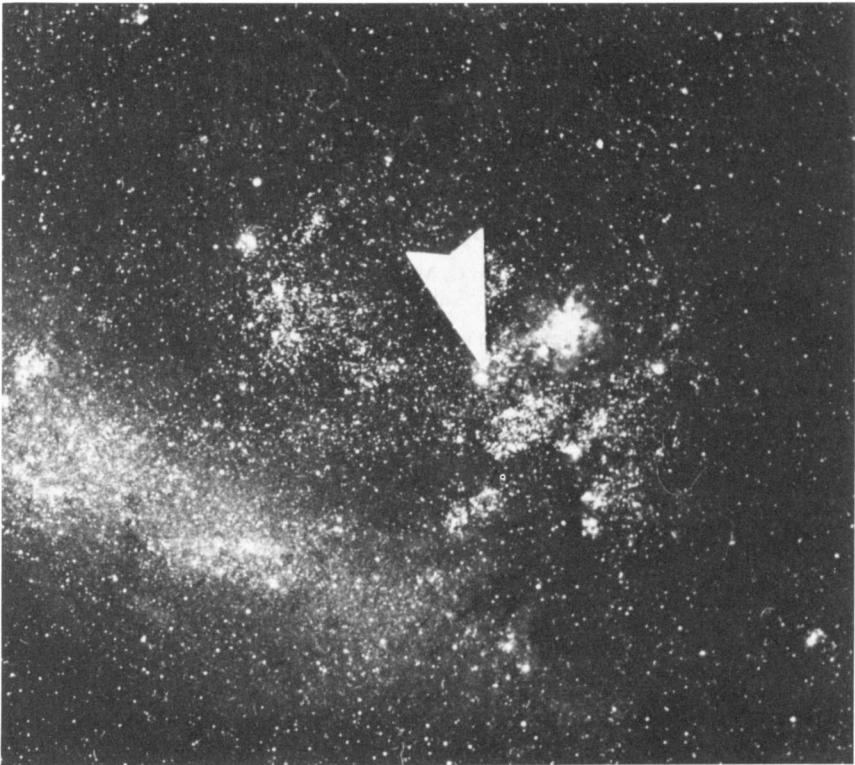

NATIONAL NEWSLETTER

Royal Astronomical Society of Canada

Supplement to the *Journal*

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Canadian Discovers Supernova

The arrow indicates Supernova Shelton 1987A discovered by Ian Shelton, the University of Toronto's resident astronomer at Las Campanas, Chile. Discovery photo taken on February 23, 1987 at 11:48 EST. *Photo by Ian Shelton.*

NATIONAL NEWSLETTER

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Supernova Celebration!

by Ian G McGregor
Editor

What better reason to celebrate than on the occasion of the discovery of the brightest supernova in almost 400 years. Thus on April 24th, the University of Toronto hosted a very special evening to recognize the achievement of 30 year old Ian Shelton and to discuss the significance of the event for the public at large.

Titled "Supernova Celebration", the evening was held in Convocation Hall on the university's main campus. Long before the doors opened a long line of invited guests, members of the astronomical community, and interested public had formed outside the columns of the great building. When the doors opened the hall filled quickly and was almost full by the time the festivities started.

The evening was opened by George Connell, president of the University of Toronto, who welcomed the large audience and discussed the honour and prestige the supernova discovery brought to the university and the affiliation of the David Dunlap Observatory with the university. He was followed by presentations by six other individuals.

Professor Donald Fernie, chairman of the Department of Astronomy of the university and Director of the David Dunlap Observatory, discussed the history of the observatory from the early efforts to build one to the D.D.O.'s eventual founding in 1935. The distinguished work of Dr. Helen Hogg was recognized including mention of the fact that she has taken the only photograph ever taken of a nova in a globular star cluster. Another Toronto astronomer, Tom Bolton, is famous for his research on black holes and did pioneer work on the leading black hole candidate object, Cygnus X-1. Today, the observatory has the largest optical telescope in Canada and eastern North America.

Professor Robert Garrison, director of the university's southern observatory at Las Campanas, Chile where the supernova was discovered then discussed the history of the site. He outlined the reasons for building observatories on such isolated sites and the favourable sky conditions needed for good astronomical observations. His vision was that in the future the university would have a good-sized instrument at the Las Campanas site, something in the two-metre class range.

The “star” of the evening was Ian Shelton himself. A native of Winnipeg, Manitoba, Ian had been brought back to Canada on a special flight for about seven days to share the experience of his discovery with the astronomical community and through the news media, the Canadian public at large. Tonight was his night and he had a large, enthusiastic, and fairly knowledgeable audience gathered for him.

As resident astronomer at the university’s Las Campanas observatory, Ian discussed his observing routines, the very human aspects of observing at an isolated location far from home but under beautiful dark skies, and the events surrounding his discovery.

The discovery had been made during his second visit to Chile. On the night of February 23rd, the university’s 24-inch telescope had been in operation as long as the radio could be cranked up louder than the blowing wind. Adjacent to the 24-inch dome was the Carnegie 10-inch telescope which Ian had used the year before for Comet Halley observations. At that time, motors had been installed to control the opening and closing of the dome. But on the night of the 23rd, the motors failed. At this point the choice was between going to bed or opening the dome manually. He chose the later and discovered his supernova.

Ian took two photographic plates. One hour into exposing the second plate, the batteries failed in his portable radio and shortly after, the stars “disappeared” as the wind blew the dome closed. With the telescope cut off from the sky, Ian decided to develop the two plates. He discovered that the Large Magellanic Cloud had acquired a new bright star. Not believing the photographic evidence, Ian stepped outside and spotted the extra “star” in the fist-sized Large Magellanic Cloud.

It was one thing to discover a supernova and another to let the world know. A telegram should be sent but there was no telex. Phone calls were unsuccessful and furthermore, the mind was not working well enough to calculate the supernova’s coordinates. Finally, after much effort, the message got out and the world learned of the new star.

Ian was understandably nervous by all the attention being focused on him. At the beginning of his talk, the emotional impact of facing hundreds of people and the television cameras was noticeable. But after a few minutes, and the dimming of the lights for slides, he moved into a smooth, first hand retelling of the events surrounding his discovery.

Shelton was followed by Dr. Marshall McCall of the astronomy department who discussed the significance of the supernova discovery. In picturesque language, McCall described the background theory to exploding stars. A supernova is a “star that has thrown off all of its clothes and revealed itself.” The star thought to have exploded was surprisingly a blue giant star with perhaps twenty times the mass of the sun. Of special interest was the sudden burst of the tiny particles known as neutrinos which had been detected by several neutrino observatories at the time of the discovery. Interpretation of the neutrino observations could determine the mass of neutrinos and whether the “Big Bang” would end in the “Big Crunch.”

The federal government was represented by the Minister of State for Science and Technology, Frank Oberle. The minister made a low key and rather disappointing presentation. He discussed “the great vision that the prime minister has for science in Canada” but many in the audience were aware of the cuts in science funding and the recent closing of the 46 m Algonquin Radio Observatory. His comments received a restrained response from the audience and it did not appear that the minister was aware of the magnitude of the discovery for which the evening was being held.

Although there was no provincial government representative present, a telegram was read from Premier David Petersen congratulating Ian on his discovery and wishing a successful evening.

The last speaker was David Dunlap, president of G.F. Thompson Co. Ltd. and grandson of the benefactor of the David Dunlap Observatory. He said his remarks were from the viewpoint of a businessman and he discussed the experience of being a descendant of the first David Dunlap. He gave credit for the delivery of the gift of an observatory to Clarence Augustus Chant because of his vision and energy in pushing for its construction. He closed by asking if such a gift could happen a second time, and read letters from the 1920’s between Chant and other individuals when it was thought that the economy was so poor that no donors were thought possible at that time.

The public program ended with the wish that the university would be able to get the support necessary to build a new two-metre telescope. It was an evening enjoyed by all who love astronomy and highlighted by the first hand account by Ian Shelton of the discovery of Supernova 1987A.

Canadian Amateurs Invited To Japan

by Osao Shigehisa
Kanagawa, Japan

Dear Members of the R.A.S.C.:

Are any of you planning to come to Japan this fall?

I am pleased to announce that the 20th Assembly of Japanese Amateur Astronomers will be held in October 10–12 in Tokyo, our capital city.

The annual Assembly originated in 1967 in the city of Kawasaki and moves its location from city to city. The executive committee of the Tokyo assembly has announced the preliminary schedule as follows: On the 10th (a Saturday and also a National Holiday), there will be registration, opening events, paper sessions, subcommittee meetings and a “Friendly Party”. Then on the 11th, there will be additional paper sessions, a group photograph, and a feature lecture by Mr. S. Murayama of the National Science Museum titled “A Look Back at Three Decades of Artificial Satellites”. All of this will be followed by a banquet.

The Kaho Prize will be given to the best entrant in the paper presentations. Individuals who are interested in entering a paper are requested to submit an abstract, no later than August 10 to the committee. The abstract should be no longer than 150 words. The time allocated per paper is 10 minutes. The speakers will be asked to present his or her final manuscript (in English and no more than 2000 words in length including illustrations and photographs) to the committee.

Subcommittee meetings will be held under the following categories: the sun, eclipses, occultations, planets and the moon, asteroids, comets, meteorites, variable stars, history and folklore, instrument techniques, and applied astronomy.

Observers wishing to attend the Assembly should contact the committee by mid-September.

The estimated participation fees (in Yen) are as follows: Registration – 1500 (About \$14 CDN); Program – 1500 (About \$14 CDN); Group Photograph – 1000 (About \$9 CDN); Banquet – 6000 (About \$56 CDN).

Accommodations can also be reserved by the committee in a choice of Japanese-style or Western-style. The estimated rate is about \$65 to \$130 CDN per person per night.

In addition to the assembly proceedings, sightseeing tours can also be arranged to observatories or to scenic locations. You might enjoy the scenery in Japan’s northern areas, or maybe some ancient culture in the western areas of Japan. For more information write to: Miss Taiko Takeuchi, Assembly Executive Secretary, 7–11 Sakura 3-Chome, Setagaya-ku, Tokyo, Japan 156, or Mr. Osao Shigehisa, 22–30 Nishi-Tsuruma 6-Chome, Yamato, Kanagawa, Japan 242.

Ed. Mr Osao attended the 1986 General Assembly in Winnipeg and presented a paper on the William Herschel Society in Japan

Alberta Star Party July 24–26

The Calgary Centre is sponsoring the 1st annual Alberta Star Party at Chain Lakes Provincial Park about 1½ hours drive south of Calgary. Coinciding with a favourable time of the month for the moon (New Moon is on the 25th), the three day event (July 24–26) will be highlighted by extremely dark skies and steady seeing conditions.

Among the many facilities of the large park are a lake for those interested in boating or fishing and numerous hiking trails. A cooking building with natural gas stoves is also available. The town of Nanton is nearby and provides accommodation for those not inclined to camping. It also claims to have the “cleanest drinking water in Canada” and supplies bottled Nanton water (a reply to Perrier). Talks and activities are planned for each day.

Registration is \$25 and includes use of the camping area. To help in planning please call in advance for information or to make a reservation. Contact Simon Hum, Quasar Optics, 7220A Fairmount Drive S.E. Calgary Alberta T2H 0X7 (403) 255 7633

Digitizing the Moon

by John Dekker
Niagara Centre

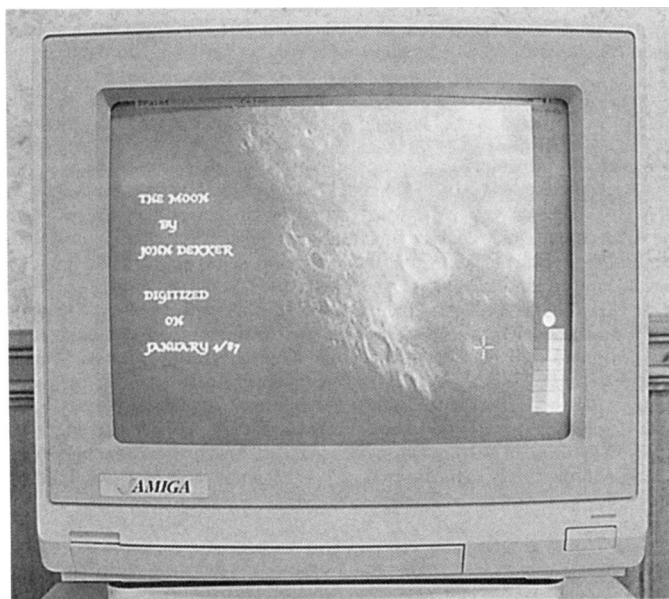
Whether you realize it or not, digitizers are becoming increasingly more common. Remember those spectacular fly by photos of Uranus that appeared in *Astronomy* and *Sky and Telescope* magazines last year? Before the photos were printed, they were only digits in a computer.

With digitizers becoming more available to computer enthusiasts, amateur astronomers are making good use of the marriage between computers and telescopes. Seeing the Moon on your computer monitor at 200 times magnification, then having the ability to hold and modify it for a later date sounds futuristic, or perhaps a bit professional. Well, it is something anybody can do with the right equipment!

Before an image can be digitized, it must be acquired by the computer. There are several packages of digitizers on the market that support the various computer systems. I own a Commodore Amiga, and I am only familiar with the Digi-View system manufactured by New-Tek. Speaking from personal experience, I can say that I am very pleased with this product. As for other systems of digitizers on the market I cannot vouch for them so if you try them be prepared to experiment.

Last January, Paul Obrocki and I "digitized" the Moon. Using a video camera and a digitizer connected to a Commodore Amiga computer we were successful in obtaining very high quality images of the Moon at 200 times magnification. This process involved using a Sony black-and-white video camera and the Digi-View digitizer, a little box that plugs into the computer's parallel port.

To set up the system, a special bracket was made to support the video camera on the telescope and allow it to move up or down and weights added to the telescope to balance the new video system. Once the proper balance has been achieved, the camera cable is connected into the video jack of the monitor. Then by watching the monitor it is possible to adjust for fine focus and make the proper adjustments



Using a video camera, a digitizer, and a computer, high quality images of the Moon at 200 times magnification can be obtained. *Photo by John Dekker.*

with the eyepiece focuser of the telescope. At this stage you simply follow the manufacturers instructions regarding the use of the digitizer.

Having the right video camera is the key to success in this process. You may be wondering "Why would I want to use a black-and-white camera? Why not use a colour camera instead to digitize images?" Simply put, a black-and-white camera is capable of a much higher resolution than a higher priced colour camera. Digi-View requires a black-and-white camera with a RS-170 video and 2-to-1 interface. This means some black-and-white cameras will not work with Digi-View. A camera with a low lux factor is highly recommended so shop carefully if you are in the market for a camera. Experimentation will be needed to achieve a successful image. Camera filters, zoom lenses, and adjustable iris controls are some of the variables which may be tested as well.

The foremost question that the reader may have in mind is: "How does the system produce an image?" A picture is divided into a large number of small, equally-sized parts which are known as picture elements, or pixels. A digitizer simply reads the pixels off the monitor screen scanning one line at a time from left to right and top to bottom, assigns them numbers, and stores them in the computer memory. The process is accomplished in high-resolution mode in about 20 seconds with the result being a beautiful high-resolution (640 x 400 pixel image with no interface flicker) black-and-white image in 16 shades of gray. This is as nice as any black-and-white image you have ever seen on television.

Once the image is stored, it can be modified by adding colours, text, or enhancements to obtain finer detail. This is exciting because the process allows the user freedom to create special effects and obtain hard copies of the stored image from a printer. I believe I may be one of the few people in Canada to have performed this operation as an amateur astronomer. Several amateurs have obtained video images of the Moon, but to use a computer to store and modify images to show at a later date is relatively new. If you own, or plan to own a computer look into the possibilities of digitizing the Moon.

Take aim, "Go forth and digitize!"

Nouvelles de l'A.G.A.A.

Stage de camera Schmidt du 27-29 mars 1987

Pour la troisième fois l'Association des Groupes d'Astronomes Amateurs (A.G.A.A.) a tenu un stage pour enseigner le maniement de la caméra Schmidt à ses membres. En effet, afin de leur donner accès à du bon équipement l'A.G.A.A. a acheté deux ensembles de caméra Schmidt pour la photographie astronomique. L'un des ensemble consiste d'un Celestron Super C8 et d'une Schmidt de 14 cm monté en piggyback. Le C8 est aussi pourvu de tous les accessoires requis pour faire de la photo planétaire et objets lointain. L'autre ensemble comprend une Schmidt de 20 cm montée dans une fourche Super C8 et un Meade de 10cm pour le guidage. Pour optimiser le rendement de ces équipements et s'assurer qu'ils seront utilisé de la bonne façon il fut décidé d'organiser des stages de formation qui ont lieu à des sites éloignés des grand centres. Il y a des leçons théoriques et la prise de photos, incluant le développement de négatifs. Un comité a été formé pour étudier les demandes de prêts d'équipement et les projets soumis doivent répondre à des critères minimum pour être retenus. Les équipement commenceront circuler sous peu parmi les membres et on anticipe une atmosphère de compétition qui aura un effet positif sur le bilan de ce projet. A date plus de 25 personnes, dont plusieurs du Centre de Québec de la S.R.A.C. et de la Société d'astronomie de Montréal (S.A.M.), ont assister à ces sessions de formation.

Le Congrès de l'A.G.A.A.

En 1987 le congrès aura lieu les 19, 20 et 21 juin à Drummondville situé à quelque cent kilomètres à l'est de Montréal. Le président du club hôte est nulle autre que Réal Manseau qui est aussi un membre indépendant de la S.R.A.C.. Les astronomes amateurs qui prévoient être dans cette région pendant cette période sont invités à communiquer avec Réal, son adresse est: 85 118ième avenue, Drummondville, Québec J2B 4E1. Tel: (819) 472-5176.

Make Your Own Nagler: Reader Replies

In the February 1987 *Newsletter*, Clive Gibbons of the Hamilton Centre discussed the special type of telescope eyepieces known as Naglers and in particular, described an improvised “Nagler” which he had field tested and found to compare favourably with an actual Nagler eyepiece.

Mr. Albert Nagler, president of Tele Vue Optics Inc., and Peter Ceravolo of the Edmonton Centre, replied to Mr. Gibbons. Both of their letters and Mr. Gibbon’s comments on them follow.

The Value of a Nagler

I wish to comment on the article “Make Your Own Nagler” by Clive Gibbons on page 11 of the February issue of the *Newsletter* and would appreciate your publishing my comments.

I fully subscribe to the author’s conclusion that a wide angle eyepiece and a Barlow can be combined to make a greatly improved eyepiece. In fact, our “Wide Field” successor to Erfles and our Barlows are designed to benefit from the match, and we say so in our literature. The “Nagler” design, while using the same general principal, is a far more integrated product. The wide angle portion is not designed like an Erfle and the “Barlow” portion is similarly of unusual design as shown in the detailed design data and drawing published in *Telescope Making* Issue #20 in an eight page article entitled “The Nagler 13, a Remarkable Telescope Eyepiece.” In fact, neither section of the eyepiece could be considered a good product on its own. Mr. Gibbon’s point about the Barlow slowing down the beam to make it easier for the wide angle portion is true but is not as important as the effect of field flattening, astigmatism correction, and reduction of lateral colour.

Not having seen Mr. Gibbons combination, I can not presume to say how “close” the performance comes to our eyepiece. I question the 80 degree field (How was it measured?) and doubt very much if the eye relief compares to our 130% of the focal length. I would certainly like to see the \$10 surplus eyepiece.

Mr. Gibbons may be surprised that our “simple” Nagler contains one almost hemispheric cemented element and some very large optics. To manufacture, multi-coat, and cleanly assemble such an eyepiece is not so simple either. Manufacturing in relatively small quantities and fully inspecting every eyepiece in our plant certainly contributes to its cost.

As I said at the outset, I have no quarrel with promulgating the value of a Barlow in greatly enhancing performance of wide angle oculars, and I have no problem with skepticism, since Mr. Gibbons admits our eyepieces do what we claim. I do, however, object to the characterization that we are asking our valued fellow amateurs to “pay through the nose for old principles in a fancy package.” Such a conclusion to the article seems like “sour grapes” to me. Because Mr. Gibbons found a surplus eyepiece that works well with a Barlow does not of itself bestow him with higher moral authority.

Albert Nagler,
President, Tele Vue Optics, Inc.,
20 Dexter Plaza,
Pearl River, New York 10965

Mr. Gibbons replies: *Although I have not conducted a computer ray trace of my “Nagleresque” design, myself and others who have used it in the field appreciate its wide field and good off-axis performance. It does appear to have a flat field and little objectionable astigmatism or lateral colour. In other words, it performs well which is all that really counts when using an eyepiece.*

The actual eyepiece in question was bought from a friend for only \$5 (not \$10 – he refreshed my memory!). It came from a 10-year old pair of brand X department store 8 X 40 binoculars he tore apart one day. By the way, the objective lenses made excellent telecompressors. Any 8 X 40 binocular having a 10 degree field or 7 X 35’s having an 11.5 degree field will have similar oculars for the project.

I have no doubt that Nagler oculars are expensive to make, are precisely assembled, and have steeply curved elements. This, however, does not make them good value in light of my findings, since “value” can be a very subjective quantity, I am sure others may differ from my opinion.

The entire intent of my article was to inform people how to make for themselves an eyepiece with performance approaching a Nagler, for a fraction of the cost. My opinions expressed in the article do

not, I feel, constitute "sour grapes", nor do I pretend to possess "higher moral authority", as Mr. Nagler contends.

However, I do hope my work stimulated some critical thinking and if a little bit of eyepiece mysticism has evaporated, I feel vindicated

Clive Gibbons
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In Defence of Quality Products

Nothing can be more discouraging to a manufacturer of a quality product than remarks like those of Clive Gibbons in his article "Make Your Own Nagler", printed in the February 1987 issue of the *Newsletter*.

There is no doubt that as the quality of a product increases, the price will naturally follow the same trend. The new generation of very wide eyepieces are very easy to criticize as being superfluous and unnecessarily expensive. Any new, ground breaking, product will have to, and should, face such criticisms. But to be fair, one must understand the nature of the beast before one can justifiably criticize it. There are a few very sound reasons why these new breed of eyepieces cost two to three times more than amateur astronomers are accustomed to paying.

Look up the ads for the Tele Vue Nagler eyepieces in a back issue of *Sky and Telescope* or *Astronomy* magazine. Better yet, look up the article "The Nagler 13: A Remarkable Telescope Eyepiece" in *Telescope Making* Issue #20, summer/fall 1983. In one particular ad there is a patent diagram of the cross section of the lens elements. These eyepieces begin to rival some photographic lenses in their optical complexity. Eyepieces are generally much more complex than the "heart" of the telescope, the objective lens or mirror. Designing and making objectives is child's play when compared to eyepiece design and construction – especially when the eyepieces are to cover an 82–84 degree apparent field of view.

Notice the steep curves on the majority of the lenses and the number and large size of some elements. Very strong, large lenses are expensive to produce when compared to the weaker variety found in the older eyepiece designs. In a production environment, lenses are made in clusters, or in optical shop jargon, "blocks." As many lenses as practical are mounted side by side so that their surfaces occupy the same spherical curve. The blocking technique allows the optician to grind and polish many lenses at the same time, lowering the cost of the completed instrument considerably. The weak curves of the conventional eyepieces allow as many as a dozen or more components to be processed at the same time. The very wide field eyepieces, however, have steeper surfaces relative to their diameters. This limits the number of lenses one can block together, thus increasing production costs. One surface is so steep it must be worked singly. This, of course, is very expensive. To compound things further, astronomical eyepieces do not have the same production run as, say, camera lenses do, which again raises tooling and associated costs.

Subtle refinements can help to enhance an optical instruments performance. In the very wide field eyepieces, the edges of the lens elements are blackened to reduce light scatter, The surfaces are multi-coated to improve light transmission and reduce ghost images caused by internal reflections off the lens surface. Although such refinements might seem relatively insignificant, it is the accumulation of these small victories that produces an optimized instrument. What one is paying for in these eyepieces are those little refinements which, when added together, have an appreciable effect on image quality, at least to the trained eye.

There are some refinements which are obvious. The Naglers are built solid. There is no scrimping on machining or materials and their complex design requires tight mounting tolerances, again raising the cost. The eyepieces are also physically large in relation to their focal lengths and this raises the cost of materials. Some of the longer focal length eyepieces are so heavy that they must be counterbalanced for the telescope to work properly.

Most eyepieces will not perform well with a "fast" mirror because the cone of light reflected off the mirror is too steep. The aberrations of the eyepiece are amplified, and to complicate things further, the coma of a "fast" parabola will add to the already amplified aberrations. These very wide field eyepieces

were designed with “fast” mirrors in mind. Last summer, at the Starfest conference at Mount Forest, Ontario, I had the opportunity to look through the home-made “Nagler” described by Clive Gibbons in his article. We compared its performance with a commercial equivalent, my own 9 mm Nagler, on my 20cm f/4, “Kneebiter” Dobsonian telescope. Mr. Gibbons’ eyepiece compared very favourably with the Nagler. Although the images were not as good at the edge of the field, its performance was amazing for an assembly of masking tape, cardboard, and off-the-shelf optical components. The home-made eyepiece is an example of the resourcefulness of its makers.

Telescope making, as a hobby, is nearly dead. Many people cannot be bothered to assemble their own telescope to try something new, not to mention assemble their own eyepieces. Today, people want a self-contained unit that will perform well, and they won’t mind paying good money for a well-made product. To produce and market Mr. Gibbons home-made eyepiece we would first have to get the lenses. They, of course, would have to be custom made and because of this we might as well redesign them so that they will give optimum performance – if you are going to do it, do it right. We commission an optical designer to optimize the system and design a solid housing. We then contract out the optical and mechanical work, since setting up our own shop will be far too costly – well over a million dollars. People must know about our fantastic new product, one that has been refined and optimized, so we advertize in astronomy magazines. After the dust settles, we have come up with a price per unit so that everyone gets paid, including ourselves. What have we come up with? Surprise! A several hundred dollar item.

If I sound a little defensive, it is because I make my living as an optician. I know first hand how much work is required, and the resources needed, to produce quality optical components. It perturbs me when people, like my good friend Clive who I have known for years and who can tell the difference between good and less than mediocre optical goods, lay rash judgments on companies who only ask a fair price for a quality product.

Peter Ceravolo
199 Bush Pilot Road
Edmonton, Alberta
TSG 2Z4

Mr. Gibbons replies: *As the proud owner of a Nagler ocular, I am sure Mr. Ceravolo has had ample opportunity to examine it in detail and appreciate its quality.*

I agree whole heartedly with his opinions regarding the care and workmanship that contribute to the excellence of Nagler optics. But may I reiterate that my original article, “Make Your Own Nagler,” never once questioned these values. I am sure that Nagler oculars cost what they do mainly to reasons mentioned in Mr. Ceravolo’s article.

However, I still stand firmly by my opinion regarding the performance of a Nagler compared to what can be fashioned by hand. The main idea of my article was that very wide field eyepieces can be easily constructed by those who wish to save some money and have a bit of fun with optics.

My home-made design is actually quite well made, and although it is not as shiny as its commercial equivalent, it will survive a fall onto a concrete patio just as well.

Actually the ocular demonstrated to Mr. Ceravolo at Starfest was a modification of the original design. In this ocular, the Barlow group was moved closer to the eyepiece field lens, which resulted in a 13 mm focal length instead of 10mm. However, edge sharpness did suffer compared to our original 10mm design. Although masking tape was used in this ocular, I do not recall any cardboard in its construction!

Fortunately, nobody needs to produce and market my design since it uses parts commonly available to amateur astronomers who are willing to experiment. Besides, Tele Vue and other companies are already following the course Mr. Ceravolo suggests.

I suppose there will always be a difference of opinion regarding the value of one piece of equipment versus another. A few feathers might get ruffled, but the awareness stimulated by such discussions is always worth the trouble!

Clive Gibbons
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Across the R.A.S.C.

CALGARY: Many activities were planned for Astronomy Day in May. The Calgary Centennial Planetarium will have free admission into the building and free Star Chamber demonstrations. Calgary Centre members planned to set up telescopes at Glenmore Park for public viewing. This summer the Centre will be sponsoring the first annual Alberta Star Party at Chain Lakes Provincial Park. A large turnout is expected from Calgary, plus Edmonton members and smaller groups from Lethbridge, Medicine Hat and Fort McMurray.

EDMONTON: New Centre President Peter Ceravolo reports in *Stardust* that the Centre has a rarely used dark sky observing site, Buck Mountain. Recently, members were invited to give their opinions on what should be done with it.

HAMILTON: President Bob Speck has announced that the very successful Beginners Observing Group instituted last year is to be conducted again this year. Regular classes and workshops are held for new members to introduce them to various aspects of astronomy and observing techniques. The official Grand Opening of the newly-named Leslie V. Powis Hamilton Centre Observatory scheduled for May 9 marks the completion of the two observatory buildings making up the site. Public nights are still growing strong under the guidance of Neil Rogers, Grant Dixon, and Ian Stuart, with Stan Bryant keeping them well booked.

KINGSTON: Despite the below freezing temperatures and slight breeze, the Centre held its first observing session of the year on January 26. *Regulus* editor Leo Enright observed bright zodiacal light during the last week of February. It was comparable to the brightness of the Milky Way.

KITCHENER-WATERLOO: A star night for the Kitchener-Waterloo Field Naturalists was held in March. Organizer Paul Bigelow reports that both nights scheduled previously had been unfortunately clouded out. Bernd Mueller gave a presentation on "Astrophotography for Beginners" at the March meeting. Monthly constellation have continued with Canis Major (Jonathan Doupe) in February and Lynx (Brian Dernesh) in March.

LONDON: The Centre's first observers group meeting of the year held on January 18 was well-attended. Dr. Robert Garrison of the University of Toronto was guest speaker at the annual banquet on January 23. Two weekend observing sessions/campouts are scheduled for the end of June and July at the River Place near Mount Forest.

MONTREAL: The Montreal Centre sadly has reported the death of one of their members, Grace Hill. The April group of Saturday Night talks ended the series of talks for another season.

NIAGARA: As reported in the April Newsletter, Niagara Centre plan to order club jackets. Members have decided on navy as the official club colour and will hold a contest for the best design for a club crest. During July the Centre will have a display at the Centennial Library in St. Catharines. A fund raising garage sale will also be held in June or July. This year's spring banquet featured Ian McGregor, editor of the *National Newsletter*, as the speaker. His presentation was titled "The Origin of the Constellations – A Detective Story."

SASKATOON: In celebration of Astronomy Day, displays of amateur astronomy and telescopes were set up at the Circle Park Mall.

TORONTO: Public star parties at Harbourfront have been scheduled for June 27 and July 25. Toronto Centre member Paul Markov is undertaking the compilation of the third edition of the Directory of Observers. The purpose of the directory is to give members/observers (beginners and advanced) the opportunity to contact each other to discuss all aspects of observing. Members of the Toronto Centre are geared up to host the 1987 General Assembly in May.

VANCOUVER: Centre newsletter *Nova* sadly reported the unexpected death of past president, Tom Tothill (see obituary in April Newsletter) and honorary president, Dr. Michael Ovenden. The memorial service for Dr. Ovenden was held in the theatre of the H.R. MacMillan planetarium. A Space Science Teach-In was held at Highlands Community School on February 18. There, Vancouver Centre exhibited telescopes and photographs. The Centre also hosted a telescope seminar in February. Members are working on a telescope trailer to hold their 10-inch (25 cm) Cassegrain and 14-inch (36 cm) Newtonian telescopes. The Centre's library card system is being transferred into the computer. This should make the library much more efficient.

WINNIPEG: Several star parties have been scheduled for the spring as well as a few astronomy courses.

HALIFAX: The Centre's regular March meeting fell on the eve of this year's spring equinox, March 20. After the regular meeting, we had our first annual "Spring Equinox" party! This was on the suggestion of our Observing Chairman, Glenn Roberts. The Equinox party included many solar delicacies like sun punch, sun cake, and sun punch, as well as a "Pin the Sun On The Solar System" game! We here in the maritimes were extremely anxious for spring to arrive. The party was a huge success.

Across the R.A.S.C. is a regular feature of the *Newsletter*. Centre editors or secretaries should send newsletters and reports of Centre activities to the *Newsletter* editor. Deadline for the October issue is August 1.

Observers Cage

by David H. Levy

Comets and supernovae have little in common. After all, they are at opposite extremes in terms of size. Furthermore, even the brightest comets are local affairs. While mighty Comet Halley's performance last year was less than in 1910, this is only by our reckoning. It we had been observing from Venus, it would have put on quite an incredible show. A supernova, however, is an announcement to the whole universe for at its brightest, a supernova could outshine an entire galaxy.

There are two things that comets and supernovae do have in common. One is the excitement they can generate as they upset the perceived balance we see in the sky. In this regard, ancient records are sometimes so vague that we cannot tell whether the object being described is a comet or a supernova. The other thing they have in common is their initial assigned designation. Thus the first comet of 1987 (Comet Levy) is known as 1987a, and the first bright supernova (Canadian astronomer Ian Shelton's Large Magellanic Cloud supernova) is listed as 1987A. Both 1987a and 1987A have given me a lot of joy.

That faint comet, "wandering on the outskirts of creation," as the great comet discoverer E.E. Barnard put it many years ago, has been approaching our corner of the solar system for a long time, finally reaching it closest approach to the sun on December 17, 1986., 21 years to the day after I began my comet hunt. The comet was already backing away at discovery in early January.

It was not much longer (February 23) before the light from SN 1987A reached us from the Large Magellanic Cloud. On March 20, after travelling to southern Mexico to meet it, I saw this distant sun just above the southern horizon. Shining at magnitude 4.7, it was one of the reddest stars I have seen. Bright in binoculars, the supernova would have been clearly visible with the unaided eye if it had been higher in the sky. I am still amazed that a star from another galaxy could be so bright. Even with a telescope, the supernova and the Tarantula Nebula were the only two representatives of the Cloud that could be seen. The rest of that galaxy was hidden in haze.

A thousand years from now, Supernova 1987A may have a cloud that we can see and study. Possibly, we may even detect the pulsing neutron star that is the remains of its core. In that time, Comet 1987a would have made but the tiniest fraction of its journey back to its home in another cloud, a comet cloud surrounding the solar system that we will probably never see.

Beginners' Guide to Astrophotography Part 2

by Bryce Heartwell
Edmonton Centre

In Part I of this series, we looked at two of the four different types of astrophotography. These were 1. fixed photography and 2. piggyback photography. Now, we will look at the remaining two types – Prime Focus and Eyepiece Projection.

3. PRIME FOCUS PHOTOGRAPHY

Some uses of this method are for photographing a) deep sky objects in detail b) comets and c) the lunar disk such as during eclipses.

Equipment Required: a) A telescope with equatorial mount and drives b) A drive corrector to correct tracking errors during exposure c) A guide telescope, or off-axis guider d) A camera with a removable lens and time exposure capability e) Fast film with low reciprocity failure (reciprocity failure is a film's inability to gather light after it has been exposed for a period of time) f) An illuminated reticle eyepiece g) A cable release for the camera.

Method: In prime focus photography, the camera is brought to focus at the prime focus of the telescope being used: The camera's own lens is removed from the camera and no eyepieces are used. The prime focus is the focal point of the main objective of the telescope itself. This method requires a certain amount of skill that comes with practice.

- (1) Set up the telescope and carefully polar align the mount.
- (2) Install on the telescope all photographic equipment required to take a picture. Set the camera's shutter on "bulb" or "time".
- (3) Carefully balance the telescope. This is very important as poor balance will affect drive operation.
- (4) CAREFULLY focus the camera on a bright star or planet using the telescope's focuser. Good focus is critical.
- (5) Centre the object being photographed in the camera viewfinder. If the object is too faint to be seen in the viewfinder, use surrounding stars to centre the object. A star map helps!
- (6) Find a suitable guide star in the off-axis guider or guide telescope.
- (7) Centre the guide star in the guider using a low power eyepiece. Once centred, remove the low power eyepiece and insert a barlow lens and the illuminated reticle eyepiece. Focus the reticle lines and the star (done independently) in the eyepiece.
- (8) Align the reticle lines so that they correspond to directions in right ascension and declination. The direction of star drift can be determined and the proper correction made.
- (9) Carefully adjust the brightness of the reticle lines so that they do not drown out the guide star. This is very important if the guide star is faint.
- (10) Once everything is ready, check the time and open the shutter using the cable release and lock it open.
- (11) Watch the guide star and make corrections during the entire exposure to keep the guide star centred in the reticles of the eyepiece. Corrections are made with the drive corrector.
- (12) After the desired length of time, close the shutter and record all information about the exposure in your log book.

Advantages of the prime focus method: a) Greater resolution b) Photography of faint objects is possible c) Larger image scale is possible than with the piggyback method (thus more resolution and detail).

Disadvantages of the prime focus method: a) Substantial investment is required in equipment b) Very accurate guiding is required c) It is prone to more failures because of the greater chance of error.

The prime focus method of photography is a very powerful way of photographing deep sky objects with a telescope. Beautiful photographs of many different types of objects are possible with some practice.

4. EYEPIECE PROJECTION PHOTOGRAPHY

Some uses of this method are: a) High resolution lunar photography b) High resolution planetary photography c) Double star photography d) Solar photography (with proper filters).

Equipment required: a) A telescope with an equatorial mount and good drives b) A camera with a removable lens c) Camera adapters and extension tubes d) Drive corrector to make drive rate corrections e) Good quality eyepieces and Barlow lens for projection f) Adequately fast film with good contrast and resolution.

To obtain enough image size when photographing the planets or lunar closeups, the image is projected onto the film using eyepieces, the Barlow lens, and the extension tubes. Different combinations of eyepieces and extension tubes will give different magnifications. These combinations will change the exposure time required.

The proper exposure time that is required for an object can be determined by experimentation or by using an exposure graph. A graph, such as the "Henry" exposure graph, can be used after determining the focal ratio of the photographic set up to determine the exposure time required for a particular object. The focal ratio is determined with formulas. Both the formulas and the graphs can be found in books such as *The Complete Manual of Amateur Astronomy* by Clay Sherrod.

The exposure graphs can only give a starting point to set the shutter speed. Therefore, the shots must be bracketed and much experimentation is required. Because of the very high magnifications used, factors such as the seeing conditions, wind, or vibration of the optical system can affect the results greatly. This type of photography is the most difficult one in which obtain good results.

Method:

- (1) Set up the telescope and carefully polar align it.
- (2) Place all necessary photographic equipment onto the telescope and carefully balance the telescope. This is very important for the drive to track properly.
- (3) Centre the object to be photographed in the camera viewfinder and CAREFULLY focus the image. This is a critical step.
- (4) Monitor the object in the viewfinder and watch for drift. Adjust the drive by making adjustments on the drive corrector to minimize drift.
- (5) Do one of the following depending upon your exposure time.

If the exposure is to be less than one second:

- (a) Set the shutter speed on the camera to the desired setting.
- (b) Check the object focus and centering.
- (c) Retract the camera mirror (if possible).
- (d) Wind up the camera timer.
- (e) Release the timer and stand away from the telescope. Vibration will die down during the timing sequence.
- (f) After the shutter has operated, check the object centering, focus and repeat the exposure. Take several shots and bracket the exposure.
- (g) Record all information about the exposures in your log book.

If the exposure is to be longer than one second:

- (a) Set the camera shutter speed to "time" or "bulb".
- (b) Attach a cable release to the camera.
- (c) Check the object focus centering it in the camera viewfinder.

- (d) Take a piece of black cardboard larger than the diameter of the telescope tube and cover the front end of the tube making sure not to move the telescope.
- (e) While holding the cardboard in front of the tube, open and lock the shutter using the cable release.
- (f) Wait about five seconds to let vibrations die down then quickly remove the cardboard from in front of the tube.
- (g) After the desired exposure time, quickly replace the cardboard in front of the tube making sure not to move the tube. Release the camera shutter using the cable release.
- (h) Repeat the exposure. Take several shots and bracket the exposures.
- (i) Log the information about the exposures for each shot.

This method is known as the “hat trick” or “black hat trick” for obvious reasons. With practice, exposures as short as half a second can be made.

Advantages to eyepiece projection photography: a) Great magnification is possible b) Details on the Moon and planets can be photographed c) This method is not affected by a bright sky as are prime focus and piggyback photography.

Disadvantages to eyepiece projection photography: a) It is affected greatly by poor seeing and vibration b) Large financial investment is required c) Lots of film is needed d) It is very difficult to get good results.

This method of photography is difficult but it is worth trying even if to only get one good picture. The Moon is not as difficult to photograph because of its size and brightness. The planets are a real challenge because of their small size.

We have now looked at all of the main methods of astrophotography. I hope the introduction has been helpful and that some readers will try at least one of the methods. I would be very interested in hearing of your successes and failures, and if anyone has any questions, please write me. My address is: Bryce Heartwell, Box 1082, Stony Plain, Alberta T0E 2G0.

In the August *Newsletter* there will be an article on polar alignment. The reason for polar alignment and two methods will be discussed.

(Ed. This series of articles first appeared in the Edmonton Centre’s newsletter *Stardust*. It has been revised and reprinted with permission of the author.)

Events Calendar

June 14–18

Joint meeting of the Canadian Astronomical Society and the American Astronomical Society.
Vancouver, British Columbia
Contact: Harvey Richer, University of British Columbia

June 19–21

XII Congrès de l’Association des Groupes d’Astronomes Amateurs (A.G.A.A.)
Drummondville, Quebec
Pour plus d’information: Real Manseau, 85 118ième avenue, Drummondville, Quebec J2B 4E1
(819) 472-5176

June 24–27

Biennial Conference of the Planetarium Association of Canada Edmonton, Alberta
Hosted by Edmonton Space Sciences Centre
Contact: Space Sciences Centre (403) 452-9100

July 14–16

99th Annual Meeting of the Astronomical Society of the Pacific, Pomona, California
Contact: Andrew Franknoi (415) 661-8660

July 24–26

1st Annual Alberta Star Party
Drumheller, Alberta
Hosted by the Calgary Centre R.A.S.C.
Contact: Simon Hum (403) 255-7633

July 31–August 3

Annual Camping Observing Weekend (C.O.W.)
Fundy National Park, New Brunswick
Hosted by the Halifax Centre R.A.S.C.
Contact: Patrick Kelly (902) 477-8720

August 14–16

Syracuse Summer Seminar
Syracuse, New York
Hosted by the Syracuse Astronomical Society
Contact: Ms. Denise Sabatini (315) 458-1454

August 21–22

6th Annual Starfest Convention
Mount Forest, Ontario
Hosted by North York Astronomical Association
Contact: Andreas Gada, 701-145 St George St., Toronto, Ontario MSR 2M1

August 21–22

4th Annual Mount Kobau Star Party
Osoyoos, British Columbia
Hosted by Okanagan Astronomical Society
Contact: Peter Kuzel, 4100 25th Avenue, Vernon, British Columbia V1T 1P4

Syracuse Summer Seminar August 14–16

The Syracuse Astronomical Society is planning an exciting weekend-long event for amateurs this August. And as in past years, it will feature many events and activities which have made the event a popular one for amateurs from New York State and southern Ontario.

The seminar will feature paper talks, four very different contests, a raffle, a touch football game, a banquet with Professor Martha Haynes of Cornell University speaking on “The Large Scale Structure of the Universe”, and a tour of the Holden Observatory at Syracuse University. Camping is available for those wishing to be closer to nature.

The four contests are 1. an observing contest on the Friday night 2. a kite flying contest 3. a “bake-off” with the requirement that entries must be edible and astronomical and 4. an astronomical photo contest.

Registration is \$7.50 US and the dinner is \$10 US. Advanced registration is requested. Contact Ms Denise Sabatini, 3424 Chestnut Street, North Syracuse New York 13212 or call (315) 458-1454 for further details.

The Syracuse Astronomical Society is a member organization of the Niagara Frontier Council of Amateur Astronomical Associations (N.F.C.A.A.A.) which includes several R.A.S.C. centres in southern Ontario.

Eyewitness Report: Spica Snuffed For 53 Minutes

by Mark Zalcik
Edmonton Centre

On the morning of February 18, 1987, an unique event occurred as the Moon occulted Spica, the brightest star in the constellation of Virgo. It was something to see and I hope many others were able to watch the event. As I was working that night in St. Albert, I had planned a couple of weeks in advance to time the event.

Fortunately, the night of the 17th was nice and clear, and everything looked good for the occultation, which was to occur late that evening, with the bright limb disappearance occurring at 04:55.3 Mountain Standard Time. As the pair of celestial objects rose in the south-east before midnight, I was surprised to see how far apart they seemed to be, and for a while wondered if I had made a mistake in reading the *Observers Handbook*. Within a few hours, though, it became very apparent that things were happening as planned, as our natural satellite inched its way towards Spica. The pathetic scintillation of Spica made it look like it was aware of its imminent fate, as the Moon, complete with its maria forming upon it a somber, hungry expression, got dangerously close. By 04:30, I could not separate the two upon peering outside. Where was Spica?

Observing from the roof of a shopping mall in St. Albert with my 12 x 80 binoculars, I found the star, with the Moon almost eclipsing it with its south-east limb. Somewhere around 04:50 am, the separation was so small that I decided to call it quits until reappearance at 05:48.9. Spica was gone.

With the reappearance of Spica taking place from behind the dark limb of the waning gibbous Moon came my opportunity for my very first occultation timing. A first magnitude star should not be too hard to spot as it blinks out of the darkness. To do the timing, I had with me my stopwatch and short-wave radio, to make timing as accurate as I could – to the nearest tenth of a second, as recommended by the International Occultation Timing Association (IOTA) and ILOC. The binoculars would allow me to zero in on the area in question and I thought I had it made. At 05:45, I was out on the roof again, with my eye looking through the binoculars and my left thumb covering the start button of the stopwatch.

Unfortunately, I had started looking just a bit too early, as by reappearance time, the lenses had partially fogged up with my breath, despite my efforts to delay my exhaling. With all the anxiety, indeed, I had almost passed out by 05:48. I suggest avoiding holding one's breath during an occultation. Those 24 minutes or so seemed like 24 hours, but suddenly (of course), at the west edge of the Moon, was the brightest star in Virgo, ready to greet the eyes of any observers who were intrigued enough to get up a little early to watch this dramatic occurrence.

"There it is," I grumbled, almost simultaneously starting the stopwatch. With the unaided eye, I looked for Spica, but it was still too close to the Moon to be seen with the unaided eye. I lunged down the stairs to get the radio with the tick-tick-tick of the timepiece adding to the tenseness of the situation. If there had been batteries in the short-wave radio, I could have done everything outside, but I had decided to rely on AC power instead. I shouldn't have – the fun was just beginning.

It would have helped a little, I suppose, if the radio antenna had not been broken off by my nephew a few years ago -it had not worked the same since. But the difficulty of getting the time signal station WWV from inside the shopping mall was tremendous. From outlet to electrical outlet I leapt, turning knobs and feeling, turning, and cursing at the antenna as an array of deranged sounds oozed out of the radio. Somehow, WWV finally came on, and with nearly 11 minutes elapsed on the stopwatch, I finally stopped the incessant ticking with the time signal.

The time I came up with was 05:48:01.1 (MST), with a deviation of plus or minus 0.8 seconds, taking reaction time into consideration. Some time later, however, I examined the stopwatch, and discovered that I may have read it wrong in all the excitement, and time may have been 05:48:31.1, which was closer to the predicted reappearance of 05:48.9 (or 05:48:54). In any case, I do not think that I will be sending this timing off to either IOTA or ILOC.

Oh well, I was only doing it for fun anyways. But, by the way, just out of curiosity, did anyone else witness the occultation of Spica. Was the reappearance closer to 05:48:01.1 or closer to 05:48:31.1? Let me know!

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