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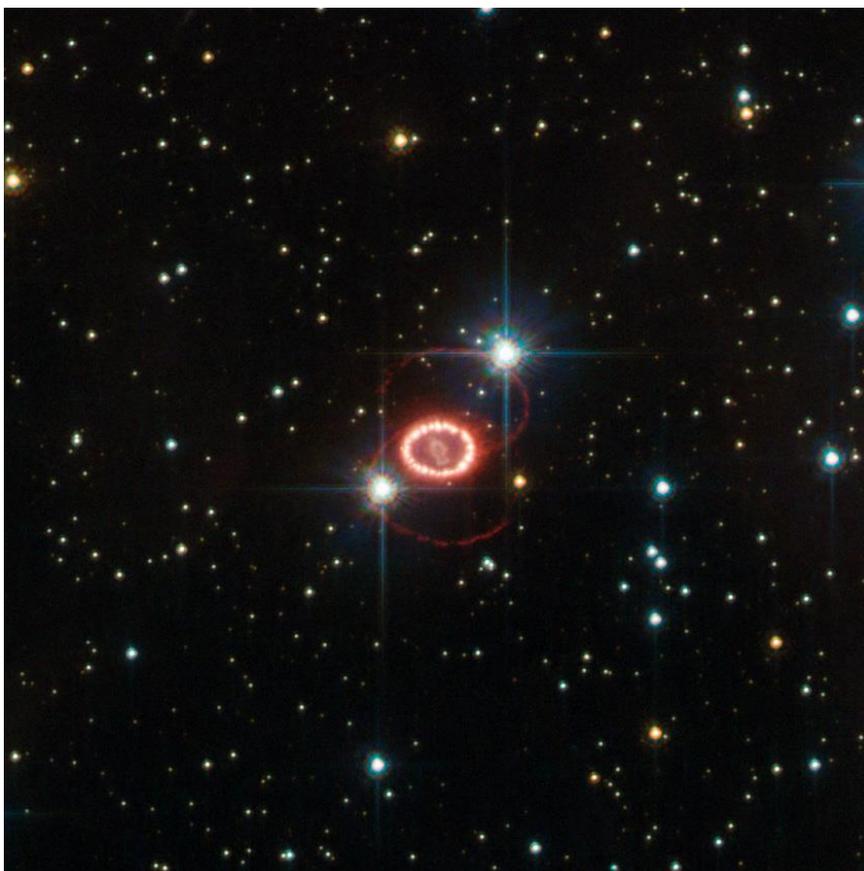
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SN 1987A Remembered



Remnant of SN 1987A in the LMC (imaged in 2011) (Credit: HST/ESA/NASA)

*Late in the evening of February 23, 1987, a graduate student from the University of Toronto named Ian Shelton stepped out of the Las Campanas Observatory in Chile to check if the anomaly he had detected in a freshly developed photographic plate of the Large Magellanic Cloud was something real. Oscar Duhalde, a telescope operator, joined him. The two were the first human beings to visually spot the brightest stellar explosion in almost 4 centuries. A third of the globe away in Nelson, New Zealand, it was already the afternoon of February 24, and shortly after nightfall that day (and within the same 24-hour period), **Albert Francis Jones** would become the third person to spot the supernova and be recognized as a co-discoverer. Jones had been observing a trio of variable stars in the LMC near the Tarantula Nebula when he spotted a bright blue new 'star' in his field of view. A legend amongst variable star observers, his contributions to astronomy spanned more than 70 years; Albert Jones is believed to have made more than 500,000 visual estimates of variable stars. Known to his peers as "the quiet achiever," he died on September 11, 2013, shortly after his 93rd birthday.*



Our Timeless Views

When we look at the Hubble pictures of the “Pillars of Creation” in the Eagle Nebula, we see the entire four light-year length of the pillars all at once. Since all parts are about the same distance from us, we also see them as they were at about the same time, seven thousand years ago.

When I first saw that image, I was most struck by the fact that the little tiny blobs resisting erosion by light were dust held in the grip of a developing star and they were the size of our solar system. But it wasn't until recently that I realized that if I lived there, I would never see this view because of the time-of-flight light delay. I would see near-by parts in their recent past, the end of the pillar as it had been four years ago and the other side of the clear bubble as it had been fifty years ago.

Our view may be out-of-date – [the Wikipedia page of the Eagle Nebula](#) mentions that a supernova may have already destroyed the pillars and we'll see that destruction in a millennium. But it is simultaneous in a way which a more up-to-date image couldn't be, and isn't that cool?

John Bishop
NHAS President

Sky Watch Review

[Whereas this February more than matched the previous month for the cold, it could find no way to top the blizzard of January 27. It decided instead to snow almost every other day, with predictable consequences. Milton Mills postponed its Winter Carnival to early March (and Milton Library followed suit); Maplevue Elementary School in Goffstown also postponed its event. But Dover Public Library planned for the cancellation of its outdoor observing and so this month we have a single brief report, thanks to Paul driving all the way out to the coast and quite a few hardy Dover souls showing up. -Ed.]

Dover Public Library, Dover NH, February 17

Conditions were completely overcast. I gave an extended indoor presentation of an hour to about 20 people.

- **Paul Winalski**

Society Activities

First Friday at MSDC, Concord NH, February 6

To everyone's surprise the event went ahead as planned, with **Gardner Gerry** joined by **John Rose** and **Mike Townsend** to represent NHAS. His report:

It was a decent evening of observing, though cold and some wind made it a little uncomfortable. The folks that stopped by, about 20-25 all told, were appreciative of our willingness to stand out in the cold, and we shared the typical winter objects as well as Jupiter.

New Horizons, same old Solar System Ambassador

*[Marc Stowbridge once called him a “nice guy” and even though he is now an out-of-state (but still luna-tic) member, **Ted Blank** lives up to the billing by not reporting about the weather from his new domicile. -Ed.]*

At the [August 2014 Business Meeting](#), **Steve Conard** gave us a remote talk on the *New Horizons* mission to Pluto and his own instrument on board, the LORRI imager. The Long Range Reconnaissance Imager (LORRI) is a 200mm Ritchey-Chretien telescope tasked with obtaining early long-range images of the Pluto/Charon system to assist with fine-tuning the spacecraft's trajectory at the flyby, and later with providing high resolution panchromatic images at closest approach, with an expected resolution of 100 meters.

The *New Horizons* team is now taking optical images to finalize the orientation and track of the spacecraft as it approaches the Pluto system. A series of these images has been assembled into [an animated GIF of one orbit of Charon around Pluto](#); it is a fantastic view of this dynamic system. In the movie you can clearly see that Pluto and Charon (which is about 1/8th the mass of Pluto) orbit around their common center of mass, their barycenter, leading to the 'wobble' you can see in Pluto.

Earth and the Moon have a similar mass relationship and Earth makes the same off-center orbit around the barycenter of the system, and this has a direct effect on our ocean tides. As the Earth rotates on its axis, the water on the side nearer to the Moon is pulled up by the Moon's gravitational attraction (and to a lesser extent by the Sun's attraction), giving us one of our daily high tides.

Our other daily high tide happens on the other side of the Earth away from the Moon, and after observing the Pluto/Charon movie you can see why. Water on the side of Earth opposite the Moon is "thrown outward" by centrifugal force. As a spot on the Earth rotates through that point opposite the Moon it experiences its second high tide of the day. The two low tides occur at the points 90° from the line connecting the Earth and Moon. Isaac Newton, not surprisingly, was the first person to figure this out.

Since the Earth is rotating on its own axis as well as being orbited by the Moon, while at the same time going around the Sun, you can see why predicting the tides is a complicated business even without considering the effects of local topography and bathymetry.

- *Ted Blank*

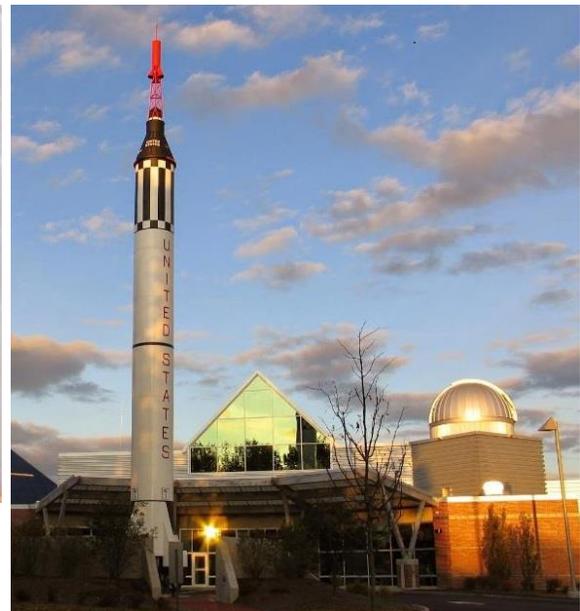
MSDC Mosaic Event, Hopkinton NH, February 14

With snow falling lightly outside the studio windows on Valentine's Day, NHAS members **Linda Lopez, Melinde Lutz Byrne** and I joined mosaic artist **Lizz Van Saun** of Kast Hill Studio in Hopkinton to piece together sections of her mosaic depicting the McAuliffe-Shepard Discovery Center (MSDC). The panel is one of four commissioned for Concord's 250th anniversary celebration this year.

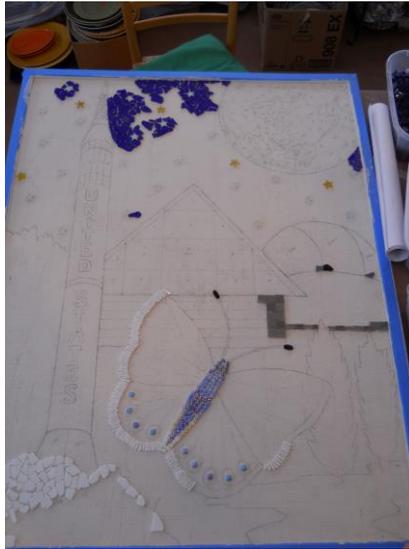
We listened to a few minutes of instruction on how to cut, break, and shape the glass into small pieces, position them on the panel, and then attach them with thinset, a bonding mortar. Linda focused on bringing the endangered **Karner Blue butterfly** to life in the foreground. With skills from her stained glass experience, Linda meticulously cut and attached tiny white rectangles to outline the creature then moved onto the blue glass to fill in the wings.



*The artist's vision (above).
(Credit: Lizz Van Saun)
The real world MSDC (right).
(Credit: unknown)*



*Pluto-Charon imaged on January 25
(Credit: JHU/NASA)*



Lizz Van Saun demonstrates basic tiling technique (above left). The mosaic as it was to start with (center) as Linda gets to work on the Karner Blue (above right). Meanwhile Melinde begins to fill in the Lunar mares and craters (below right).

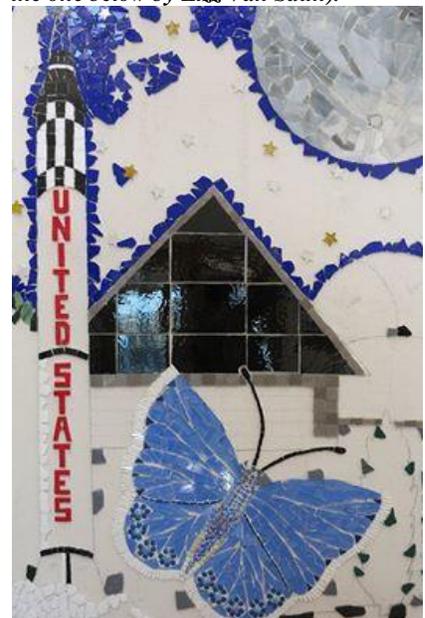
Meanwhile, Melinde and I reflected on how to create the moon. Lizz had a very detailed sketch based on an image of the Moon, but soon realized that it was probably too detailed (especially for inexperienced tilers), so she let us newbies do whatever we wanted to. We started by cutting and placing a small white tessera on the panel to represent Tycho and many hours, one glass sliver, and a few bloody cuts later, voila... the lunar surface was done (more or less)!

- **Michelle Thomas**

Melinde and Michelle after their excellent lunar adventure (below left), with Linda having brought more than half a Karner wing to life (center). Two more weeks and a few more volunteers' effort later, the mosaic is nearing completion (right).



(All Photos by Michelle Thomas, except the one below by Lizz Van Saun).



M47 (NGC 2422) – Open Cluster in Puppis

by Glenn Chaple

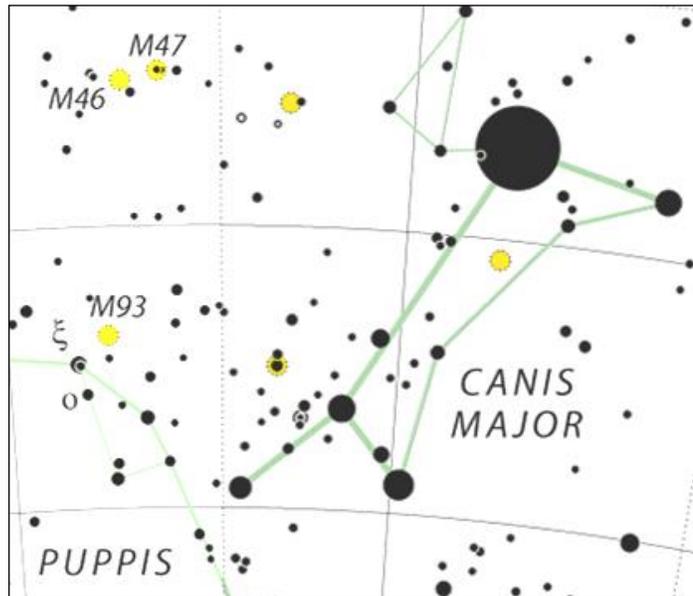
Last March, we explored the open star cluster Messier 46 in Puppis. This time around, we turn our telescopes 1 ½ degrees westward to another Puppis cluster – M47. For nearly two centuries, this was one of Messier’s “missing” objects. It was originally discovered by the Italian astronomer Giovanni Battista Hodierna – a forerunner of Messier. Hodierna reported it in a treatise on comets and “admirable objects of the sky,” published in 1654.

Hodierna’s work was unknown to Messier, who independently discovered the cluster on February 19, 1771. But Messier made an error in plotting its position and the mistake wasn’t rectified until the mid 1900s.

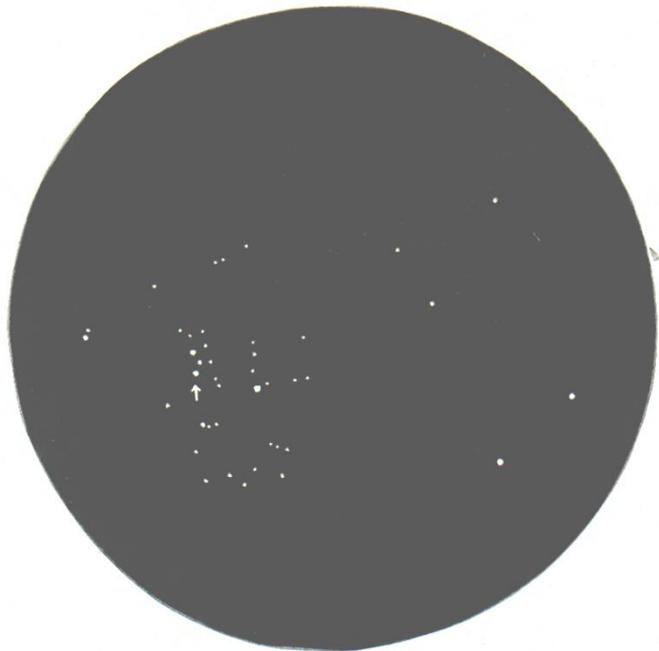
At magnitude 4.4 and having the apparent width of a full moon, M47 is visible to the unaided eye under dark-sky conditions. It’s a fine sight in binoculars and rich-field scopes, which capture M46 as well. While the latter appears as a hazy patch, M47 has an almost Pleiades-like look. Even a small scope will pick up several dozen cluster members.

Like M46, which houses the planetary nebula NGC 2438, M47 is home to a deep-sky delight of its own. Near its center is the pretty double star Struve (STF) 1121 – a pair of white magnitude 7.0 and 7.3 stars separated by 7.4 arc-seconds. STF 1121 is well resolved when M47 is viewed with magnifications of 50X and up.

M47 is approximately 1600 light-years away and has a true diameter of 12 light-years.



Generated by www.constellation-guide.com
(Courtesy: IAU and Sky & Telescope)



Messier 47 (in 4.5-inch f/8 reflector at 33X). North is up in this 1.3° field. An arrow shows the location of STF 1121. Sketch by author.

Almost a Rite of Passage



M42 and M43, a stack of many unguided exposures and a nursery of many, many stars.

(Image: Joe Dechene)

The image above was taken on January 11, 2015 with “Ian’s scope” – it is the result of stacking a number of unguided exposures of 16 and 45 seconds using a modified Canon EOS Rebel XSi at prime focus.

Beginning in the summer of 2013, **Joe Dechene** set about making a 6” Newtonian Reflector (of his own design) for his son Ian. The Optical Tube Assembly was more or less done by the end of the year. The first half of 2014 was devoted to the construction of the Equatorial Mount for the scope.

The new telescope had its public showing at the Merrimack Public Library’s skywatch of July 24, 2014. The next day it was entered in the Telescope Competition at Stellafane 2014.

The story of “Ian’s scope” is next.

A Telescope for Ian

I had always wanted to make a telescope mirror, and at the Stellafane Kids Raffle of 2001 my daughter Kristin won a mirror grinding kit. Her brother Brian won a similar kit in 2005. My other son Ian bought an incomplete mirror at the 2006 swap meet. This was a perfect opportunity to check an item off my bucket list!

Working on the three mirrors pretty much at the same time allowed for economy of scale. By polishing in the bathroom, where there is running water, counter space, and the ability to heat the room to the temperature required to parabolize relatively fast mirrors, the task was made easier. Use of the counter also reduced the traditional grinding barrel to a wooden disk on three rubber feet.

I had always thought that making a mirror would take a long time, but I was surprised to find out that it took less time to make the mirror than to make the mount. The idea was to make a Newtonian telescope for each child. I made simple dobsonians for Kristin and Brian, and each won an optical award at Stellafane (in 2007 and 2008).



Above: The three mirrors, one down and two to go in 2007.



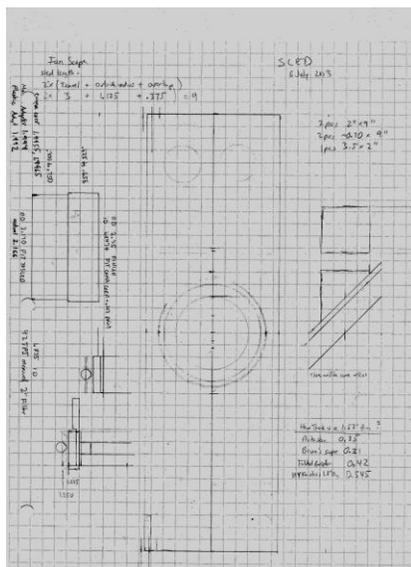
Right: Working at the counter on Kristin's mirror.

Ian wanted his telescope for astro-photography with a two-inch focus barrel, a slide focuser and an equatorial mount with drives. A slide focuser has worked well for me; all of the kids' scopes have one (plus an earlier test scope). It allows for a small diagonal, wide focus range, smooth control at very low cost, and it is camera capable. A reasonably large diameter tube with a flat surface and a two-inch focuser could have no more than eight sides, leaving just enough structural strength for the sled to hold the barrel. I started sketching details in May 2012 and refined it over the next month.

(All photos and images for this article were taken by Joe, Maggie and Ian Dechene)

The Slide Focuser

I first cut wood for the focuser sled in July 2013 – start with the most risky component being the motto. I made the guide grooves for it in September (illustrated on the next page as part of the OTA construction), and re-made them in November after making and buying more accurate fixtures and tools. The tolerances for Ian's slider were more demanding than the other two scopes I had made, given its narrow tracks – they had to allow movement of the secondary mirror without compromising



Above: These pieces represent the first work on the project. Part of the sketch for the focuser sled (shown left) can be seen in the foreground above. The components of the Slide Focuser are laid out (top right), and the final assembly of the diagonal secondary mirror done, with black paint applied later (bottom right).

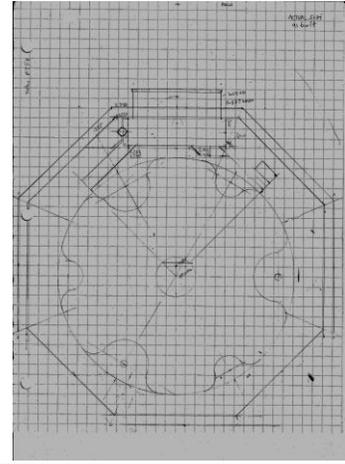


the collimation of the optical path. The slider would glide on a pair of brass rods and its lateral movement would be controlled by a threaded screw manipulated by the focuser wheel.

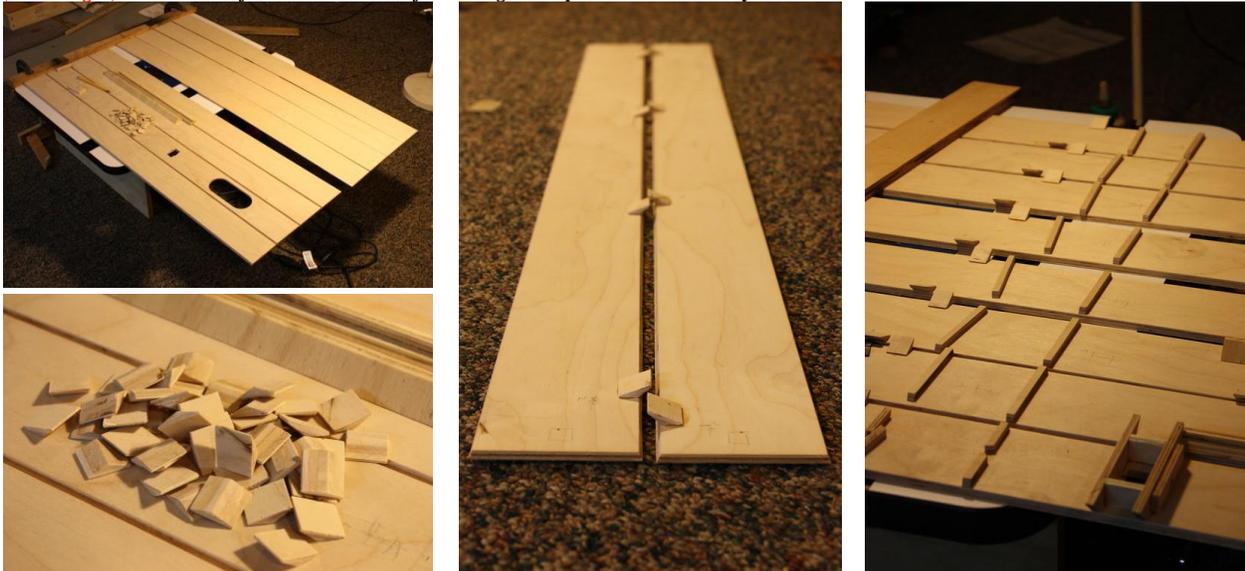
The OTA

The eight-sided tube was fashioned in November 2013, but the tube was still kept in two halves to allow for ease in any subsequent modifications for compatibility with the not-yet-finalized mount. The mirror cell was added at one end and the focuser sled grooves and slide mechanism at the other.

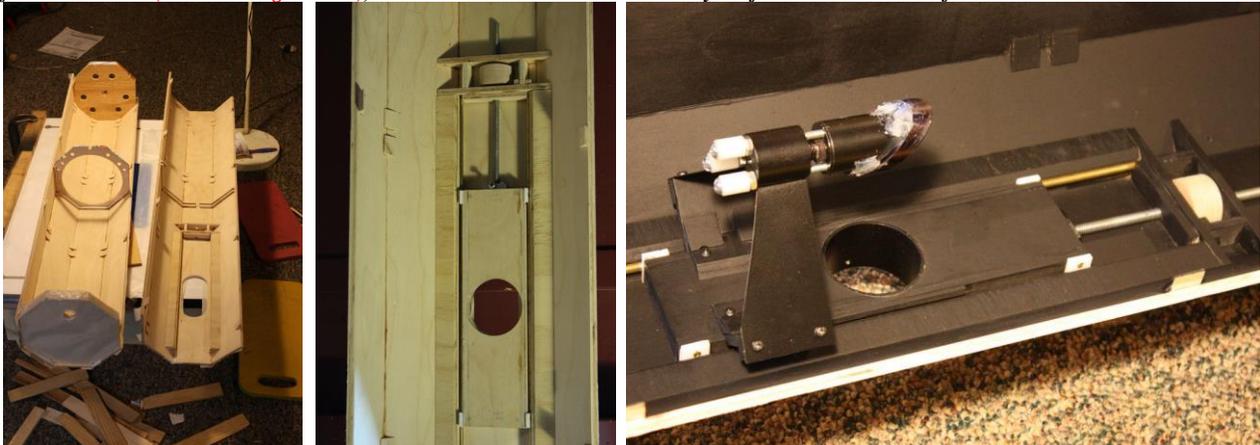
The interior of the OTA was painted and detailed in December. By the end of that year (2013) I could put the tube assembly on Kristin's dobsonian mount and observe (some later photos show dobsonian altitude circles attached to the side of the tube), although the mirror was uncoated at this point. An uncoated mirror reflects about 4% of incident light, which amounts to a 22-fold drop in luminosity of objects being observed, equivalent to a loss of almost 3.4 in magnitude.



(Above right): The sketch of the cross-section of the octagonal Optical Tube Assembly.

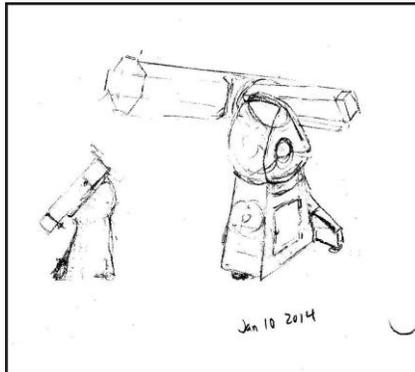


Parts of the OTA laid out for assembly. The eight sides of the tube (top left) and some of the custom fasteners (bottom left, center and right above) come together to make the tube for the 6" mirror. The tube was glued into two halves (far left below). The grooves and rods the sled focuser slides on (center and right below), with its lateral movement controlled by the focuser wheel rotated from outside the OTA.

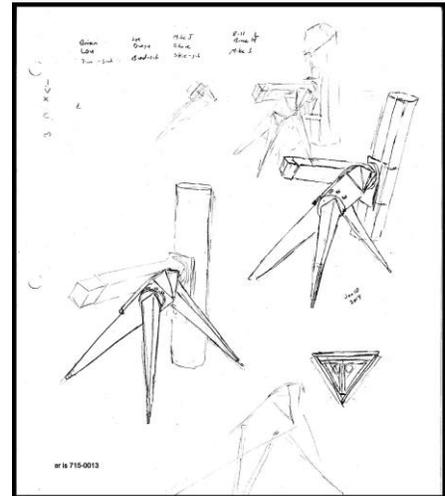


The Mount

Work on the mount started in January 2014. The requirements were that it be easy to set up and store compactly, adjust for a range of latitudes, and be steady for astrophotography. I sketched the mount concepts in January, but before getting close to a chosen configuration I presented two concepts to Ian. Both had wood disks instead of shafts for the axes. One was the safer approach that resembled a Byers 812 mount. The other was more aggressive, a risky approach that Ian chose and I built.



(Above): Concept #1 resembling a Byers 812. (Right): Concept #2 is an untried design, and oddly enough, the design implemented in the end is in the light sketches at top and bottom of the sheet!



I first wanted to prove that wood disks would actually work. I built a trial disk-based declination axis out of available 3/4" plywood and mounted the tube assembly on it. Then I mounted that combination on my "Hawaii" polar axis and tripod for an evening of testing. It carried the heavy dec axis and a much larger scope and was stable enough to take a 1/2 second image of the Moon on January 7, 2014. It was an encouraging sign, in fact the go-ahead signal to construct the actual mount.

The "Hawaii" telescope was built to fit in a suitcase and was taken to Hawaii for the 1991 Total eclipse. A driven equatorial fork mount designed to carry a lightweight 500mm f/8 lens (costing \$69) with the option of a 3" f/5 achromatic refractor, the scope was featured in *Sky & Telescope's* **Gleanings for ATMs** (May 1992).



(Above): The test setup on the "Hawaii" mount and the test shot of the Moon.

(Near right): Waffle core construction of the north leg that will eventually hold the polar disk and center bolt.

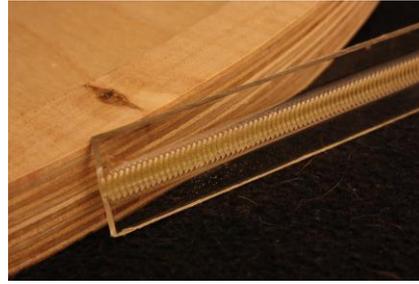


(Far right): The north leg takes shape (top) and the base of the leg (bottom).



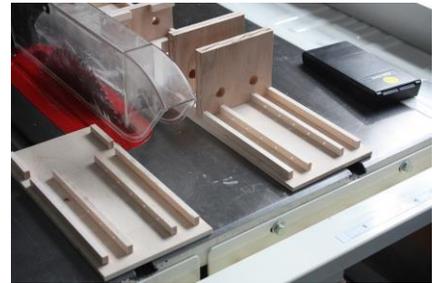
I started to cut wood for the larger North leg in late January 2014. If my 14.5" telescope was an exercise in cutting circles and arcs, this scope was an exercise in cutting angles. I made fixtures to cut angles for both large and small pieces. The detail work for the polar axis structure (the north leg) began in February; it is a waffle core structure to save on weight and also provide a flat surface. I then made the plastic drive teeth in Lexan by late February. I had improved some of the concepts used in the old "Hawaii" telescope; by this time I was able to reliably press the worm teeth into Lexan, a much more durable material than styrene (the material I had originally used).

I also made temporary thin south legs in February and the permanent upper declination axis by March 15. The lower sliding declination axis was finished by the end of March; it would eventually house the battery that would also serve as a counterweight.



(Left): Making the worm teeth in Lexan by pressing a brass threaded rod into a strip of Lexan carefully heated up with a hot air gun.
(Above): A finished Lexan worm teeth strip is ready to be attached to the Right Ascension sector.

(Right): The Declination arm assembly (top), with the arc allowing for an 8" polar disk (seen below the box's bottom side), and other components of the sliding counterweight assembly (bottom).



Interim Testing

This was enough to do some outdoor night sky testing of the components. Permanent south legs made out of maple wood replaced the temporary ones after a favorable test. The sliding counterweight was added and another night sky test took place at the end of March, when Ian accidentally kicked the legs and collapsed the mount. After that we replaced the single strut connecting just the south legs with a wire that looped through all three legs.



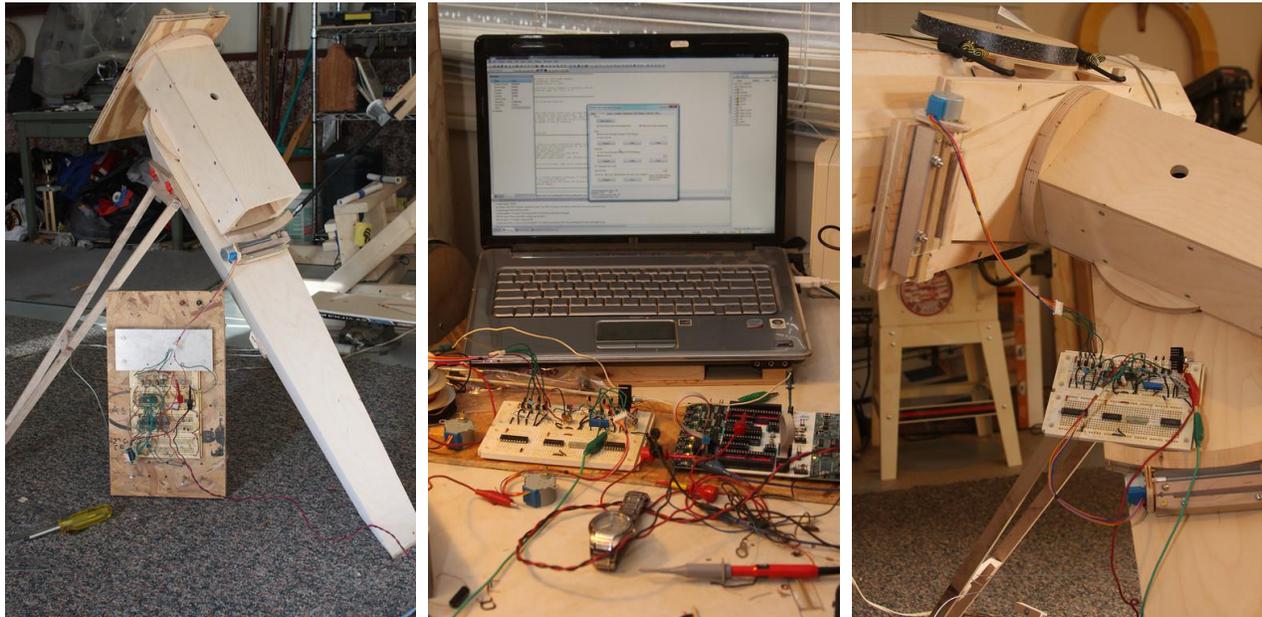
(Left): Ian pressing down on the mount as part of the "Ice Test" of the single strut. *(Center):* A south leg with a wood and Teflon pad underneath to promote slippage (above) and a

close-up of the original strut linking the pair of south legs (below).

(Right): Ian testing the wire solution (with adjustable length clamps); tying all three legs together met the ruggedness criterion for the mount.

The strut had dealt only with the pair of south legs, leaving the north leg free to move about independently when pushed. The wires "roped" all three legs together, so that the whole mount would rotate and not collapse if someone walked into it. The wire length can be adjusted with a set of wire clamps, and thus control the spread of the legs; the adjustable slant of the north leg allows a stable range from 30° to 45° latitude.





(Left): Initial test of Right Ascension sector drive with the large proto-board driver. **(Center):** Writing assembly language code for the controller (the watch in the foreground is to confirm the motor rotation rate). **(Right):** Testing the proto-board version of the final circuit on both the RA axis (lower right) and the Dec axis (upper left). The blue 'knobs' are the two step motors.

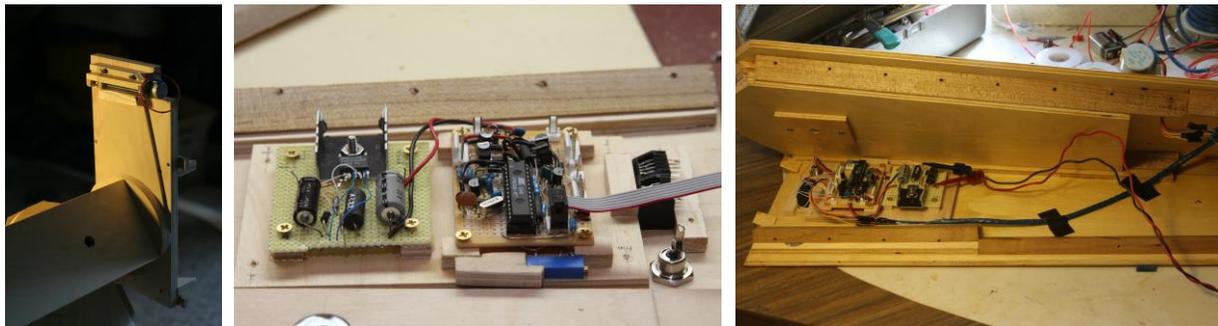
The Clock Drives

The Right Ascension drive assembly came into being in April, first driven by a large temporary proto-board test step-motor driver circuit (still functional from the 14.5" scope made 12 years ago). The declination motor was commissioned by early May. Programming was accomplished by mid-May, using Atmel Mega 8 assembly code. The permanent drive circuit was finished by late May, and the switching power supply was done by early June.



(Above left): The Right Ascension drive up-close and personal. **(Above right):** Ian with the glued halves of the OTA, finally!

June was then time to send the mirror out for coating. The tube halves were finally glued together on June 14, with Ian helping. All the wiring was completed by late June and the testing, trimming and tuning of the setup continued through July, and even after Stellafane 2014.



(Left): The OTA saddle and the Dec sector drive. **(Center):** The drive power supply and controller, with a ribbon cable that allows for firmware updating. **(Right):** The drive electronics are all mounted inside the north leg, with access from the top.

First Public Light

By mid-July the telescope was in sufficiently robust working condition to be unveiled at the [Merrimack Public Library skywatch on July 24](#), and at Stellafane 2014 the very next day.

Polar alignment is done for this mount before the OTA or counterweight is installed. A simple alignment scope set in its own homemade wooden bracket is clipped to the upper declination axis for the visual sighting, after which the implement is put away in the accessory box. As noted before, wire looped through the legs is used to set the latitude of operation, by adjusting the slant of the north leg. Out in the field, I can place thin pieces of wood under one or more legs to adjust the level.

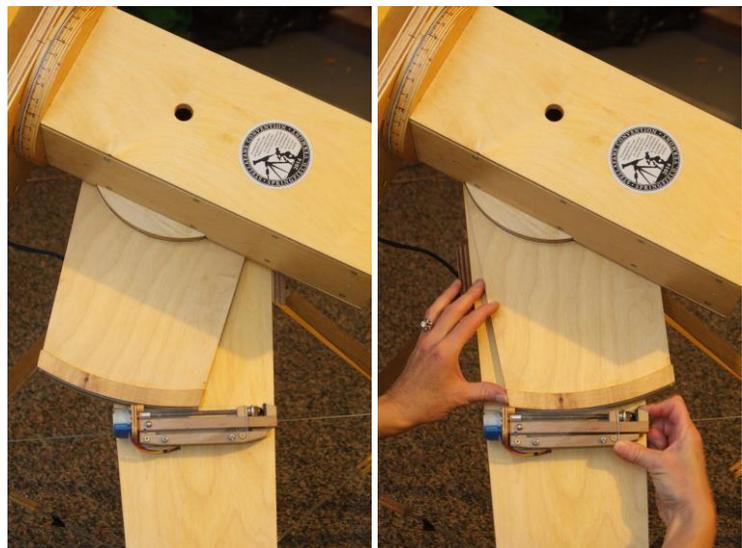


The Polar Alignment scope (left) clips on to the Dec axis for use (center), and is then put away. The counterweight of the battery is then hooked up and inserted in the Dec axis box (seen above, empty). The counterweight assembly (right) stays in place by friction; there is no toe-saver! Thumb-screws secure the bottom and the battery is charged in place with the charger kept in the accessory box. Air vent holes are provided to vent any discharge gases.

The scope operates by balance without the use of clamps, with full time manual override. Balance is easily achieved by adjusting the tube position in the saddle, and then by adjusting the extension of the lower declination axis, which houses the sealed-lead-acid battery counterweight and a battery charger. This lower sliding section (made of birch plywood) rides on maple runners in the upper declination housing, with gentle torque and friction holding it securely in place during operation. I can remove the sliding section and use its built-in charger to top off the battery after an evening of observing. The battery is a standard 12 volt 7 ampere-hour unit weighing 6 lbs.

The OTA is secured to and balanced on the declination saddle simply with a pair of bungee cords, with a third cord used when heavily loaded with camera and guider. There is no On/Off switch for engaging the battery. The clock drive, the tube fan, and the autoguider input are activated once their respective cable is plugged in. There is only one switch on the scope: to allow autoguiding on both sides of the meridian.

The control is housed in the hollow of the north leg (as shown on the previous page). It drives the Right Ascension and Declination step-motors using half-steps well under the angular resolution of the scope (about $\frac{3}{4}$ arc-second). The RA sector can drive for up to 2 hours and 40 minutes and can then be reset by pressing down on the spring lever, moving the sector to the start position and re-engaging the worm teeth.



Resetting the Right Ascension sector is an elegantly simple process.

Stellafane and beyond

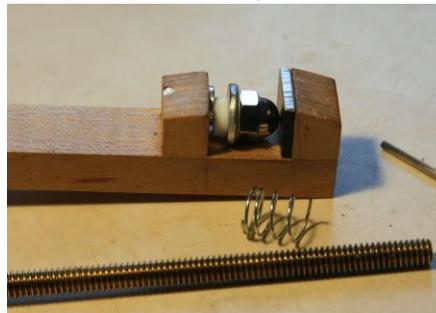
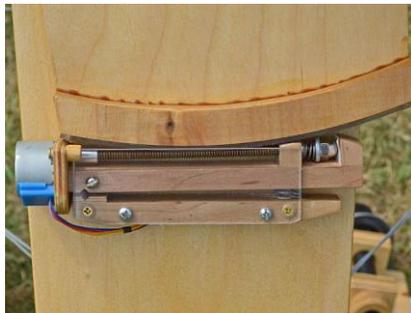
At Stellafane, the scope picked up the following awards:

- first place mechanical
- first place craftsmanship
- third place small optical (tie)

Since Stellafane 2014, I have reduced the periodic error to a very small level and fine-tuned the RA drive speed. The result is better tracking, allowing for even longer unguided exposures, such as on Aug 4, 2014 for the M13 stack of five one-minute exposures (right), and recently on Jan 10, 2015 for the comet C/2014 Q2 (Lovejoy) stack of four 2-minute images.



M13



(Left): The Stellafane version had the acorn nut, but not the sheet of aluminum. **(Center and Right):** The post-Stellafane version shows the plastic bushing used to control the spring that keeps the acorn nut pressed against the aluminum surface.

Periodic Error is caused by the threaded rod shifting back and forth once during each revolution. This shifting is eliminated by use of the acorn nut pressing against a flat perpendicular surface. A post-Stellafane improvement involved replacing the original wood surface with a flatter aluminum one.

Happily, this telescope meets all its requirements and is smooth and steady.

I applied some lessons from my work to this project: sketch out the concepts, feasibility-test the risky items first before committing to final construction, and do frequent tests in the shop and under the stars.

And perhaps best lesson of all was to follow the advice from my son Ian:

Go for it!

- *Joe Dechene*



Astrophotography in action: Capturing the occultation of star SAO 159034 / HIP 74007 (mag. 7.6) in the constellation of Libra by Saturn's moon Rhea (mag. 10.2). This image combines 1- and 5-second exposures during the event that lasted less than 19 seconds at 8:38pm EDT on September 12.



The cooling fan for the mirror cell (left), the barrel focuser on the sled, whose lateral movement is controlled by the focuser wheel visible in the middle (center), the look down the OTA at the mirror (top right) and the compact folded disposition of the Mount (right), that being a prime objective. Beauty as seen through the optics, both celestial and terrestrial (below). Clockwise from the left: The Dumbbell nebula (M27), the eastern end of the Veil nebula and a daylily in the garden.



NHAS February 2015 Business Meeting Report

The monthly business meeting was held at MSDC, Concord NH on February 13th, with our President **John Bishop** presiding. The Treasurer's report by "**Rags**" follows on the next page.

President's Report

In the spirit of "The Future is Now" it was already time to look at some upcoming events. The skywatch at the Maple Avenue Elementary School in Goffstown has been postponed to March 5; some 100+ students and parents are expected. Then there is the Messier Marathon (and pot-luck), hosted by the **Lopez**s on March 20, with March 21 as the backup date. Later in the year we will be involved at the Aerospace Fest at MSDC, NEFAF and Stellafane (August 13-15).

Other Reports

Membership: (Pat Adams)

A membership survey was sent out. Responses by level of experience were for help/instruction regarding: mount alignment (beginners), star hopping and astro-photography (intermediates and expert), as well as requests for more YFOS walk-throughs, more in-reach events and members-only skywatches from just about everyone. It would also help to make sure that new members know the veteran members care about their development.

Speaker Search Committee: (Michelle Thomas)

Gary Duranko, Gerry Smith, and Michelle Thomas (chair) met on Jan. 14 to compile a list of resources to use in the speaker search process. Two invitations were sent out for an open April slot; one has accepted but will only be available for June, so the search continues. Members were also polled regarding speakers and topics of interest; 6 responded.

Astronomy Shorts

Gardner Gerry: saw a Stellafane bumper sticker.

Paul Winalski: saw color in comet Lovejoy (C/2014 Q2, below). The green is from diatomic carbon (C₂) and this comet also has a lot of cyanogen radical (CN).

Ed Ting: answered some questions for folks, who thanked him. He said to thank NHAS. Texan pecan pies showed up.

Larry LaForge: Nobody managed to observe the triple shadow transit of January 23, except online. R.P. Hale saw first two (Callisto & Io).

Gerry Smith: got a solar scope and tracking mount for Pete. See the [April 2015 Observer](#) for details.

Steve Rand: washed the mirror of his 10" dob.

Marc Stowbridge: got a call from a Canadian who is writing a book on small observatories. Suggests short presentations from members on their own observatories.

Scope of the Month

Pat Adams presented his go-to scope for now, a Takahashi Mewlon 180 that provides excellent views. Details will be in the [April 2015 Observer](#).

The Evening Presentation

John Pappas talked about "*Messier, Myths, Mistakes and the Marathon*," providing a brief outline of Charles Messier's life, accomplishments, his catalog and the marathon that bears his name. Often interest in astronomy is driven by a celestial happening one witnesses, perhaps like Hale-Bopp, the Great Comet of 1997. In Messier's case, it was the Great Comet of 1744.



Comet C/2014 Q2 (Lovejoy) in late-January.

(Image: Herb Bubert)

NHAS Treasurer's Report (as of February 9, 2015)

Starting Checking Balance:	\$14,903.89	Membership:	110
Deposits:		Single + Family	
Membership	163.37	Cash Renewals:	0x30.00+0x10.00 0.00
Donations	0.00	Cash New Members	0x30.00+0x10.00 0.00
Interest	0.39	PayPal Renewals:	1x28.83+0x 9.61 28.83
PayPal (Astronomy magazine)	98.07	PayPal New Members:	4x28.83+2x 9.61 134.54
PayPal (Sky & Telescope)	126.76	Total:	5 \$163.37
Café Press (website merchandise)	81.44	Current Members:	115
Total:	\$470.03	<i>[15 Family memberships; 51 members paid by PayPal]</i>	
Expenses Paid:		New Members:	
Rackspace Cloud (Web site)	59.91	Anthony Contarino	Hampstead NH
SouthPort Printing (brochures)	315.85	Rae Melloh	Cornish Flat NH
The Laser Guy (GLPs x20)	279.78	Dennis Isbell	Derry NH
Kalmbach Publishing	102.00	Dean Plager	Portsmouth NH
(Astronomy magazine)			
Sky Publishing (Sky & Tel)	131.80	Donations:	
Total:	\$889.34	Total:	\$0.00
Current Checking Balance:	\$14,484.58		
Petty Cash:	\$100.00		
Current Cash Balance:	\$14,584.58		
EOC Share:	\$6,703.02		

Contact Information

How to join NHAS

Write to us: **NHAS**
P. O. Box 5823
Manchester, NH 03108-5823

Send Email to: info@nhastro.com

Visit our web site: <http://www.nhastro.com>

How to contribute to the Observer

Email articles and snapshots to the Editor:

ramax.astro@yahoo.com

NHAS Officers:

President: [John Bishop](#)
Vice-President: [Tom Cocchiaro](#)
Secretary: [Paul Winalski](#)
Treasurer: [David "Rags" Gilmore](#)

Board of Directors:

[Ken Charles](#)
[Pete Smith](#)
[Steve Rand](#)



Orion Starblast 4.5 – LTP-style Scope

Custodian: *Pete Smith*
Contact: psastro60@gmail.com

Equipped with:

Commercial red-dot finder with a special Joel Harris mount.
 Celestron 8mm-24mm zoom EP, plus 17mm and 6mm EPs.
 Instruction booklet and an Audubon constellations guide.
 A red/white Headlamp and a Lens Cleaning Pen in the pouch.
 A simple Collimation Cap to learn to collimate the old way.
 A Planisphere and a Moon Map.
 Richard Berry’s “Discover the Stars”

How to Borrow a Loaner Scope in 3 Simple Steps

- Contact the custodian of scope you’re interested in
- Arrange to meet for the transfer (usually at a monthly Business Meeting)
- Sign the requisite papers and leave with the scope

It is a benefit of your membership in NHAS. The loan will be for 2 months; an extension might be granted if no one else is waiting for the unit. The objective is to help new members get to know what will suit them personally, to experiment with options and to understand **what will work** in the time available to them to pursue their new hobby, and equally, **what may not.** A suitable (beginner’s) telescope is invariably one that is easy to transport to the observing site and easy to setup, and not necessarily the one with the most aperture or sophistication.

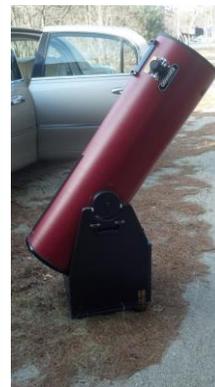


Orion XT6 – 6” Newtonian on a Dobson mount

Custodian: *Tom Cocchiaro*
Contact: tomcocchiaro@comcast.net

Equipped with:

Telrad finder with a dew shield
 32mm, 25mm & 10mm Plössl EPs in a case
 A Planisphere, a Moon map and a red light
 Orion XT6 user manual
 Richard Berry’s “Discover the Stars”



Coulter Odyssey 10” Newtonian on a Dobson mount

Custodian: *“Rags” Gilmore*
Contact: nhas@ragnorok.net

Equipped with:

Telrad finder with a dew shield
 26mm TeleVue Plössl and 15mm Celestron Plössl in a case
 A Planisphere and a Moon map
 Richard Berry’s “Discover the Stars”

Also available, independently of the telescope and in a separate slip-case:

Sky Atlas 2000.0 by Wil Tirion and Roger Sinnott
 Sky Atlas 2000.0 Companion: Robert Strong & Roger Sinnott



Meade 8” Newtonian on a Dobson mount

Custodian: *Scott McCartney*
Contact: Scott_McCartney@nhb.uscourts.gov

Equipped with:

Telrad finder with a dew shield
 25mm and 10mm EPs
 A custom-built base (made by Joe Derek and Chase McNiss)



Orion XT10 Newtonian on a Dobson mount

Custodian: *Pete Smith*
Contact: psastro60@gmail.com

Equipped with:

Telrad finder
 Assorted EPs: 35mm, 25mm wide-angle, 17mm and a mystery one (25mm?).
 An EP case
 Richard Berry’s “Discover the Stars”

Regional Astronomy Clubs

New Hampshire Astronomical Society
[NHAS] *Skywatches around the State*
Sidewalk Astronomy in Portsmouth
www.nhaastro.com

Amateur Astronomical Society of Rhode Island (North Scituate, RI)
www.theskyscrapers.org

Amateur Telescope Makers of Boston
(Westford, Mass.)
www.atmob.org

Astronomy Society of Northern New England (Kennebunk, Maine)
www.asne.org

Gloucester Area Astronomy Club
(Gloucester, Mass.)
www.gaac.us

McAuliffe-Shepard Discovery Center
[MSDC] (Concord, NH)
First Friday Observing Event
www.starhop.com

Northeast Kingdom Astronomy Foundation (Peacham, VT)
www.nkaf.org

North Shore Astronomy Club
(Groveland, Mass.)
www.nsaac.org

Penobscot Valley Star Gazers
(Bangor, Maine)
www.gazers.org

Online Live Observatories

Astronomy Live (broadcasts)
www.astronomylive.com

SLOOH (Tenerife, Canary Is.)
www.slooh.com/about.php

Worldwide Telescope
www.worldwidetelescope.org

Magazines

Astronomy
www.astronomy.com

Sky & Telescope
www.skyandtelescope.com

Astronomy Gear

Adorama
www.adorama.com

Agena AstroProducts
www.agenaaastro.com

Astromart
(Used equipment and advice)
www.astromart.com

Astronomy-Shoppe
(in Plaistow, NH 03865)
www.astronomy-shoppe.com

Celestron
www.celestron.com

Cloudynights
(Used equipment, Articles, Forums and Reviews)
www.cloudynights.com

Explore Scientific
www.explorescientific.com

High Point Scientific
www.highpointscientific.com

Kendrick Astro Instruments
www.kendrickastro.com

Lunt Solar Systems
www.luntsolarsystems.com

Meade Instruments
www.meade.com

Oceanside Photo & Telescope
www.optcorp.com

Orion Telescopes
www.telescope.com

ScopeStuff
www.scopestuff.com

TeleVue
www.televue.com

Vixen Optics
www.vixenoptics.com

William Optics
www.williamoptics.com

Astronomy Web Sites

CalSky
(Sky Calendar to plan Observing)
www.calsky.com

Free Star Charts
(Star Charts for MM, Planets etc.)
www.freestarcharts.com

Heavens Above
(on Satellites, Spacecraft, Planets)
www.heavens-above.com

NASA
www.nasa.gov

Dark skies Observing Sites
(Horizons and Clear Sky information)
www.observingsites.com

ScopeReviews
(Reviews by Ed Ting, NHAS)
www.scopereviews.com

Sloan Digital Sky Survey DR10
<http://skyserver.sdss3.org/>

SpaceWeather
(Solar activity, Asteroid passes)
www.spaceweather.com

Computer Software

Cartes du Ciel (*aka* Skychart) (Free)
www.ap-i.net/skychart/

Celestia
www.shatters.net/celestia

Computer Aided Astronomy (Free)
www.astrosurf.com/c2a/english/

Earth Sky Tonight
www.earthsky.org/tonight

SkyMap Online
www.skymaponline.net

Starry Night
(many versions, Novice to Expert)
www.starrynight.com

Stellarium (Free)
www.stellarium.org

WinStars (Free)
www.winstars.net/english/

Event	Date	Time	Location
Maple Avenue Elementary Skywatch	Thursday, March 5	6:30pm	16 Maple Avenue, Goffstown, NH
First Friday Skywatch for MSDC	Friday, March 6	5:00pm	MSDC, Concord NH
Milton Free Public Library Skywatch	Saturday, March 7	6:30pm	13 Main Street, Milton Mills NH
Hudson Memorial School Skywatch	Thursday, March 12	7:00pm	1 Memorial Drive, Hudson NH
NHAS Business Meeting	Friday, March 13	7:30pm	St. Anselm College, Manchester NH
Goffstown High School Skywatch	Tuesday, March 17	7:00pm	27 Wallace Road, Goffstown NH
Salem High School Skywatch	Wednesday, March 18	7:00pm	44 Geremonty Drive, Salem NH
EOC Meeting	Thursday, March 19	6:30pm	Manchester City Library, Manchester NH
Spring Messier Marathon	Friday, March 20	3:00pm	[Members only]
Spring Messier Marathon (backup date)	Saturday, March 21	3:00pm	[Members only]
Rey Center Skywatch	Saturday, March 21	7:30pm	Waterville Valley NH
Daniel Webster College Skywatch	Monday, March 23	7:00pm	20 University Dr, Nashua, NH
Josiah Carpenter Library Presentation and LTP Demonstration	Tuesday, March 24	5:00pm	23 Oneida Street #1, Pittsfield, NH
Daniel Webster College Skywatch (backup date)	Thursday, March 26	7:00pm	20 University Dr, Nashua, NH
Sidewalk Astronomy Skywatch	Saturday, March 28	6:00pm	Market Square, Portsmouth NH
First Friday Skywatch for MSDC	Friday, April 3	7:00pm	MSDC, Concord NH
Goffstown High School Skywatch	Thursday, April 9	7:30pm	27 Wallace Road, Goffstown NH
NHAS Business Meeting	Friday, April 10	7:30pm	MSDC, Concord NH
Gordon-Nash Library Skywatch	Thursday, April 16	6:30pm	69 Main Street, New Hampton NH
EOC Meeting	Thursday, April 16	6:30pm	Manchester City Library, Manchester NH
Gordon-Nash Library Skywatch (backup date)	Friday, April 17	6:30pm	69 Main Street, New Hampton NH
Coffee House Night at YFOS	Saturday, April 18	5:00pm	YFOS
Rey Center Skywatch	Saturday, April 18	8:30pm	Waterville Valley NH
Beech Hill School Skywatch	Tuesday, April 21	7:00pm	20 Beech Hill Road, Hopkinton NH
Beech Hill School Skywatch (backup date)	Wednesday, April 22	7:00pm	20 Beech Hill Road, Hopkinton NH

Note: Please check [Calendar] at www.nhastro.com for up-to-date information on upcoming events.

Date	Time	Lunar Phase
Thursday, March 5	1:05pm EST	 Full moon
Friday, March 13	1:48pm EDT	 Last quarter
Friday, March 20	5:36am	 New moon
Friday, March 27	3:43am	 First quarter
Saturday, April 4	8:06am	 Full moon
Saturday, April 11	11:44pm	 Last quarter
Saturday, April 18	2:57pm	 New moon
Saturday, April 25	7:55pm	 First quarter

Credits

Contributors to this month's **Observer:**

Pat Adams, Ted Blank, John Bishop, Herb Bubert, Glenn Chapple, Joe Dechene, Maggie and Ian Dechene, Gardner Gerry, "Rags" Gilmore, John Pappas, Pete Smith, Michelle Thomas, Lizz Van Saun and Paul Winalski.