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The General Assembly at Edmonton. Central photo: Marie Fidler Lichinsky receiving the richly-deserved Service Award of the Society.

NATIONAL NEWSLETTER

August, 1978

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Deadline is two months prior to the month of issue.

The 1978 General Assembly in Review

by Alan Dyer
Edmonton Centre

A Bit of History

Each year the RASC holds a national convention with an open invitation to all RASC members to attend. This "General Assembly" as it's called has grown in popularity over the years and today is considered by many independent judges as one of the finest astronomical gatherings in North America (perhaps even the world!). The G.A. is a little different than some of the other well-known annual astronomical meetings (such as Stellafane, Riverside, the Apollo Rendezvous) because each year it is held in a different location. There are now 19 Centres across Canada, and of these, the major Centres are all given the opportunity to host the G.A. (Though whether you consider this opportunity an honour or a chore depends on whether or not you are one of those lucky people who end up being volunteered to plan that year's G.A.!)

However, the G.A. has not always hopped from Centre to Centre across the country. Up until 1962 it was never held outside of the Toronto-Hamilton area, and was in fact held in the month of February. But in that year members of the Edmonton Centre convinced the National Council to take a chance – hold the General Assembly out west, and on the Victoria Day weekend in May, a long weekend so that anyone from across Canada would be able to attend, and perhaps make a vacation of it.

Since 1962 the G.A. has generally alternated between East and West Centres each year. By 1970, eight years later, the G.A. wheel had turned full circle and it was once again Edmonton's

turn to act as hosts. Then another eight years passed (all too quickly it seemed!) and delegates found themselves once more back in Edmonton for the 1978 General Assembly.

That was the Weekend that was (May 19–22, 1978)

Most delegates began arriving at the University of Alberta campus on the Friday afternoon. (We use the term "delegate" fairly loosely – anyone who attends a G.A. is a delegate, though he or she is not necessarily at the G.A. in any official capacity, though all delegates in effect represent their home Centres.) By the time the RASC invasion of Edmonton had stopped, about 170 delegates had registered from every Centre except St. John's, Windsor, and Niagara. (Shame!) Of these, 56 delegates were from Edmonton, almost 60% of our Centre membership, a record turnout at a G.A. from the local Centre if ever there was one.

The first evening (Friday) was a social evening held at historic Fort Edmonton Park, an exact replica of the Hudsons Bay Company fort which stood until 1915. Along with the Fort itself, the Park also contains "1885 Street", a reconstructed version of the shops and buildings of downtown frontier Edmonton. For many people it was a chance to learn a little of the history of the area. But the main function of the evening was to enable delegates to get together, to renew old acquaintances, to meet new friends, and to chat about what other RASC centres have been up to. To top off the evening a hearty meal of authentic buffalo meat on sourdough bread was served, accompanied by cranberry punch – a true frontier meal!

Saturday was a very busy day. Starting at 9 AM and running till 3 PM (with an ample break for lunch of course) were the Paper Sessions. An annual feature of each G.A., this year's Session featured 15 short talks on a variety of amateur astronomical topics. The rest of the afternoon was devoted to more informal presentations, such as the World Premiere of the Ottawa Centre's epic motion picture "The Indian River Saga."

During the day the Display Room was open for viewing, and there was much to see. Exhibits of observing results, of Centre activities, and of some of the finest amateur astrophotography ever seen at a G.A. were set up by various Centres and individuals. This was all part of the 1978 Observing and Display Competition, which, needless to say, gave the judges a very difficult time. (For further information on the Competition results, see the accompanying article.)

Saturday evening was set aside for the Annual Banquet, which featured the retiring Presidential Address from Dr. Alan Batten entitled "*Whither Leads Urania*?" It was a thought-provoking assessment of the state of the RASC, of its problem areas and of its tremendous strengths.

On Sunday morning it was off on the buses once again for a tour of Petro-Chemical Row, the heart of industrial Edmonton, and a quick drive through downtown Edmonton itself. The tour also included stops at two of the most spectacular of the new sports facilities built for the 1978 Commonwealth Games – the 40,000 seat Commonwealth Stadium and the huge Aquatic Centre. Then it was back to the University for the afternoon's agenda, which included the Annual Meeting of convention delegates for discussion and voting on various items of RASC business.

Sunday evening was a chance to do some real astronomy. Delegates were treated to a tour of the brand new 50cm telescope at the Devon Observatory, built, owned and operated by the University of Alberta at a site just outside the city of Edmonton. From there the buses converged on Coronation Park and the Queen Elizabeth Planetarium. A forest of orange sprouted on the front lawn as telescopes (mostly Celestrons it seemed) were set up to view the planets, the moon, and the lovely (!) glow of perpetual northern twilight.

While half the people were outside viewing the real sky, the other half were inside the Planetarium to view the then-current production entitled "*Impact*." All-in-all, it was a beautiful evening – fine skies, lots of telescopes to look through, four planets to look at, the money-saving G.A. Sale at the Planetarium's Bookstore and Telescope Shop, the great RASC East-West football game (the East won!), and the finale of the whole G.A. – the awe-inspiring RASC human pyramid, with 15, count 'em, 15 fearless RASCals defying gravity (and their own sanity) just so they can get everyone to take a picture of them!

Sunday evening was the close of the G.A. for most people. Come Monday the delegates began to scatter in their separate ways back home across Canada. A few stayed on to partake in our Monday morning tour of Elk Island National Park. But by afternoon it was all over, and several months of planning were now complete. It was hard to believe!

Recovering from it all

The G.A. is like a time-warp: You enter it on Friday afternoon and emerge from it sometime on Monday, oblivious to what went on in the outside world during that time. All you know is you had a great time!

The G.A. is one of the RASC's greatest selling points. It's a pity that more of our 2500 members have not been able to attend one, for whatever reason. If ever the G.A. comes to a town near you, be sure to go. We can almost guarantee that it will be an astronomical weekend you'll not soon forget.

In conclusion, we wish to thank all those who came to Edmonton this year and made it all worthwhile. And thanks to the superb crew in the Edmonton Centre who assisted in the planning, or who simply attended – you're all great! And thanks to the weatherman for the fantastic weekend – it was a relief to us all.

See you in Edmonton in 1986? If you don't plan that far ahead, why not try London, Ontario for the G.A. in 1979 (May 18–21), or perhaps we'll see you somewhere along the Eclipse Path on February 26?

A Successful Observing Competition

by Alan Dyer
Edmonton Centre

The RASC is fast gaining a reputation as an organization well-known for the quality and quantity of its amateur observations. But what vehicle do these observers and astro-photographers have to exhibit their work at a national level to the rest of the RASC? One medium of course is the *NATIONAL NEWSLETTER* which is distributed to each RASC member. Another is the annual General Assembly itself. This year at Edmonton's General Assembly, as with G.A.'s of the past few years, one of the features was an extensive Observing and Display Competition. Each year the interest in these Competitions has grown, and certainly the 1978 contest in Edmonton was the biggest yet. A total of 33 projects were entered from across Canada, from members in 11 of the now 19 RASC Centres, plus an entry from one unattached member in B.C. and each year the *quality* of the work increases, much to everyone's delight, and the judges' dismay!

Another interesting fact was that in our 1978 Competition, 18 of the 27 people who entered exhibits had not participated in any of the previous years' Competitions, such as in Calgary and Toronto. It shows we are attracting more and more people out of the woodwork and into the limelight. That one fact alone is very encouraging and bodes well for the future of the RASC.

Here then is a brief summary of the winners in each of the contest categories:

1. *Best Centre Display*: The Saskatoon Centre, for their exhibit of prints and slides depicting Centre activities. THE PRIZE: 3 recently published astronomy books for their Centre library.
2. *Best Group Project*: Doug Welch and Robert Dick (Ottawa Centre), for their display of a home-built Ebert Spectroscope along with their high-dispersion atlas of the solar spectrum. THE PRIZE: a set of 6 Meade Research-Grade eyepieces.
3. *Best Photometric Project*: (only one entry here, but an excellent one!) Doug Welch (Ottawa Centre), for his exhibit of visual light curves of several rapidly-varying objects observed over the past two years. THE PRIZE: A $50 Gift Certificate from Celestron International.

4. *Best Special Purpose Instrument or Reducing Technique*: (a tie in this category) Larry C. Coldwell (Halifax Centre), for his display of a Canadian multiple-mirror telescope. THE PRIZE: an Edmund RKE eyepiece. Mario Lapointe (Quebec Centre), for his detailed project report on "Sensikilisation de Film par Fomine." THE PRIZE: a $50 Gift Certificate from Tele-Optics.
5. *Lunar, Planetary, Comets and Minor Planets:*
   A. *Visual* – Mark Capstick (Edmonton Centre), for his extensive report and analysis of visual observations of the Galilean satellites. THE PRIZE: a mounted copper-plate etching of the moon.
   B. *Photographic* – Bill Krosney (Winnipeg Centre), for his two beautiful prints of a thin crescent moon. THE PRIZE: a set of 4 Sky and Telescope Spotlight Series prints.
6. *Solar*: Following the rules of the Competition, it was the Judges' decision not to award prizes in either the Solar Visual or Solar Photographic decisions.
7. *Deep-Sky (Clusters, Nebulae, Galaxies, etc.)*:
   A. *Visual* – Philip Teece (Victoria Centre), for his beautiful set of sketches of deep-sky objects. THE PRIZE: a boxed set of Astro-Cards, plus a $25 Gift Certificate from Roger Tuthill, Inc.
   B. *Photographic* – Craig McCaw (Vancouver Centre), for his collection of incredible deep-sky shots, in color, produced with a cold camera of his own construction. THE PRIZE: A copy of "Astrophotography Near City Lights", and an Edmund RKE eyepiece.
8. *Atmospheric Phenomena (Aurora, Meteors, etc.)*:
   A. *Visual* – No entries were received for this category.
   B. *Photographic* – (another tie!) Allan Cook (Victoria Centre) for his striking set of 6 Cibachrome prints of aurora. THE PRIZE: a set of 8 "Astronomy" magazine art reprints.
   Bob Worthingham (Edmonton Centre), for his remarkable series of photos showing the formation of a funnel cloud. THE PRIZE: a set of 12 Astro-Posters.

Lastly, there was a special Judges' Choice Award consisting of an Edmund Astroscan 2001 telescope, which the judges could present to any individual, group, or Centre that made a particularly outstanding showing at this year's contest. It was to everyone's satisfaction that this prize went very deservedly to the Ottawa Centre for their terrific work over the past two years, much of which was in evidence at the Edmonton G.A. Good work, people – we'll leave it to all your 200 members to fight over the Astroscan!

And to everyone who entered this year – THANK YOU one and all for helping to make our Competition a success. It was a small dream come true! To those who did not win a prize, remember, it is not the winning that counts. The fact that you were there and that you gave others an opportunity to see your work is by far the most important consideration.

In conclusion, we would like to thank the following companies for their tremendous support through the donation of prizes:

Astro-Cards
Astronomy Magazine
Celestron International
Edmund Scientific Corp., Toronto
Everything in the Universe
Hansen Planetarium, Salt Lake City
Joseph A. Cocozza, Publisher
Queen Elizabeth Planetarium, Edmonton
Roger Tuthill, Inc.
Sky Publishing Corp.
Tele-Optics, Calgary
University of Toronto Press
Wadsworth Publishing Corp.
W. B. Saunders, Publishers

Nouvelles des Centres Québécois

de Damien Lemay

CENTRE D'ASTRONOMIE DE MONTREAL

L'observatoire du Québec au Mont Mégantic est devenu opérationnel au printemps. La publicité qui lui a été accordée a créé un veritable réveil dans le public, à en juger par l'intérêt démontré lors de l'Expo-Sciences de Montréal, du 24 au 30 avril, au Complexe Desjardins. La S.A.M. y avait un kiosque qui attira une foule inhabituelle et depuis, le nombre d'appels téléphoniques et le courrier qui entrent au secrétariat ont subi une hausse soutenue. Il semble bien que le concept de "loisirs scientifiques" est définitivement en train de prendre racine.

On attend la visite prochaine du Dr Charles Berto de l'Observatoire de Paris (ex-président de la Société astronomique de France) qui prononcera une conférence sur les NOVAE.

La S.A.M. fête cette année le l0ième anniversaire de son incorporation et des festivités marqueront cet événement. Le Québec Astronomique de juin est un numéro spécial faisant l'historique de cette decade de progrés.

Les amateurs qui ont du trouble avec l'alignement optique de leur télescope de type Newton sont invités à consulter l'article de Claude-A. Picard dans le Québec Astronomique de mai '78, page 13. Cela devrait solutionner la plupart de leurs problèmes.

CENTRE DU QUEBEC

L'assemblée générale annuelle du 7 juin a donné lieu au nouvel exécutif suivant:

Ancien président:	Jean-Pierre Bernier
Président:	Paul Darisse
Vice-président:	Docteur Eloi Bolduc
Secrétaire de la société:	Réjean Dutil
Trésorier:	Jean-François Lallier
Secrétaire de l'exécutif:	Mario Lapointe
Directeur des observations:	Giam Carlo Taddei
Directeur des conférences:	Jean-Marie Fréchette
Bibliothécaire:	Benoît Talbot
Conseiller pour 1 an:	Michel Lavoie
	Charles Thériault
Conseiller pour 2 ans:	Maurice Leclerc
	Alphonse Tardif

Dans le bulletin de mai 1978 (page 2), il y a un communiqué intéressant à l'intention de ceux qui aimeraient faire des calculs d'éphémérides. Il se lit comme suit:

Le U.S. Naval Observatory vient de publier un livre, ALMANAC FOR COMPUTERS, de 125 pages donnant les expressions mathématiques pour le calcul par calculateur ou par ordinateur des coordonnées du soleil, de la lune et des planètes avec une erreur maximale de 0.2 minute d'arc. II y a aussi une section permettant de trouver la position apparente de 176 étoiles. De plus, on trouve des formules pour calculer l'altitude, l'azimut, les corrections à la réfraction, le lever, le coucher, le début de l'aurore et la fin du crépuscule. Finalement, il y a une section plus avancée permettant de calculer les positions à 0.1 seconde d'arc. On peut aussi obtenir les programmes sur cartes perforées ou sur ruban magnétique pour usage avec un ordinateur.

U.S. Naval Observatory,
34th and Massachusetts Ave, NW,
Washington, D.C. 20390

Les etoiles doubles binaires

de Damien Lemay
Rimouski

Ce terme désigne les étoiles doubles dont les composantes sont en orbite autour de leur centre de masse. Elles sont un sujet d'observation intéressant pour n'importe lequel télescope d'amateur, et pour les professionnels, c'est un outil important pour déterminer la masse précise des étoiles.

On reconnait quatre (4) catégories d'étoiles doubles binaires, c'est-à-dire visuelle, astrométrique, spectroscopique et à éclipse. Les trois dernières se révèlent respectivement par leur mouvement propre, leur vitesse radiale et leur changement (répétitif) de magnitude. La premiere categorie fait le sujet du présent article.

La resolution de notre ceil est d'environ 4 minutes d'arc ou 1/15 de degré. Cependant, pour tenir compte de la qualité variable des équipements d'amateur et de la stabilité de l'atmosphère, en pratique il est préférable de ramener cette limite à 8 minutes d'arc. Ccci correspond à l'angle séparant les lignes suivantes, lorsque à dix (10) pouces de votre œeil.

A retenir que le diamètre angulaire de la Lune et du Soleil est approximativement de 30′.

Lorsque nous observons une étoile double au télescope, il est possible de la résoudre si la separation réelle, multipliée par le grossissement du telescope, est de 8′ d'arc.

Par ailleurs, il est admis que le grossissement maximum d'un télescope est son diamètre en pouce multiplié par 60. On peut donc estimer le pouvoir séparatcur d'un instrument grâce à la relation suivante: 8′ d'arc/DX60 = 8″/D ou D est le diamètre du télescope exprimé en pouce.

TABLE I

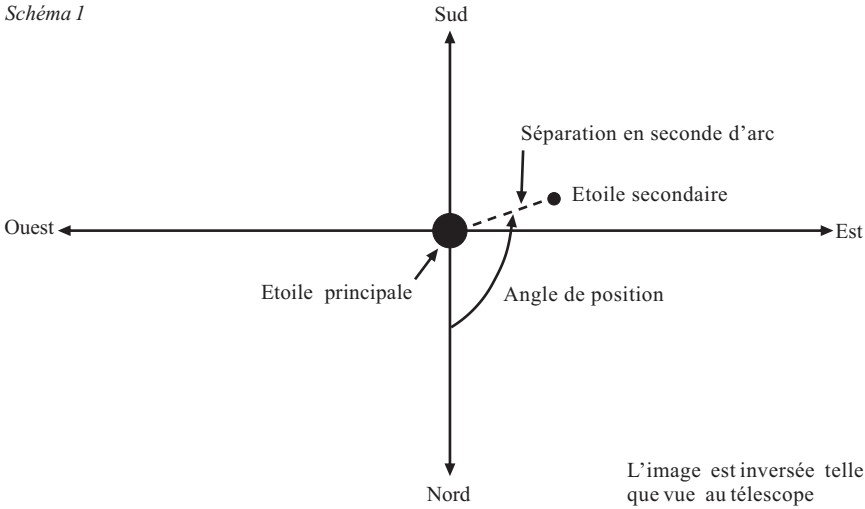
Diamètre de l'instrument	Grossissement maximum	Pouvoir séparateur
2.4 pouces ou 60 mm	144	3.3″
4 pouces ou 100 mm	240	2.0″
5 pouces ou 125 mm	300	1.6″
pouces ou l50 mm	360	1.3″
8 pouces ou 200 mm	480	1.0″

Lorsque la différence de luminosité entre les composantes est de cinq magnitudes ou plus, la separation minimum entre les composantes doit être proportionnellement plus grande.

L'observation visuelle est supérieure à la photographic, parce que l'œil peut profiter des brefs instants ou l'air est stable (entre les scintillements), alors que la pellicule enregistrera des images d'étoiles grossies par ce scintillement, rendant plus difficile la séparation des composantes. Pour les amateurs, il faudrait aussi ajouter le problème d'un guidage adéquat.

Pour les professionnels, la détermination de l'orbite des étoiles doubles fournie les données de base pour calculer avec précision les masses stellaires. Les étoiles dont les masses sont ainsi déterminées deviennent des jalons importants pour l'astronomie. Ces systemes ont habituellement des périodes de plusieurs centaines d'années, aussi doivent-ils être observes pendant de nombreuses années avec un appareil de précision spécialement construit à cet effet, c'est-à-dire le "Micrometre à fils". Cet appareil permet de mesurer l'angle de position de la moins lumineuse par rapport au nord, et la séparation en seconde d'arc, la plus lumineuse étant à l'origine du systéme.

Schéma 1



La construction d'un tel appareil est un projet à la portée des amateurs.

La découverte et l'observation des étoiles binaires a été l'appanage d'astronomes célèbres, à titre d'exemple mentionnons Sir William Herschel, Wilhelm Struve, Robert Grant Aitken, S. W. Burnham, etc...

La table suivante contient une liste abrégée d'étoiles binaires observables dans des instruments d'amateurs. Ces données sont pour l'année 1970.

Nom	A.D h	m	Dec. o	′	Mag.	A.P. Degre	Sep'n ″	Period Annee
λ Cas.	0	29.0	54	15	5.4–5.7	179	0.6	640
i Cas.	2	24.9	67	11	4.7–6.9	237	2.3	850
α Gem	7	31.4	32	00	2.0–2.8	131	1.8	420
ε Hyd	8	44.2	06	36	3.7–7.1	278	2.8	900
γ Leo	10	17.2	20	06	2.1–3.4	123	4.2	620
i Leo	11	21.3	10	48	4.0–6.7	181	1.1	190
γ Vir*	12	39.1	–01	11	3.5–3.5	303	4.6	172
ζ Boo	14	38.8	13	57	4.5–4.5	307	1.1	123
ζ Her	16	39.4	31	41	2.9–5.5	231	0.9	34
μ Dra	17	04.3	54	32	5.8–5.8	59	2.0	480
τ Oph	18	00.4	–08	11	5.2–5.8	274	1.9	280
δ Cyg	19	43.4	45	00	2.9–6.3	238	2.2	540
μ Cyg	21	49.5	28	31	4.7–6.0	291	1.9	510
ζ Agr	22	26.2	–00	17	4.3–4.5	245	1.8	850

* Voir l'article de M. Georges Lovi à propos de cette étoile, dans *Sky and Telescope* de mai 1978, page 412.

Réf.: *Visual Observing of Double Stars*, par C.E. Worley. *Some Bright VisualBinary Stars*, par Jean Meeus. *All About Telescopes*, par Sam Brown.

Simon Newcomb Award

At the meeting of the Council of the RASC on May 21, 1978, a proposal from the Halifax Centre, the *Simon Newcomb Award*, was adopted. The award is named after a native of Nova Scotia, an astronomer who was the foremost man of scicnce of his time in America.

Simon Newcomb (1835–1909) was born at Wallace Bridge, N.S. At age 18 he moved to Massachusetts and later to Washington, D.C. where he spent his entire professional life. In 1861 President Lincoln commissioned him as Professor of Mathematics and Astronomy in the United States Navy. For 16 years he carried on astronomical observations at the Naval Observatory. From 1877 to 1897 he was Superintendent of the American Ephemeris and Nautical Almanac Office. Newcomb became the world authority on the orbital dynamics of the Moon and planets. Among the many honors which-he received were the Gold Medal of the Royal Astronomical Society (1874), the Copley Medal of the Royal Society of London (1890), President of the American Association for the Advancement of Science, the first President of the Astronomical and Astrophysical Society of America (the present American Astronomical Society), and seventeen honorary degrees from leading universities in the United States and Europe.

Rules:

Topics

Awards will be given for articles relating to astronomy, astrophysics or space science. Topics should interest average to well-informed amateurs and may be of current or historical interest.

Presentation

Articles should be 1000–1500 words, written in proper grammatical form and presented typewritten and double-spaced. Diagrams need not be in finished form but should be complete and ready for drafting. Photographs may also be submitted and if possible original negatives should accompany the submission.

Eligibility

Any RASC member in good standing may submit articles. The intent of the *Simon Newcomb Award* is to recognize literary ability among non-professional members of the Society.

Submission of Entries

Articles must be received by the Awards Committee of the RASC between January 1 and March 31. **Members of Centres** must first submit the entries they wish to their Centre Executive with the Executive choosing the entries they wish to represent their Centre. It is the responsibility of the Executive of the Centre to ensure the entries are received by the deadline above. **Unattached Members** will submit their entries to the Awards Committee directly.

Judging

Articles will be judged by the Awards Committee. Criteria shall include scientific accuracy, originality, and literary merit.

Presentation of Award

The award will be presented at the General Assembly by the Halifax Centre representative to the winner (or a representative of the winner's Centre). The award will remain in the hands of the winner's Centre for display and will be returned to the National Office by April 1 of the following year. If the winner is an unattached member, the award will be displayed at the National Office of the RASC. The award will be described at a later date once its design has been established.

Adopted by the National Council
Edmonton General Assembly
May 21, 1978

Astrophotography: A Personal Approach
Part II

by Alan Dyer
Edmonton Centre, Queen Elizabeth Planetarium

When you get into photography with a telescope itself, however, the situation becomes more complex. Now you have to invest in not only all the basic equipment that a visual observer would need, but much more – camera adapters, drive correctors, guiding units, illuminated-crosshair eyepieces, a variety of lenses, maybe some filters, *and* a good carrying case in which to put all the paraphernalia!

But even all this is not necessary for simple telescopic photography. Prime focus pictures of the moon and sun can be taken with a minimum of fuss.

Planetary photos require a bit more work – a good eyepiece for projection, a very steady drive, and preferably a camera with a special viewing screen to aid focussing. Deep-sky photography is the most bothersome of all, but potentially the most rewarding, requiring a telescope that seems to depend more on electronics than it does on optics!

While we're on the subject of deep-sky photography, this is a good place to put in my 2¢ worth about lenses. Whether it be wide-angle, normal, or telephoto, if you are buying a camera lens that you know is going to be used to take pictures of star fields and nebulosity, then buy a good lens. Don't buy some cheapy that you'll have to stop down to f/5.6 or f/8 in order to get good results. Remember, a sky full of stars is *the* toughest test of a lens, and any aberrations will show up noticeably. If you have to stop down a lens considerably to get it to work, you're creating more work for youself by doubling or quadrupling exposure times unnecessarily. This creates severe reciprocity problems, with the added complication that reducing lens aperture also reduces the lens's ability to record faint stars and nebulosity, the very things you are trying to record. A 40-minute exposure at f/5.6 will never show as much sky detail as a 10-minute exposure at f/2.8. All your lenses should be of such a quality so as to allow you to shoot at full aperture, or, in the case of extremely fast lenses, stopped down no more than 1 or 2 f/stops to f/2 or f/2.8.

True, fast f/ratios pick up sky fog more, but if sky fog is a severe problem, then your site isn't good enough. Stop down the lens and you reduce sky fog, *but* only by sacrificing nebulosity. The best solution is an observing site where sky fog and nebulosity are sufficiently differentiated so as to allow photography of one without picking up the other. Of course, there are other tricks such as using red-sensitive emulsions and red filters, but I won't bother to go into those. Besides, what if you want to shoot colour, which I always feel gives a more spectacular result than B&W?

With regard to films, I always prefer to stay away from super-fast emulsions and tricks like push-processing, especially in colour. For deep-sky work my favorite is Fujichrome R-100, being nicely red-sensitive and fine-grained. I avoid the GAF films like the plague – they are too grainy and will never make an acceptable colour print. I also stay away from B&W films in general, prefering instead to stick with colour slide films. That way I get results that are immediately presentable to large groups of people without having to go through the hassle of printing in order to see your picture. Colour slides can always be printed later at your own leisure if you want prints for exhibition. I've found the Cibachrome process gives very fine results in the printing of astrophotography.

However, enough about films and lenses, because there is a third major point I wish to emphasize: Don't load yourself down with too much gadgetry and geegaws that only serve to confuse and frustrate. *More* equipment doesn't necessarily mean better pictures. On any photo-taking session just take what you need and no more. (Celestron owners take note: You really only need two Allen wrenches to set up your scope. Why take along the whole set each time?) A lot of extra junk just clutters up your case and your tasks for the evening. And *that* is another thing that you should always have – a specific task or goal for each session.

Upon setting out for a night's observing session say to yourself, "Tonight I'm going to photograph M42," and go out and do it. Don't try to do too much in one evening, especially if it involves switching from deep-sky to planetary to prime focus to piggybacked photography, etc. Even if you only get 1 or 2 good photographs out of night's work, you've done well.

Camera cases should be well-organized, enabling you to get at all your equipment easily without having to rumage through layers of useless junk. It's an old adage, but everything should have its place, and everything should be in that assigned niche. It's not just a matter of neatness, something you'll soon find out as your fingers fumble around in the darkness searching for that missing cable release!

Of course, for those fortunate enough to own permanent observatories the situation is somewhat different, but for those of us relegated to setting up and taking down a complex array of hardware each time we want to use it, it is required that we be very well practised in the procedure. The mundane preparation of getting ready to photograph should never get in the way of the actual photography.

Which gets us to point four – Know your equipment well. Practise setting it up during the day. These sort of dress rehearsals will tell you what problems to expect when trying to attach object A to object B. You don't want any surprises out in the field in the wee hours of the morning when that certain piece of equipment won't fit onto the telescope or won't focus or whatever. Nature will provide enough problems to contend with. Don't aggravate the situation by way of your own ignorance.

In this department is the old problem of aligning your telescope on the North Celestial Pole, so necessary for successful celestial photography. There are dozens of methods for doing this. Pick one that works for you and perfect it. Spending 2 hours aligning on the Pole and only 1 hour photographing is ridiculous. Believe me, I learned that the hard way!

Here's point five: If you're starting out in astrophotography, do the following – Load your camera with Tri-X (or possibly Plus-X or even a medium speed colour slide film) and shoot *everything*, making sure to record all the pertinent exposure data. This is the best way to become familiar with what the best exposure is for all the celestial objects you'll want to photograph. Once you acquire a standard set of exposure times for all types of objects using your "standard" film, it's an easy task to convert those exposure times when you switch to a faster or slower film in the future.

In other words, when you're starting out, keep the variables down to a minimum. Use one standard film and one standard, well-proven developer (Microdol-X perhaps). Don't experiment right from the start with exotic films and strange developers or darkroom trickery. Learn your basic at-the-telescope techniques and exposure data. Then and only then should you branch out into new areas in order to improve the results. With too many variables too many things can go wrong and you won't know what to blame for the poor photographs you're getting.

As you progress through the various levels of astrophotographic complexity, I think it makes sense to try to perfect a certain technique before moving on to some newer, loftier realm. As an example, I hear of people wanting to get into "cold-camera" photography because they hear it gives spectacular results. But these are people who are simply not ready to make such a quantum leap in their techniques. If you can't produce consistently good results with conventional deep-sky photographs, then you're certainly not ready to graduate to the "exotics" like cold camera work. You'd be wasting your time and money, and the equipment would only turn into a white elephant, perhaps discouraging you from the whole process of astrophotography.

There is one personal bias that I want to conclude with, one that concerns the question of why. Why bother with all the expense and frustration? Why do astrophotography at all? I doubt if it's something that really needs explaining to any devotee of amateur or professional astronomy. Astrophotography is just one expression of the desire to see and learn more about what's up there, perhaps to capture on film something of the invisible and mysterious aspect of the universe.

Sure, amateur astrophotography can be a valuable research tool, as has been proven on many occasions. But I approach astrophotography along a different path. I prefer to enjoy it for its aesthetic qualities. To me a picture of some fuzzy little blob that only another astrophotographer can appreciate, no matter how difficult it was to achieve that photo, is not particularly impressive or satisfying. *But*, project a slide filled with thousands of stars and wreaths of nebulosity – show it even to the uninitiated layman, and you'll get the reaction, "Wow, I didn't realize there were so many stars or that they were so colourful!"

If it's an astrophoto that anyone can appreciate, even without fully understanding the subject matter, then it's a good picture. And it's those sort of results that are worthwhile achieving.

The James Hargreaves Gift

by Fred Lossing
Ottawa Centre

A member and former President (1951) of the Ottawa Centre, Mr. James Hargreaves, has made a valuable and generous gift of money and equipment to the Ottawa Centre. Mr. Hargreaves, a retired engineer living in Ayers' Cliff, Quebec, is well known for his work on the structure of the solar corona. He was an active and valued member of eclipse expeditions to Brazil and North Africa, and has retained his interest in and enthusiasm for astronomy. He has made the Centre a gift of much of his solar eclipse equipment, as well as a cash gift of $1,200.00. Mr. Hargreaves' generosity will greatly benefit our Centre, by providing further facilities at our new Indian River Observatory. The Observatory is located on the property of the Mississippi Valley Conservation Authority, close to the historic mill of Kintail near Almonte. The numerous active amateur astronomers of our Observers Group, who will make good use of this valuable equipment, wish to express their special thanks to Mr. Hargrcaves.

The 1979 RASC Competition

London, May 18–21, 1979

General Rules

1. Entrants must be RASC members in good standing.
2. All work must have been done during the five (5) years preceding May 1, 1979.
3. All entries must be original and cannot have been submitted to any previous RASC competition.
4. Each entry may be in one category only.
5. An entrant may submit only one entry in each category.
6. Mandatory entry forms will be available Jan. 1, 1979, and must be returned before May 1, 1979.
   Information and entry forms are available from London Centre, RASC, 1507–205 Oxford Street East, London, Ontario, N6A 5G5. It should be pointed out that the London Centre will soon have a Post Office Box number for the General Assembly.
7. Entries must be displayed at the 1979 General Assembly in London, although the entrant(s) are not required to appear in person.
8. Judges will assign prizes to the various categories as they see fit. Prizes will not necessarily be awarded in each category, and multiple prizes may also be awarded at the judges' discretion. In judging, all relevant factors will be taken into consideration, including observing equipment and conditions and the experience of the entrant(s) involved. Clarity and originality of presentation arc very important.
9. Group prizes will be shared among the contributors.

N.B. Please tell us about any special or unusual requirements your project may require. We will do our utmost to ensure that your project is presented in the manner you wish, but if you

don't tell us well beforehand, it may be difficult or impossible to make special accommodations for you at the last minute.

Contest Categories

I. *Centre Display*: Includes astrophotography, centre projects and activities and will be judged on both subject and presentation. One display is permitted per centre.

II. *Observational Equipment or Techniques*: Includes reports or exhibits of construction or implementation of devices or methods of gathering or reducing information of any sort.

III. *Amateur Radio Astronomy*: Includes any non-professional project involving radio wavelengths; construction of special purposes or applications of such equipment.

IV. *Open*: Any astronomical project which the entrant feels does not fit the other classifications.

V. *Solar Eclipse or Solar Activity*: Hopefully, there will be many entries based on the February 26 Eclipse!
   A. Photographic B. Visual

VI. *Deep Sky Project*: Includes treatments of any objects or phenomena generally existing outside the limits of our Solar System.
   A. Photographic B. Visual

VII. *Solar System Project*: Includes lunar, planetary, cometary or other objects or phenomena generally existing inside the limits of our solar system; specifically excluding the sun itself.
   A. Photographic B. Visual

VIII. *Best Song*: A "special" category, with SEPARATE JUDGES. The lyrics must deal with astronomy or with the RASC, and they must be original. Each Centre is permitted one entry. Centre members must present the entry live, at the time of judging, Saturday night at midnight. Kazoos, juice harps, ocarinas and other acoustical embellishments will be allowed. There will be a special trophy in this category.

Summary of Papers Presented at Edmonton General Assembly

Observing Dwarf Cepheids for Fun and Profit

John R. Percy (Department of Astronomy, University of Toronto) and Robert Dick and Douglas Welch (Ottawa Centre)

Dwarf Cepheids are pulsating variable stars with periods of 1 to 6 hours and amplitudes of $0^m.3$ to $1^m.0$. Visual observers can therefore follow these stars through one or more cycles on a single night, and see the results of their observations almost immediately. Studies of the changes of the periods of these stars can shed some light on their nature and evolution. Visual observations can contribute significantly to these studies.

As an example, some recent visual observations of the dwarf Cepheid *CY Aqr* by Robert Dick and Douglas Welch (Ottawa Centre, RASC) published in *Astronotes* were analyzed.

From Hess to HEAO: The History of High-Energy Astronomy

Peter Jedicke (London Centre)

In modern science, Astronomy has a much broader meaning than it did just a few centuries ago. The most amazing expansion of Astronomy's scope has been the range of wavelengths in the electromagnetic spectrum. Although many students take its results for granted, Astronomy of high-energy photons is still a new and only partially-explored territory. From the

earliest observations with the gold-leaf electroscope to the most sophisticated satellite equipment, the paper traces the significance of this branch of the science.

Amateur-Built Multi-Mirror Telescope

Lary Coldwell (Avonport, Nova Scotia)

An experimental feasibility study was undertaken to determine if a multi-component parabolic mirror could be formed from small, conventional mirror blanks. Four 4¼″ Pyrex mirror blanks were ground together on a supporting base, using hand grinding techniques. The problems encountered were: constructing a rigid supporting block to hold the mirror blanks fixed, grinding precautions, alignment of components, mechanical restrictions on image quality. Benefits include reduced grinding time, lighter mirror per unit aperture, components can be aluminized separately, possible binocular construction by separating pairs of components, and a hole for Cassegrain use.

A Titillating Testing Technique or Milliès-Lacroix Mirror Marvel

Peter J. Edwards (Halifax Centre)

The amateur telescope maker of today has inherited a wealth of testing techniques to assure himself of top optics. One of these techniques has been explained to amateurs by Adrien Milliès-Lacroix, an ATM from France. His procedure has been applied not only to parabolic primary but also to a hyperbolic Cassegrain secondary with excellent results. An illustration is the description of its application to a 10″ Cassegrain system in this paper.

Qualitative Polar Alignment of an Astronomical Telescope

Doug Beck (Saskatoon Centre)

In order to take long exposure astrophotographs or do serious observing it is necessary to align the polar axis carefully. The tracking error due to misalignment is first examined, then a qualitative method for alignment of the polar axis is outlined. This method assures that the tracking error in declination will be smaller than the tolerance prescribed by the observer.

A Guide to Guiding

Jack Newton (Toronto Centre)

The paper deals with the problems encountered when guiding a 12.5″ f/4.6 Newtonian telescope. Different systems of guiding are discussed, including the use of a 3″ refractor and an 8″ Celestron for off-axis guiding, as well as a home-made adapter for guiding through the main optics. Several methods of attaching the guide telescope to the main instrument to avoid flexure are covered in detail. Special illuminated guiding eyepieces and specialized equipment to aid in astrophotography are discussed.

Scientific Models

M. Holmes (Hamilton Centre)

Various categories of models are examined. In particular, some physical model processes are described. Types of model classification are presented, and the effects of scale are discussed, with the effect on astronomical comprehension considered. Illustrated.

The Moon and Fundy

Roy L. Bishop (Department of Physics, Acadia University)

The tidal aspect of gravitation produces some of the most interesting phenomena in the Universe, from the structure of M51 and the rings of Saturn, to moonquakes and the dulse industry in eastern Canada. Induced by the moon and sun, the largest tides on Earth occur

within the borders of Canada. Two months ago the Federal Government and two Provincial Governments committed $33M to detailed design and engineering studies of a tidal power plant. In this paper, a brief description of the tidal phenomenon is presented together with a description of Fundy tides and the location and design of the proposed structure for extracting energy from these tides.

The Canadian Solar Eclipse Expedition to Labrador, 1905

Mary Grey (Ottawa Centre)

Considerable research and careful selection assembled a photographic account of an historic expedition. The illustrations showed the travel arrangements aboard historic river boats, the living accommodations taken along, as well as the instrumentation.

Design for a Narrow-band Solar Telescope

J. D. Jones (Castlegar, B.C.)

A proposed design for a solar telescope operating in a narrow band was described. By combining two slits with a diffraction grating in the optical path of a telescope it is suggested that an image of the sun derived from only a discrete wavelength may be formed.

Performing C.P.R. on/for the Local Astronomy Club

D. H. Fallows (Ladysmith, B.C. – unattached member)

The results of conducting Community Public Relations for astronomy, to promote interest in the subject, mainly at the local high school are presented. To date the reception has been somewhat less than anticipated. Suggestions for developing a more enthusiastic response are requested, but the feeling is strong that all centres should formulate and conduct programs with this objective in mind.

Community Astronomy: A Public Astronomy Programme for B.C.

Ken Hewitt-White (Vancouver Centre)

Community Astronomy operated in 1977–78 under funding from the National Museums of Canada in co-operation with the H. R. MacMillan Planetarium in Vancouver. The programme was designed to offer public education in astronomy through telescope observing sessions and illustrated lectures to schools, community centres, and other interested groups throughout British Columbia. The author describes the overwhelming public acceptance of the programme, and acknowledges the help of the Vancouver Centre with a particularly ambitious segment of the program in late March 1968.

The Mobile Planetarium of the Province of Alberta

John Musgrove and Art Pederson (Mobile Planetarium Lecturers)

The Mobile Planetarium of the Province of Alberta has been in operation for almost two years. Details of the type of programs presented and the reception are described. Public acceptance has been most enthusiastic, and one of the problems has been to accommodate the number of requests for the facility to visit communities. Communities invariably request that the stay be extended. (The planetarium itself was erected in the display area.)

The Discovery of Comet Meier (1978f).

Rolf Meier, read by Andy Woodsworth. (Ottawa Centre)

The events leading to the discovery of the comet are presented. In particular the argument leading to concentrating the sky scan to a particular area towards the sun which may be

expected to be more fruitful than searching the opposite field are described. Reporting and confirmation procedures are outlined.

Eye Injuries and the Solar Eclipse

B. Ralph Chou (School of Optometry, University of Waterloo)

The nature of eye injuries sustained during observations of the partly eclipsed sun is described. Because these injuries have serious consequences to vision, the need for adequate information in public announcements about the eclipse is a matter of concern to both amateur and professional astronomical organizations.

Note: The paper is scheduled for reprint in the October issue of the *National Newsletter*.

Amateur Radio Astronomy
Part IV

by Ken Tapping
Ottawa Centre

Into Practice

The construction and operation of a radio telescope requires, in addition to the appropriate astronomical knowledge, the level of electronics expertise consistent with the construction of a black and white television receiver given only a block diagram. It is obviously beyond the scope of a short article of this type to start at the beginning; the discussion here is limited to essentials and to points not discussed in the references. Before embarking upon the construction of any hardware, the prospective amateur is urged to read at least some of the literature mentioned at the end of this article.

The professional radio astronomer can select his site with the radio astronomical requirements as the prime consideration. This, unfortunately, is not true in the case of the amateur. In the latter case the nature of the observing site greatly influences the choice of projects which may be carried out. It is possible to indicate (at least) two criteria which limit the choice of work which may be carried out and which are usually beyond the control of the observer. These are:

(i) The nature of the electrical intereference present at the site,
(ii) The size and visibility restrictions of the site.

From hard experience it has become possible to indicate what effect various types of environment would have on the specification of the observing system and the work that may be carried out. The types of environment will be divided, somewhat arbitrarily, into Country, Suburban, City, and, for those who like a challenge, Downtown.

A COUNTRY LOCATION

Interference.

As the level of electrical interference is strongly related to the number of people per square mile, this is the best environment that one can reasonably hope for. The only significant interference will probably be man-made transmissions such as T.V., etc. This problem can be avoided by an appropriate choice of operating frequency.

Choice of Frequency

Any. (Bearing in mind the point made above).

Choice of Project

Any.

Choice of Instrument

May be entirely dictated by the requirements of the project.

A SUBURBAN LOCATION

Interference

Ignition interference and interference from electrical appliances is a problem. Trouble from Police and Taxi radio systems may occur. Badly designed (or maintained) C.B. equipment is an increasing problem. It is likely that powerful broadcasting transmitters in the neighbourhood may give trouble and necessitate special design measures. Amateur radio enthusiasts usually operate in an extremely hygenic fashion and are rarely a problem.

Choice of Frequency

Greater than 100 MHz. Avoid using 30 MHz as an intermediate frequency.

Choice of Project.

Unless operating at short wavelengths (centimeters), observations of transient phenomena cannot reliably be made. Thus Jupiter observations are not likely to be possible and only the solar bursts at centimeter wavelengths are accurately observable.

Choice of Instrument.

Any.

A CITY LOCATION

Interference

All the interference problems mentioned in the case of the suburban environment are worse by orders of magnitude. In addition, interference from the T.V. Cable system is fairly certain, and radiation from badly maintained T.V. receivers is common. Special interference cancelling techniques will probably be necessary.

Choice of Frequency

Almost certainly above 300 MHz (that is, shorter wavelengths than 1m). Choice of frequency at wavelengths longer than 30 cm or so is dictated by where there might be a clear space not swamped by man-made interference.

Choice of Project

Solar studies.

Discrete sources.

Choice of Instrument

For wavelengths longer than 30 cm or so, only the phase switched interferometer has enough invulnerability to interference. Elaborate anti-intermodulation techniques will almost certainly be required in order to operate among the strong local signals. The 432 MHz solar recordings shown in Figure 7 (see April 1978 *NATIONAL NEWSLETTER*) were obtained in such a location.

A Down-town Location

Due to even stronger interference levels than above, operation at wavelengths longer than 30 cm is out of the question. Solar studies might be possible.

SYSTEM RECOMMENDATIONS FOR PARTICULAR PROJECTS

It is dangerous to make over-specific recommendations as to the type of radiometer most suitable for use for particular amateur projects. The choice is influenced by many variables, most of which are specific to the observer, his expertise, money supply, time available and, of course, the nature of the site. Nevertheless, some tentative suggestions are made here which might serve as guidelines for the beginner in the field. Each project is discussed in terms of site requirements and the most appropriate range of wavelengths of operation.

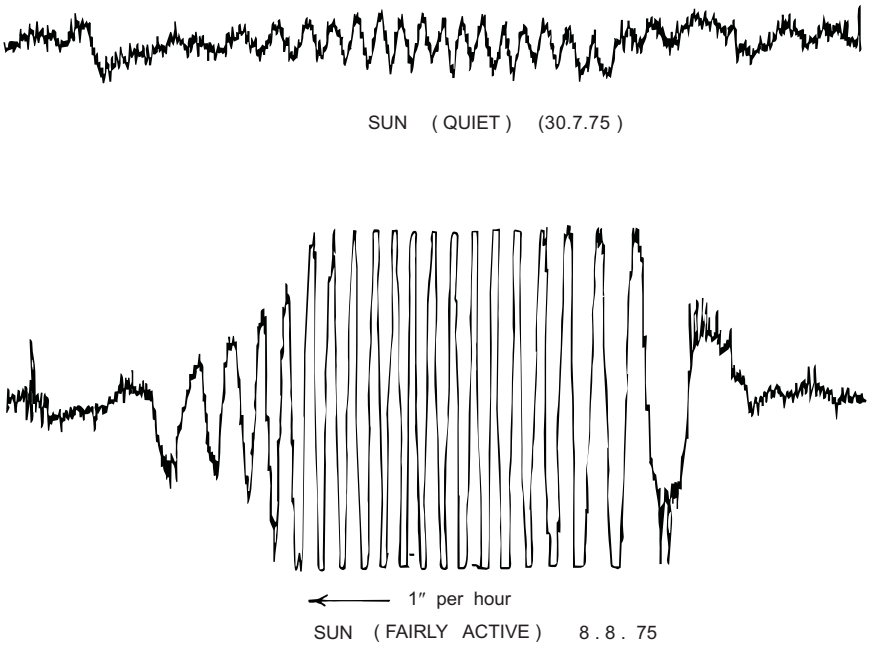


FIG. 11—Quiet and active Sun, observed using 117 MHZ phase switched interferometer.

Radiation from the Active Sun

From the amateur point of view, this project can be considered to be two projects; the study of strong, short events of seconds or minutes in duration, and the study of fainter longer (hours or days) events. This division is quite arbitrary in terms of solar physics but is more brought about by the different types of hardware used by amateurs to observe it.

The variability of solar radio emissions can be seen in Figure 11.

(i) Short Term Variations

The burst activity associated with flares and the mysterious noise storms which occur periodically are sufficiently intense to be observed by means of very simple equipment. Because the events are both short term and intense, the long term stability of the receiver need not be very good. A simple yagi antenna and a total power radiometer would be more than adequate for this work. The receiver output can be monitored aurally or recorded by means of a chart recorder. Since, however, the recordings will exhibit much of the same character as terrestrial interference but sound quite different to the ear, aural monitoring is still desirable. Because of this problem, a low interference environment is very preferable for this type of work. A chart recording speed of about ½ inch per minute should be used in order to show the rapid variations to good advantage. Rapid periodic pulsations occur sometimes but very rapid chart speeds (1 cm per second or faster) are required and the capture of one event will entail the waste of many rolls of chart.

These types of emission are normally observed at wavelengths longer than about 1 m. They are most common at about 2m.

(ii) Slow Variations

When very intense radio events occur on the sun, it is unlikely that more than one event would be occurring at any particular occasion, so it is reasonably certain that the data "seen" can be analysed in terms of the dynamics of one active region. When, however, the equipment has the sensitivity to see the basic (thermal) radiation of the "quiet" sun, that assumption can no longer be made. Whenever there are active regions present on the solar disk there is always a faint background radio emission which gets stronger as the number of regions or their activity increases. Therefore, the emissions observed by more sensitive radiometers will show a dependence upon the general overall level of solar activity as well as the violent flare type events.

The range of wavelengths which may be used for the observation of these background variations is broad, from 10m to 10 cm, but 10m to 75 cm is a good working range for the amateur. As one moves towards the shorter wavelengths, this background radiation becomes more intense compared with the short term bursts until at about 10 cm it is predominant. These radio observations provide a very good indicator of the general level of solar activity. Superimposed upon the day to day variations, the modulation due to the 27 day solar rotation and the 11 (or 22?) year sunspot cycle may be observed.

The best type of receiver for this type of work is the Phase Switched Interferometer. The separation of the antennas should NOT be more than 100 wavelengths. Country, suburban or city environments are appropriate for this type of work as the type of radiometer used is fairly immune to interference.

In all types of solar astronomy the comparison of different types of observations is very important. Radio solar observations should be compared with those made at different frequencies and at different locations and – especially – with optical data.

GALACTIC CONTINUUM RADIATION

This radiation is observable at any wavelength longer than about 30 cm and increases towards the long wavelengths. At about 10m it is strong enough to detect with a communications receiver and a simple wire antenna.

The galactic radiation may be mapped by means of a simple Total Power receiver and a single antenna having a beamwidth of less than 30° or so. Work of this type is probably only possible in suburban or country environments.

Discrete Sources

Detection of the brightest radio sources, Cygnus A, etc. is, as already mentioned, possible with amateur systems. Although detectable all the way across the radio-wave spectrum, the sources generally increase in intensity towards the longer wavelengths. Consequently, operation at wavelengths longer than about 50 cm is recommended. In order to yield unambiguous recordings of these sources a phase switched interferometer system is the most useful. This type of work is only possible in country or suburban environments. The antennas should be – preferably – further than ten wavelengths apart. This will restrict the choice of operating wavelength.

Jupiter

Detection of the meter wavelength radiation from Jupiter may be achieved with very simple equipment. A standard communications receiver tuned to a wavelength in the 10–15 m region, where there are no man-made transmissions, will do. The antenna need only be a simple "long wire" or, preferably, a dipole tuned to the observing frequency. The data can be recorded on chart or magnetic tape, or simply monitored aurally. These observations are possible in country or surburban environments.

Notes and References

Due to the limited size of this article, it is inevitable that some of the points raised in it will

require clarification. The references listed below should go at least part of the way towards answering these queries.

It is strongly suggested that the prospective amateur radio astronomer read at least some of the references as it is necessary to get a clear conception of the task one is taking on. The construction of a radio telescope is a large task which entails a considerable investment in terms of time and money. While it is inevitable that there is a degree of uncertainty in the results of a project of this nature, a period of research beforehand can considerably reduce the difficulties.

Textbooks

Radio Astronomy by J. D. Kraus (McGraw Hill)

This is the standard textbook on radio astronomy. It contains all the information that the amateur will ever need. Mathematics is used heavily in this book and makes it inappropriate for the non-mathematical enthusiast.

Radio Astronomy by Steinberg and Lequeux. (McGraw Hill)

A non-mathematical, somewhat diluted version of Kraus. Recommended.

Solar Radio Astronomy by M. Kundu (John Wiley)

This is the Bible of the solar radio astronomer.

Papers on Amateur Radio Astronomy

"*The Development of a Total Power Radiometer*" by E. Doylerush: *J. Brit. Astr. Ass.* 1969, **79**, 4

"*A Basic Radio Telescope*" by J. R. Smith: *J. Brit. Astr. Ass.* 1974, **84**, 5

This paper gives a detailed discussion of the design and use of a small general-purpose radiometer. Complete with full circuit information.

"*Amateur Radio Telescopes – Their Design and Adjustment*. Part I – Design by J. R. Smith: *J. Brit. Astr. Ass*. 1970, **80**, 5

"*Amateur Radio Telescopes – Their Design and Adjustment.*" Part II – Adjustment by J. R. Smith: *J. Brit. Astr. Ass*: 1970, **80**, 6.

"*Reduction of Radio Telescope Recordings*" by J. R. Smith: *J. Brit. Astr. Ass.* 1969, **79**, 5.

Information on circuits of amplifiers, power supplies, etc. and on antenna design and setting up can be found in:

"*VHF Amateur Radio Handbook*," published annually by American Radio League and the Radio Society of Great Britain.

Processing Service for GAF Film

by Chris Spratt
Victoria Centre

As many members are no doubt aware, the GAF Company has ceased the manufacture of their photographic films. To those in Canada (like myself) who still have GAF 200 and GAF 500 film still to be developed, please note that the only place in Canada capable of handling these films is:

GAF Canada Ltd.,
Box 1740, Station B,
2403 Stanfield Road,
Mississauga, Ontario.
L4Y lR8

Film sent for processing to the above address is sent to the United States for processing, and then returned to sender. Please allow 6 to 8 weeks for the developed film to be returned.