

Nova Notes

The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

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YOUR "HOW TO" ISSUE:

WAYNE MANSFIELD ON HOW TO MAKE A DIY PARALLEL MOUNT FOR BINOCULARS

DAVE CHAPMAN ON HOW TO SET UP A SYNSCAN DOBSONIAN SCOPE

ROY BISHOP ON HOW TO OBSERVE THE ECLIPSE

ART COLE ON HOW TO PHOTOGRAPH STARS IN THE MILKY WAY

TONY SCHELLINCK INTRODUCES THE
UK MAGAZINE *ASTRONOMY NOW*

THE HALIFAX CENTRE CONGRATULATES
PAUL HEATH: 2017 QILAK AWARD WINNER

May/June 2017

St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, NS. The site has expanded over the last few years and includes a roll-off roof observatory with electrical outlets, use of the Centre's new Go-To 400-mm Dobsonian telescope and 100-mm binoculars, a warm-room, and washroom facilities.

Enjoy dark pristine skies far away from city lights and the company of like minded observers searching out those faint "fuzzies" in the night. Observing nights (Fridays close to the New Moon or Saturday backup) are open to both members and their guests. If you are not a key holder and would like to become one, or need more information, please contact the SCO Manager, Tony McGrath.

Upcoming Observing Nights:

July 21 (alt 22)

August 18 (alt 19) [Total Solar Eclipse]

September 22 (alt 23) [Keji Dark-Sky Weekend II]

Meetings usually begin at 7:30 p.m. at Saint Mary's University in Room 101 of the Atrium Building (AT).

All meeting locations and presentations subject to change

Meeting Dates for 2017

Sept. 15,

Oct. 20,

Nov. 17,

Dec. 8 (Annual General Meeting)

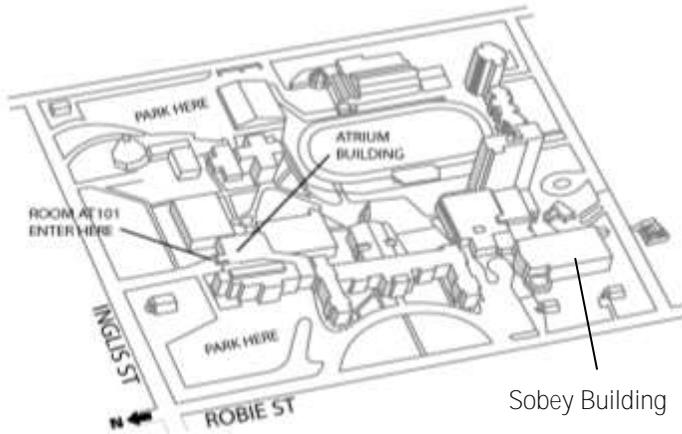
Meeting Location:

Saint Mary's University

Atrium Building (AT)

Room AT 101

The Atrium is located in front of the Patrick Power Library, between the Burke Building and Science Building.



Meetings are usually held on the third Friday of the month, except for the months of July and August.

Executive meetings begin at 6:30 p.m., usually in room AT306, and all members are welcome.

Halifax RASC Executive, 2016:

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Cover Photo

Karl Hudson

The picture was taken with my Pentax K7 at ISO 800 on my C11 Edge HD. 8x300s lights and 10x300s darks, no biases or flats. Aligned and stacked in Deep Sky Stacker and stretched in Photoshop. I cropped a bit around the edges to get rid of some of the electronic noise my camera produces.

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From the Editor

Like many of us who are keen amateur astronomers, I regularly read astronomy-related magazines such as *Astronomy* and *Sky & Telescope*. I find the UK magazines I purchase at Atlantic News on Queen Street in Halifax are far more detailed and interesting than the North American publications, though by the time I am reading them the time-sensitive information may be out of date. I would like to tell you about one magazine that I think is superior in content to all the rest, *Astronomy Now*. I have the folks at Atlantic News set aside a copy each month. The cost is \$13.00 an issue, but the 132 pages are packed with interesting articles. Unlike their North American brethren the articles are not limited to about 500 words, and can be over 2,500 words long and feature many photos and diagrams. This allows them to go into depth on a particular subject; you get the full story. Something else they do that I really like is the "Object of the Month" section where they take a DSO and describe it, then they explain how to observe it, then how to photograph it and finally how to sketch it.

I'll describe a typical issue, in this case the March 2017 issue. Their news

update section is nine pages long and is full of detailed stories covering what is happening around the world (less of a NASA focus than I see in NA magazines). It's comparable to the coverage in *Astronomy*, but better. This was followed by a six-page story on the history of Mars missions going back to when the Soviet Union launched five Mars missions in 1960 and 1962, none of which were successful. It covered the successes and failures of subsequent missions and then ended with a discussion of the challenges inherent in sending humans to Mars in the near future. The 3,000-word article included ten photographs and images.

This was followed by another six-page article covering the history of neutrino research going back to Wolfgang Pauli's theories in the thirties and Ray Davis' work in the early fifties up to the next generation neutrino detector to be located in the deepest waters in the Mediterranean Sea. This was great reading. A four-page article followed this on the "Messages from Earth", covering the deep space missions that had messages attached to them in case aliens happen to come across these time capsules from Earth. A five-page article followed on the *Solar Probe Plus*, a satellite scheduled to be launched July 2018. It will, over the following six years, make eight close passes of the Sun, the closest only 6.2 million kilometres from the surface in order to study the weather on the Sun. In particular it will study the corona and solar winds. Still more, another five-page article covers ancient stories of the stars. We find out what the ancients knew or believed about the sky through their stories, drawings and architecture. All of this reading takes us up to page 60; we are not half way through the issue yet!

There then follows a 28-page description of the night sky for the month of March. It covers all the topics you would see in other magazines plus much more. Dave Chapman would particularly appreciate the section on observing the moon. That month's article focused on the crater Plato with three photographs and two sketches.

After this there is a five-page section on astronomy for beginners which focuses on observing comets; a two-page article called the Astro-spectroscopy Masterclass which I found to be very inspiring; a five-page article on how to tune up a 130-mm Newtonian for use as an astrograph, and finally, several reviews of equipment, including the Orion SteadyPix EZ Smartphone Photo Adapter and the Sky-Watcher Star Adventurer Mini with WiFi. Wow, it takes me much of the month just to get through one issue. I suggest you take a look at this magazine as I believe you will find that reading it is a rewarding experience.



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Nova Notes is published five times a year, in February, April, June/July, September/October and December.

The deadline for the next edition is October 20, 2017

The opinions expressed herein are not necessarily those of the Halifax Centre.

Articles on any aspect of astronomy and related activities will be considered for publication.

A DIY Parallel Mount for Heavy Binoculars

Wayne Mansfield

In the spring of 2015, I purchased a pair of Orion 25x100 Giant Binoculars. Man, they were big and heavy, tipping the scales at 15 lbs. I knew a tripod would be required equipment and I already had a heavy-duty camera tripod that I thought would fill the bill. When I mounted them, they were very front heavy, so I made a small adapter for them but I still had problems with balance. Also, using a camera tripod with binoculars makes viewing at the zenith an exercise in



Eager participants observe through Wayne's 25x100 binoculars at the Dark as Keji event (Photo: Ian Corbett).

acrobatics, and a real pain in the neck.

I knew a parallelogram mount would serve my purpose, so I started my search. I had a used surveyor's tripod from a previous project, so my thoughts were to buy a mount and adapt it to my tripod. I contacted Orion about their Monster

Parallelogram Mount and it could only be purchased with the included tripod. Also, pricing was an issue. So my next course of action was good old Google. I researched a few plans and found one with which I felt I could work.

I had collected some 1" square aluminum tubing and together with my surveyor's tripod, I started to form a plan. I cut my tubing into 5 pieces (1 x 32" long, 1 x 18.5" long, 1 x 6.5" long and 2 x 11" long). Another rather substantial hurdle I had to overcome was how to mount the arms to the tripod. Many years ago, I read an article by a gentleman who constructed an equatorial mount using 2" plumbing fittings. A trip to a local hardware store and I was in possession of a 1" galvanized pipe 8" long and a 1" flange. I drilled a couple of 1/4" holes in my tripod and mounted the flange.

After drilling the mount holes and bolting the contraption all together, I noticed it didn't move as smoothly as I would have liked. I went back to my shed to see what I had in my collection of indispensable junk I had collected over the years. Bingo! I had some 2" square Teflon pads that when cut down to 1/4" thickness fit between the arms and made for a smooth up-and-down motion. The next issue I had to attend to was the balance problem. As I mentioned, these binoculars are quite heavy, so I needed some weight. I thought I would try dumbbell weights and find a combination that would

work. I found 12 lbs. worked nicely. I made a hook affair out of a piece of threaded rod to suspend the weights from the long arm of my parallelogram mount. This 'final' job done, I packed up and headed to Keji for their launching of Boxing Rock's "Dark as Keji Beer".



Parallel Mount Components (Photo: Wayne Mansfield).

During the busy evening, I found my 'suspended' weight idea made for a problem with the weights banging against the tripod legs. When I got home, I had to redo my 'final' job. Back to the hardware store to purchase a length of 3/4" threaded rod and a few nuts and washers. I fitted the rod to the end of my long arm, mounted the weights and now I have a mount that I am pleased with. It now works very smoothly in both altitude and azimuth, the binoculars stay where I put them and, most importantly, when I get them on target, I can raise and lower them so that others can see and they stay on target. This little feature was wonderful, as proven out at Keji during my trial run that night.



Wayne tests out his DIY parallel binocular mount (Photo: Pam Mansfield).

Centre Meeting Notes 12 May 2017

Chris Young

Paul Gray opened the Centre meeting by welcoming the 44 members and guests and introducing the Board members present. Paul gave a brief description of the benefits of membership and a quick run through the latest *Nova Notes* on the big screen before asking Centre member Paul Heath to read a poem for his Food for the Soul. Following this Centre member Chris Young provided a brief demonstration of the Centre's new parallelogram mount for the Thurlow binoculars. This mount is user-friendly, fits the height of all observers and can be moved with a finger. The mount will be resident at SCO and the simple set-up procedure will be provided shortly for all to follow.



Chris Young demonstrates how to use SCO's new parallel binocular mount (*Photo: Tony Schellinck*).

The evening's presentation was by Randall Rosenthal, the Archivist of the RASC, titled "**Music of the Spheres: Astronomers as Musicians & Musicians as Astronomers**". Randall's presentation included numerous slides as well as interludes of ancient music which he played on his 16th century replica flute.

Music of the Spheres, or Harmony of the Spheres as it is also known, has two meanings in this presentation, the first being "the harmonious notes produced by the regular movement of the classical celestial objects" (these notes are not usually thought to be literally audible but a harmonic, mathematical or religious concept) and a secondary contemporary meaning of "any relation between astronomy and music."

The concept of harmonious proportionality goes back to

Pythagoras who discovered that the pitch of a musical note depends on the length of the string that produces it. He had discovered the mathematical basis of musical harmony and extended this understanding of nature through mathematics to include the movement of the heavenly bodies in the Earth-centred universe of the time. Harmonious proportionality was then proposed as a theory of everything with examples of music notes, proportioned distances between planets, design of buildings.

This doctrine was passed on by Greek and Roman philosophers to Medieval Europe. Medieval astronomical knowledge had a close relationship with music as technical knowledge was then set to music and sung. While there were practical reasons for this, such as assisting memorization before the invention of the printing press, it was also an expression of the formal education of the clergy which included training in music and astronomy. Clerics made up many of the astronomers of the day and they set their astronomical knowledge to the music they composed. Music as a carrier of astronomical knowledge declined during the scientific revolution of the 16th century. The reason why is not clear, perhaps it fell out of fashion, or was displaced by the new natural sciences which made inroads into the understanding of nature. While the simple geometric relationships of planetary orbits were undermined by the ellipses of Kepler's laws, Kepler himself saw his laws reconciling the emerging vision of a Sun-centred planetary system with the ancient Pythagorean concept of universal harmony.



Randall Rosenthal tucks his 16th century replica flute under his arm while lecturing on the music of the spheres. (*Photo: Tony Schellinck*).

The ancient concept of Harmony of the Spheres became progressively marginal to the ideas of natural philosophy and the beginnings of modern science.

Randall seems to lament that the ancient meaning of the Music of the Spheres has been lost however the term itself has been given new meaning with our understanding of orbital resonances and the study of oscillations within stars (asteroseismology). This keeps this phrase alive and leads the

curious to seek earlier meanings that still provide some wonderful insights into nature. It was delightful to have the flute music woven throughout the presentation and it is easy to understand the belief that music and the orderly motion of the heavenly bodies are fundamentally related, as Pythagoras had proposed. This presentation touched on many topics of interest and has me following threads on ideas, beliefs and historical figures through the Web. Any presentation which inspires you to carry on with the topic is certainly a success. The evening ended with refreshments, conversation and tinkering with the new mount. It was an enjoyable meeting.

Words of Wisdom for Those Planning to Watch the August 21st Eclipse

This editor sent out a request to RASCals for photos and stories from those who will view the upcoming eclipse. This request evoked the following...

From Dave Chapman

As for photos, I may take a few crowd shots of the event, but for the 2 m 28 s of totality I'll be watching the eclipse with my eyeballs, not taking photos. I reckon there will be a gazillion photos shared by others, possibly from our own group.

From Roy Bishop

For those of you planning to stand in the path of totality of the August 21 eclipse, Dave's comment (above) should be heeded.

The few minutes encompassing totality will vanish into the irretrievable past all too quickly, and if you occupy your brain with the busy work of photography and telescope adjustments during those priceless, once-in-a-lifetime moments, you will miss much of what you could have experienced. For example:

Ten minutes before totality, note the strange colour of the rapidly fading light, light from a slender solar crescent for which limb darkening is pronounced. In the few minutes before totality, look to the west for the umbral shadow of the Moon darkening that part of the sky as it rapidly bears down upon you. Be alert for possible shadow bands, rippling waves of light that, depending upon atmospheric turbulence, will dance over the ground around you during the minute before totality. When the umbra envelops you, scan the entire horizon to witness the lighting effects. Look overhead and remind yourself that the inky black disk framed by the solar corona is the Moon, hanging there in silhouette, in free fall. Gaze at it and let it burn into your memory bank. You may never see such a sublime sight again. Raise your binoculars (you do have them hanging around your neck, don't you?), and

gaze at that celestial apparition for another half minute, taking particular note of any fire-engine-red flaming prominences extending beyond the lunar limb, and study the delicate, ghostly structures in the pure white, million-degree, hot solar corona. Can you see albedo features on the new Moon, now illuminated by maximum earthshine? Back to the eyeball mode for another sweep of the horizon, and a brief check to see if Mercury, Venus and possibly a few bright stars are visible. Fifteen seconds before totality ends, raise your binoculars again and watch for the formation of Bailey's Beads as the Moon drifts eastward and the solar photosphere begins to shine through valleys on the Moon. A second or two later a spectacular diamond ring will form, surrounding the Moon, growing rapidly in brilliance, warning you to look away. Immediately



A crowd gathers to watch the 1998 Eclipse in Curacao. About a dozen members of RASC Halifax joined the trip organized by the Calgary Centre. (Photo: Dave Lane)

turn eastward and watch the Moon's shadow recede into the distance, while being alert for possible shadow bands flickering around you.

Before the day is done, write down what you have experienced. Years from now those words will be more precious than any photo located somewhere on a hard drive.

Roy Bishop (Veteran of 6 total solar eclipses)

Starlight and Semiconductors: Capturing the Stars in the Milky Way

Art Cole

Summer is here. That means two things – one, the nights are getting longer, and two, the Milky Way is arching overhead in all its summer splendour. It's truly mind-boggling to stare up at it on a warm summer night and try to comprehend its immensity. We are literally floating in a sea of stars.

As astrophotographers we can take this wonderment one step further; we can take those nebulous clouds that wander across our summertime constellations and resolve them into millions of stars. How amazing is it to look at a Milky Way image and see that those hazy bands we view with our unaided eyes are actually made of billions of stars? How many of those stars have planets with life? What is really out there in our galaxy?

If you want to capture one of these mind-bending galaxy shots yourself, you will need a few things – a wide-field telescope or lens, an equatorial mount (preferably with

When capturing the subframes, set the exposure time to keep the image histogram about one-third of the way from the left side of the histogram to the right. This will help to ensure that the stars retain their colour while giving good dynamic range to the background. Also, because the field of view is so wide, there is a great opportunity to frame multiple sky targets in the same image, making for an interesting composition.

Once indoors, calibrate and stack the subs using high-quality calibration frames. In particular, make sure that your flats are top-notch. These Milky Way shots need lots of stretching, which will amplify optical vignetting aberrations if they are not properly removed first. So, after stacking and doing the initial stretch, process the image as follows (I will assume here that you already have astroimage processing software and know how to use it):

Remove any gradients. This could be a little tough, as the background will not be flat due to the nature of the subject, but do your best. Stretching will amplify gradients, and if they appear during subsequent processing keep removing them.

Remove the stars and save them for later.

Make a mask of the starless image, blur it to remove noise, and do a linear stretch on it (no clipping!) to increase its contrast.

Stretch the starless image using the mask. I usually perform this background stretch numerous times until the background has lots of contrast. The goal here is to really show off those dark dust and gas lanes in between us and the starry galaxy background.

Put the stars back in. Wow!

Boost the saturation so that the background is colourful. Make that multitude of stars golden-yellow and boost the red in those summer nebula gems. Double wow!!

Crop the image to get rid of the nasty edges and to create a better composition.

Look at the image at full resolution and get blown away by what you're looking at!

It is amazing that we backyard amateurs can capture wonders like these with our equipment, our techniques, and our imagination. If you'd like to see some high-res examples of summer shots, have a look at the following images. Make sure you zoom in!

The North American Nebula: <https://tinyurl.com/yawnw712>

The Wild Duck Cluster: <https://tinyurl.com/y77f3szh>

The Crescent Nebula: <https://tinyurl.com/y8gq73pa>

Have a great summer and keep looking up!



Figure 1: The Wild Duck Cluster & surrounding area with a high-resolution insert. Those bright clouds are not gas – they're all stars! Millions of them! (Photo: Art Cole)

autoguiding), and a dark site. If your field of view is too wide, the stars will blend into a fog in your image, and if it is too narrow, you will be missing out on the incredible Milky Way background. Optics in the range of 120 to 500 mm strike a nice balance between the two options. The equatorial mount, of course, is to prevent star trailing, and if you are using a DSLR/lens combination instead of a telescope, piggybacking on your scope is a great solution. And, as always, the dark site provides better contrast in your image and prevents the background from becoming washed out.

Tips on Setting Up a Sky-Watcher SynScan Dobsonian Telescope

Dave Chapman (dave.chapman@ns.sympatico.ca)

The main telescope at the RASC Halifax Centre's Saint Croix Observatory is a 400-mm (16") Sky-Watcher SynScan alt-azimuth collapsible Dobsonian. I have its 300-mm baby brother and Keji Dark-Sky Preserve has the 250-mm version. I have become familiar with the operation of these instruments, so I am writing down some tips for setting up these telescopes beyond what the basic manual provides. I have spoken to a few members and others who have experienced problems, and usually the fix is something quite elementary. This may be for you! I am, however, assuming that the reader is already familiar with the basic telescope operation procedure through training and/or reading the



The author at RASC Halifax's Saint Croix Observatory with the 400 mm Sky-Watcher SynScan alt-azimuth Dobsonian telescope. (Photo: Halley Davies)

manual. I am not trying to rewrite the manual here! The manual for these telescopes can be downloaded from halifax.rasc.ca/publications.html but be aware that manufacturers often make small changes to things. Even if you do not operate this telescope brand, some of the following tips may still be helpful.

I have no experience with the Sky-Watcher EQ (equatorial) versions and I do not recommend EQ mounts for beginners—an alt-azimuth mount is much more intuitive and the SynScan technology that drives these models is perfectly adequate for visual observing. I also prefer the Dobsonian design because optically it is a classic Newtonian with an inverted image, which is the same as a 180° rotation. This

means the observer can use standard star charts and lunar maps with a minimum of confusion. Most refractors and many other telescope designs employ star diagonals for ease of observing, but this introduces another reflection that results in a left-right mirror-reversed image, which can confuse the beginner.

Preparing to Observe

Before initializing the telescope and beginning to observe, there are several things you should take care of, perhaps in daytime: make sure your battery is charged (if rechargeable) or sufficiently fresh (if not). Have backup power handy. Make an observing plan (even in your head) and go through the checklist of all the things you need to take to the observing site. Review the initialization and alignment procedures and pick out some bright alignment stars appropriate to the season (the aforementioned online manual has a page appended with named navigational stars—they are good).

At the observing site, place the telescope base on a level spot, with an eye out for trees or buildings that might interfere with your plans. Level the mount as best you can—things just work out better, believe me! I bought a bubble level for my telescope and glued it to the base, or you can use a smart phone app. (It's a pity the manufacturer did not provide a built-in level and a means of levelling the base.) Place the telescope on the base if it's not already there, install and firmly tighten the locking screw, then check the level again.

This is a good time to check optical collimation, particularly if the telescope has been moved (that is if collimation is important to you and if you know how to adjust it).

Typically, the secondary mirror holds its alignment, but the primary mirror might have shifted, particularly if you have taken the telescope for a ride down a bumpy road. The SCO telescope has adjustment knobs on both secondary and primary mirrors, and there's a laser collimator for those who like them (however, given that telescope never travels it's usually good to go). In daytime or twilight, a quick peek down the focusing tube will identify any obvious problems. You should see a series of concentric circular reflections of the various components of the optical train, including a centre bullseye on the primary mirror. If things look off-kilter, take action or seek help. Better now than later in the session! If you are new to the concept of collimation, start with

Tips on Setting Up a Sky-Watcher SynScan Dobsonian Telescope *continued*

Dave Chapman (dave.chapman@ns.sympatico.ca)



Collimation knobs at the base of the Sky-Watcher SynScan altazimuth Dobsonian telescope. (Photo: Halley Davies)

Alignment), you also need to know the direction of true north. Use a magnetic compass, correcting for the magnetic declination of your location (roughly 17° W in Nova Scotia), or a smart phone app.



The hand clutches on the side and base are loosened when pushing the scope by hand and tightened when using the hand control to reposition the telescope. (Photo: Halley Davies)

garyseronik.com/a-beginners-guide-to-collimation.

Now align the finder telescope to the main telescope, using a distant terrestrial target or bright star. Again, better now than later (you can always tweak it later). The SCO telescope has an 8x50 inverted-image optical finder with crosshairs and a Telrad 1x erect-image finder with an illuminated bullseye. If you are not using the GPS dongle, have ready your observing longitude and latitude in degrees/minutes/seconds (not decimal degrees), the date, and the accurate local time. For simple Auto-Tracking mode (what I call No-Star



The 8x50 inverted-image optical finder with crosshairs on the Sky-Watcher Dobsonian telescope. (Photo: Halley Davies)

I need to say a few words about data entry: be mindful of the US mm/dd/yyyy date format; enter your STANDARD time zone (Daylight Saving Time is handled independently); use NEGATIVE hours for time zones west of Greenwich.

By using the optional GPS dongle, you can skip a lot of manual entry and avoid manual entry errors. The GPS needs to be plugged in to the hand control before powering up. When you do power up and initialize, don't be fooled by the message "GPS FOUND!" You must proceed and enter the time zone and DST info, then wait for the fix. Sometimes the GPS takes a while, but not too long if the telescope hasn't been relocated. After GPS fix is achieved, you can unplug it. Are you ready?

Aligning the Telescope

There are three basic approaches to alignment (which I think should really be called sky orientation), with variations:

1. Manual or Push-To Operation. Without electricity, you can manually push the telescope to point in any direction, using the finder to place a target in the telescope's low-power field of view. The SCO telescope has hand-adjustable clutches on both axes for adjusting the bearing friction to your liking. With electrical power, you could use the hand control to move the telescope at a variety of speeds to follow a target or to slew to a new target; however, you should turn OFF tracking in the Setup menu, because the telescope will have a mind of its own if you don't orient it to the sky. Honestly, if you are going to use the electronics, consider...

2. No-Star Alignment or Auto-Tracking. This is an under-appreciated mode of operation that does not use stars to orient the telescope to the sky, but provides sufficient orientation to track celestial objects once found. With care, this method can situate a bright planet within the finder's field of view in twilight (possibly daylight). Accordingly, it is especially suited for solar observation, and lunar or planetary observing in twilight, but obviously works just as well at night. The trick is to place the telescope in HOME position before turning on the power—to do this, manually level the

Tips on Setting Up a Sky-Watcher SynScan Dobsonian Telescope *continued*

Dave Chapman (dave.chapman@ns.sympatico.ca)

telescope tube using the scale on the altitude axis (assuming the base itself is level) and manually rotate the telescope to point true north. After you turn on the electronics, follow the initialization procedure on the hand control—this includes entering Longitude and Latitude (in that order), Date, Standard Time Zone, Local Time, and Daylight Saving Time: Yes/No. The hand control will ask Begin Alignment? which you decline and bypass. The telescope will now track a target pretty well, once you find it. The Go-To function will actually work in a crude way, but you will normally need to use the finder and hand control to centre the target. The tracking will be decent, but you will need to correct it from time to time. It is worth pointing out that at any time you can push the telescope to point where you want without interfering with its automatic positioning. At any time, without shutting down, you can opt to perform a star alignment. I successfully used the Auto-Tracking mode to setup my telescope in daylight to observe the transit of Mercury in May 2016—the telescope tracked the Sun almost perfectly all day.

3. Star Alignment or Go-To Mode. This is the typical mode of operation of these telescopes, which assumes the observer has some familiarity with the bright stars in the sky. You can start up with the telescope pointing in any direction; however, there still is a case to be made for levelling the telescope and pointing roughly north—then the telescope will track while you centre the alignment stars. Either way, first initialize the telescope as described in Section 2. At this stage, the telescope knows where it is and what date and time it is, but may not know where it's pointing. This time, when the telescope offers asks Begin Alignment? you accept. There are two flavours: classic Two-Star Alignment and an assisted version called Brightest Star. In both cases, the first star orients the telescope to the sky with the assumption that the base is perfectly level; the second star corrects for any small deviation from levelness. All true in principle; however, I have found that the more care taken to level the base at the very start, the better everything turns out after that. The telescope's tracking performance and especially Go-To performance will just be better.

Let's begin with **Two-Star Alignment**. As far as choosing stars goes, the telescope makes fairly smart suggestions, but is unaware of any obstructions to viewing the sky (in my yard, there are plenty!). You can choose alternate stars, but be sure you know where they are and that you can see them! Use the hand control and finder to place the first star in the telescope field (it's important to centre the star in the telescope, not the finder—if you discover the finder "off" then readjust it). To make centring easier, start with a low-power eyepiece, but switch to a higher power and re-centre for the most accurate alignment. Some observers like to use an eyepiece with

crosshairs for centring. Also, you might want to centre in the (aligned) finder first, using a moderate slew rate (5–6) and then switch to the eyepiece and centre with a slower slew rate (3–4). For precise positioning, the last motions should be UP and RIGHT on the hand control. Once the first star is centred and accepted, the telescope will suggest a second star. If it is not obstructed, choose it, otherwise choose another with the hand controller. It is good practice to choose a second star that is roughly 90° different in azimuth from the first star. Once the second star is centred and accepted, you are good to go! Happy Observing!

Brightest Star Alignment is similar to the Two-Star Alignment, but you don't have to know the names of the stars. You DO need to know your cardinal directions NEWS, and their in-between directions. Look up in the sky, find a bright star, face it, and figure out in which of the 8 sectors it lies: north, northeast, east, etc. Also confirm that it is the brightest star in that direction. Then scroll through the hand control menu until the appropriate sector is displayed, and enter it. The hand control will (with luck) identify the star. There may be a list of star candidates, which you can often discriminate by their altitude above the horizon. If you are happy with the star, accept the choice. After that, the alignment proceeds as with Two-Star.

Here's the best kept secret about the Brightest Star option: it recognizes bright planets as "brightest stars"; however, when you centre and accept the planet, the telescope proceeds to find two actual stars to complete the alignment. In this way, when it's dark enough to pick out planets with the unaided eye, but too bright to pick out stars with the unaided eye, you can still proceed with star alignment, because the stars might be visible in the finder and telescope, owing to their greater aperture. Cool, eh?

Parking the Telescope

If you would like to shut down your telescope briefly and restart later without having to go through the entire initialization procedure, there is a hand control menu item for that, including options for the park direction of the telescope. For example, you might want replace a weak battery (note that there is a hand control menu item for monitoring the battery voltage). When restarting, you only have to enter the date (if changed) and time. For best positional accuracy, use as accurate time as possible: every minute out is equivalent to a minute of image drift in the eyepiece. Actually, it's best to use the same time source as before, for consistency. On one occasion, I aligned my telescope for night-time observing at the observatory, parked it for the night, and returned in daytime to start from park and find Venus in the daytime sky. That was fun!

In the next instalment, I will discuss some advanced tips, such as pointing accuracy enhancement, and control of the telescope from a computer or device.

Paul Heath Receives RASC National 2017 Qilak Award for Astronomy Education and Communication

On Sunday July 2, 2017, at the General Assembly held in Ottawa, Paul Heath received the Qilak Award in recognition of his contributions to astronomy outreach. Here is an excerpt from the Halifax Centre's nomination of Paul for this award.

The Qilak Award / Prix Qilak is intended to recognize individual Canadian residents, or teams of residents, who have made an outstanding contribution, during a particular time period, either to the public understanding and appreciation of astronomy in Canada, or to informal astronomy education in Canada, and to promote such activities among the members of the sponsoring organizations.

The Award recognizes the individual or team of individuals who contributed the most to astronomy outreach in the past year, either as part of a continuing project or as part of a separate event or sequence of events, either on a local or a national scale, but not as part of their regular job-related or professional work.

Paul Heath has been a member of the Halifax Centre for 17 years. Many of those years have also included an active role on the Centre executive committee, and full engagement in all Centre activities. His astronomy outreach has a history that goes back well before he joined the RASC. Starting in the late 1960s Paul was showing friends and family the moon through his small telescope. Then, from 1989 – 2004, came 15 years as a Scout leader, where he developed and regularly presented astronomy programs for the Boy Scout groups in his local area. He joined the RASC in 1999, became actively involved, and by 2009 he was fully involved with a dedicated focus on education and outreach.

Paul's contributions to astronomy communications and educational outreach are truly remarkable. His outreach work is characterized not only by the number of events and people that are reached, but also by the broad range of topics, venues, and audience types with which he interacts. It is both formal and informal, in classrooms, the planetarium, libraries, youth groups, star parties, parks, campgrounds, trade shows,

media interviews, and other venues. As a school bus driver, he also used his school bus to engage and educate his daily riders about upcoming astronomical events, to challenge them to investigate relevant topics, and to encourage them to view special astronomical events. He works with children of all ages, as well as adults. Using everyday materials, he has developed many unique, hands-on demonstrations, and numerous engaging presentations to bring the subject alive for his audiences.

Not only does Paul do an enormous amount of outreach himself, but he also coordinates the outreach activities of the Halifax Centre. Phone, web, and email requests come in from all over Nova Scotia. Paul answers them, searches out, supports and organizes volunteers, and then picks up the slack when volunteer response is a bit thin on the ground. He is the outreach go-to guy in the Halifax Centre.

In just ten months this year (January through October, 2016), Paul has lead and/or participated in 29 outreach events attended by 526 youth and 2251 adults. Scaled up to a full year, that's about 3000 people per year, being

introduced to the universe by Paul Heath. And he's been doing outreach at that scale for several years. We do not have complete numbers. Paul is too busy doing outreach to remember to record and track all the events, hours and participants. We can't keep up with him! With only incomplete numbers available, Paul has averaged 1500 people per year for six years running. We know the true numbers are higher than this. Every year the numbers keep getting larger, climbing to three thousand in 2016!

In summary, we believe Paul Heath is highly deserving of the Qilak Award for Astronomy Education and Communication. His energy, creativity, and dedication are remarkable. The breadth and scope of his presentations, and his ability to engage people of all ages, is striking. Carried by a passion for the night sky, Paul Heath is an astronomy outreach force unto itself. Every year, thousands of people benefit from his expertise and effort. His extraordinary contributions deserve to be recognized with the 2017 Qilak Award.



Colin Haig, President (left) and Craig Levine, Past-President (right) present Paul Heath with the Qilak Award in Ottawa at the RASC General Assembly. (Photo: Judy Black)

Centre Meeting Notes 16 June 2017: A BBQ at the St. Croix Observatory (SCO) Judy Black

After a week of unfavourable weather reports, members were notified the annual Halifax Centre BBQ at the St. Croix Observatory (SCO) on Thursday evening was a go! Even though it would be a cloudy night, members were encouraged to come and enjoy the food and the social time with Halifax Centre friends, and to learn how to use the Thurlow binoculars on the newly acquired parallelogram mount and the Centre's Dobsonian.

The evening was indeed cloudy but that did not deter the twenty-five members who showed up to enjoy the BBQ - burgers, veggie burgers, sausages, hotdogs, salads, fruit, cookies and the special rhubarb cake baked by Melody Hamilton.

Judy Black welcomed everyone to the BBQ on behalf of herself and fellow organizers Melody Hamilton and Chris Young (who could not attend). She also noted there were many reasons to celebrate at SCO this evening, including well deserved recognition for some of our members.



Tony Schellinck receives the Explore the Universe certificate from the Centre's observing chair, Sean Dzafovic. (Photo: Halley Davies)

Dave Chapman presented the first award of the evening to Tony Schellinck, a certificate and pin for completing the Explore the Universe (ETU) observing program. Tony was the fourth member of the Halifax Centre to receive this award. Congratulations, Tony!

Dave stated very proudly that he and Pat Kelly had signed the application form for Melody Hamilton whom they verified had completed the requirements for the Deep-Sky Gems certificate. Her previous certifications were for Explore the Universe (2012), Messier Objects (2014), Finest NGC Objects (2015), and Explore the Moon (2016). Congratulations, Melody!

Also noted was a 3-time author in our midst. John Read, a relatively new member to Halifax Centre and an astrophysics student at SMU, was acknowledged for his latest book, *50 Things to See with a Small Telescope*, which is available in English, French, Spanish, Japanese, Russian, Portuguese, German, Italian & Hindi. Copies of the French and English versions of this book (which he laughingly noted were proofs with spelling errors and layout challenges) were there for members. His other publications are *50 Targets for the Mid-Sized Telescope* and *The Martian Conspiracy*. Come to Nova East to win a copy of "50 Things" or "50 Targets"!

It was great to see new as well as long-time RASC members in attendance, despite the cool temperatures. Carpooling, as recommended in the notices, worked well in reducing the number of vehicles parked at SCO.



Good friends, good food and a fantastic setting make for a great June meeting. (Photo: Halley Davies)

Tony McGrath had set up the Thurlow binoculars on the parallelogram mount and invited members to try them. Dave Chapman provided a tutorial on the use of the Centre's Dobsonian telescope until rain drops made it necessary to close the observatory roof.

Despite the clouds and the chilly temperature, it was a wonderful evening of good food, laughter and entertainment until the threat of rain ended the party.



Jerry Black tests out the Halifax Centre's Thurlow binoculars on the new parallelogram mount. (Photo: Halley Davies)