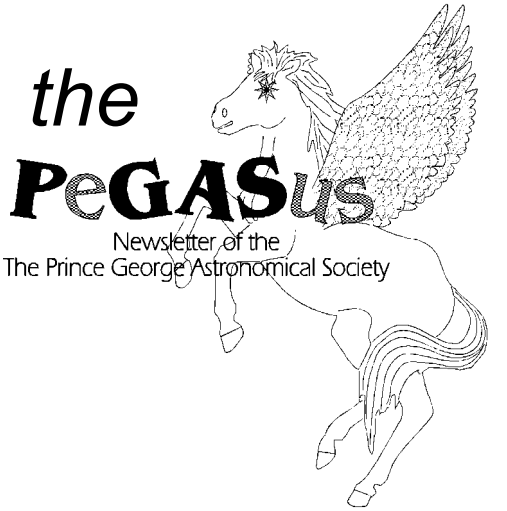
PeGASus
Newsletter of the
Royal Astronomical Society of Canada
Prince George Centre

The RASC-PG meets next at 7:30 pm Wednesday January 29th at The Observatc Map on Page 2

January 2003



In Issue # 125

Also This Month;

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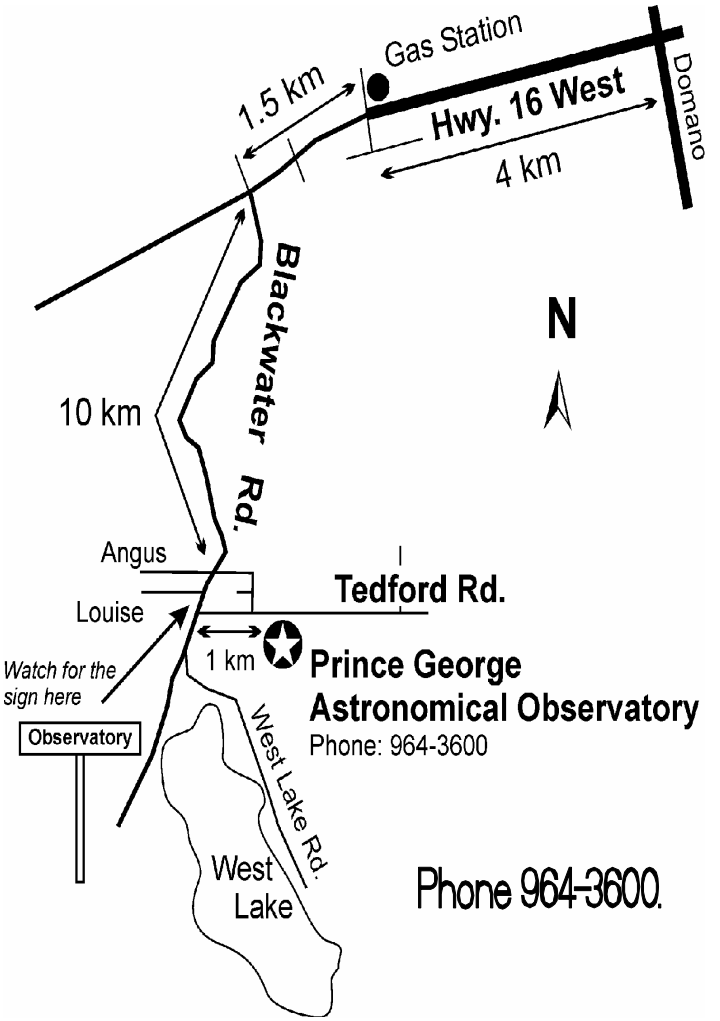
the PeGASus
is published monthly by the
Royal Astronomical Society Canada
Prince George Centre

Our pursuits are out of this world.
Our activities are astronomical.
Our aim is the sky.



Contributions to the newsletter are welcome.

Deadline for the next issue is

February 14

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www.rasc.ca/princegeorge

By Gil Self / Glen Harris

PRINCE GEORGE CENTRE 2002 ANNUAL REPORT

Although this year hasn't provided us with an overabundance of clear observing opportunities, (is there such a thing?), the Prince George Centre has nonetheless kept itself busy.

Two keynote speakers visited us this year. In mid February, Mark Kaye entertained us at a well-attended lecture on his many years of observing. Former member Alan Whitman spoke to us in early September on his experiences of naked eye observing and pursuit of solar eclipses. Both speakers had fascinating tales to relate.

The March Messier Hunt was held at the centre's observatory, and although the temperature hovered around -25ºC, clear skies enabled most attendees to view many of Messier's objects. One determined observer braved the elements until morning light to record a total of 96 objects! Several members had a unique opportunity to search by helicopter for a suitable September Messier Hunt location. Baldy Hughes, a decommissioned radar site located about 35 km from Prince George, was finally chosen. Although clouds appeared intermittently, those who participated in the fall hunt were moderately successful.

Attempts to participate in April's International Astronomy Day were thwarted by successive weekends of cloudy weather. Several solar viewing events were held in a shopping mall parking lot throughout the summer however, and using three telescopes, the public viewed the Sun, Moon and Venus. Attending members, buoyed by the amount of enthusiasm generated, spent many hours answering questions and extolling the benefits of membership in the Centre.

The Innovative Resource Centre invited the Prince George Centre to be the subject of a survey, the results of which showed us the need to focus on increasing public awareness. Subsequently, brochures were made available at several locations, such as the Public Library, Tourist Bureau and Airport, plus inclusion in the Welcome Wagon's package to new residents of the city. Newspaper notices of the Lyrid, Perseid and Leonid meteor showers, and the appearance of Asteroid 2002NY40 created a fair amount of interest, as was evidenced by a total attendance of about 120 people at these events. Also increasing public awareness was our participation in the spring and fall Recreation Markets, and presenting astronomy in the bandshell at Fort George Park in August.

Membership has increased steadily this year, and the Centre now has 41 members, some of them actively obtaining various certificates, modifying webcams for astronomical photography, or honing their observing skills. Meetings held on the last Wednesday of every month except June, July, and December allow members to present their interests which include celestial navigation, the intricacies of stepper motors, and talks on asteroids, constellations, and light pollution. Family potluck dinners and barbecues also enhance the feeling of fellowship within the Centre.

Well over 1000 visitors experienced what the Prince George Centre had to offer this year. Public viewing events, high tech PowerPoint presentations, stimulating lectures, tours, and an abundance of telescopes at the observatory highlighted many evenings. The future looks bright for the Prince George Centre, and continued involvement by its enthusiastic members will ensure that it remains so.

Glen Harris
Prince George Centre Secretary

COMING EVENTS

January 29, 2003	General Meeting	7:30 pm	Observatory
February 1 & 7	Start of Members Nights & Open Houses for the spring season.		
February 8	"Rain or Shine" Members Night	7:30 pm	Observatory
February 12	Executive Meeting	7:30 pm	Gil's Office
February 26	General Meeting	7:30 pm	Observatory

The Night Sky for February 2003

by Bob Nelson, PhD

Hi Folks,

What to write about this month? Well, things are chugging along fairly normally: yours truly has been blessed with many clear nights late 2002 and into 2003 (shall we thank El Nino?); I recently submitted for publication my 64 times of minima that I was able to get in 2002. I hope that some of you got out to look at the heavens. I have been using my backyard observatory (oooh, but I'm getting lazy!) but hope to get out to the club observatory on more occasions this year. We have been having problems with the drive; your executive discussed it at length at the exec meeting (Jan 15) and we will be working at installing a new system involving digital motors and some electronic circuitry. That's essential and will receive a high priority. Next on the agenda is improving the digital setting circle accuracy, followed by finishing the flip secondary mount (Newtonian <--> Cassegrain). In the image section of this newsletter, we display images of two of the brighter galaxies that I took at home on nights of good seeing using my robotic telescope. The exposure time for each was about three quarters of an hour (and involved some image processing with Photoshop!). Needless to say, one would do better with longer exposures, and even better with a larger telescope - like our 24"! That will be the motivation for getting these needed upgrades completed.

Anyway, here is what is happening in the sky next month.

PLANET ROUNDUP

MERCURY, is a morning object this month; it reaches greatest elongation west (to the right of the Sun for us "northies") on Feb 4 when it will be 25 degrees from the Sun. This is an unfavourable apparition for those of us in the northern hemisphere owing to the tilt of the ecliptic to the celestial equator. But have a look for it if you get up early. It's a 6" disk of magnitude -0.1 then in the gibbous stage.

VENUS, in Sagittarius all month, is a morning object in February, rising at mid-month a couple of hours before the Sun. It's a 18" waning gibbous blob getting smaller and more gibbous as it zooms away from us.

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MARS, in Ophiuchus until February 27, when it passes into Sagittarius, is a morning object this month, rising as it does at mid-month over three hours before the Sun. It will be small (6.7") and far away (1.65 AU) but Earth will be catching up to it, reaching opposition in August.

JUPITER, in Cancer until June, is a fine object this month since it transits at about 11:30 PM and sets 7 AM. It will be a 45" disk of magnitude -2.5. Since the planet reaches opposition on Feb 2, this means that the disk is as large as it can be. Numerous moon events (occultations, eclipses and shadow transits) occur all month

SATURN, in Taurus until May, is a fine object this month since it transits at about 8 PM (nice and handy for people who have to get up in the morning) and sets at about 4 AM. It's a 19.4" disk of magnitude -0.1 making it as bright as Arcturus or Vega.. As usual, its moons should be of interest, either visually or with our CCD camera.

URANUS, in Aquarius until 2009, is lost in the glare of the Sun this month. As usual, it's a 3.6" disk at about magnitude 5.7.

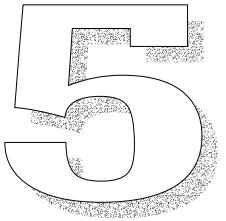
NEPTUNE, in Capricornus until 2010, is lost in the glare of the Sun this month. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO passes from Ophiuchus to Serpens on Feb 11. At mid-month, it rises about 4.5 hours before the Sun. As usual, it's a 0.1" disk at magnitude 13.8

CONSTELLATIONS to look for in February (at 9:00 PM, PST) are Eastern Eridanus, Taurus, Canis Major, Lepus, Monoceros, Orion, and Gemini.

Taurus (Tau, "The Bull"), contains The Hyades, the well-known V-shaped open cluster which represents the head of the bull. For astronomers, it's the closest open cluster (after the Ursa Major Group), lying at about 40 parsecs (=130 light years) distant and probably containing several hundred members. It's important because the distance is too great to be measured by normal stellar parallax, but can be determined by a method known as the "moving cluster method". After that, its Hertzsprung-Russell (HR) or colour-magnitude diagram can then be used to determine the distance to clusters lying further away. This cluster is then an important rung in the cosmic distance scale.

Taurus also contains M45, the Pleiades star cluster (the 'Seven Sisters') which lies about 3 times further away -- 126 pc (= 410 light years). On deep exposures, many of the stars exhibit circumstellar nebulosity which is the tip-off that these are young stars. Another attraction in Taurus is M1, the well-known Crab Nebula. The subject of much study, the Crab is thought to be the result of a star that exploded in 1054 (on July 4th, of all days!). It's not too hard to find -- give it a try -- but the image is just an amorphous blob in the sky. Better images are obtained with a CCD camera (yeah!!).



Gemini (Gem, "The Twins"), is a well-known northern constellation that lies just to the east of Auriga. Just missing the Milky Way as it does, it lacks a lot of deep sky objects. (It does have open clusters M35, and NGCs 2158 and 2392 however.) Some of the stars are quite interesting. Alpha Geminorum, better known as Castor (one of the twins), lies about 45 light years from us and has a total luminosity of about 36 Suns. It is a multiple system: Castor A and B form a visual binary making an orbit of about 6 arcseconds in radius (corresponding to a real distance of about 90 astronomical units) and a period of about 400 years. There is a third star, Castor C, which orbits the other two at a distance of about 72". The fascinating thing about Castor is that each of the three stars (A, B, and C), as revealed by the spectrograph, is also a binary system.

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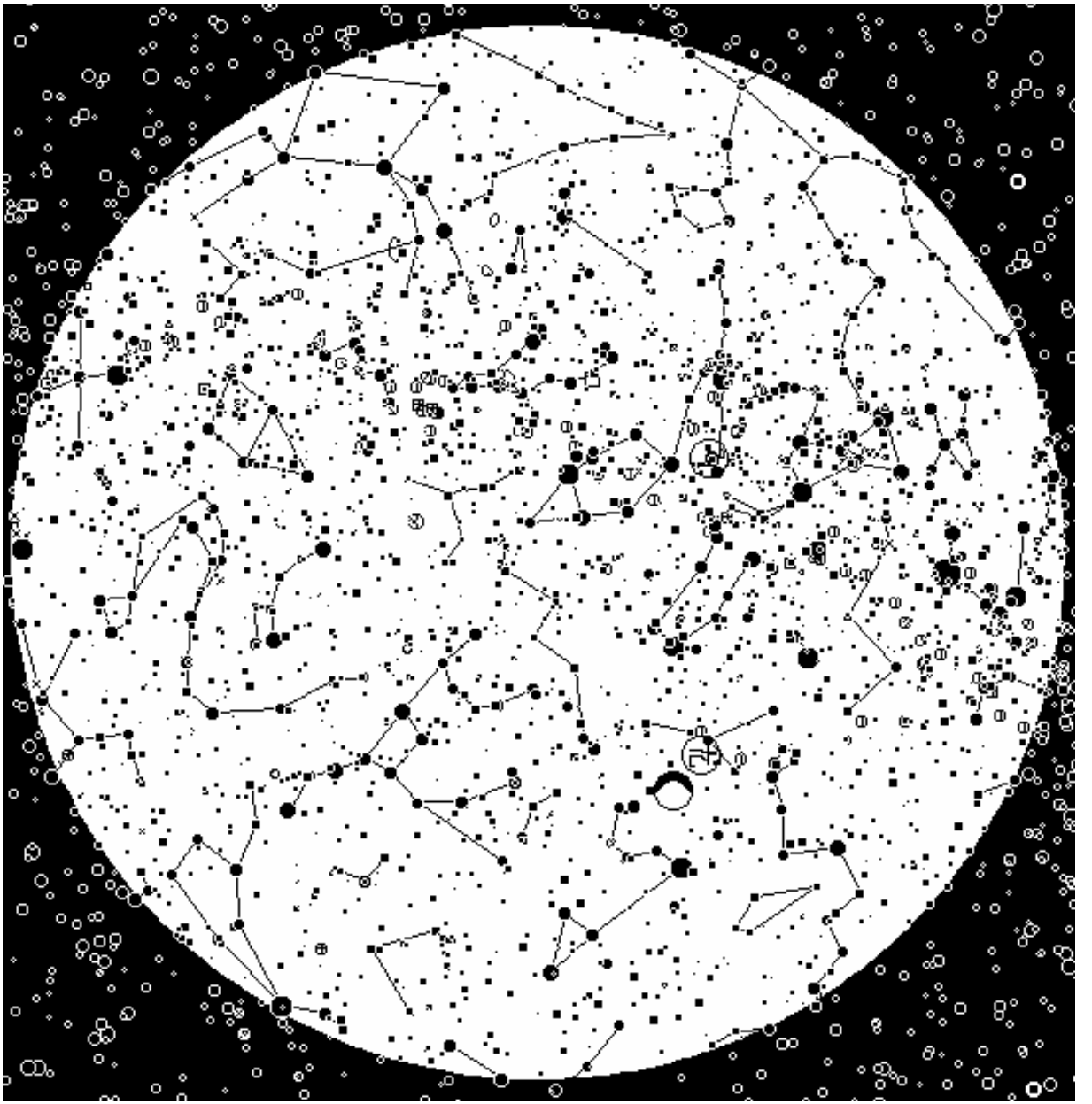
Gemini also contains U Geminorum - discovered variable by J.R. Hind in 1855 - which is a typical example of a rare class of objects called "dwarf novae". Normally quite faint at magnitude 14.9, every 17 days or so, it suddenly flares up to magnitude 8 or so staying at that brightness for a week or two. (Needless to say, these figures are averages; on occasion this system has gone 200 days between eruptions). Today we know that stars of this class (SS Cyg is another) consist of a white dwarf primary (the hotter star) with a red dwarf main sequence (cooler) secondary star. Now white dwarf stars are remnants of stars that have gone through the nova stage - exploding as they reach the end of their lives, settling down to an electron-degenerate compact object (sorry about that mouthful). What the term means is that it behaves like a giant atom, prevented from collapsing further by the laws of quantum mechanics. Anyway, there are rules for the mass and temperature of this object. Now usually, at a slow rate, mass spills over from the secondary to the primary star. Owing to rotation, this material does not fall to the white dwarf directly but enters a disk surrounding the latter. Periodically (and we are not sure what initiates the process), some of this material - which is mostly hydrogen - falls to the white dwarf, breaks the rules and ignites into a thermonuclear explosion. Much material is expelled in a large hot shell, and that is what produces the extra luminosity. The total light output increases by a factor of 100 or more in these outbursts. In a few weeks or months, the whole process repeats. Studies of these objects continue using the latest space telescopes. In order to coordinate these observations, NASA relies on the many amateur astronomers in the AAVSO (American Association of Variable Star Observers) to send the professional astronomers timely outburst notices.

Clear skies,
-Bob

A very striking picture, when you realize what you are looking at.
Evan Williams

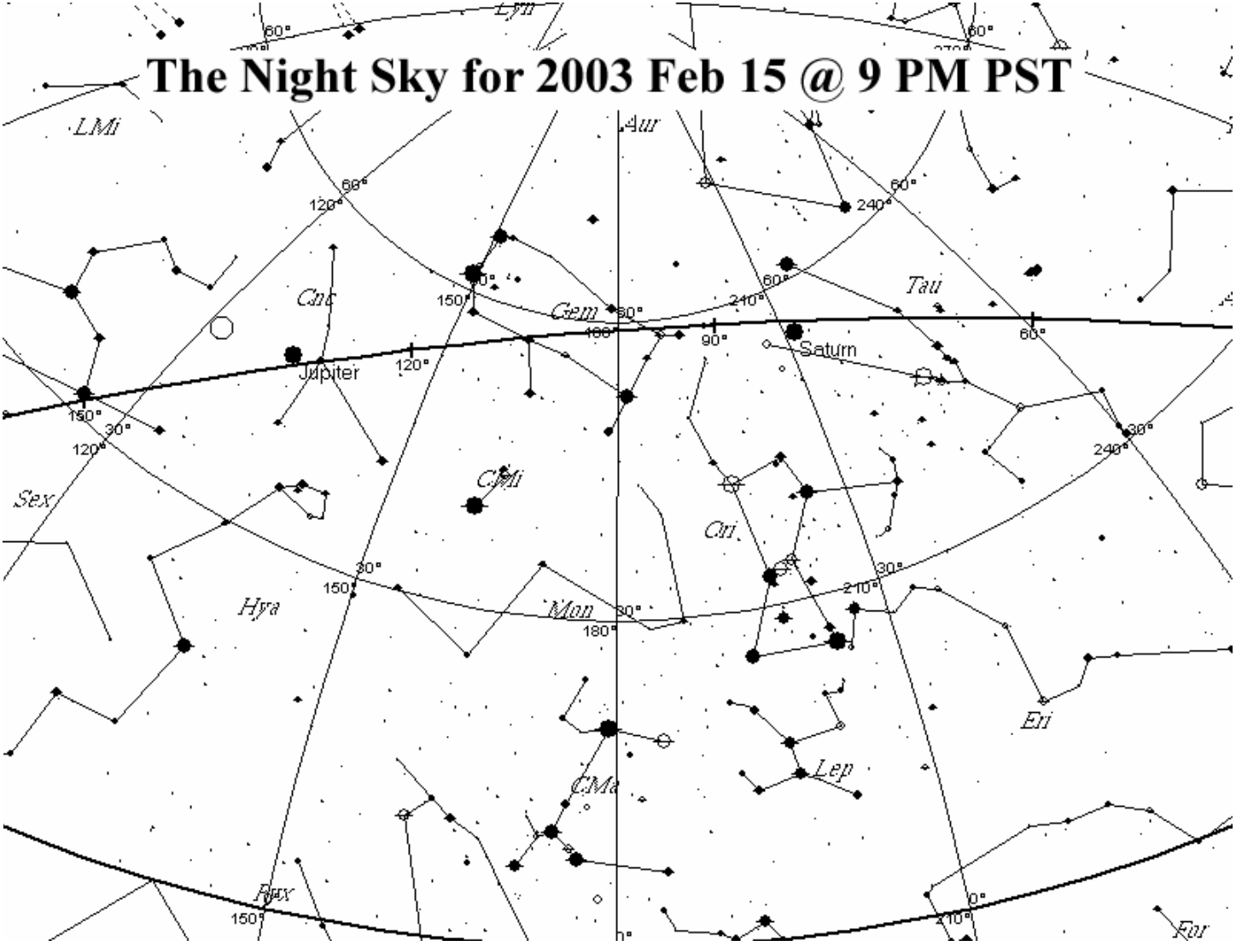
Our second annual Christmas Pot-luck.
We had a good turn-out and everyone had a great time. Hope to see you next year.

Brian Battersby was the first member of the Prince George Centre to earn the RASC Explore the Universe Certificate Congratulations Brian
Certificate questions administered and verified by Dr.Bob Nelson PGRASC National Rep

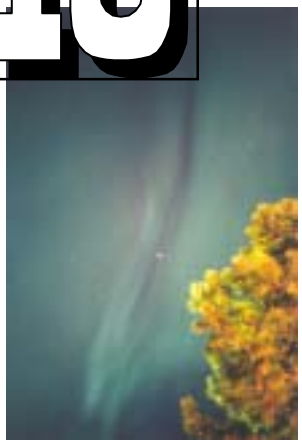


EAST

The Night Sky for 2003 Feb 15 @ 9 PM PST



Map Courtesy Dr. Bob Nelson



Aurora Jupiter and aurora Orion images by our old friend Owen Salava

Evan Williams got a new camera. A Nikon Coolpix 4300. These images, the Pleaides and Orion, are unmodified

Bob Nelson produced these three excellent images from his backyard observatory (downtown Prince George)

M-82

M-65

Reid Lake Observatory

Almost 47 years ago this month a young 15-year-old lad who had just completed a homemade 6-inch reflector telescope looked skyward. What he saw then he remembers Now.

Joining the Royal Astronomical Society of Canada, Prince George Centre in March of 2002. At the introduction period of my very first meeting I said that I was just revisiting an old friend. The Night Sky. Well guess I am doing it up in a big way.

One of the main difficulties of making that visitations easy have been travel time, taking upwards of 80 minutes to complete the drive one way. So trips to the observatory have been limited to no more that 2 a month.
Well now trips to my observatory are 30 paces to the east of my door and one minute to fold off the roof of the Reid Lake Observatory. The scope is at temperature, polar alignment is correct and the CCD camera at temperature, and the dam clouds are here. Since its semi –completion have had three cloud less nights.

Following are photos showing the construction of the building.
It is made from the 2 inch

thick foam lined steel material that is found in garage doors, they are cut and stacked with metal angle plate at each corner both in and outside. Base is built on a pressure treated skid. Walls are 5 foot or so high centre line of the roof is 6 foot. At one end opposite the entrance door is a warm room where the

computer for astrophotography is located, there are two operating positions here. One for the 6 inch scope the other for

smaller scopes that can be set up outside.
Two 6'8" sections of the roof, fold off, where they rest on 4 upright poles.
The two wooden rafter

(Continued from page 6)

extensions that are seen in the photos are in fact the means

to fold the roof sections off . First the north side that has the roof cap on it, then the south side
A small 12 year old regularly fold the roof off.

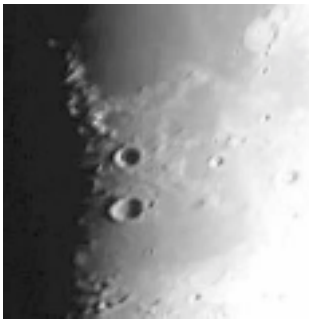
Things that I would change or do differently.
1 Start early in the spring to build

2 Make the viewing area 10' X 10 '

3 Dig the footing for the scope before moving the building on.

Some of the images taken since its completion follows

next is a processed one



Then perhaps my best moon image yet.

Submitted Jan 1 2003
Wayne

Image one is a raw data signal taken with a Vesta Web Camera,

An All Metal Telescope — From Scratch

Evan Williams

The image you see here is a virtual model of the telescope created in Pov-Ray, a ray tracing program. Pov-Ray is not a CAD program but does allow modelling of all aspects of the design, including the optics. The mirror is correctly modeled with a focal length of 30 inches and a reflectivity of 92%. These images are orthographic projection with no perspective.

DESIGN FEATURES

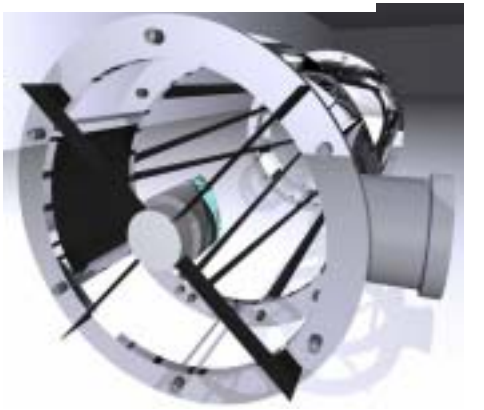
Aluminum-graphite construction. The negative linear coefficient of expansion of the graphite truss rods exactly balances the expansion/ contraction of the aluminum parts resulting in a telescope that does not change length with temperature. A similar system is used on the Hubble Space Telescope.

The faces of any aluminum part visible to the mirror are sandblasted and anodized black providing very low reflectance.

The mounting cage assembly can be moved forward and back to adjust balance as required.

The helical focuser is constructed from nylatron.

The graphite truss rods are hollow and the total weight of all the truss rods is about 270 grams.



The spider assembly shown here is not accurate. The final spider assembly will be a unique semi-curved design. This telescope is currently under construction and most of the aluminum parts are made. The telescope will not be finished until late next spring due to weather conditions here. All my anodising is done outside because of the sulphuric acid fumes the process generates and that means I must wait for warmer weather. In the meantime I will build a conventional german equatorial mount with clock drive to mount the scope.

February Star Hop in Orion

While Orion (oh-RYE-un) is better placed for viewing in January the Hunter is still impressive in the early evening February sky. It is one of the most recognised constellations in the sky perhaps second only to the Big Dipper asterism, even non-astronomers are usually familiar with Orion. Its great recognition probably has to do with the fact that it is one of the few constellations that looks like what its name suggests. Orion is not alone in the sky, he always has his loyal dogs Canis Major and Canis Minor by his side. The three of them hunt Lepus, the rabbit, and Taurus, the bull beside the river Eridanus. Orion was in madly love with Metrope, one of the seven sisters of Pleiades fame. She, unfortunately, couldn't stand the sight of him. Orion's life was cut short by Scorpius when he accidentally stepped on the poisonous scorpion. The gods, feeling a bit sorry for poor Orion, immortalised him in the stars upon his death but made sure he was on the opposite side of the sky as Scorpius so he couldn't step on him again.

Hop #1: Betelgeuse – Diffuse Nebulae

Forming Orion's right shoulder (on the top left corner of the constellation from our view) Betelgeuse, meaning armpit, is not particularly exciting to look at in a telescope, but it is worth mentioning for a number of reasons. Firstly, because it is a red super giant it does has a pleasing orange colour to it when viewed in a telescope. It is also a variable star with a period of 335 days and a range of 0.0 to 1.3V so you can go to the AAVSO website and download the chart for it and make a magnitude estimation if you wish. Its AAVSO designation is 0549+07. www.aavso.org However, it is the fact that it was the first star other than the Sun to have a direct image taken of it which makes it the most distinctive in my mind. The Hubble image revealed to scientists the existence of a "huge ultraviolet atmosphere". The atmosphere has a "mysterious hotspot" on it roughly "2,000 degrees Kelvin hotter than the stars surface". Visit http://hubblesite.org/newscenter/archive/1996/04 for images and more information.

Hop #1: M42 and M43 – Diffuse Nebulae

M42 or the "Great Orion Nebula" is, in my mind, the most stunning nebulae visible from the Northern hemisphere and possibly the Earth. This rich star forming region reveals intricate texture and detail when viewed under good conditions. I have even noted a brownish/reddish hue in addition to the usual green/white hue. It can readily be noticed by the naked eye even under less than perfect conditions. To find it simply locate Orion's belt then look down to his sword the last "star" in his sword will appear slightly fuzzy to the naked eye this is the Great Orion Nebula. You may use any size instrument to view this object. This incredible area of the space is in the process of producing an open cluster. The cluster already has many stars but the most brilliant, most massive of these is what is called the Trapezium. The 3 brightest stars are easy to see but under good conditions 4 stars are the norm and I believe Doug Wayland has picked out 5 in his 8" SCT.

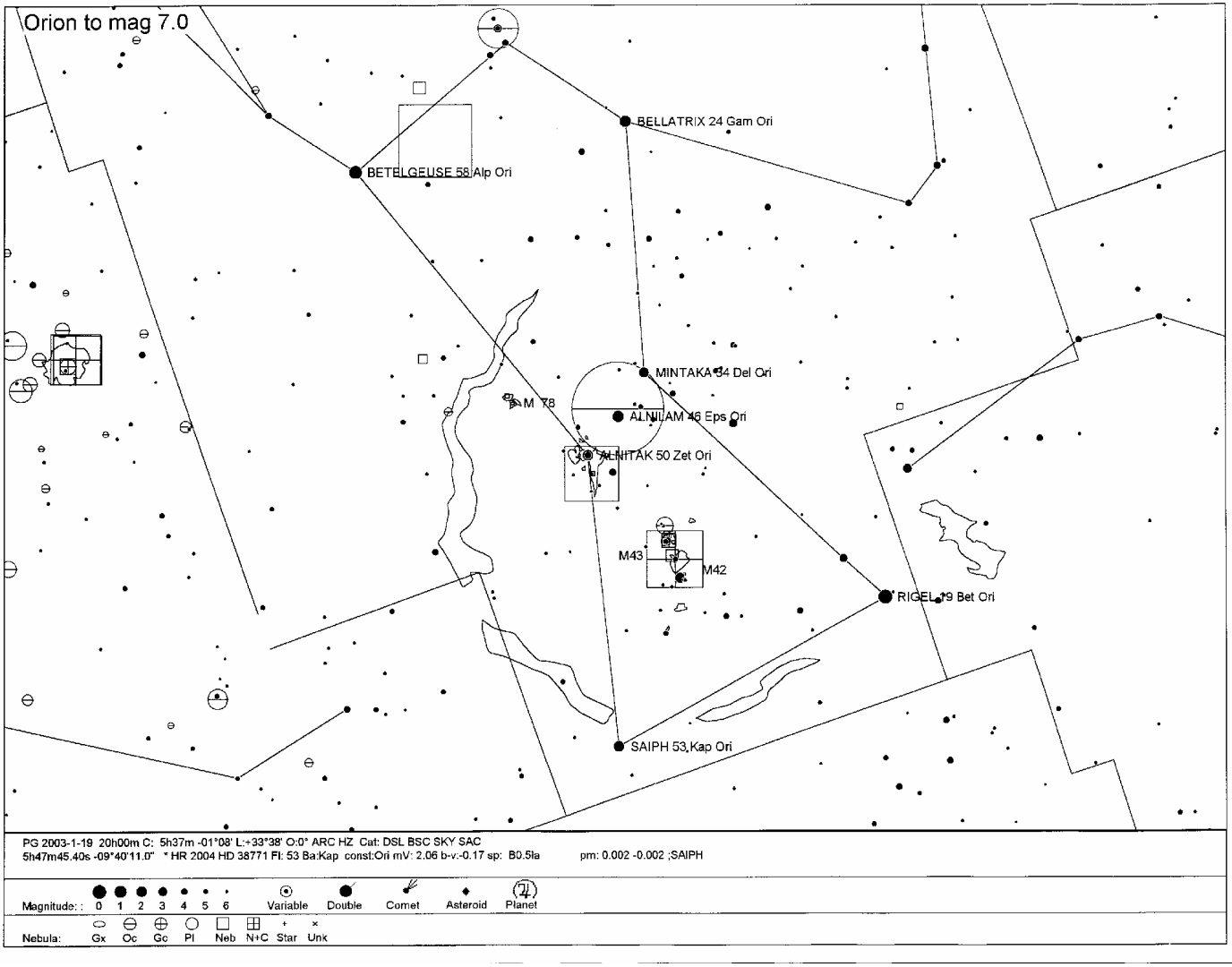
M43 is part of the Orion Nebula and is located in the same field of view in my telescope. Consult a detailed star map or planetarium software to see the exact position. I had a hard time picking out which was the de Mairan's Nebula (M43) at first when at the eyepiece because it all seemed like one object to me.

Hop #2: M78 – Diffuse Nebulae

I had meant to talk about this diffuse reflection nebula as well but seem to have run out of room. I will simply explain how to locate it as quoted from the SEDS website (www.seds.org/messier/m/m078.html) and let you view it for yourself.

"M78 is not difficult to locate from Zeta Orionis, also named Alnitak, the easternmost star of Orion's Belt; M78 is situated about 2 degrees north and 1 1/2 degrees east of this star; a chain of 3 stars of mag 5..6, northward from Zeta, may help locating it. Alternatively, it is found roughly 1/2 deg North and 3 3/4 deg East of Delta Orionis, the NW most belt star."

Good viewing and good luck!,
Brian Battersby


Orion to mag 7.0
BELLATRIX 24 Gam Ori
BETELGEUSE 58 Alp Ori
MINTAKA 34 Del Ori
M 78
ALNILAM 46 Eps Ori
ALNITAK 50 Zet Ori
M43
M42
RIGEL 79 Bet Ori
SAIPH 53 Kap Ori
PG 2003-1-19 20h00m C: 5h37m -01°08' L:+33°38' O:0° ARC HZ Cat: DSL BSC SKY SAC
5h47m45.40s -09°40'11.0" * HR 2004 HD 38771 FI: 53 Ba:Kap const:Ori mV: 2.06 b-v:-0.17 sp: B0.5Ia pm: 0.002 -0.002 ;SAIPH
Magnitude: : 0 1 2 3 4 5 6 Variable Double Comet Asteroid Planet
Nebula: Gx Oc Gc Pl Neb N+C Star Unk