

NOVAC

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An Adventure in QuickCam Astronomy

Geoff Chester

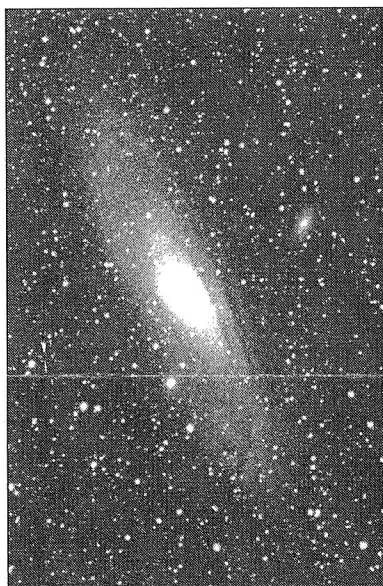
I've been interested in astrophotography since that night some 35 years ago when I hand-held my Dad's Topcon SLR up to the eyepiece of my Tasco 4.5-inch reflector and snapped some pictures of the Moon. The fact that they turned out at all was nothing short of a miracle in my mind. This experience led to a continuing interest in photography. I learned to process black & white film, and during college and for a few years afterward made something of a living as a free-lance photographer. This experience served me very well, since I was able to parlay my astronomical and photographic interests into a 19-year career at the Einstein Planetarium at the National Air & Space Museum.

I've kept up my interest in astrophotography over the years, accumulating a few items to help facilitate the process. However, I have also learned that a real commitment to the art involves a fairly large outlay of cash and time, neither of which are particularly abundant in my Northern Virginia lifestyle.

I bought a Celestron-8 in 1980, and for several years took snaps of the Moon and planets, and occasionally piggybacked a 200mm telephoto lens for large-scale deep-sky shots. But as 1986 drew near I knew I'd need a bigger gun for Halley's Comet. Fortunately I happened upon a relatively good deal on a Celestron Comet Catcher, which was the equivalent of a 500mm f/3.6 telephoto lens. With this combination I was able to get a nice portfolio of comet and DSO images, and even managed to get a few published in *Astronomy*, *Deep Sky*, and *Sky & Telescope*. However, at this time, folks like Tony and Daphne Hallas were "raising the bar" to the point where my images were nothing if rank amateur. I haven't used the C-8/CC combo for several years now.

However, my new job here at the Naval Observatory has allowed me to use one of the Celestron 8-inch Schmidt Cameras bought for Halley in '86. This contraption, coupled with some of today's fast color emulsions, has resulted in some very nice portraits (IMHO) of Comet Hale-Bopp and a few selected objects like the

Andromeda galaxy. The Schmidt takes some fine photos, but it's cantankerous and not easy to use as a portable setup, so it spends most of its life in storage.



Andromeda galaxy, M31, photographed in October 1997 with the USNO 8-inch Schmidt Camera from Oak Shade Observatory, Rixeyville, VA. 5-minute exposure on Kodak PPF color negative film. Photo by Geoff Chester

The idea of digital imaging has always grated on my "purist" chemical photo side, but over the past several years I have to admit that the quality of digital work, especially in lunar and planetary imaging, has really taken off. So it was only natural that I began to think of some way to get into this field.

A quick scan of any *Sky & Telescope* issue these days will certainly when the appetite of a potential digital imager, but a check on the ads for the most popular cameras will bring reality crashing down on anybody with a tight budget... until now.

An article in the June 1998 issue of *S&T* caught my eye the other day as I was leafing through

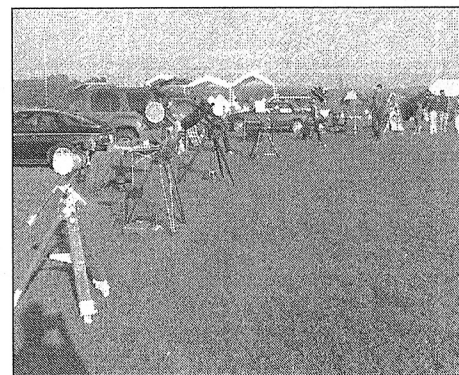
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NOVA Star Party 2000 A Big Success!

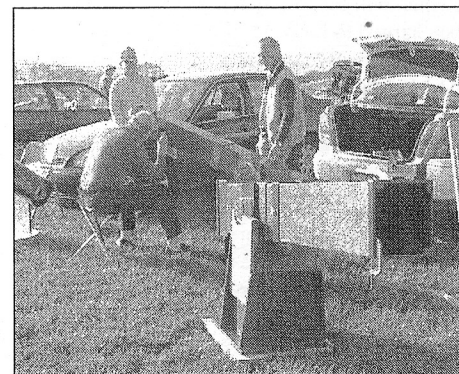
Jeff Cook

On September 30, 2000, NOVAC held its annual Star Party at Franklin Park, near Round Hill, Virginia. This year was quite successful, with clear skies and lots of participation. The official numbers were 235 cars, 500 people and over 100 telescopes or binoculars! Thanks to all who came out. See you next year!

For more images from the Star Party, see the NOVAC web page at <http://www.novac.com>



A few of the 100+ instruments on the field at Franklin Park



Checking out the sunspot display through one of Gerry Wolczanski's beautiful home-made 'scopes.

NOVAC Public Outreach Programs

Ed Witkowski

Date	Place	Group	Theme
11/17/2000	Kensington, MD	Cub Scout Pack	General Stargazing
11/18/2000	Mickie Gordon Park	Loudoun County Parks	General Stargazing
12/14/2000	Franklin Park	Loudoun County Parks	General Stargazing

Please let the people at the gates at the November and December events know that you are with NOVAC for free admission.

If you have any questions, please contact Ed Witkowski at edwski@erols.com

C. M. Crockett Park

John C. Stewart

Crockett Park is about 20 miles south of Manassas, and is scheduled for the Fridays and Saturdays closest to the new and last-quarter moons. It is our oldest and currently most popular site.

Crockett has reasonably dark skies, with a limiting magnitude around 6.0 most nights. It has excellent horizons (Omega Centauri has been observed from Crockett on several occasions), with relatively little light pollution to the south and west. To the north, Manassas is the biggest offender, while to the east an airport beacon can be annoying.

In addition to its virtues as an observing site, Crockett is a nice place to visit during the day. The lake offers fishing and boating (rentals available), and there are several playgrounds for children, as well as picnic pavilions and volleyball courts

Rules for Observing at Crockett Park:

NOVAC has access to the park for approximately two weekends per month, Friday and Saturday only. These are the normal moonless Friday and Saturday nights, excluding holiday closure periods, and are specified in the schedule below. In addition, there may be three special events at the park each year, held under similar rules.

The weekends will also be open to the public, who may be required to pay an admission fee (which will be posted at the gate). No fees will be charged to NOVAC members. Public viewing sessions will conclude at 11:00 P.M., at which time the park gates will be locked. Only NOVAC members will be given the combination to the gate. NOVAC members may remain after the advertised activity ends, under the conditions for weekend use.

Cancellations: Sessions may be cancelled due to weather by NOVAC or park management staff. Park staff will post cancellations on the park's answering machine and on signage at the front gate.

Observing Coordinators: At least one NOVAC observing session coordinator must be present throughout the public session. A primary and a secondary observing coordinator are

listed for each date in the schedule. The gate will be locked and will not be unlocked unless a NOVAC observing coordinator enters the park. Park management will supply all observing coordinators with a handbook outlining their responsibilities while supervising public sessions; an extra copy will be kept with the logbook.

Signage: NOVAC will place the signage (provided by the park) with information about the public viewing session before each session and remove it when the gates are locked at 11:00 P.M.

Logbook: All participants, both NOVAC members and the public, are asked to sign in using a logbook or sheet provided by the park. This is both to help tighten security at the site and to show participation levels to the Parks Department.

Rules enforcement: If any NOVAC member out observing at Crockett Park notices anyone violating county park ordinances or departmental policy, he or she should notify the Resident Manager. If the Resident Manager is not available then the Park Manager should be notified. For emergencies, dial 911 on a cell phone and a Fauquier County Sheriff will respond. In addition, there is a pay phone at the concession building (deck-side) that will accept emergency calls.

Areas to be used: During EDT, set up only in

the large field to the left of the paved parking lot. During EST, NOVAC may set up either in the large field or in the paved cul-de-sac 200 yards past the gate. NOVAC members are asked to use their best judgement about driving on the field.

Be a good neighbor: No loud radios, alcoholic beverages or loose pets. Do not leave trash or debris behind. We are guests of the park and park management may revoke our observing privileges at any time due to the carelessness of one person.

The memorandum of agreement between NOVAC and C.M. Crockett Park can be downloaded in PDF format from the NOVAC website: <http://www.novac.com>.

Directions to C. M. Crockett Park:

From Washington DC/Northern Virginia, go west on I-66 to exit 44 (234 South bypass around Manassas). Take 234 bypass on Rt. 28 West. Stay on Route 28 for about 13.7 miles through Nokesville, Catlett, and Calverton. Turn right on Rt. 643 towards Warrenton (Mayhugh's country store is on the corner) Go on about a mile up Rt. 643 to the park entrance road. Look for a small sign for C. M. Crockett Park on your right directing you to turn left. Once on the park entrance road, go one-half mile to the park gate.

Schedule of Crockett Park Public Observing Sessions

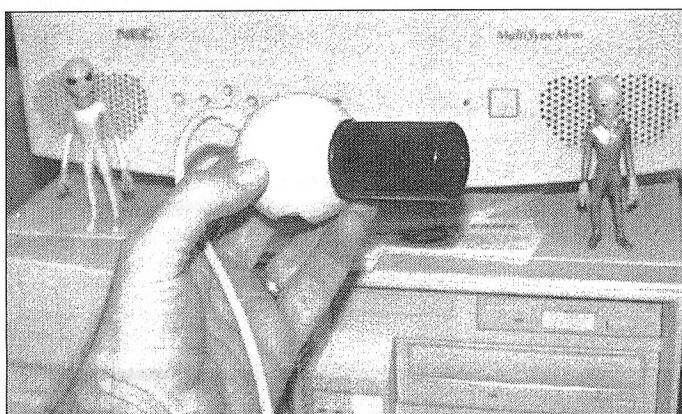
Date	Primary Observing Coordinator	Phone	Secondary Observing Coordinator	Phone
Nov 17	John Stewart	703-787-2149	TBD	—
Nov 18	Guy Brandenburg	202-635-1860	TBD	—
Nov 24	TBD	—	Robert E. Ridgley	703-641-0152
Nov 25	Robert E. Ridgley	703-641-0152	TBD	—
Dec 22	TBD	—	TBD	—
Dec 23	TBD	—	TBD	—
Dec 29	TBD	—	TBD	—
Dec 30	TBD	—	TBD	—

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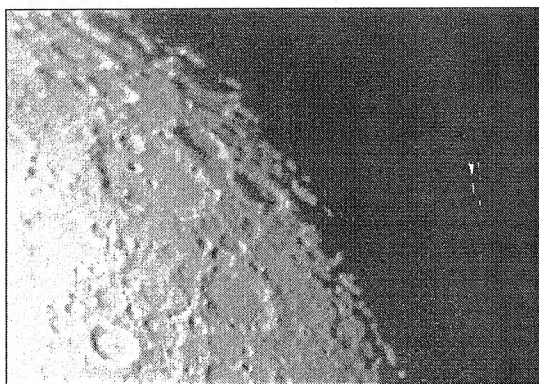
some back issues. "QuickCam Astronomy" by John Buchanan showed some very impressive lunar and planetary images taken with a \$50 Connectix black & white QuickCam, one of those little doohickeys that sends a picture of your room and everything in it out over the Web. A little judicious hacking (Warning: cracking the case voids the warranty!) and you have a CCD camera not all that different from Richard Berry's Cookbook CCD.

A trip to the local 'pooter superstore for some CD-R's a few weeks ago found me returning home with a \$40 Logitech QuickCam Express, a color USB web-cam with a 320 X 240 CMOS imager chip and software to control it.

Buchanan hacked his QuickCam pretty extensively, removing the PCB from its cute little round case and re-mounting it in the top of an Edge shaving cream can. I didn't want to get too surgical, so I simply removed the lens assembly from mine and hot-glued a slightly modified Kodak 35mm film can to the round case (the film can has a 3/4-inch hole cut in the end, which serves as a baffle). It took all of 10 minutes to modify, and as soon as the glue was dry I toddled the camera, my laptop, and my 8-inch Dobsonian (Ol' Blue Eye) out to the front yard for a few test shots.



The Moon was peeking through sucker holes in the clouds, but despite this I was able to get a couple of shots. This is the first one:

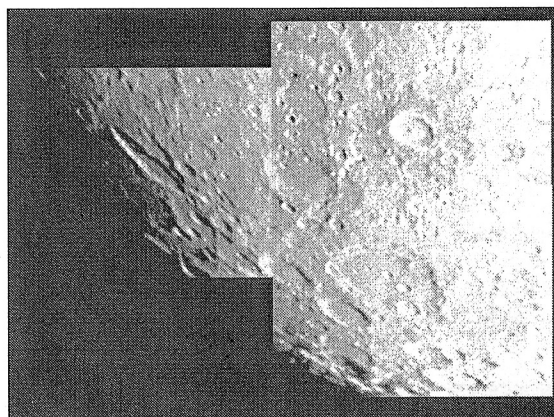
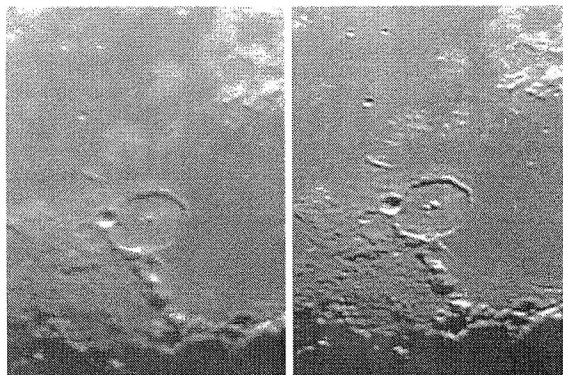


The next night proved to be clearer, so I dragged out the C-8 and fired off a few dozen shots of various parts of the Moon and the double star Albireo.

By this time I'd found a very good web site, the QCUIAG (QuickCam and Unconventional Imaging Astronomy Group), <http://www.astrabio.demon.co.uk/QCUIAG/>.

This led to a small freeware application called AstroStack, which I used to combine several frames, the results of which can be seen in the next picture. This image shows a "raw" frame of the crater Gassendi (left), along with a processed image made from a stack of 6 frames processed with a sharpening mask for 3 iterations.

This, in turn, led to a mosaic of the southern lunar highlands. This mosaic is made from 3 images (6 frames each, processed as above with AstroStack) pieced together using PaintShop Pro.

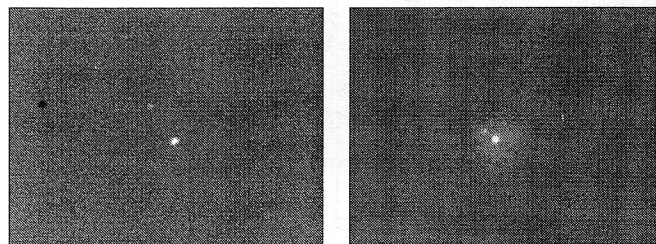


I also processed the Albireo images, the result of which is below, on the left.

A few nights later I tried the QuickCam on the USNO's 12-inch Clark refractor. Despite bad seeing, I managed to get this image of Rasalgethi (Alpha Herculis), a 4.7 arcsecond binary star system. This pic was made from a stack of 10 images that was first sharpened, then blurred to remove the sharp mask's noise (below right).

A few days later I tried to get some pix of the big sunspot AR 9169, a huge blot on the Sun that (at the time) was the largest spot group seen on the Sun in 8 years. Between the very large image scale of the 12-inch telescope and the bad seeing at 2:00 pm, I found myself hand-holding the camera to the barrel of the 4.5-inch f/10 Clacy finderscope to make the picture below. I had to completely wrap the camera in duct tape to blot out the internal glare, but I managed to snag 7 frames, of which 4 were useful for the image stack. An unsharp mask pulled out quite a bit of detail from the murky sunspot, but left some processing artifacts in the surrounding photosphere.

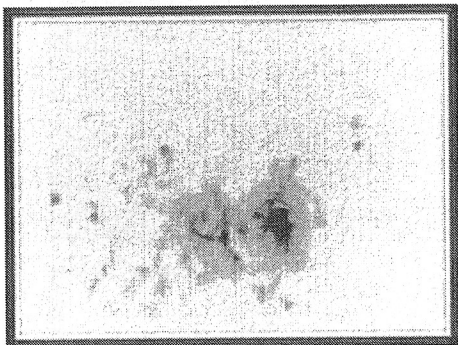
Finally, I decided to try some preliminary planet pix. Taking advantage of the one clear night we had last week, I ventured out to Mickie Gordon Regional Park with the QuickCam and C-8 (as well as my 14.5-inch Dob) in tow. After visually viewing galaxies until midnight, I judged the



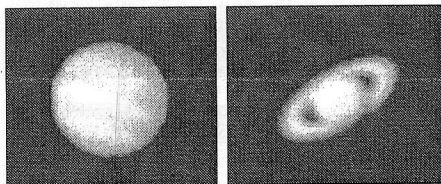
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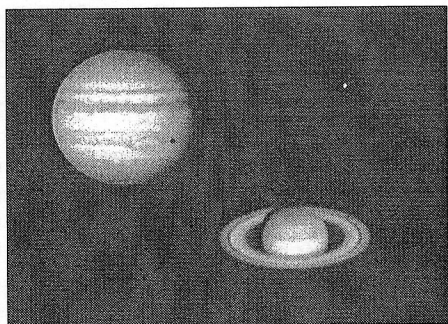
planets to be high enough to start taking some images. The seeing was marginal, and the focus control on my old C-8 has a few sticky spots, but the first results are promising. The images below were stacks of 5 of the best dozen or so frames of each planet, each processed with an unsharp mask.



The best part about this setup is the near "instant gratification" I'm getting by seeing my images captured on the laptop screen. While acquiring the source and focusing the image are still somewhat problematic, the overall ease of use and the quality of the results are keeping my interest up. I'm now looking forward to each lunation, and the planets can't hurry into the evening sky fast enough.



The CMOS chip in the QuickCam Express lacks low light sensitivity for possible deep-sky imagery, but the Panasonic Vega Pro, which goes for around \$80.00 or so, has a much more sensitive CCD. The QCUAIG group has software to control this cam for longer exposures, so I may be investing in one soon. Some of the planetary results with this camera are pretty awesome. Sylvain Weiller, A French member of the group, has used this cam and a C-8 to get these images of Jupiter and Saturn.



Looks like I have a goal to shoot for...

Starting Out Right

Rob Lentini

Greetings fellow NOVACers! When I got a new telescope for my birthday a few years ago, it looked huge to me. As a 4.5" reflector, it was about the biggest of all the department store scopes I had seen. I had high hopes when I dragged it outside, but I had no clue what to look at. Orion and the Big Dipper were the only constellations I could name. And I had no idea that the Big Dipper was just an asterism, and not a constellation.

I recall looking at the moon and a crescent Venus, but very soon the telescope became a fixture in the corner of my apartment. I think my most significant discovery was that you could read the upside-down serial number off of a VCR through a window a couple of houses down. (Don't let the clouds convince you there is nothing to look at, but don't be a Peeping Tom!) The telescope looked nice, but I did not know what to do next, so it sat for a couple of years.

While browsing the internet one day (I swear I was not goofing off at work!), I bought two things which changed my life, astronomically speaking. First, I figured out that my department store scope came with 0.965" eyepieces, and 1.25" eyepieces could be had. I bought three cheap 1.25" Plössl's. Not only did they look fantastically better than the .965" eyepieces with their much larger apertures, but the view through them made a world of difference. If you got a department store telescope as a gift, make sure you upgrade to 1.25" eyepieces. (Note that not all scopes have a 1.25" focuser. You can buy an adapter, but ask a more experienced NOVAC member before spending more money on such a scope.)

My favorite online sources for inexpensive eyepieces are E-Bay and The Telescope Warehouse. I have had good luck buying used eye-

pieces, but if you are looking for new ones, Orion has a good selection.

The second item I bought was the book *Turn Left at Orion*, by Guy Consolmagno and Dan Davis, which is perfect for beginners who don't know what to look at, those with small scopes, those in bright skies, and especially those who are beginners with small scopes in bright skies. The brilliance of this book is that it lets you get started finding a hundred of the most interesting deep space objects in a small telescope before you learn the sky. *Turn Left...* accomplishes this in a very unintimidating way by first dividing the book into seasons so you know what is up when you are looking. Navigating to each season's objects always starts at bright stars that you can see even in light-polluted skies. I was in Springfield, Virginia, near the mixing bowl and Springfield Mall when I started using this book (like living at the North Pole the six months of summer when the sun never sets). This book will convince you that light-pollution and having to drive to dark skies are not valid excuses for not pulling your telescope out on a week night in your backyard.

Turn Left... first guides you to a bright star, then tells you how to navigate using your finderscope to get to the right region, and finally tells you what you should see in the eyepiece. For each object, there is a picture of the naked eye region, the finderscope view, and a sketch of the object in the telescope view, along with an interesting description of what you are looking at. The authors also rate each object (one to four telescopes) based on how bright/brilliant it is, so you know what to expect.

A new version of *Turn Left at Orion* was recently released, and I highly recommend it to all beginning astronomers. Well, I am off to try and squeeze royalties out of the authors for recommending their book.

President's Message

Pete Johnson

The annual elections for the NOVAC Board of Directors will be held this December 10th at the monthly club meeting. This is your chance to get involved in the direction of NOVAC by voting or running for office. The Board of Directors has an election committee responsible for finding prospective candidates. Additionally, nominations will be solicited at the meeting before the vote. The board positions open include President, Vice President, Secretary, and Treasurer for one year terms and two Trustee positions for two year terms. The remaining two trustee positions make up the nominating committee.

If you are interested in running for an office contact the nominating committee through John Avellone at JGAVELLONE@aol.com or Ian Keith at ik7565@erols.com.

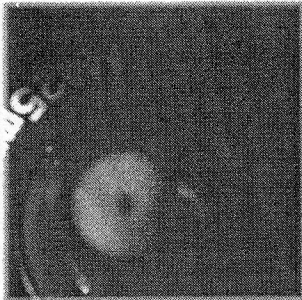
Support The IDA

Join the International
Dark-Sky Association
3225 N. First Avenue
Tucson, AZ 85719-2103
www.darksky.org

Moon Shots Through the Monk 'Scope

Shelkey Atkinson

My husband, David, and I joined NOVAC in February, hoping to increase our understanding of the stars, moons and planets. We have always had an interest in the sky above and the constellations and the great photos we see in magazines. Being an avid photographer, I thought we could learn about telescopes before making a purchase (the new Nexstar looked pretty neat) and I could make a new exploration into astrophotography.



When we attended a few meetings and a few viewings at Crockett Park to learn about the different telescopes and to see what everyone was using. One night there were so many telescopes set up, we could not believe how much interest there was in the heavens above. We also couldn't believe all of the 'extras' we would probably need (or want?) once we decided on a telescope - tables, chairs, red lights, books, coolers, etc.

Knowing that this was probably more involved than we first believed, and not wanting to buy a

lot of equipment we wouldn't use or need, we started to reconsider our new hobby. While viewing one night, we came upon a telescope for sale by Ed Karch. It was handmade by brother Maurice Flood, a Trappist Monk in a Monastery in Berryville. Though not as fancy as the Nexstar, it was more in line with our price range and comfort level at that point.

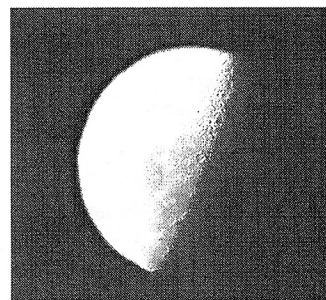
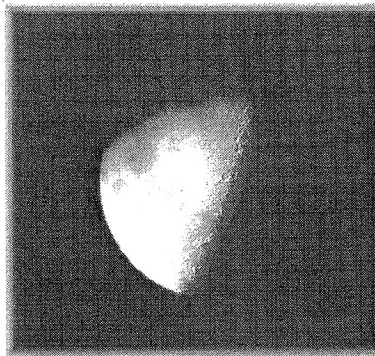
We paid for the telescope, got home, and waited and waited and waited for a clear night to view the stars. We only knew a few constellations and stars, star maps were difficult to get oriented and with some light pollution in our neighborhood, we were getting discouraged quickly. Where were those great pictures we had seen in magazines? Yes, that was a star, that's nice.

One night, there was a half moon. Interested to see what could be observed with our new telescope, we aren't early birds or night owls and wouldn't see a planet for awhile, we decided to view the moon. Even with all the books we had read and magazines we bought, we didn't learn about moon filters until after a few nights of viewing. We were amazed and fascinated with how large the moon looked and the detail was just unbelievable! Seeing how bright the moon appeared, I wanted to try an experiment and ran inside to get my point and shoot digital camera - an Olympus D-320L. No interchangeable

lenses, no locking down the shutter. I held the camera to the eyepiece and David would look at the camera lens from the front to see if I had the moon's reflection in the lens. We couldn't use the LCD as the moon was too bright. We also had to turn off the flash to avoid overexposing. I took a few photos that I have included here. They aren't the magnificent photos in the magazines, but I used simple equipment and the photos were pretty exciting for us. Hope I didn't bore any-

one with a CCD or more sophisticated equipment! I have only sharpened the images a little and deleted the annoying reflections. No color changes or digital manipulation.

Well, I hope I haven't duplicated anyone else's ideas.



The Antenna on the Hill

John Avellone

The "antenna on the hill" at this year's Stellafane (and at several NOVAC public observing sessions) was a simple loop detector for "spherics". Its function is to directly convert very-low-frequency (10 to 10,000 Hz) electromagnetic noise into acoustic sound at the same frequencies. Thus you can hear the otherwise inaudible natural atmospheric noises termed spherics. Some level of noise activity is always present. At public events, it is interesting to watch people start to walk by, only to stop in surprise and lean over to hear better, as they realized that the detector was "on" and working.

Typical "natural" sounds are: clicks, pops, and tweets (short duration impulsive signals generated by near and far lightning); whistlers (faint short tones descending from 10 kHz down to 10 Hz generated by near-by lightning impulses spread out in frequency as they travel along the geomagnetic field lines to the conjugate point and back); and the "dawn chorus" (half-second tones rising from 1 to 4 kHz, possibly associated with auroral-induced electrojet currents in the ionosphere). Of course, you almost always

hear some 60 Hz hum from electrical lines and equipment. The "clicks" and "pops" are easy to hear. It took a while for me to realize that I could also pick out the "whistlers" (averted hearing?). So far, the "dawn chorus" has proved elusive!

The loop is easy to build. It consists of 90 feet of #22 insulated solid copper wire wound in 5 turns (1/4" apart) around a wooden "X" frame. The two pieces of wood for the "X" are 6 feet long, so the wire run is about 4 feet on a side. The start and finish ends of the wire are connected to the red and white input leads of a 5 Ohm to 2 kOhm matching audio transformer (Radio Shack # RS 273-1380). The green and blue output wires from the transformer are connected to an amplifier/speaker (Radio Shack #RS277-1008A). One word of caution: the matching transformers show a large unit-to-unit variation. They are cheap (like \$2.00 each). I have tried three. The first was OK, but I lost it at Mickey Gordon. The second was actually worse than no transformer at all! The third, and current unit, is the best of all and gives a strong output. The construction was outlined on a single-sheet plan that I distributed at Stellafane and at several NOVAC sessions. At least two working examples have been built from the plans so far. If you want a copy, catch me at a

meeting.

I like to have the loop running nearby while observing. It's fun to hear what's going on in the ionosphere while stargazing. As one lady noted: "So, you're listening to the sky while you're watching the sky!"

With different (shortwave) equipment, it's also interesting to listen at 21 MHz to the radio noise roaring and surging in from Jupiter (Jovian whistlers?) while observing Io at maximum elongation. Strong Jupiter noise storm events are predicted for: Nov 18 (19:45 - 0:00 Local); Nov 26 (23:30 - 2:00 Local); Dec 3 (1:15 - 2:45 Local); and Dec 28 (19:15 - 22:15 Local Time).

Here are some references for the spherics loop antenna and also for the 21 MHz Jupiter signal: LOOP ANTENNA:

Calvin R. Graf, *Exploring Light, Radio and Sound Energy*, TAB Books, 1985, ISBN 0-8306-1758-2

RADIO ASTRONOMY:

<http://www.bambi.net/sara.html>

21 MHz JUPITER SIGNAL:

<http://radiojove.gsfc.nasa.gov>

New Members - August 26 through October 19

Kevin Brown

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Michael Corish
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Alexandria, VA 22310-1464
mikec@micros.com

WELCOME!

Highlights of NOVAC Meetings



September 6 NOVAC BOARD MEETING

19:30 Pete Johnson, President, called the board meeting to order.

Pete Johnson informed the NOVAC board members that the Fauquier County board would be voting on the revised Crockett Park observing agreement with NOVAC on September 6.

Pete Johnson announced that a decision had been made to move the NOVAC Star Party to Franklin Park in Loudon county.

Ed Witkowski briefed the board on a potential new observing site at a buffalo ranch near Rixeyville in Culpeper county.

Pete Johnson appointed a committee consisting of trustees Ian Keith and John Avellone to solicit candidates for the NOVAC officer/board positions which need to be filled during the December elections. It is planned to announce the slate at the November general membership meeting.

The board decided that no formal special event will be planned for the Leonid meteor shower November 14-21 since it occurs near full moon.

Ed Witkowski listed the upcoming public outreach programs.

Craig Tupper listed the upcoming programs for

the general membership meeting.

Pete Johnson adjourned the meeting at 21:00

Submitted by Kevin Brown, Secretary

September 10 NOVAC GENERAL MEETING

19:00 Pete Johnson, President, called the meeting to order. The prospective and new members introduced themselves.

Pete Johnson announced that the new Crockett Park observing agreement has been signed and that volunteers were needed to be the on-site coordinator for the scheduled observing nights.

Pete Johnson announced that the site of the September 30 NOVAC Star Party has been changed to Franklin Park in Loudon County and asked for volunteers to help out.

Pete Johnson solicited comments on the idea of the club purchasing a 10" or larger Dobsonian type telescope for loaning out to members.

Ed Witkowski listed the upcoming public outreach events.

Ian Keith gave the sky tour.

For the main program NOVAC member Elizabeth Warner gave a talk on the NASA Deep Impact Mission to comet Tempel 1.

Pete adjourned the meeting at 20:00

There were approximately 55 in attendance.

Submitted by Kevin Brown, Secretary

October 3 NOVAC BOARD MEETING

19:30 Pete Johnson, President, called the board meeting to order.

Pete Johnson informed the NOVAC board members that the revised Crockett Park observing agreement has been signed with Fauquier County. Tilly Smith has volunteered to coordinate the implementation of the agreement.

Plans for the September 30 NOVAC Star Party at Franklin Park were discussed. Pete Johnson is also planning to meet with Franklin Park officials to discuss access to the park as a regular NOVAC observing site.

Ian Keith and John Avellone reported on their progress so far in soliciting candidates for the open officer/board positions for the December elections.

The board decided that no formal special event will be planned for the Leonid meteor shower November 14-21 since it occurs near full moon.

Craig Tupper listed the upcoming programs for the general membership meeting.

Pete Johnson adjourned the meeting at 21:00

Submitted by Kevin Brown, Secretary

Upcoming NOVAC Meeting Programs

Craig Tupper

November 12

Buying a Telescope

Tom Dietz, NOVAC

Just in time for the holidays, come hear what Ironman Tom has to say about purchasing a telescope, particularly for the first time or as a gift. There are a bewildering array of telescopes out there, and Tom will help you navigate the maze and make a wise choice, no matter what your budget. Lots of other NOVAC regulars will be there to make sure Tom gets it right, or just to be argumentative. Even if you've never been to a NOVAC meeting before, come on by for one of our liveliest, and most popular, topics, which has become a yearly feature.

December 10

Topic: TBA

Dr. Harold Geller

NOVAC's own GMU sponsor, Dr. Harold Geller, will be speaking to us on a unique new subject of great interest to amateurs. What is it, you ask? Still top secret, but we'll have info here soon!

January 14

Dr. Eric Smith: The Next Generation Space Telescope

NGST is planned as a powerful space telescope that will replace the highly successful Hubble Space Telescope when it retires near the end of this decade. Scheduled for launch in 2009, NGST will feature lightweight optics approximately 8 meters in aperture (HST is 2.4 meters), and will carry cameras and spectrographs sensitive to infrared radiation. Over the telescope's 5-10 year lifetime astronomers hope to observe

PLEASE NOTE: the schedule of speakers is subject to change. Please check at <http://users.erols.com/ctupper/NOVAC/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!

National Capital Astronomers Meetings

Elliot Fein

Dr. Nolan Walborn will present the featured talk for the November 4, 2000 meeting of National Capital Astronomers, "Insights into Massive Star Formation from the Hubble Space Telescope". The November 4 meeting will be held in the Lipsett Amphitheater in Building 10 (Clinical Center) of the National Institutes of Health in Bethesda at 7:30 PM. Dr. Walborn has provided us with a synopsis of his talk as well as a brief biography.

Synopsis

New views of giant nebulae, or H II regions, from both imaging and spectroscopy at ultraviolet, optical, and infrared wavelengths by the Hubble Space Telescope, will be displayed and discussed. These regions are the birthplaces and residences of massive stars, some of which are more than 100 times as massive as the Sun. They synthesize many of the chemical elements, including those essential for life, in their nuclear furnaces and then disperse them into the interstellar medium through stellar winds and their final supernova explosions. A key idea supported by the HST observations is the triggering of second-generation star formation around the peripheries of such regions, by the action of the energetic outflows from the original central cluster on surrounding dust clouds. Giant dust pillars oriented toward the central cluster are sculptured by this process, in the heads of which new stars are formed and born. The resulting structures enable the relative ages of particular regions to be estimated, and developmental or evolutionary sequences among different regions to be recognized. Relatively nearby, galaxy-wide starbursts can be decomposed into such regions of varying ages, which in turn aid in the interpretation of starbursts at cosmological distances that cannot be resolved directly. Observations of the giant Carina Nebula in the southern Milky Way and of the supergiant 30 Doradus Nebula in the Large Magellanic Cloud will be emphasized, but several other objects at key stages of the evolutionary sequence will also be included to illustrate the complete concept.

NOVAC Officers 2000

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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.

Jupiter Eclipse Events on Principle Club Observing Nights

Nov 17	10:50 PM	Europa Eclipse Start	(S -66 J 126 60)
Nov 20	6:07 AM	Io Eclipse Start	(S -10 J 290 17)
Nov 25	1:26 AM	Europa Eclipse Start	(S -63 J 234 65)
Dec 23	11:24 PM	Io Eclipse End	(S -72 J 237 64)
Dec 30	5:07 PM	Europa Eclipse End	(S -3 J 95 31)
Dec 31	1:19 AM	Io Eclipse End	(S -69 J 273 37)

The Sun

Nov 12	rises at 6:48 AM, sets at 4:57 PM
Dec 10	rises at 7:16 AM, sets at 4:46 PM
Jan 14	rises at 7:26 AM, sets at 5:10 PM

The Moon

Nov 18	Last Quarter
Nov 25	New Moon
Dec 3	First Quarter
Dec 11	Full Moon
Dec 17	Last Quarter
Dec 25	New Moon
Jan 2	First Quarter
Jan 9	Full Moon

Events

Nov 15	Mercury at Greatest Elong: 19.3°W (from Espenak)
Nov 17	Leonids ZHR=100+, active 11/14-11/21 (from IMO)
Nov 19	Saturn at Opposition (from Espenak)
Nov 27	Jupiter at Opposition (from Espenak)
Dec 4	Pluto is in conjunction with the Sun (from AM)
Dec 13	Geminids ZHR=120, active 12/07-12/17 (from IMO)
Dec 21	Winter Solstice (from Espenak)
Dec 22	Ursids ZHR=10, active 12/17-12/26 (from IMO)
Dec 23	Venus passes 1.3° south of Uranus (evening) (from AM)
Dec 25	Mercury at Superior Conjunction (from Espenak)
Dec 25	Partial Solar Eclipse; mag=0.729 (from Espenak)
Jan 9	Total Lunar Eclipse; mag=1.181 (from Espenak)

The Planets

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

Nov 12	Rises	Transits	Sets	Mag	Diam	Notes
Mercury	5:11 AM	10:41 AM	4:12 PM	-0.3	7.2"	
Venus	10:04 AM	2:38 PM	7:11 PM	-4.0	14.6"	SSW, 18*
Mars	3:02 AM	9:02 AM	3:01 PM	1.7	4.3"	
Jupiter	5:51 PM	1:08 AM	8:21 PM	-2.8	48.3"	
Saturn	5:22 PM	12:27 AM	7:28 PM	1.8	20.3"	
Dec 10	Rises	Transits	Sets	Mag	Diam	Notes
Mercury	6:28 AM	11:25 PM	4:12 PM	-0.8	4.8"	
Venus	10:24 AM	3:12 PM	8:01 PM	-4.2	17.4"	SSW, 26*
Mars	2:36 AM	8:14 AM	1:52 PM	1.5	4.7"	
Jupiter	3:47 PM	10:58 PM	6:13 AM	-2.8	48.2"	ENE, 10*
Saturn	3:25 PM	10:24 AM	5:27 AM	1.8	20.2"	E, 15*

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 Bretagnon's and Franco'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 listed above and 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>); from IMO: the International Meteor Organization calendar (<http://www.imo.net/calendar>); from AM: Astronomy Magazine's Highlights of the Night Sky (<http://www.kalmbach.com/astro/astronomy.html>)

Upcoming Ganymede Shadow Transits

Jeff Stetekluh

Of all the Galilean moons, Ganymede casts the largest shadow on Jupiter. To the right is a list of the upcoming Ganymede shadow transits that will be visible in this area, weather permitting. Included is the Sun's altitude and Jupiter's azimuth (magnetic) and altitude. For me, the most convenient of these shadow transits to try to observe will be on Oct 13, Nov 25, Dec 31 and Jan 7 (these are on weekend evenings). The full list of Galilean Moon Events is at <http://www.novac.com/jeff/>.

Date	Time (EST)	Event	Sun Alt/Jupiter Az-Alt
11/18/2000	19:33	Transit End	(S -31 J 89 23)
11/25/2000	21:31	Transit Start	(S -54 J 115 52)
11/25/2000	23:34	Transit End	(S -72 J 165 70)
12/03/2000	03:36	Transit End	(S -41 J 276 35)
12/10/2000	05:32	Transit Start	(S -20 J 298 7)
12/31/2000	17:33	Transit Start	(S -7 J 100 37)
12/31/2000	19:41	Transit End	(S -31 J 130 60)
1/07/2001	21:34	Transit Start	(S -52 J 213 69)
1/07/2001	23:43	Transit End	(S -72 J 261 49)
1/15/2001	01:35	Transit Start	(S -66 J 285 22)
2/12/2001	17:40	Transit Start	(S 0 J 151 68)
2/12/2001	19:54	Transit End	(S -26 J 235 64)
2/19/2001	21:41	Transit Start	(S -45 J 270 41)
2/19/2001	23:55	Transit End	(S -61 J 291 15)
3/27/2001	20:07	Transit End	(S -20 J 276 36)

Upcoming Events

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29 •Observing at all sites	30	31	1 •Board Meeting	2	3	4
5 •General Meeting 7 pm @ GMU	6	7	8	9	10	11 FULL MOON
12 •ATM SIG Meeting	13	14	15 •Mercury at greatest elongation in A.M.	16	17 •Observing at all sites	18 •Observing at all sites
19 •Observing at MG/Savage •Saturn at opposition	20	21	22	23	24 •Observing at all sites	25 NEW MOON •Observing at all sites
26 •Observing at MG/Savage	27	28	29	30	1	2
3	4	5	6 •Board Meeting	7	8	9
10 •General Meeting 7 pm @ GMU	11 FULL MOON	12	13	14	15	16
17 •ATM SIG Meeting	18	19	20	21 • Winter Solstice	22 •Observing at all sites	23 •Observing at all sites
24 •Observing at MG/Savage	25 NEW MOON • Partial Solar Eclipse	26	27	28	29 •Observing at all sites	30 •Observing at all sites
31 •Observing at MG/Savage	•First day of Third Millennium	2	3	4	5	6

N O V E M B E R

D E C E M B E R

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 three six-inch 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 Ultrascope 10mm and Meade MA 25mm eyepieces with 1.25-inch barrel sizes.

The second telescope is a homemade six-inch f/5 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.

The third telescope is a six-inch, f/8 Meade Dobsonian reflector.

To borrow a telescope you will need to show your NOVAC observing pass and leave a \$500 (for the Celestron) or \$250.00 (for a

Dobsonian) 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 GMU lecture hall, 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 George Mason University 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 posted on the NOVAC website.

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 7:00 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. To subscribe to the list, send a message to majordomo@his.com with the body "subscribe novac <your e-mail address>".

You should soon thereafter receive a reply welcoming you to the list and describing how to navigate it in more detail. There is also a digest subscription option, which sends each day's traffic in a single message the following day. To subscribe to this option, send a message to majordomo@his.com with "subscribe novac-digest <your e-mail address>" in the body. If you would like more information about listserv commands, send a message with "help" on a line by itself.

For additional information, send a message to Bob L'Hommedieu, bobcat@erols.com.

NOVAC Observing Site Rules

C. M. Crockett Park:

NOVAC's access to Crockett Park for regular observing sessions resumes in November. Please see Page 2 for details. Please consider volunteering as an Observing Coordinator to help us retain Crockett Park as an observing site.

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 near the entrance of the park. It is better to 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. 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/gas station) 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) for 8.4 miles (about 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.

Alternate 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 Rt. 7 near Leesburg. Stay in the left-hand lane to go to the exit for Rt. 7 West. Take Rt. 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 Rt. 7. Turn left onto Rt. 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.

Parking at the observing area itself is much more limited at Savage than at Crockett or Mickey Gordon. 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 on Rt. 50 fifteen miles west of 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 Coordinates

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
- Mickey Gordon 38°58.58' N, 77°42.31' W

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 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. Send article submissions to the Editor, Michael Mills mjmills@fpcc.net, (703)333-5075, 5001 Ridgewood Road, Alexandria, VA 22312. The deadline for submissions is three weeks in advance of publication, e.g., October 9 for the November/December newsletter.

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NOVAC Elections

December 10 General Meeting

See "President's Message" on page 4 for more details

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