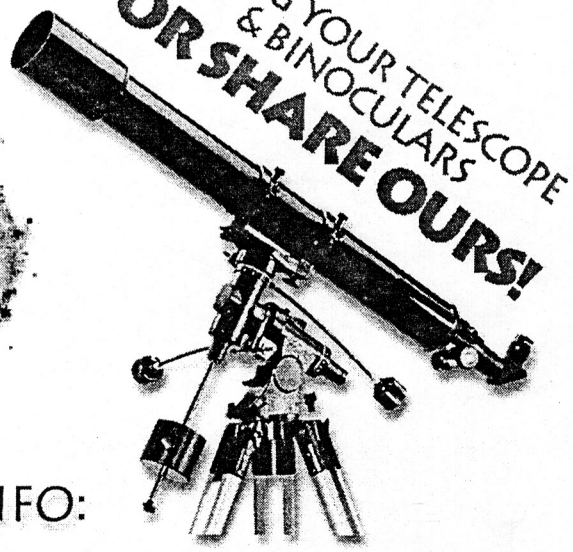
CONSTELLATIONS
BUYING SCOPES
OBSERVING SUNSPOTS
YOUR PLACE IN SPACE
LIGHT POLLUTION
SUNDIALS
FREE RAFFLE!

**AND GREAT SURPRISES!**

DOZENS OF SCOPES
SKY TOURS EVERY HOUR
SLIDE SHOWS & DEMOS
HELP WITH YOUR OWN GEAR
**GO METEOR HUNTING**
**WATCH SATELLITES IN ORBIT**
**LIVE TV THRU THE TELESCOPE**

**BRING THE KIDS!**






MORE INFO:

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# The 1998 NOVAC Membership Directory

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# Highlights of NOVAC Board Meetings and General Meetings

**Kevin Brown**

## June 16 General Meeting

19:32 Tilly Smith, President, called the meeting to order. The prospective and new members introduced themselves.

Tilly Smith talked about the move to GMU The first meeting there will on July 11.

Tilly Smith announced the upcoming public events.

Bob Gent spoke briefly about his attendance at the Mason-Dixon Star Party, and presented AL awards to Brenda Clements Jones, Bill Burton, and Tilly Smith.

Bob Gent talked about the IDA efforts to reduce light pollution.

Jeff Stetekluh gave the observing report.

Ian Keith gave the sky tour.

For the main program, NOVAC's own Tom "Iron Man" Dietz gave a presentation on supernova hunting.

There were 35 in attendance, 6 of whom were not members.

Submitted by
Kevin Brown, Secretary

## July 7 Board Meeting

19:30 Tilly Smith, President, called the board meeting to order.

Tilly Smith and Pete Johnson discussed the final preparations for moving the NOVAC General Meeting to GMU. The first meeting at the new location will be on July 11.

Pedro Martinez presented the midyear budget review.

Jonathan Bein presented the current schedule of public outreach events.

Pete Johnson spoke about the upcoming general-meeting programs.

Submitted by
Kevin Brown, Secretary

## July 11 General Meeting

This was the first meeting at the new GMU location and new time.

Tilly Smith called the meeting to order at 18:05

There are no other minutes for this meeting due to the absence of the Secretary.

There were fifty people in attendance, four of whom were not members.

The meeting adjourned at 19:50.

Submitted by
Kevin Brown, Secretary

## August 4 Board Meeting

19:30 Tilly Smith, President, called the board meeting to order.

Tilly Smith led a discussion of plans for the NOVA Star Party on October 16.

Jonathan Bein presented the current schedule of public outreach events.

Pete Johnson spoke about the upcoming general-meeting programs.

Tilly Smith adjourned the meeting at 21:00

Submitted by
Kevin Brown, Secretary

## August 8 General Meeting

18:05 Tilly Smith, President, called the meeting to order. The prospective and new members introduced themselves.

Tilly Smith discussed the public astronomy program that NOVAC will be conducting with Loudoun County Parks and Recreation at Mickey Gordon Memorial Park on August 13.

Tilly Smith presented the upcoming general meeting programs.

Jonathan Bein discussed the upcoming Public Outreach programs.

Tilly Smith gave the observing report.

Kevin Brown gave the sky tour.

For the main program, NOVAC's Pete Gural gave a presentation on his trip to Mongolia for the Leonid meteor shower last November.

Tilly adjourned the meeting at 20:00

There were 31 in attendance, 4 of whom were not members.

Submitted by
Kevin Brown, Secretary

## Editor's Note

**Elliott Fein**

Please keep those letters and articles coming in!

The 10th of the month preceding publication is the cutoff. Material that I receive after the 10th will appear in a later newsletter. Copy (in ASCII, please), not previous published, for the November/December issue must be in my hands by October 10.

When I receive copy for an article, I start to format and edit it. If later, I receive an updated copy of the full article, I need to either figure out what changed and update the article in progress, or throw away the work I've done and start anew with the second copy. It would be much better if authors would tell me what changes they want made to the first, or if the changes are too complex for that, send me the second one and tell me the paragraph or whatever that has been changed.




**NOVAC Notices and Benefits**

**Discounts on *Sky & Telescope* and *Astronomy.***

As a member of NOVAC, you can get astronomy magazine subscriptions at a discount. To obtain *Sky & Telescope* for $29.95 (instead of the standard $37.95), make your check out to "Sky Publishing Co." You can subscribe to *Astronomy Magazine* for $29.00 for one year. Make your check payable to "Kalmbach Publishing Company". In each case, note on the check: "new subscription" or "renewal." If a renewal, include your customer number. Send your check to Treasurer Pedro Martinez, Jr., 6319 Anneliese Dr., Falls Church VA 22044.

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.

**Discount on Books**

NOVAC is participating in the discount book sales program offered by Kalmbach Publishing. They will sell our members any astronomy-related book in their catalog for 25% off the list price when we send in a group order. Kevin Brown is coordinating the sales. If you are interested, please see him at a meeting, or call him at home (703) 503-9523 to place an order. Make your check payable to "NOVAC" for the price of the book minus the discount, when you place the order. We anticipate doing this 3 - 4 times a year if demand warrants.

**Club Telescopes and Binoculars**

NOVAC makes available two six-inch (*f*/5) Newtonian reflectors for club members to check out, free of charge, and use for a limited time.

One telescope is a Celestron model SP-C6 on a Super Polaris German equatorial mount and wood tripod. The telescope comes with Orion Ultrascopic 10mm and Meade MA 25mm eyepieces with 1.25-inch barrel sizes.

The other telescope is a homemade six-inch reflector on a Dobsonian mount, and comes with a 25mm Kellner eyepiece. It is easy to transport to dark sky sites, and easy to use.

To borrow a telescope you will need to show your NOVAC observing pass and leave a $500 (for the Celestron) or $250.00 (for the Dobson) security deposit. To borrow the Celestron, contact Doug Mistler at (703) 437-0513; for the Dobson, contact Bob L'Hommedieu at (703) 978-0946. Note: Checks must be made payable to "NOVAC". The club also has a pair of 10x50 binoculars available for members to borrow. They are kept in the club library in the back of the planetarium, and can be checked out after the regular monthly meeting, for a period of one month. Please show your observing pass.

**NOVAC Library**

NOVAC has established a library at the Arlington Planetarium for use by NOVAC members. Books may be checked out and returned only at the monthly meetings. Members may check out books for one month at a time. To borrow books, see NOVAC Librarians Pedro Martinez or Craig Tupper at the monthly meeting.

The NOVAC library seeks book donations to the library. If you have any astronomy books or materials you are thinking of discarding, please consider a donation to the NOVAC library.

A complete list of all library holdings is available upon request.

**General Membership Meetings**

General Membership Meetings are held at George Mason University (GMU), Fairfax Campus, off Ox Road (Rt. 123) on the second Sunday of every month. To reach GMU take either Rt. 66 to Ox Rd. (South) or Braddock Rd. to Ox Rd. (North). Enter GMU at the main entrance off Ox Rd. (University Drive) and proceed to Parking Lots F, G, or H for free parking. Pay Parking is also available in the Parking Garage.

The meetings are in the Lecture Hall, next to Fenwick Library, on the North side of campus across Patriot Circle from the parking lots. Meetings start at 6:00 p.m.

Trustee Meetings are held on the first Wednesday of every month. Members who are not trustees but are interested in attending should contact a club officer or board member for further information.

**NOVAC On-line**

NOVAC maintains an e-mail mailing list. Messages sent to the list include reminders about scheduled observing sessions, announcements for unscheduled sessions, requests for quick observing session summaries, MIR observability predictions, etc. For more information, send a message to Chewning Toulmin, pct@his.com.

**NOVAC Observing Site Rules**

**C. M. Crockett Park:** We have permission from Crockett Park to unscrew the light bulbs on the light sensor fixture on the side of the gate guard building facing the observing field (south side). Please leave the lights on the far side (north side) active so people can see the gate.

Weekends (Fri./Sat. only), NOVAC has unlimited access to the park for all weekends. The weekends will also be open to the public. The gate will be locked and will not be unlocked unless a NOVAC member enters the park; after which time the gate will stay open to approximately 10:00 p.m., when the Assistant Park Manager will ask the public to leave. The gate will then be locked, and should remain locked through the rest of the evening. NOVAC members may remain until they are finished with their observing sessions.

Weekdays (M-Th & Sun.), NOVAC members need to notify Assistant Park Manager Bonner Davis by e-mail (crocketcow.aol.com) or phone (540-788-4867) by 2:00 p.m. on the day they plan to observe. Assume approval unless the park notifies you in the negative. The weekdays are not open to the public. The gate should remain locked after you enter the park and throughout your observing session.

If any NOVAC member notices any member of the public violating park policy, he or she is to notify the Assistant Park Manager, who lives in the house adjacent to the end of the parking lot. During EDT, set up on the large field to the left. During EST, set up on the paved cul-de-sac 200 yds. past the gate. No loud radios, alcoholic beverages, or loose pets permitted. Please do not leave trash or debris behind. We are guests of the park; Park Management may revoke our observing privileges at any time due to carelessness of one person.

**Savage Farm Site:** Weekends (Friday/Saturday/Sunday): NOVAC has unlimited access to the park for all weekends.

Weekdays (Monday-Thursday.): For unscheduled observing sessions, contact the park manager, Paul McCray, at (703) 729-0596 or <wodtrail@erols.com> at least 24 hours in advance, and leave a message with your phone number or e-mail address. You may use the site for that session ***unless*** you hear from Mr. McCray stating otherwise.

No loud radios, alcoholic beverages, or loose pets. Pick up after yourself, and do not leave any trash behind. Make sure the gate is locked whenever you are in the park, and when you leave. We are guests of the NVRP and could have our access to this site revoked at any time if it is abused.

**Mickey Gordon Regional Park:**

There is a light pole on the road entering the park and it is a problem towards the entrance of the park. We recommend you set up further back in the park or on a lower field behind the baseball diamond to escape the light.

The park is available without notice to all members seven days a week. As sports season begins we will post the schedule when the lighted baseball facility will be in use.

**Directions to NOVAC Observing Sites**

**C. M. Crockett Park**

From the Washington, D.C./Northern Virginia area, go west on I-66 to Exit 43A in Gainesville onto Rt. 29 South toward Warrenton. After 11.8 miles on Rt. 29, stay left (toward Culpeper), to bypass Warrenton (but still on Rt. 29 S.) Go about 1 mile to the Rt. 643 exit, Meetze Road. Turn left (East) on Rt. 643. Go 7.5 miles on Rt. 643. Watch for the C.M. Crockett Park sign on your right, and turn right into the Park Entrance Road.

**Alternate directions to Crockett**

From Washington, D.C./Northern Virginia, go West on I-66 to exit 44. (234 bypass around Manassas). Take 234 bypass to Rt. 28 West. Stay on Rt. 28W for about 13.7 miles, through Nokesville, Catlett and Calverton. Turn right at Rt. 643 (store on corner). Go 1 mile to Crockett Park entrance road on left.

**Savage Site:**

From D.C. I-66 West to Route 17 North. Stay on Route 17 North until it intersects with Route 50 at Ashby Gap. Turn left onto Route 50 and go 1.0 mile and turn right on Route 601. Continue on Route 601 (Blue Ridge Mountain Road) and go two miles past the main gate of the FEMA installation. Turn right at the park entrance after passing the gateposts with *Belle Allee* and *Ball Alley 1875* on your right.

The park entrance on Route 601 is marked by a small NOVAC sign. As you turn into the park, go straight ahead until you reach the gate, which is secured by both a keyed padlock and a combination lock. These locks are located to your left behind the gate as you face it from the outside. The combination is on your NOVAC observing pass. **Always** lock the gate behind you. The NOVAC lock **must be locked to the keyed lock, not to the chain,** to allow emergency access by the fire department. Drive to the observing area (the stone patio next to the house). There is very limited parking at the observing area itself, so please park in the parking area on the right as you face the patio.

**Alternative Directions to Savage via the Dulles Toll Road**

Take the Dulles Toll Road west to the Dulles Greenway. Take the Greenway west about 14-15 miles to where it ends at Route 7 near Leesburg. Stay in the left-hand lane to go to the exit for Route 7 West. Take Route 7 West for about 18 miles to Route 601, Blue Ridge Mountain Road, which is at the top of Snickers Gap and marked by a flashing yellow light on Route 7. Turn left onto Route 601 and continue 2.4 miles to the park entrance, which is on the left about two-tenths of a mile past a driveway on the left with a stone wall marked with the name "Ben Lomond." There is a white "NOVAC" sign nailed to a large tree to the right at the entrance to the somewhat rutted gravel driveway that leads to the park. Drive up to the white gate at the top of the hill. The combination for the gate is on your observing pass. The driveway curves down and around to the right to the observing area after you pass through the gate. Please lock the gate behind you and remember to use parking lights only as you approach the observing area, which is on the left as you reach the lawn in front of the old house.

One additional note. Parking at the observing area itself is much more limited at Savage than at Crockett or Mickey Gordon. Please try to leave an access lane to the area around the stone patio. If possible, unload your telescope and then park your car away from the area. There are plenty of places to park around the lawn and even south of the old house. This will allow those who arrive later to have access to whatever spots remain without having to lug equipment across the lawn. If you plan to leave early, please be considerate of others and either pack up away from the stone patio or avoid using backup lights when you drive down to pack up your equipment.

**Mickey Gordon Regional Park**

The park is located fifteen miles west on Rt. 50 from the intersection of Rt. 28 and Rt. 50. It is only a 20-minute drive from the Centreville area and should be a convenient site for most members in western Northern Virginia. Directions to the park: take Rt. 66 west to Rt. 28 north. Take Rt. 28 to Rt. 50 West. Go 15 miles until you see the brown Mickey Gordon Regional Park sign. Make a right on Rt. 627, Carters Farm La. Go a few hundred yards to the park entrance on the left. The park has a gate but should never be locked.

**Site Locations**

Here are the locations of four observing sites as provided by NOVAC members:

- Savage: 39 ° 04.7' N; 77 ° 51.7' W
- Crockett: 38° 37' N; 77° 43' W
- Big Meadows: 38°32' N, 78°26' W
- Little Bennett Regional Park: 39°17.0' N, 77°17.5' W

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The *NOVAC Newsletter* is sent to members of NOVAC as a regular membership benefit.

**Membership in the Northern Virginia Astronomy Club is $18.00 per year and is open to anyone interested in astronomy or the sciences. Additional memberships at the same address without additional copies of the newsletter are $6.00 per person. Contact Secretary Kevin N. Brown, 5755 Walnut Wood Ln., Burke, VA 22015, 703-503-9523.**

All notices of change of address should be sent to Kevin N. Brown. Please include both old and new addresses.

NOVAC does not knowingly accept advertising for products of inferior quality nor does it accept responsibility for the quality of advertised products.

NOVAC members are invited to submit articles for publication in the *NOVAC Newsletter*. The editor reserves the right to edit all materials submitted.

Article submissions, in ASCII please, may be sent to Elliott Fein at elliott.fein@erols.com, or to Elliott's address in Rockville, given above. Questions? Call 301 762-6261, or send e-mail.

Deadline for submissions is three weeks in advance of publication, e.g., June 10 for the July/August newsletter.

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## 1999 NOVAC Observing Schedule

### C. M. Crockett Park

Every Friday night and Saturday night

NOVA Star Party - October 16

### Savage Farm

Every Friday night, Saturday night, and Sunday night

### Prime Observing Nights

September 3, 4, 5, 10, 11, 12, 17, 18, 19
October 1, 2, 3, 8, 9, 10, 15, 16, 17
November 5, 6, 7, 12, 13, 14

December 3, 4, 5, 10, 11, 12, 31
January 1, 2, 2000

### Meteor Shower Dates for C. M. Crockett, Mickey Gordon, and Savage

October 21 Orionid meteor shower
November 17 Leonid meteor shower

December 14 Geminid meteor shower
December 22 Ursid meteor shower

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