



Send in Your Vote!

President's Message

This month we have more real science for NHAS members who attend the business meeting at CMP. Dr. Norbert Schulz of MIT will be with us to talk about the high energy processes in early stellar evolution. This promises to be another fascinating evening under the CMP dome. I would like to thank **Wade Walker** who set this speaker up for us.

,, Gardner Gerry
NHAS President 2007

Highlights for this Month

Be sure to vote on the proposed amendment to the NHAS By-laws.!

During the period covered by this issue of the *Observer*, we held two of the Astro 101 classes: Astrophotography and Planetary Observing.

Exterior cleaning and painting of the Observatory and Warming Hut at YFOS are in progress.

,, Paul Winalski
NHAS Secretary 2007

Vote Now on Amendment to NHAS By-Laws

At the March NHAS business meeting it was moved and seconded that the following two changes be made to the NHAS Bylaws (copies available on the NHAS Website or by request from the club Secretary):

(1) From section II.A.3 (duties of the Treasurer), strike paragraph (d), which reads:

d. sign, laminate, and distribute all membership cards;

(2) From section II.A.4. (duties of the Secretary), strike paragraph (c), which reads:

c. be responsible for the production of membership cards, valid for one year and to be provided for each shareholder at the January meeting

The rationale for the motion was that laminated membership cards no longer seem to be necessary, and their production represents an unnecessary burden on the officers involved, as well as an extra expense for the Club.

This motion is now being put forward to a vote.

A **YES** vote means that you are **in favor** of amending the Club By-laws as described above.

A **NO** vote means that you **oppose** amending the Club By-laws as described above.

To pass, a simple majority (greater than 50%) of the entire NHAS membership must vote YES.

There are three ways that you may register your vote:

1) By electronic mail: Send an email message containing your vote (YES or NO) to: secretary.2007@nhastro.com. Be sure that your real name (NOT just an Internet alias) appears somewhere in the message so that we are sure we know who you are.

2) In person: Give a signed statement indicating your name and your vote (YES or NO) to one of the NHAS officers or Board members, who will forward it to the Secretary for counting.

3) By US Mail: Mail a signed statement indicating your name and your vote (YES or NO) to this address:

**New Hampshire Astronomical Society
P.O. Box 5823
Manchester, NH 03108-5823**

The Secretary will keep all votes in the strictest confidence. If you wish your vote to be kept secret from the Secretary, you must deliver your vote in person or by US Mail. Write your YES or NO vote on a piece of paper and seal it in an unmarked envelope. Enclose that envelope in an envelope on which your name appears, then mail that to the US Mail address given above, or hand-deliver it to a Club Officer or Board Member.

Voting of course is open only to current NHAS members. We need to hear from the majority of the Club to decide this issue. Please let your vote be known!

,, Paul Winalski

Membership Report and Astro 101

NHAS welcomed 8 new members during the last month: **Nori Odoi** of Greenfield; **Steven Rezsutek** and **Todd Kozikowski** of New Boston; **Mike Norris** of Contoocook; **Joseph Westwater** of Goffstown; **Carolyn Kegel** of Concord, **Ken Charles** of Nashua and **Tim Mauro** of Portsmouth. Please welcome them when introduced at our meetings or skywatches.

NHAS has also held two Astro 101 courses.



Astrophotography 101 at Grainger Observatory (Chase McNiss photo)

John Blackwell presented Introduction to Astrophotography to 17 attendees. Packed house (or observatory as it were). We learned enough about Film, Digital and Video imaging to make us dangerous. John's examples were inspirational. **Chase McNiss** set up his video imaging gear and showed us how he captures lunar images.

John Bishop presented Planetary Observation to a packed house/Hut at YFOS.

John relays: "After the presentation we went out to observe. It took a while for the sky to darken enough to find Venus, then Jupiter and finally Saturn. Seeing was good but transparency poor; Jupiter was too low to the horizon to show much detail (it was very reddened).

People trickled away over the post-talk time. Clouds at 9:30 or so cause all but **Herb Bubert** to leave."

Our next Astro 101 Course has **Chase McNiss** presenting Polar Alignment at YFOS on July 13th. Any new members with an equatorial mount should be interested in this presentation.

,, Alan Shirey

International Sidewalk Astronomy Night

I love impromptu sidewalk astronomy. It really is an outreach activity, in that the folks you snare were likely not expecting to have such an opportunity. Sky watches are at least preaching to those interested in astronomy, whereas sidewalk events are available to the merely curious. When everybody is saying things like "Oh my [Flying Spaghetti Monster or what have you...]" when seeing the Moon through a telescope or Saturn (at all) for the very first time, you know they are having a good time.

I had heard of the Sidewalk Astronomers some time ago, but when **Matt Amar** told me about this particular event, his enthusiasm was contagious (though treatable, so they will still let him fly to Italy, if he wants...) I thought it would be fun to participate.

As Matt so nicely said in his email:

*"...Info can be found here <http://www.sidewalkastronomynight.com/>. I have talked with **Marc & Gardner** about trying to get something organized to participate in this and both agree that it's a good idea and fits well with our Public Outreach programs. The Public Observing e-mail address has been registered with the ISAN mailing list. I will post information on our participation to ISAN as we get organized. So...here we go...*

What I'd like to propose is something a little less formal than our usual sky watches. I'd like to see just how many cities (MA & NH) we could get someone out set-up in a public spot available to passersby.

Here are the parameters I'm suggesting (all comments & additions greatly appreciated):

- 1. Locations are chosen by individual members.*
 - 2. Location should be posted to the NHAS chat list for coordination/participation purposes. (Perhaps a thread in the Forums would be more appropriate.)*
 - 3. One or two members per spot are all that's needed.*
 - 4. Location should be an area where people are likely to be present; dark skies are not important.*
 - 5. A 'Guest Book' be kept to keep head count per spot.*
 - 6. Info flyers on NHAS should be available for handing out. It would be great if the one's we had at Astronomy Day could be posted to our website for easy access and printing (hint, hint).*
- So what do you all think? Anyone interested? Clear skies, Matt"*

Adding to Matt's eloquent email, I would suggest that a scouting trip to the site would be smart, checking out nasty lights and what's visible from there on the target night. Also, I think getting

permission from the landowner or town is a good idea. Invite the police to stop by (without their flashing lights). This is the sort of thing we could do anywhere, at any time (within reason). It doesn't have to be on a given night, but that might be a fun aspect. Imagine an email going out with: "It's clear tonight, it's Saturday, I want to go play on the street...!" Later, emails would tell about who went where and what happened. (This is a kind of activity is called "Parallel play" by some developmental types http://en.wikipedia.org/wiki/Parallel_play. For us, it might be Parallax Play...)

My experience was in North Conway, on May 25.

At last, the sky cleared after a week of rain. I received permission to set up next to a candy store with a nice view to the west. The management turned out some of the outside lights. I set up my LX90 with a solar filter and spent the next couple of hours showing people the sun. There were no spots to be seen, but about 100 people stopped in to look. After the Sun set, Venus took center stage. Just about everyone walking past stopped to look. As darkness fell, the Moon came up over the buildings. North Conway is flanked by dark mountains, but it is a tourist town with lots of "decorative" lights. There was hardly a star to be seen. The Moon was its usual wonderful self. Lots more people stopped in. The step stool helped the toddlers to see, and their parents quizzed them about what they saw. "It's big, gray, with lots of dots and circles." Bigger kids, couples, folks from Germany, France, Canada, New England, and a big group from New Jersey came by.

Finally, it was dark enough for Saturn, always a show-stopper. At times, 15 people were lined up to see. Friends called other friends over, and lots of people came back for second and third looks as it became darker and the scope was pointing at new stuff. Even the store people came out in shifts.

I met 4 or 5 teachers who were interested in the NHAS. I had Club handouts and the new cards, and passed out a bunch of each to interested people. I also had some of the *Astronomy* and *Sky & Telescope*

handouts. The kids really liked them, and the parents were pleased to have the kids get them.

I had put a poster up against the tripod with the ISAN logo and web address. I also gave mention to the New Hampshire Astronomical Society and Zeb's General Store, my gracious host. Even with all that, and reassurances that it was free, the phrase that people responded to best was "It's just a random act of astronomy."

The ISAN folks have been getting feedback from the participants in what turned out to be the ISA Week. The totals as of June 9 are:

Total number of amateur astronomers:
1100 +

Total number of telescopes involved:
475+

Total number of viewing guests:
25,000+

Number of countries represented:
28

Number of U.S. states represented:
22

∞, Marc Stowbridge and Matt Amar

YFOS Report

8 June 2007

While at **John Bishop's** wonderful Astro 101 on viewing planets **Larry Lopez** noticed the Magic Sheep had not eaten the grass. This was strange as the grass looked really tasty. He also noted the Porta Potty had not been pumped, which was strange since he called it in. Oh well. (I refuse to conjecture what kind of magic animal would have anything to do with a porta potty).

9 June 2007

So, waking up early (7AM) Larry bopped over to YFOS with all of **Linda's** hoses and the GT235 tractor. It was thinking of raining so he skipped breakfast and got there as quickly as he could. Against all odds the mowing was easier than it looked. It did of course rain while he was doing it.



Matt Amar power washes the YFOS warming hut (Larry Lopez photo)

He then proceeded to lay out the hoses so that **Matt Amar** could pressure wash the warming room and observatory. Of course by this point he was very very wet. Curiously Linda had about 500' of hoses and not 250' as advertised. That and 2 of **Jim Young's** hoses did the trick. One of Linda's hoses was bit worse for wear and had to be replaced. Bother. Larry was able to toss a 50' coil across the drainage ditch the first time. No photo or witness of this astonishing event exists. It made it the first time.

Matt got there at 10AM as scheduled. He came with 500' of hose also.

Matt power washed the buildings. Larry malingered, being spent—napping on rocks, truck ramps, tail gates, ...

Larry stayed inside the observatory with a bright white light to make sure nothing important got wet. Very little came in.

We finished up as about 1PM. Larry had 3 pitas and 1 banana and then went home.

We will be needing people to tape windows and such when Matt treats the surface of the shingles.

He's thinking of doing this June 16, Saturday, 2007 weather permitting.

I'll probably not show as my knee is bothering me again, although it was working great after I got back from YFOS.

∞, Larry Lopez

Help Needed at YFOS Painting Session

Next step is to stain the shakes and repaint the trim. It might be nice to have a couple of extra hands out there. Windows/doors will need to be protected by tape and plastic. Protection will need to be removed after spraying.

Unprotected trim will need repainting after over-spray dries.

People need to ooh and ahh at what a nice job we've done.

I'm hoping to do this Saturday, June 16th, weather permitting. I'm planning on arriving @ YFOS at 10AM.

Anyone interested in helping with the prep work should arrive then.

Anyone interested in helping with trim painting should come @ 12 noon.

Anyone interested in Oohing and Aahing should arrive at 4pm ;-)

Will keep you all posted here and on chat-list.

∞, Matt Amar

Radio Astronomy

The longest daylight hours of the year are here making it challenging for optical work. But for radio it is no bother. Actually, many entry type radio astronomy projects use the sun as a source. Having the sun high above the horizon much of the day makes this work easier.

Radio waves do have some disadvantages. One of them is that their longer (much longer) wavelengths yield less resolution.

To overcome this, the size of the collector must be increased. This is the theory behind what is called long baseline arrays. Extending the distance between receivers enhances resolution. This means two or three similar stations with a large distance between them (in wavelengths) tuning in on the same space-based signal can improve resolution as long as the signals being received are summed coherently, meaning at the same frequency and properly phased.

So we can try some solar observing of we can go for a larger effort of setting up several relatively simple receiving stations and take on the challenge of summing the signals. Summing the signals is the tough part and requires "processing" to get the information desired.

It will never look as good as visually peering though an eyepiece. But it still might be fun.

∞, Bob Sletten

Clay Center Visit

Nils Wygant and I went to the Clay Center for Science and Technology Center which is part of Dexter and Southfield Schools in Brookline, MA on the evening of June 5th to enjoy their public observing session. The building is built *around* a 5 story pier that supports a custom-designed 25-inch f/9.6 Ritchey-Chretien telescope along with several others on the same mount.



Unfortunately the dome was undergoing maintenance and could not be opened to use the large scope. As an alternative there were two scopes set up on the roof, a 12" SCT and a 90 year old Zeiss 3" refractor shown here with Nils at the eyepiece.



We looked at Venus, Saturn, Jupiter and Nils found M13 with the Zeiss, not an easy feat in the light polluted skies just outside Boston. We also were invited to the Physics lab where we played with the static electricity generator and marveled at an 1875 Alvan Clark refractor which was set up as a spectrograph.



John Briggs is the faculty Astronomer at the Clay Center and the owner of the Zeiss and Clark refractors. Clay Center public observing nights are Tuesdays during the school year.

<http://www.dexter-southfield.org/podium/default.aspx?t=10561>

.. Gardner Gerry

Star or No Star: When to Raise the Alarm

I wanted to relate a neat (and somewhat sad) story for your consideration and thought. There are a lot of people out in astronomy-land with a great deal of awesome equipment that could potentially allow for new discoveries each and every day. The word potentially is bold here... A couple of nights ago, I was taking a slew of images of my favorite cataclysmic variable stars (CVs from now on) in the hopes of catching one in outburst. These are neat objects as they tend to go boom from time to time with an amazing brightness change. One goes from magnitude 18.8 to 12.5 in a matter of hours! They are fun to watch, and even more fun to catch on the rise. There is a dedicated following among a group of us that likes to see who can catch one in outburst first... before all the rest.

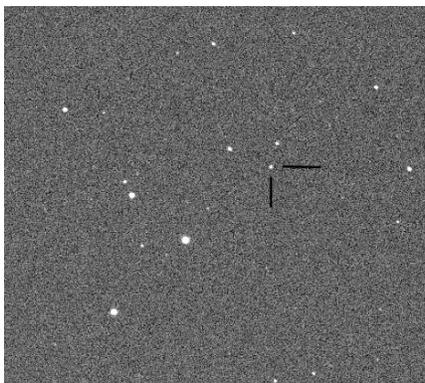


Figure 1: The field around TT Boo. The mystery object is marked.

One of my stars is TT Boo. I imaged it, didn't see it in the field and went to bed. The next day, I reopened the images and analyzed them to see if there was anything else to note: asteroids, other variables, etc. This time, in the TT Boo field there was an interloper, a star-like object floated about 3 arc minutes to the north of TT Boo's normal location (*see* Figure 1). It was at magnitude 12.5. It could have been an asteroid, a new CV, a nova (though unlikely due to the high galactic latitude). I checked the DSS: no star there. I checked the latest 95Mb long astorb.dat file to see if it was a bright rock in our solar system. Nope. I checked with SIMBAD to see if there was anything there at all, a faint galaxy perhaps. Nope. Not a distant supernova. Ok. Now this was interesting. It could be a new CV. I did the last thing I knew to do: check the image carefully to see if it could be a cosmic ray strike. It didn't look like one, as it had a nice round shape and bell curve cross section. Ok!

I sent an email to Aaron Price, my buddy at the AAVSO. He is a great guy, and undoubtedly if you have worked with the AAVSO, you know Aaron, Elizabeth and Arne... All wonderful people. They got somewhat excited, but in a good calm scientific manner. They wanted a JPG to see the object. It was suggested that since the weather was poor in NH that I send a broadcast to the AAVSO-Photometry mail list and request confirmation from folks over in Europe. A friend answered the call in Germany. It would be dark there soon, so he would confirm or deny the object for us.

In the meantime, Arne wanted a copy of the FITS file, this behemoth 24Mb data set, so he could check the star more carefully. I did that: sent it via email! Argh. There must be a free public FTP some place, says I. About half an hour later, Arne sends out an email to me: This is truly a defect, most likely a head on cosmic ray strike. End of message. I replied: Ok – how did you reach that conclusion, as I had been trying to ascertain that for an hour? He replied: Check the full width half maximum (FWHM) of the object

versus the FWHM of the surrounding stars. If the object is a star, then it will be very close or the same as all the surrounding stars.

Full width half maximum is an interesting mathematical device, a tool we can use to determine all sorts of nifty things in science. One of those nifty things is the ability to check for a sharp focus, determine your location's seeing conditions numerically and to see if an object is a star or an asteroid or something else. Software usually does the work for us: you place your cursor over the star in question and the software pops out a value for FWHM in either pixels or arc-seconds. Around here a typical FWHM can be anywhere between 2.5 to 6 pixels for an 150mm f/8 system with an ST8 imager depending on your seeing and equipment. That is pretty lousy given that big observatories on islands at high altitude will see values of 0.30 arc-second!! Ok, so what does it mean? Take a cross section of a star's image. Measure the brightness levels for each pixel as you go across. You will get a bell-shaped curve (hopefully). Divide this in half from bottom to top. Now measure how wide it is at that halfway point (*see* Figure 2). That is it. If you want the math:

<http://www.cmrr.umn.edu/stimulate/frame/fwhm/node1.html>

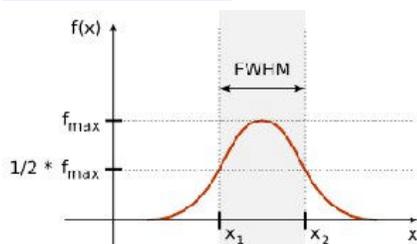


Figure 2: A plot of the cross section of a star and how to find the FWHM (Wikipedia, 2006 Full Width at Half Maximum).

Ok – that made sense to me immediately, and lo and behold, the object had a much smaller value of FWHM. Add that to your checklist people! The moral of the story: there will always be one more thing to think about before getting truly excited.

— John Blackwell

How They Figured It Out

When I first started doing astronomy, I learnt facts, such as the length of the

different kinds of months and how they were different. I didn't ask how people had figured out these different months and how they had gotten the lengths to tiny fractions of a day.

But as I watched the sky myself, I began to become interested in the process used to figure out what the lights in the sky were doing. In particular, I was interested in how the ancients, without telescopes, rockets or radar, had come up with such good estimates. And they were good -- they could predict the dates of solar eclipses and even make good guesses at where on Earth the eclipse would be visible, for example.

Here, then, are some stories about how you might determine facts about the universe by observation and thought in the deep past. The actual events aren't recorded so we'll have to imagine what they might have been.

Let us assume you are a gentleman of leisure, a noble (or priest) with lots of free time and the liberty to stay up late and travel a bit. Let us assume you are literate to some degree—perhaps you cannot write novels, but you can take notes with descriptions and numbers. Let us assume you can do simple arithmetic. While most people in the past were none of these things, sufficient numbers were for progress to be made. Indeed, in some cases (such as Babylonia and Egypt) whole priesthoods were funded by taxes for the purpose of pursuing astronomical knowledge.

Let us start with your first step into astronomy. It is a nice clear night and the Moon is bright and appears full. You remember that full Moons appear fairly often, and you wonder exactly how often. Maybe there's a specific number of days to a month you were taught but you decide to find out for yourself what it really is.

You start a journal. Each day you observe the Moon and record whether it is full or not. You count the days and give each one a number. Soon—on day twenty-eight, twenty-nine or perhaps day thirty—you note that the Moon looks full again. You might also note that you can't quite tell when the Moon is exactly full. There might be as many as three nights in a row when it looks full. That means that your estimate of

the length of a month might start two days early and end two days late, or start two days late and end two days early. In other words, it could be as much as two days off at either end and as much as four days off over overall.

So you don't stop there. You continue the count, and at day fifty-eight, fifty-nine or sixty, the Moon looks full again. Now when you analyze your possible errors, you note that while you might be two days off in picking the starting full Moon day and you might be two days off in picking the ending full Moon day, your maximum error is four days over two months rather than four days over one month: in relative terms, it's only half as big as it was.

And that's the secret: recording more cycles! If you continue your count for ten full Moons, you still have only four days of error over a total of around 295 days, and your estimate is at most 0.4 days (9.6 hours) off. A hundred full Moons will take about eight years to count, but when you have counted them your error will be at most 0.96 hours (58 minutes) from the actual value. At this point let's turn over the counting of days and full Moons to a priesthood so we can count ten thousand full Moons. That'll take about eight hundred years, but at the end of the process we'll know the length of the synodic month to a precision of about 30 seconds!

Let's consider a different count you could make at the same time. You could count the days between appearances of the Moon in some particular constellation (e.g., Leo). This count would increase in accuracy the same way. It would give the length of the sidereal month.

With more care, you could record the angle between the Moon and a selection of bright stars. Some trigonometry (or measuring on a sphere) would let you figure out how far from the celestial equator the Moon was; a bit more figuring would give you how far from the ecliptic it was. If you tracked that latter distance, you'd see it wax and wane over the draconic month. If you followed the draconic month for a long enough time, you could detect the precession of the Moon's orbit. Measuring the draconic month is far trickier than measuring the synodic month, but it was done quite accurately

millennia ago. The precession of that orbit is far easier to detect than that of the Earth's orbit, as the Moon's orbit precesses completely around in only 18.6 years, so it could be detected within a single observer's lifetime.

During these days you could also record the weather and the length of a shadow at noon. Of course, just as with the month, you might already know the official length of a year, but how accurate a value could you get with a notebook, a pen and regular habits?

If you went out around noon every sunny day and marked the shadow of a pole on the ground with pebbles for an hour or so, you could find the shortest shadow length for the day, and make a permanent mark on the ground to record that length. Over a year you could see that length grow and shrink and then grow again over a figure-eight path. You would have created an analemma!

Again, the initial count from shortest day to shortest day over a year could be several days off. Bad weather might interfere and prevent recording for a few days.

However, if you continued the count over a few decades, the relative error would shrink and the shape of the curve would become more certain. The Egyptians and Babylonians had the advantage of dryer, warmer climates which meant they didn't have weeks of clouds, rain or snow during which they couldn't record shadows. Quite early in history observers managed to measure the length of the seasonal year (the "tropical" year) to within a small fraction of a day.

The year is called "tropical" not because it was measured near the equator, but because it measures the time for the Sun to turn a full circle (from Greek "tropos", to turn). The turning points are thus named Tropics, like the "Tropic of Cancer" where the sun stops ascending and starts descending.

The sidereal year is the time for the Sun to go from one position in the sky, such as in Leo, and come back to the same position. While you can't see the stars when the Sun is in the sky, you can look at them just before sunrise and estimate where the Sun is with ten degrees or so. As before, that error will

be reduced over many cycles of counting.

Due to the precession of the Earth's axis, the tropical year is just a tiny bit shorter than the sidereal year. It would take decades of careful counting to detect that difference, as it's about twenty minutes. Let's say you put the year start at the summer solstice. If your error in detecting the start of the year is two days (and thus the cycle count is off by at most four days), it would take about five hundred years for your year-length estimates to be accurate within ten minutes and thus accurate enough to detect a twenty minute difference.

While five hundred years is a long time, we should remember that by the time of Hipparchus (150 BC) astronomical records from Mesopotamia went back more than two thousand years.

Unfortunately, invasions and dark ages meant that there weren't any continuing "long counts" of the sort described here. Ancient astronomy wasn't quite as simple and easy as it would have been in the ideal case.

It's important to note that while multiple cycles give you a cycle length that is very precise, it doesn't give you any more precision in picking the exact moment of a particular event. Knowing the synodic period of the Moon is 29.53 days long doesn't mean that you can pick the moment of a particular full Moon any more accurately: it'll still be a matter of "Thursday, plus or minus a day".

Some events are quite precise in time however. A total solar eclipse lasts at most seven minutes. How could one predict such an event in the days before computers and telescopes? I'll discuss that in a later installment!

... John Bishop

NHAS May 2007 Business Meeting

ATM

No report.

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YFOS

Chase McNiss reported that the upgrade parts for the Titan mount had arrived from Losmandy, were tested by Don Ware, and have been installed at YFOS. The new motors are not here yet so the slew rate is only 800. Chase mowed the lawn and did reseeding on the ruts left from the winter plowing. Old thatch has been raked up. We need a work party to clean up the warming hut. Matt Amar has volunteered to help with spraying of the cedar siding on the buildings.

Membership

Chase reported seven new members: Ken Charles, Carolyn Cable, Joseph Westwater, Stephen Razuttek, Mike Joseph, Debby Norris, Nori Odi, Dave Gilmore.

Public Observing

There was discussion of the happenings at Astronomy Day (see the reports in last month's *Observer*). The wind ripped the grommets out of our club banner. A new one has been donated and is in preparation.

Web Administration

No report.

Photography

Gardner Gerry reported that the next Photography Committee meeting will be the Astro 101 course on 25 May. Members continue to post great images in the Members Only area of the NHAS website.

Radio Astronomy

No report.

Scope of the Month

Mike Townsend presented an Orion Starblast 4.5" f/4 Newtonian reflector on a single-arm Dobsonian-style mount. The secondary obstruction is

25%. The plastic focuser takes 1.25" eyepieces. There is quite a bit of coma. Magnification is good up to about 200X. There are good collimation screws for adjusting the primary and secondary mirrors. The scope has a tension adjuster for altitude and a red dot EZ-Finder. On the minus side, things are a bit faint through the finder, and the shadow of obstruction shows up on wide-angle low power eyepieces. This is a very deal as a scope for small children.

Miscellaneous Business

There is no word yet on the status of our equipment grant proposal that we presented to PC Connection.

Evening Program

Two of our club members, **Nils Wygant** and **Dave Weaver**, presented slide shows and talks on their respective recently completed home observatory projects.

Nils was finding that setup and takedown of his scope were taking a lot of time, so he built an observatory to get more time for actual imaging.

Lacking room for an observatory on the ground, he instead built a 12' x 10' raised platform in the southwest corner of his garage, with a manual roll-off roof. This was very much a do-it-yourself project all the way, except for some expert waterproofing help from **Joe Derek**.

Dave took a different tack on his project. His new motor-operated roll-off roof 9.5' x 9.5' observatory was built and installed by Backyard Observatories and sits on a full foundation. Two underground electrical conduits carry data (three daisy-chained USB cables with active connectors) and power cables the 30 feet to the house.

You can see pictures of the construction of both observatories, along with commentary, in Nils's and Dave's blogs in the Members Only area of the NHAS website.

∩, Paul Winalski

The Bottom Line

Starting Balance:	\$5786.92
Deposits/Credits:	\$75.00
(Membership)	
Accounts/Paid:	\$57.86
(Peerless, treasurer supplies)	
Net Account Balance:	\$5804.06
Petty cash drawer:	\$195.75
Cash Balance:	\$5999.81

2007 Membership: 137

New members:

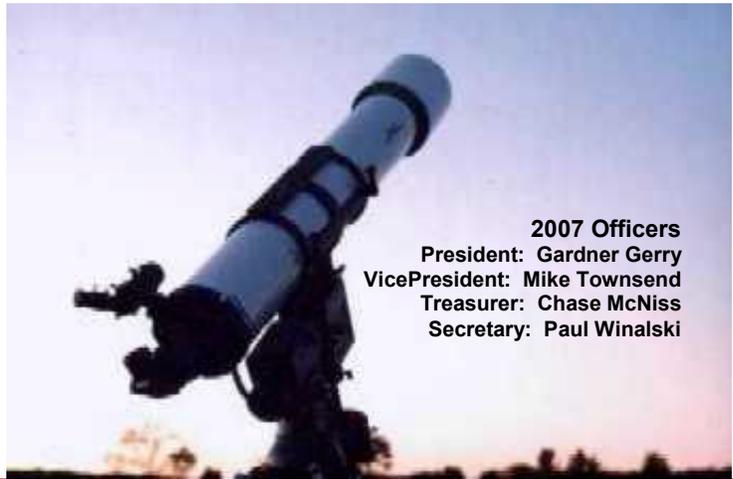
Richard Barbalato, Chatham, NJ

Mike Hobbs, Nashua, NH

Michael D'Angelo, Northfield, NH

Todd Kozikowski, New Boston, NH

∩, Chase McNiss



2007 Officers
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DEADLINE July 2007 Issue: 5 PM July 13

E-mail articles to the Editor.

CHANGE OF ADDRESS – Notify the Treasurer of changes to postal or e-mail address.

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This month's contributors:

Gardner Gerry, Alan Shirey, Marc Stowbridge, Matt Amar, Larry Lopez, Bob Sletten, John Blackwell, John Bishop

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Manchester, NH 03108-5823



NHAS Upcoming Events

Event	Date	Time	Location
June Business Meeting	June 15	7:30 PM	Christa McAuliffe Planetarium
YFOS Painting Session	June 16	10:00 AM	YFOS
CMP Public Sky Watch	July 6	7:00 PM	Christa McAuliffe Planetarium
Coffee House Night	July 13	5:00 PM	YFOS
Astro 101: Polar Alignment	July 13	7:30 PM	YFOS (will be held clear or cloudy)
Goffstown Public Library Sky Watch	July 18	8:30 PM	Cemetery Field, Rte 114, Goffstown NH
July Business Meeting	July 20	7:30 PM	St. Anselm College
Merrimack YMCA Daytime Sky Watch	August 3	9:00 AM	Camp Sargent, Merrimack, NH
CMP Public Sky Watch	August 3	7:00 PM	Christa McAuliffe Planetarium
Stellafane	Aug 10-11		Springfield, VT
Coffee House Night	August 10	5:00 PM	YFOS