NOVAC

THE NEWSLETTER OF THE NORTHERN VIRGINIA ASTRONOMY CLUB NO. 109 • VOL. 23 • SEPTEMBER/OCTOBER 2003

Adventures in mirror-making

by Ed Witkowski

More than 35 years ago I smelled pitch for the first time. As a child I watched my older brother, Hank, grind and finish a mirror. For many years he would say, "Grind a mirror and build your own scope." I would browse through my copy (second printing) of Jean Texereau's *How to Make a Telescope.* At times, I would be overwhelmed and intimidated by all of the terms and techniques: grit, pitch lap, rouge, wave error, figuring, and other assorted terms. I avoided the adventure for many years, but finally took the plunge and decided in June of 2001 to grind a mirror.

Part 1: The first Mirror

As a first time "Glasspusher" I opted for an 8-inch mirror and contacted the local mirror making class leader, Guy Brandenburg of the National Capital Astronomers Mirror Making Workshop. The first stage in mirror making is the **rough grinding** of the mirror; a rough spherical concave depression is ground into the mirror blank. This stage is also commonly known to mirror makers as "hogging out" the mirror and is accomplished by using 60 or 80 grit silicon carbide abrasive. After eight hours, I had completed rough grinding with 80 grit abrasive and had even moved through the 120 and 220 grit abrasives.

It was now time to move on to **fine grinding.** Fine grinding proceeded at a faster pace. Eight hours later and the 320, 302, 303, 304 and 305 grits were done. A great website which explains grit sizes is the Stellafane website at *www. Stellafane.com.*

At this point, I had what I hoped was a nice spherical concave depression in the mirror blank. While looking at the blank at a lower angle, a nice even sheen reflected off of the surface. This was very exciting for me, almost as good as witnessing the birth of my daughter—*almost!*

Next up is **polishing.** During this stage, a pitch lap is made from pitch and a polishing agent is used. Different polishing agents were available to me, one being cerium oxide (CeO) and the other rouge. I picked cerium oxide as it polishes faster and my wife was nagging me about the "never ending process." Rouge polishes more slowly (and can provide a smoother surface) it also allows the mirror maker to sneak up on the final figure. I will tell you more about figuring later. During polishing, the mirror blank is slowly slid over the pitch lap in a 1/3 center over center W-like stroke. After seven hours of cerium oxide and one hour of rouge, the surface was beautifully smooth and polished.

The final step is **figuring the surface,** this step is also known as parabolizing. This stage involves making a slight change of the spherical surface into a parabola. Remember my mentioning overwhelmed and intimidated, well this is when it can get tricky! The "classic" technique a la Texereau has the mirror slide across the tool in a zigzag pattern. Using such a stroke deepens the center slightly, if you're lucky—or ruins the mirror if you're not. Ruined mirror . . . please go back to stage one, hogging.

Tests are performed on the mirror during this stage. The two tests that were used on my mirror were the Ronchi "Ron-key," or if you have a sense of humor "Rauncie," the

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Events in September and October

September

3 FIRST	10 FULL	18 LAST	25 NEW	
13	14	19	21	Prime observing weekends
26	28			
14				General meeting
20				Monthly observing & NOVAC Star Gaze (Crockett)
1	2	13	30	Crockett open

October

2 FIRST	10 FULL	18 LAST	25 NEW	31 FIRST	
17	19	24	26		Prime observing weekends
31					
12					General meeting
18					Public observing (Crockett)
18					Monthly observing (Mason Neck)
1	17	31			Crockett open

Roboscope moves along

by Craig Tupper

The NOVAC roboscope is an effort to place an internet-controlled CCD observatory on a mountain in West Virginia with mag 6.7 skies. All club members will have the opportunity to capture CCD images via the web. For background info, see the project web site at *http:\\www.novac.com\robo*.

The big picture is, things are moving along. Here's what Bob Neff had to say on August 12 about the observatory structure, which will have a 6-segment "clamshell" roof opening:

> *This week everything gets reassembled with waterproof glue and screws and then all surfaces and edges will be primed and painted. The only design change is the addition of fixed outside shields for the moving side panels. These will protect hands and fingers from the moving panel sections that can pinch, reduce the potential of the moving sections jamming with wind-blown branches, etc., and provide mounting sites for any external sensors on the east and west sides of the building. The roof drive and fail-closed setup work very well but I am still not completely satisfied with the magnetic release/latching mechanism. This needs more study and adjustment (tinkering). Rodents: I can line the inside of the equipment bay with sheet aluminum and cover the ventilation grates with quarter inch or smaller galvanized wire for rodent control.*

In other news, Pete Johnson is making good progress on weather stuff, and showed us his home-brew Cloud Sensor 1.0 using a Peltier cooler and copper plates to measure the differential temperature between sky and ground. Pete has also had "first light" with his "star counter" cloud sensor and wants to get it to a dark site for further testing. He is currently shopping for a basic weather station, to include rain gauge, wind gauge, thermometer, etc. He's also done a lot of software/hardware work to enable all of this stuff to talk to the observatory control computer.

As far as the telescope/camera control software itself, a small group has been testing the system for the last two months, using just a web browser to capture CCD images from the scope and camera while it is in Craig Tupper's back yard. Most of the serious issues have been ironed out, except for the frequent appearance of clouds! Several images from the test phase have been posted on the project web site. A Yahoo email list has been established for the group, and we are going to start using that for notification of when the Roboscope will be online for testing, as well as for scheduling observing time using Yahoo's Calendar function. If this works well we may use that list for the same purposes for future operations.

Phil Wherry has delivered version 1.0 of our Observing Request Queueing Software (ORQS), which will allow members to submit requests for images to be taken later whenever the telescope is in use by others. That should be working well enough to test it with the current group of testers once or twice; then my hope is to open up the Roboscope to the whole club while it is still in my back yard, some time in September. That will give me time to drive out other issues, and let members get familiar with the system, before Pete gets comfortable enough with the structure/weather/control to incorporate the scope itself.

Most of the serious issues have been ironed out, except for the frequent appearance of clouds!

In summary, progress is perhaps slower than some of us hoped when we started nine months ago but we are getting there. Budgetarily we are well within projections. I am disappointed that we probably won't be on the mountain in 2003, but we are making real progress towards a capable and robust system, and there should be benefits to doing local testing during harsh winter weather. ✶

Star parties serve up dark skies

by Mike Mills

Star parties are an important part of the amateur-astronomy scene. Offering dark skies and astronomical fellowship, these events often attract hundreds of enthusiasts. Here is a list of several star parties in and around the Mid-Atlantic area.

The 21st Annual NOVAC Star Gaze

September 20, 2003
www.novac.com/gaze

NOVAC invites you to the largest public star gaze in the Washington DC area. Learn about astronomy while enjoying the night sky with hundreds of telescopes, binoculars and homemade projects. Many experienced astronomers will be on hand to answer questions and share their knowledge. Easy access, lots of equipment and a dark sky make for a good night under the stars.

The Oil Region Astronomical Society ASTROBLAST

September 23–28, 2003
www.oras.org

ASTROBLAST is an annual event, first held in June 1994, by the Oil Region Astronomical Society. Our organization is blessed with a remote "dark sky" site located far from the light pollution of large urban areas. The event is held in a large field surrounding our observatory in the Lockwood Campground at Venango County's Two Mile Run Park, near Franklin, Pennsylvania.

Big Meadows Star Gaze

September 26–27, 2003
www.raclub.org/BMSG/2003/BMSG.html

The Rappahannock Astronomy Club is hosting the Second Annual Big Meadows Star Gaze on September 26–27, a two-night star party located at Big Meadows in Shenandoah National Park in the Blue Ridge Mountains of Virginia. The BMSG is an informal star party for amateur astronomers to enjoy great viewing and make new friends.

Blackwater Falls Astronomy Weekend

October 24–26, 2003
www.kvas.org/astronomy_weekend_2003.htm

Held in West Virginia, KVAS co-sponsors the Blackwater Falls Astronomy Weekend with Blackwater Falls State Park each fall. A Friday night star party kicks off the weekend and is followed by classes and round table discussions on such topics as Astronomy Myths, Astrophotography, Radio Astronomy, and Telescope Basics. A Keynote Speaker kicks off the Saturday night activities with drawings for door prizes to follow. A star party is always planned where, weather permitting, telescopes of all sizes and types, factory and home made, are set up for public viewing. A flea market for bartering astronomical paraphernalia is also held.

Stella Della XVI

October 24–26, 2003
bmaa.freeyellow.com/Sdv.htm

Stella Della Valley offers you a chance to gather with astronomers and families under some of the most pleasant dark skies in Eastern Pennsylvania, at Camp Onas in Ottsville, PA.

Upcoming NOVAC meeting programs

September 14, 2003

The sunny side of stargazing—understanding H-α solar filters • Greg Piepol
Hydrogen-alpha solar filters have exploded onto the amateur astronomy scene offering exciting views of the active and ever changing sun. Join NOVAC member Greg Piepol as he explains how to observe the solar chromosphere with these interesting filters. Topics include the operation, types, and costs of filters as well as the details you see with them. There will be two different types Hydrogen-alpha filters on hand.

NOVAC meetings are held at 7:00 pm on the second Sunday of each month in Room 80 of the Enterprise Hall at George Mason University in Fairfax, Virginia. See *www.novac.com/GMU.htm* for a map and directions. **Please note:** The schedule of speakers is subject to change. Please check at *www.novac.com/craig/speakers.htm* for the latest info prior to the meeting.

What's YOUR interest? Let *ctupper@erols.com* know. Come share and learn about your favorite topic!

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Mirror-making, from page 1

other was the Foucault test. Explaining the tests and their results can take up many pages.

So, here are two excellent web links, which explain each:
www.atm-workshop.com/ronchi-test.html
www.atm-workshop.com/foucault.html

It took four Friday nights to finally figure the mirror. This stage can take a lot longer. One of the hardest questions that some mirror makers have to answer is "when am I done?" A frequent end point is when you have reached a wavefront error of 1/8 wavelength.

After 12.75 hours rough/fine grinding, eight hours polishing (seven CeO and one Rouge) and four Friday nights of "figuring" sessions, I had an 8-inch f 5.5 mirror with a 1/10-wave error.

Was it "hard" to make a mirror? No, not really. The "hard" part was allocating time for the process. Was it worth it? A big yes! There are many reasons why making a mirror can be a rewarding experience. Here are a few:

1. Learning about what's involved in making optics, testing them and how they work.
2. Knowing your mirror, "quality control." Your mirror is made as well as you want. Some of the best mirrors are ATM mirrors.
3. The pride and joy of making your own high quality optic. When you are done grinding, polishing and figuring by hand, you will have a mirror surface that is accurate to within a millionth of an inch!
4. Next: A bigger and better mirror

Part 2: Delmarva Mirror Mania

In 2002, I attended the Delmarva Stargazers 2nd Annual Mirror Making Seminar—or was it "Grinding Mania!"—or should it have been "The Mirror Marathon"?

Whichever term applies, it was a great experience. The seminar and workshop started on a Friday afternoon with a quick introduction followed by the fine grinding of our generated blanks, a 10-inch f6 in my case. A pregenerated blank has a rough curve ground into the mirror blank surface. The grit sequence was silicon carbide (SiC), 220 grit, aluminum oxide (AlO), 25, 12, 5 micron and then CeO (as the polishing agent).

Rough and fine grinding can be programmed into your brain:

Step 1—Put some grit on the tool and mirror
Step 2—Do the 1/3 center over center "Boogie" (I mean stroke). After approximately eight up and down strokes, you continue with turning the mirror and "going around the barrel" approximately a quarter turn. I mention approximately because randomness helps create a better surface.
Step 3—Go around the barrel twice.
Step 4—Dunk mirror and tool
Step 5—Clean off sludge.

Do Steps 1 through 5, eight times (this is called a wet). Be sure to clean your tool and mirror thoroughly and go on to the next grit. I did about 16 wets between the 220 and 25 micron, this was followed by eight wets each for the 12 and 5 micron. By the time Friday night rolled around, I had completed the fine grinding and was ready to start polishing in the morning.

"Ah, pitch in the morning, smells like, (sniff, sniff) victory." Pitch: messy stuff, but fun! Was it hard or was it soft? If pitch is too hard or too soft, you may encounter problems while polishing. All I know is it worked. The CeO was very effective as a polishing agent and the glass was looking fine!! It went so nicely that I was ready to start figuring by late Saturday afternoon.

Was it "hard" to make a mirror? No, not really. The "hard" part was allocating time for the process. Was it worth it? A big yes!

Figuring is when the "final" touches are applied to the mirror. The transformation of a smooth sphere to a parabola can be a long process or it can be a short one. Using CeO you really don't creep up on the final figure. In my case, I had a "very nice" sphere, so the transition was quite short when compared to when I used rouge on my first mirror. Some people appeared to be rushing through their mirrors and they wound up spending much more time finishing.

So how did my mirror end up? It has an "excellent, smooth parabola" but a turned-down edge that is about a 1/8 of an inch from the edge. The results of Foucault testing at the NCA Mirror workshop show that I have a 1/15 wave mirror, not bad for a marathon.

As I mentioned, it was a great weekend! The Delmarva Stargazers are a great group of people and the food was excellent. Steve and Bruce Swayze were outstanding teachers, tutors and testers!

Occasionally a message pops up on the Internet, in newsgroups, which goes something like this: "How hard is it to make your own mirror?"

Having completed *two* mirrors I can honestly say, "It's not very hard." *But,* there are a few "ifs, ands, or buts" included. Here are a few:

1. Take your time. If you rush, you may end with lots of errors.
2. Keep your area clean (I better not let my wife see that tip, I'd never hear the end of it).
3. Most important—take pleasure in the process!

Enjoy the sky! ✶

Monthly Observing Sessions

2003 Schedule

September 20	Crockett Park	21st NOVAC Star Gaze
October 18	Mason Neck SP	Hydrogen-alpha solar display & talk (4:30 pm)
November 29	Crockett Park	Video astronomy display
December 13	Frankling Park	Geminid meteor shower

Meeting highlights

Board of Trustees Meeting Tuesday, July 1, 2003

✶ **Treasurer Pedro Martinez** circulated **financial data** as of June 30, 2003. In short, actual revenues for 2003 have been $7,873.58 while expenditures have been $8,893.32, for a net deficit of $1,020.18. Questions were asked regarding the Spruce Knob observing site expenses.

✶ **Membership Coordinator Joe Pierson** provided a **membership report** noting a current active club membership of 545 households with 699 actual members. Most of the new members continue to find the club through the internet. He reported that those originally believed to have agreed to replace him as membership coordinator ultimately decided not to accept the position.

✶ Joe read **comments** provided with membership renewals. **Outreach, observing sites,** the **website, Roboscope** and **Monthly Observing Sessions** all received compliments. There was one request for more outside speakers at General Meetings and several asked jokingly if the club could do something about the weather. A few members did not renew, mostly because they had moved out of the area, but also due to other commitments.

✶ It was noted that **Craig Tupper** continued to have the **speakers for General Meetings** scheduled well in advance. An impromptu attempt to stump a panel of members on a variety of questions at the previous meeting, in lieu of a speaker, was considered a success.

✶ **Alan Figgatt** indicated that he had no set plans for this month's **Sky Tour.** It was suggested he consider something on the "NOVAC-45" developed by **Bob Stewart,** a marathon program developed for late July since the **Messier Marathon** this year was clouded out.

✶ Alan Figgatt said the **Analemma Society** continues to schedule Friday night public events and has success in fund-raising.

✶ **AL coordinator John Avellone** indicated that there continues to be two requests to the Astronomical League for awards based on observations submitted by club members.

✶ **Editor Mike Mills** submitted a written report indicating that the latest newsletter issue just went to the printer. He is working with the new editor, **Dave Yustein,** to help him take over editing duties. Dave will start with the next issue.

✶ **Greg Piepol** received applause and congratulations for winning an award from the Astronomical League for maintaining a good club website. He provided some **monthly statistics:** there were 6,400 unique visitors from 57 countries. E**d Witkowski**'s planetary nebula section and the telescope reviews received the most hits.

✶ Alan Figgatt reported the **donation of 7 eyepieces** to supplement those already provided with loaner scopes. They must be cleaned before distribution. One person loaning a telescope has lost an eyepiece. While a search continues, there is no policy on how to cover items other than the telescopes. It was suggested that loss of eyepieces, finders and other accessories would mean loss of $30 of the original deposit, and that this should be announced in the membership guide.

✶ **Bob Stewart** donated a video system and monitor to the club for loan; a $100 deposit was assessed for its use.

✶ Hope was expressed that the forthcoming **Monthly Observing Sessions (MOS)** at **Camp Highroad** would be clear; Bob Stewart report that the grass will be cut beforehand. Concern was expressed that Boy Scouts might be camping on the field, but some recalled that **site coordinator Tilly Smith** already clarified that a major event was not planned.

✶ **President Ed Karch** reported that a club member asked why MOS's were no longer scheduled the Saturday before General Meetings. None will be until December. It was recalled that this was originally the intent when developing the MOS, but the need to meet public observing obligations diverted the schedule from this goal. It was also mentioned that the Saturdays before General Meetings remain within 3 or 4 days of the full moon, which is ok for a few MOS's but not for all of them. While it was recognized that the Board approved and announced the schedule for this year, the MOS team might want to look at the issue and report back for the next Board meeting. There also needed to be a clarification on which MOS would be moved to Franklin Park later in the year.

✶ **Outreach Committee representative Donna Blosser** reported that a group has contacted the Outreach Committee interested in attending a MOS. It was suggested they be invited to the next public MOS.

✶ Mike Mills informed the Board in a written report that the **Powers mirror** remains in its box for now. Mike also informed the Board that he heard nothing about an impromptu **ATM meeting,** so he assumes one did not occur. The next meeting can be at his house on the usual date, July 20th.

✶ In a written report, **Bob Traube** informed the Board that a representative of the **Georgetown University Astronomical Society** contacted NOVAC asking for assistance in revitalizing the university's observatory, which includes a 12-inch refractor. It was suggested that time be given at the next general Meeting to any NOVAC member wishing to respond to this request by organizing a group to assist the students.

✶ In a written report, Bob Traube informed the Board of a **Astronomical Society of the Pacific Astronomy Survey** in which

the club members can participate. It was suggested that a link to the survey be placed on the NOVAC website. Greg Piepol said he would do an e-mail announcing this link to the membership.

✶ As **MOS team leader, Bob Parks** submitted a written request to grant him co-moderator status on the NOVAC Announce list on the yahoo groups site, allowing for timely announcements/cancellations to the widest membership base. Having heard no objection, the Board agreed to this request.

✶ **Joe Pierson** indicated a strong desire to be replaced as Membership Coordinator. To help a new coordinator, he has suggested that the club purchase a personal computer, a switch box and related software dedicated to maintaining membership records. Software for non-profit organizations was assumed to be inexpensive. There were indications that a PC and a printer might be donated. One question was raised regarding the real need for this equipment. The response was that, even if it was not the most up-to-date, it wold be useful to have and upgrades would probably be inexpensive. A motion was made, seconded and carried authorizing the Membership Coordinator to pursue quotes for a personal computer, switch box and software.

✶ **Rob McKinney** reported a question had been raised regarding the possibility of vendors at the upcoming **NOVAC Star Gaze.** Because it is a public event, as well as the possibility that **Crockett Park** might have to be included in the decision, it was agreed that vendors would not be invited to the Star Gaze. Alan Figgatt noted that a decision needs to be made regarding who is running the event this year. **Bill Burton** had done it for the last two. Publicity, speakers and equipment, including tents and chairs, needed to be arranged soon. It was suggested that a request for volunteers be made to the membership. If there was little response, the club might want to reconsider organizing the event in the future.

✶ Bob Stewart reported that, while attending the **Laurel Highlands Star Cruise,** he learned of the potential sale of the field where this event is Held, Pine Hill Campground. Members of the **Amateur Astronomers Association of Pittsburgh** are interested in purchasing or leasing the site, but informally inquired of NOVAC interest in working together. The advantages of the site are that it has a relatively dark sky, is not far off the Interstate and has access to the neighboring campgrounds showers and bathrooms. Concern was expressed over future threats to the dark sky there, particularly from a prison, and some expressed pref-

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July MOS at Camp Highroad

photos by Alexander Lim

John Deriso looks pleased with his workstation and home-made "Portaball."

John Stewart sets up his 12.5" f/5.2 Dobsonian.

Meeting highlights, cont.

erence in seeing if an agreement could be reached with **The Mountain Institute** near Spruce Knob instead.

General Membership Meeting Sunday, July 13, 2003

✶ With approximately 74 people, including about 7 first-time visitors, in attendance, **Club President Ed Karch** led an overview of activities. Bob Parks called the **July Monthly Observing Session (MOS)** at **Camp Highroad** possibly the most successful so far, with over 70 people and 40–50 telescopes, many of which participated in a "shoot-out" performance comparison. The next MOS is scheduled for **Franklin Park** on August 23, with a new arrangement at that park allowing NOVAC members to observe all night. A request was made for volunteers to organize the **September Star Gaze; Rob McKinney** indicated some have already expressed interest and agreed to be a point of contact.

✶ **Bob Stewart** announced an all-night **NOVAC-45 marathon** later in the month and indicated the next video imaging demonstration will be at the September MOS. A video system, including monitor, is available for checkout.

✶ **Rob McKinney** added that the Board had just decided that a missing or damaged accessory to a loaner telescope would mean forfeiture of $30 from the deposit provided at checkout.

✶ **John Avellone** demonstrated a new, lightweight, bug-proof jacket, ideal for observing.

✶ **Craig Tupper** said the **Robotic Telescope project** continues its testing phase while the building in West Virginia is constructed; **Pete Johnson** brought to the meeting a detector which will be used to check weather conditions at the remote site.

✶ **Bob Traube's outreach report** included an event August 2 at the **Blue Ridge Center for Environmental Stewardship** and a rescheduled event at the **Congressional School** for some time in November. A survey from the **Astronomy Society of the Pacific** hoped to determine outreach needs, and the **Georgetown University Astronomical Society** was asking for NOVAC help to bring the campus observatory and historic 12-inch telescope back into working order.

✶ A **Special Interest Group** may be created to form a relationship with the 15 or so students and Pete Johnson may help with its organization.

✶ **Alan Figgatt** presented the monthly sky tour. **Mars** is getting noticeably brighter and bigger as opposition approaches. It is now rising just after 11 pm. He showed some of the latest images and drawings provided by club members. He suggested that observers look at the nearby **Helix Nebula** as well as **Uranus** and **Neptune** while observing Mars, and advised everyone to collimate their telescopes to improve their viewing. Alan also highlights the 37 Messier objects including in the NOVAC-45, most of which are globulars and nebulae located toward the Milky Way's center between Scorpius and Sagittarius, including the cluster **M4**, where an 11 billion year-old planet has just been detected. Several objects are also located further up toward the zenith around the Summer Triangle asterism created by Vega, Deneb, and Altair. He noted that, of the 8 mystery objects in the NOVAC-45, **Pease-1** was potentially difficult. If skies were dark enough, he also suggested a look at some of the dark nebulae in the sky right now.

✶ The **guest speaker** for the night was **Greg Redfern,** a NASA/JPL Solar System Ambassador, who spoke on space rocks with considerable expertise and enthusiasm. First covering the **Stardust mission,** he reported the spacecraft was in good condition as the January 4, 2004, rendezvous with **Comet Wild 2** approached. Spreading particles from this infrequent visitor to the inner solar system will be captured in aerogel and transported back to Earth later in the year.

Next, Greg described the study of **meteorites.** He said that there are an estimated 24,000 impact events per year; an event in late March in Park Forest, Illinois, included crashes into a sleeping teenager's bedroom and the homes, cars and backyards of several others. Rarely, however, do events like this occur near populated areas; many fall into the oceans. Two of the best known events were the 1908 **Tugunska** and the 1947 **Sikohote-Alin** incidents in different parts of Siberia, although the in-air explosion of the former have left hunters of fragments empty-handed to this day.

Deserts and Antarctica, however, are the best places to find meteorites generally. The **HAM approach**—Heavy, Appearance and Magnetism—help identify finds, which should still have scientific verification. Such finds are named from the location in which they were found. The presence of chondrules and regmaglypts in addition to the shape of the rock can help determine if it is, indeed, from space.

Meteorites can be of three types: stony, iron and stony-iron. Finally, Greg described the largest impact crater in North America; the 60-mile **Chesapeake Bay Crater** created 30 million years ago. It was discovered while trying to understand why underground water in that region of Virginia is brackish, and evidence includes the inverted layering of fossils resulting from the impact. He described the devastation even a lower impact event might have for the Atlantic coast of the United States, especially the tsunamis an impact in the ocean would have.

Questions from the audience ranged from determining the price and authenticity of meteorite purchases to reported observation of meteorite strikes on the Moon. Greg provided many specimens, including one of known lunar and another of Martian origin, for examination. Only the analysis of rocks on the surface of these bodies allows for identification of rocks from them found here on

Earth; no meteorites can yet be identified with Venus or Mercury.

General Meeting
Sunday, August 10, 2003

✶ **Vice President Craig Tupper** presided over the meeting of about 60 persons, including 4 or 5 first-time visitors. On club business, Craig reported progress on the **Robotic Telescope project,** which may soon open to general club participation. **Pete Johnson** asked for donations of web cams and some other equipment associated with weather monitoring at the Roboscope site.

✶ For the August 23 **Monthly Observing Session at Franklin Park,** and for the **September 20 Star Gaze at Crockett Park, Bob Parks** and **Rob McKinney** asked members to volunteer some of their time helping with specific programs or the events generally.

✶ **Greg Piepol** displayed the award he won from the Astronomical League as webmaster of the NOVAC site, rated the best of all affiliated club websites. **John Avellone** presented **Ed Seward** with an AL Messier Club certificate.

✶ **Pedro Martinez** announced a price increase in club-member subscriptions to *Sky and Telescope* magazine; **John Deriso** advertised some of the latest additions to the club library. **Pete Johnson** announced that those interested in helping Georgetown University students to get their observatory working will meet sometime in September.

✶ **Alan Figgatt** then provided the **Sky Tour,** this month highlighting the **Perseid Meteor Shower,** the planet **Mars** and the constellation Scutum. The Perseids peak on August 12/13, but a near full moon will detract from the display. However, the shower will provide an opportunity to see some brighter meteors. Now is the time for Mars, which reaches opposition and its closes approach later in the month. Giving the data on the planet's size and brightness, Alan urged members to "push the power" to maximize the experience. For Scutum, Alan noted that

many observers will jump **M17** south of the constellation to the **Wild Duck Cluster, M11,** and miss several key targets in between, including the triple star **Struve 2306,** the compact and rich open cluster **M26** and **NGC 6649** as well as other fascinating targets of opportunity.

✶ For the feature presentation, club member **Phil Cioni** led a demonstration of some of the many pieces of astronomical software available. **Starry Night Pro, Carte du Ciel, SkyGlobe** and **Xephem** were each examined in terms of cost, best features, and errors and limitations. To compare the workings of each, the four presenters demonstrated how they would use their respective software to locate Pluto that night. All four have plenty to offer, including access to several catalogues and, for some, actual images of targeted objects. The presenters generally did not use their programs in the field while observing, but found them useful in preparation for a night under the stars.

Board of Trustee's Meeting
Tuesday, August 5, 2003

✶ **Treasurer Pedro Martinez** reported that cash received so far this year, $9,532.76, exceeded cash so far disbursed, $9,422.19, by $110.57. He also reported that the discounted subscription rate to *Sky and Telescope* magazine for club members will increase to $32.95 per year (Attachment #3). The membership guide and website will need to be updated on this matter, and club members informed by e-mail and newsletter.

✶ **New Membership Director Gene LaTour** was welcomed to his first Board Meeting. He provided a summary report of membership for July 2003. The number of members continued to rise, with 26 new households consisting of 37 members bringing total active membership to 558 households and 724 members. Comments from renewal forms include wide praise of the **Monthly Observing Sessions,** including the rotation of sites and the associated **Mentor Program.** Observing sites, especially **Camp Highroad** and **Spruce Knob,** were also noted positively, as were speakers at the General Meetings. The only suggestion made was by one member who would like to see a rider/driver program to help get people to observing events.

✶ **Vice President Craig Tupper** noted that August's speaker would cover astronomy software, and September's would discuss solar observing through H-alpha filters. October remained open. A talk on **gamma-ray observation** was being rescheduled, and a club member involved in the investigation of the **Columbia Shuttle accident** expressed interest in making a presentation at some point. Alan Figgatt said that, beyond the latest update on Mars, the subject for the Sky Tour was still under consideration.

✶ **Alan Figgatt** reported continued efforts by the **Analemma Society** to develop an

continued on page 10

Meeting highlights, cont.

observing program, and to solicit funds for construction of observatory buildings. A recent public event—one of the first given poor weather conditions—had a very small turnout, but plans were underway for an event focusing on Mars in late August.

✶ **Astronomical League Coordinator John Avellone** reported that two long-awaited awards finally arrived for presentation at the General Meeting. One was a Deep-Sky Binocular Club Certificate and the other a Messier Club Certificate.

✶ **Librarian John Deriso** reported the purchase of the latest edition of *Dickinson and Dyer's Backyard Astronomer's Guide.*

✶ **Alan Figgatt** reported that most all of the recently donated eyepieces had been distributed among the various loaner telescopes.

✶ It was noted that some of the trees at **Savage** were growing into the southern horizon and that the club should see if they could be cut back.

✶ **Monthly Observing Sessions Coordinator Bob Parks** reviewed times and locations for the remaining MOS events for this year, including clarification that the August 23 and December 13 events are at **Franklin Park** and that all four remaining MOS's for 2003 are open to the public. Concern was expressed over the ability to cover public observing obligations at Crockett Park on the August and December dates, when most of the club will likely be at Franklin Park or perhaps at **Sky Meadows Park** during August. Only **Crockett** is advertised for public observing on the club's website. Additionally, questions were raised regarding the wisdom of having events at Franklin Park, which is always open to the public. It was noted the Board had expressed support for events at Franklin earlier in the year based on its benefits as a site for large crowds and year-round availability.

✶ The Board then began a review of the **MOS** program so that **Bob Parks** could begin plans for next year. There was universal agreement that the MOS program is a definite success, bringing out new members in addition to the public. Still, being a new program, the club had learned from the experience. Noting that the MOS schedule approved for this year attempted to cover public observing obligations, for example, some strongly expressed a desire next year to separate public observing sessions from Monthly Observing Sessions. The interests of club members is the priority, except for the annual **Astronomy Day** and **Star Gaze** events. At the same time, this separation likely means a greater commitment by more club members to cover all events. While some felt that non-public MOS's could mean less volunteer work in preparation, others pointed out that it is the organized programs of these events that attracted so many club members. Publicity was also considered a problem, as monthly public nights at Crockett Park are at present the only public viewing sessions listed on the website (by agreement with park authorities they must be posted) and need to be covered. The Board concluded that plans for next year's MOS schedule should begin by looking at the Saturdays before General Meetings and diverging from that schedule only when necessary.

✶ **Outreach Committee members Bob Traube, Donna Blosser,** and **Rob McKinney** reported that the **Blue Ridge Center for Environmental Stewardship** and **Congressional School** events canceled due to weather were in the process of being rescheduled. A program in Washington, Virginia, is without club assistance. Other groups contacting the committee are being directed to ongoing public observing events.

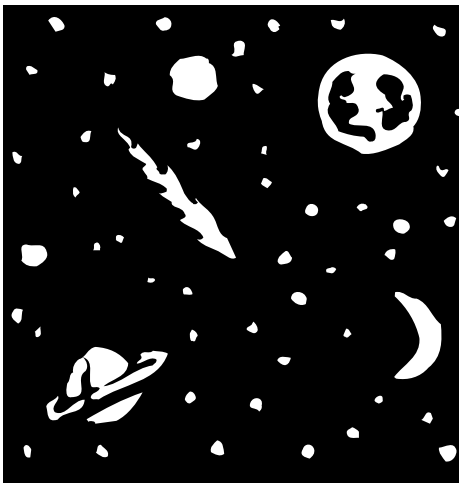
✶ **Bob Parks** reported that he and **Mike Mills** had discussed how to proceed with the **Powers Mirror,** and plan to cast a base from dental plaster.

✶ **Craig Tupper** reported that work continues on the **Robotic Telescope,** including steady progress on the structure, but that it will probably not all come together and be ready this year. He would like to get more people to test the system and intends soon to open it to use by interested club members. He expressed a willingness to have it demonstrated at the Star Gaze if the weather makes all the preparation worthwhile.

✶ **Bob Parks** said 4 or 5 people continue to attend **ATM meetings.**

✶ **Membership Director Gene LaTour** indicated his own computer handled the membership records and that, at least for now, the club did not need to pursue this further.

✶ It was agreed that **MOS Coordinator Bob Parks** should proceed with the order of 12 **T-Shirts** for those volunteers organizing MOS events. About half would be distributed this year, and the other kept for future volunteers. Bob estimated the cost to be about $300. This year, Bob Parks will also choose one volunteer among the MOS organizers to receive an award from the club for his or her service, which would include a $50 gift certificate. It was decided, for several reasons, not to offer a free annual club membership as originally suggested. There was general agreement that the club should establish a policy and process for granting a volunteer award each year to a person making an extraordinary contribution to club activities. **Bob Traube** agreed to draw up such a policy and process for the Board to review and approve.



THE 21ST ANNUAL
NOVAC Star Gaze

September 20, 2003
3 pm to midnight

C.M. Crockett Park in Fauquier County, Virginia

NOVAC invites you to the largest public star gaze in the Washington DC area. Learn about astronomy while enjoying the night sky with hundreds of telescopes, binoculars and homemade projects. Many experienced astronomers will be on hand to answer questions and share their knowledge.

You do not need to be a member of the club or own any astronomical equipment to attend. All you need is an interest in the wonders of the cosmos.

In addition, this year we will have "observing stations" set up. Each station consists of several telescopes focused on one type of object such as galaxies, star clusters, or nebula. Walk around and compare!

Easy access, lots of equipment and a dark sky make for a good night under the stars.
Please join us!

This year's event includes:

Solar observing

✶ ✶ ✶

Hands-on demonstrations

✶ ✶ ✶

Guest speakers

✶ ✶ ✶

Tours of the night sky

✶ ✶ ✶

Mars observing—
it's still at its best in September!

www.novac.com/gaze/

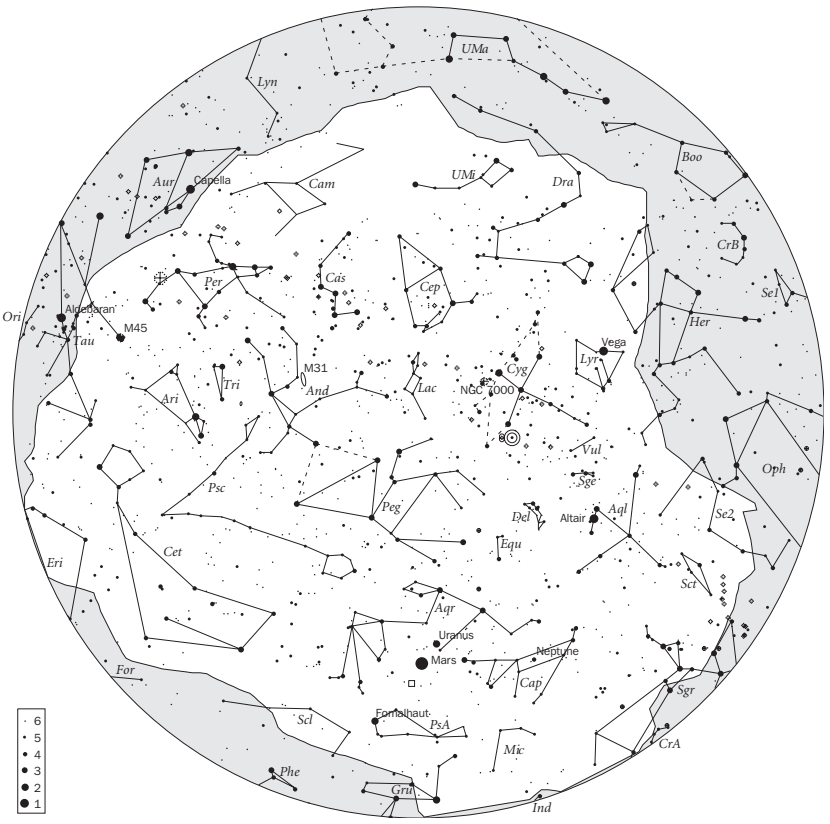
Northern Virginia Astronomy Club

Statement of Cash Received and Disbursed

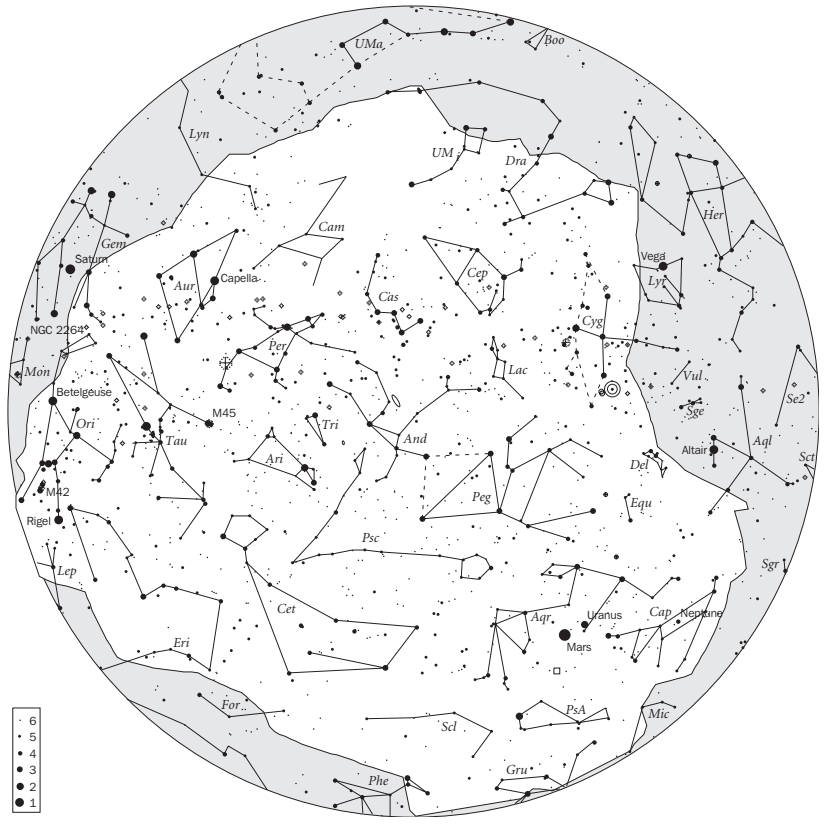
For the period January 1, 2002 through December 31, 2002

CASH RECEIVED:			
Membership Dues:			
Regular and Additional:			
Renewals	$4,735.00		
New Members	2,570.00		
Supporting-New Member	200.00		
Patron-New Member	150.00	$7,655.00	
Interest Income		89.76	
T-Shirt & Sticker Sales		54.00	
Spruce Knob		20.00	
Spruce Knob Donations		1,390.00	
Dept. Store Telescope Making Kits		0.00	
Robo Telescope Donations		324.00	
Donation		0.00	
Total Cash Received			**$9,532.76**
CASH DISBURSED:			
Newsletter:			
Printing & Assembly	1,995.98		
Postage	224.06	2,220.04	
Astronomical League			
Astronomical League Dues		1,896.50	
Astronomy Day			
Publicity		0.00	
NOVAC Picnic:			
Baroque Food & Supplies		214.51	
Observing Site Improvements:			
Porta-Jon Rental-Savage Farm	512.05		
Porta-Jon Rental-Camp Highroad	470.11		
Spruce Knob Site Rental	1,869.00	2,851.16	
Monthly Observing Session (MOS)		133.76	
Webpage Expenses		0.00	
International Dark-Sky Association (IDA)		100.00	
Science Fair Prizes		68.94	
Big Monster-34" Telescope		0.00	
Robotic Telescope Project		1,494.32	
Administrative:			
Printing -			
Membership Applications	6.58		
Printing - Administrative	36.37		
Postage	232.00		
Supplies	69.84		
Personal Property Tax	83.22		
Check Printing Charges	14.95		
Bank Service Charges	0.00	442.96	
Total Cash Disbursed			**9,422.19**
EXCESS OF CASH RECEIVED OVER CASH DISBURSED:			110.57
Cash at beginning of period:			15,465.98
CASH AT END OF PERIOD			15,576.55
Cash At End Of Period			
Checks Received, Undeposited		0.00	
Checking Account		1,250.78	
Savings Account		6,748.36	
Certificate of Deposit Due 1/2/2004		3,079.73	
Certificate of Deposit Due 11/2/2003		2,399.36	
Certificate of Deposit Due 5/2/2004		2,098.32	**15,576.55**

September skies from Savage Farm



October skies from Savage Farm



Jeff's observing report

Jeff Stetekluh

Jeff's astronomical calculations are made for the Northern Virginia area. See *www.novac.com/jeff/jrefs.html* for calculation references and further details.

Jupiter eclipse events on Friday and Saturday nights

Sep 20	6:58 am	Ganymede Eclipse start
Oct 18	5:11 am	Io Eclipse start
Oct 25	7:04 am	Io Eclipse start
Oct 26	5:22 am	Ganymede Eclipse end
Nov 2	5:46 am	Ganymede Eclipse start

The Sun

Sep 14	rises at 6:48 am	sets at 7:19 pm
Oct 12	rises at 7:14 am	sets at 6:35 pm
Nov 9	rises at 6:44 am	sets at 5:00 pm

The Moon

Sep 10	Full Moon
Sep 18	Last Quarter
Sep 25	New Moon
Oct 2	First Quarter
Oct 10	Full Moon
Oct 25	New Moon
Oct 31	First Quarter
Nov 8	Full Moon

Events

Sep 10	Mercury is in inferior conjunction (between Sun and Earth)
Sep 23	Autumnal equinox (from Espenak)
Sep 26	Mercury is at greatest western elongation (from Espenak)
Oct 21	The Orionid meteor shower peaks (active Oct 2 to Nov 7) (from IMO)
Oct 25	Mercury is in superior conjunction (from Espenak)
Oct 26	EST starts
Nov 8	Total lunar eclipse; mag=1.018 (from Espenak)

The Planets

Sep 14	Rises	Transits	Sets
Mercury	6:22 am	12:35 pm	6:49 pm
Venus	7:24 am	1:33 pm	7:41 pm
Mars	6:47 pm	11:54 pm	5:06 am
Jupiter	5:23 am	12:00 pm	6:38 pm
Saturn	1:08 am	8:27 am	3:46 pm

Oct 12	Rises	Transits	Sets
Mercury	6:27 am	12:24 pm	6:19 pm
Venus	8:28 am	1:51 pm	7:14 pm
Mars	4:49 pm	10:04 pm	3:22 am
Jupiter	4:01 am	10:32 am	5:02 pm
Saturn	11:20 pm	6:42 am	2:01 pm

Each map depicts the sky at 0 hours for the 15th day of the respective month. The shaded area approximates the local horizon obstruction at the site.

Announcements

2003 Year-Long Star Party at Spruce Knob

The official 2003 dates for the Year-Long Star Party at Spruce Knob are:

2003 Schedule—Spruce Knob, WV	
September 25–28	Thursday–Sunday nights
October 23–26	Thursday–Sunday nights

The cost of reserving the facilities for this event was more than double the cost of last year. This event was made possible this year through the financial and organizational support of the NOVAC board and its members and through over $1,000 in additional pledges of support by both NOVAC and non-NOVAC members.

For complete information about the Year-Long Star Party (YLSP), go to the YLSP website at *www.novac.com/spruce/*.

NASM/Einstein Planetarium Public Observing

Join Sean O'Brien, staff astronomer of the Albert Einstein Planetarium, and other local amateur astronomers, for public telescopic observing under dark, star-filled skies, away from city lights. The evening begins with a short night sky orientation at dusk, followed by telescopic observing of various astronomical objects, ending at 11 pm.

Sky Meadows State Park is west of Washington, D.C. on US Route 17 North, 1 mile south of US Route 50, or 7 miles north of Interstate 66, Exit 23. The park contact phone number is 540-592-3556. There is a $4 parking fee per car. Dress warmly. In case of clouds or rain, an amateur astronomer will lead a short alternate program.

2003 Schedule—Sky Meadows State Park, Paris, VA	
September 13	3 days after Full Moon. NOVAC Stargaze September 20
October 18	Last Quarter Moon. Same night as NOVAC MOS
November 8	Full Moon—Total Lunar Eclipse!

Editor's note: This is a fun program for NOVAC members to help out with. Sky Meadows park has great skies, and the public is always very receptive. Plus, NOVAC members who bring their telescopes to share may stay until 1 am.

Sky & Telescope subscriptions

Starting in September, NOVAC members who subscribe to *Sky & Telescope* as part of their club dues will see their subscription rate rise to $32.95. If you have recently renewed your membership, you won't see the rate change until your next renewal.

Loaner scope update

NOVAC has several telescopes and binoculars for club members to borrow for one month at a time. A few of these scopes have moved to the care of new custodians since the last Member's Handbook was mailed. To arrange pick up, contact the instrument's custodian at the phone number or e-mail address given below.

At the time of checkout, you must show your observing pass and leave a $100 security deposit in the form of a check payable to Northern Virginia Astronomy Club. Deposit checks are held by the custodian until the scope is returned. Don't be shy about borrowing! Some of the scopes go unused for several months in a row.

Instrument	Custodian
Celestron SP-C6 6" Newtonian (Equatorial)	Mike Mills 703-333-5075 *mjmills@fpcc.net*
6" f/5 Newtonian (Dobsonian)	Alex Hazzouri 703-264-5875 *Alex@balloonyideas.com*
Meade 6" f/8 Newtonian (Dob.)	Rob McKinney 703-924-5883 *RobCMcKinney@aol.com*
Discovery 10" f/6 Newtonian (Dob.)	Alex Lim 703-222-0419 *alexander.lim@wcom.com*
8" Celestron SCT	John Deriso 703-476-3543 *seaotter@bellatlantic.net*
SolarMax H-α filter w/ 70 mm refractor	Wolfgang Schubert 703-321-9617
Binoculars (10x50, 12x50, or 8x40) (no deposit)	John Deriso 703-476-3543 *seaotter@bellatlantic.net*
Laser collimator (no deposit)	Pete Johnson 703-830-7513 *pjohnson19@cox.net*

"To observe, and to help others observe"

NOVAC is a non-profit, all-volunteer organization chartered to advance amateur astronomy in Northern Virginia. Members benefit from:

Access to dark sky observing sites:
NOVAC maintains agreements that provide club members with year-round access to observing sites away from city lights

Monthly meetings
Monthly meetings are held at 7 p.m. on the second Sunday of each month in Room 80 of the Enterprise Building on the campus of George Mason University. Each meeting features a lecture on an interesting topic by a local expert. See the web page or future newsletters for a schedule of speakers.

Bimonthly newsletter
The NOVAC newsletter provides information specifically for NOVAC members, as well as general interest articles on such topics as observing reports, equipment reviews, upcoming events, ATM projects, and more.

High-quality telescopes to borrow
NOVAC members may borrow one of the clubs several "loaner" telescopes at no charge. Members may choose from among three 6" reflectors, two 10" f/6 reflectors, an 8" SCT, and a hydrogen-alpha solar scope. Binoculars are also available for loan.

Club website
Up to date information about club events and activities is maintained on the club website at *www.novac.com.*

Large club library
NOVAC maintains a well stocked library that members may borrow from by contacting John Deriso *(seaotter@bellatlantic.net)*. A full list of titles is available from the club website.

Private e-mail list-serve
Members keep up with current club information by subscribing to the NOVAC e-mail list, without fear of flame wars or spam e-mails.

Public outreach opportunities
Several times each year, volunteers from NOVAC present astronomy programs to schools, churches, Scout troops, and other public groups.

Membership in the Astronomical League
Through NOVAC's membership in the Astronomical League, NOVAC members gain access to the AL's newsletter, services, and observing programs.

Discounts on astronomy magazines and books
Subscriptions to *Sky & Telescope* and *Astronomy* magazines are offered to club members at a considerable discount. Also, astronomy books purchased through the club are eligible for a 10–25% discount.

See your *Membership Guide* for more details.

The *NOVAC Newsletter* is the official publication of the *Northern Virginia Astronomy Club* and is published six times per year. The NOVAC Newsletter is sent to members of NOVAC as a regular membership benefit.

Membership
Membership in the Northern Virginia Astronomy Club is $25.00 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 $5.00 per person. Contact:

Joe Pierson, NOVAC
PO Box 207
McLean, VA 22101
703-328-5260
jpierson71@yahoo.com

Change of address
All notices of change of address should be sent to Joe Pierson. Please include both old and new addresses.

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

Submissions to the newsletter
NOVAC members are invited to submit articles for publication in the *NOVAC Newsletter.* The editor reserves the right to edit all materials submitted. Send article submissions to the Editor, Dave Yustein, at *david.yustein@aero.org.* **The deadline for submissions is two weeks in advance of publication: October 17 for the November/ December 2003 newsletter.**

In this issue...

NOVAC

THE NORTHERN VIRGINIA ASTRONOMY CLUB

c/o Joe Pierson, Membership Director
15091 Jarrell Place
Woodbridge, VA 22193

Non-Profit Org.
U.S. Postage Paid
Merrifield, VA
Permit #6017