NOVA NOTES

Halifax Centre

Jan–Feb 1989
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1989 Halifax Centre Executive

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Notice of Meetings

LAST CALL FOR DUES

Final reminder to renew your memberships!!
Dues are: $25 adult, $15 youth, $500 life

Please renew as soon as possible to ensure that you receive your 1989 handbook without delay. You can renew at any meeting **OR** send a cheque or money order made payable to "Halifax Centre, R.A.S.C." at the address on the previous page

Date: Friday, January **20th**, 1989: **7:00 P.M.** early presentation **8:00 P.M.** regular meeting

Place: Nova Scotia Museum. Access from the parking lot and side entrance. Meeting to be held in the lower theatre.

Topic: At 7:00 we will be having an short talk on how to use the Observer's Handbook. The main presentation will be "Music of the Spheres: A Light-Hearted Trip in Space" by **Graham Millar.**

Date: Friday, February **17th**, 1989: **7:00 P.M.** early presentation **8:00 P.M.** regular meeting

Place: Nova Scotia Museum. Access from the parking lot and side entrance. Meeting to be held in the lower theatre.

Topic: For a change of pace, the early presentation will be an **open executive meeting**. Come and see what your executive actually does! For the main presentaion we hope to be able to bring in one of the inflatable planetariums.

Note: The above list is tentative and subject to change.

About the cover: The top image on the cover this issue shows the "Heliosaurus". The total eclipse of June 8th, 1918 featured a large prominance of which is shown in the lower image. Its unusual shape prompted astronomer-artist R.E. DeLury to add a bit more detail to it to produce the "solar lizard". The pictures are reproduced from **Our Wonderful Universe** by C.A. Chant (as in the R.A.S.C. Chant Medal) which was published around 1926

Editor's Report

Patrick Kelly

Well, the deadline for elections has come and gone once again. The executive for 1989 contains some notable changes that are worth mentioning. **Darrin Parker** has stepped down as President and will be succeeded by **Joe Yurchesyn** who moves to that position from Treasurer. We have a new executive member taking over as Treasurer in the person of **Nat Cohen**. I am sure that most members would agree that Nat should be perfectly suited for the position! **Paul Duval** is stepping down as Secretary and once again we have a new face on the executive to replace him. **David Lane** will be our new Secretary. Our National Representative, **Wilf Morley** has also decided not to reoffer and after a long absence, **Randall Brooks** will be back on the executive as our National Rep. for 1989. Also, **Doug Pitcairn** and **Mary Lou Whitehorne** will be switching positions with Doug taking over as Observing Chairman while Mary Lou becomes Second Vice-President. Three positions will show no change from last year: **Paul Smith** will continue to serve as First Vice-President, **Hugh Thompson** remains as our Librarian and I am at the helm of NOVA NOTES for another year.

One new feature about this year's executive is that we have found that the work load on the regular executive members was getting to be too heavy, so we decided to add several councillor positions to the executive that are similar to "cabinet members without portfolio". Their job will be to assist various members of the executive from time to time. We have two councillors at present, **Jim MacGuigan** and **Jason Adams**. If anyone else feels that they would like to become a councillor, please feel free to contact any member of the executive. I would like thank all of the members who served on last year's executive. It seems that each year seems to go even better than the previous one which makes it even more challenging for the next year's executive!! I would also wish to thank those new members who have volunteered their time to be involved in the executive for 1989. I am sure that they will find it a most rewarding experience.

This issue of NOVA NOTES contains our second annual Christmas card (suitable for framing). It comes as a centerfold pullout. Once it has been removed, you will find the financial statements mentioned in Joe's Treasurer's Report. His report easier to follow if you pull out these statements as well. We have had a good year financially. We hope to be able to continue this for the next several years so that when we finally do decide on

what to do about an observatory, we will have enough resources to be able to do a proper job.

Because of these extra items, I have not been able to get as many articles into this issue as I would have liked (such as GAZER and the Gawker's Report). Unfortunately, I don't want to add an extra page and have the issue returned for insufficient postage. I might add, that my "stockpile" of articles for the next issue is quite low. I usually have several articles from other centres newsletters already in my Mac and ready to go. However, it is nice to receive an unsolicited article from time to time from our own members. So if you have something that you would like to share with the rest of the centre, write it up and send it in!

Those members who were observing Mars in the parking lot after the October meeting finished may recall the odd patch of light that we saw overhead. Well, a similar event occurred at Beaverbank a while ago. We were able to see a bright vertical "beam" which was a few degrees tall. It looked like a patch of aurora, but it was due south and there was no auroral activity at all to the north. Joe took a slide which when developed showed about half a dozen other such objects that were all too faint to be seenwith just our eyes. Any guesses?

Our Astronomy Day display at Bayers Road Shopping Center proved to be a lot of fun and a great success. We signed up several new members as a result of it and got to talk to a lot of people. Joe's 6" refractor towered over us all and attracted people from the far end of the mall. I'll say one thing for those big refractors, they sure do know how to draw a crowd!!

Clear skies until next issue!Ω

Some Thoughts on Telescopes

Doug Pitcairn

It was late one September night at Tim Horton's in Sackville. We had just finished a four hour observing session. "There are two kinds of astronomical equipment owners", speculated Joe Yurchesyn, "There are those like me (meaning him), who obtain quality equipment, keep it, grow attached to it, and use it faithfully. Then there are people like you, (meaning me) who sell and trade stuff continually."

OK, I'll admit it. I do tend to buy and sell equipment quite frequently. I guess I'm just too gullible in believing all those claims "they" make in those full colour ads and brochures. I find that the only way to really know how well something works is to own it for a few months and play with it. Then if you find out it is

not what you thought it might be, you sell it and go on to the next toy. This is no problem as long as you stick with second hand equipment. Most second hand optical equipment can be sold for as much as you paid for it if you keep it in good condition. If you buy new equipment however, you rapidly discover that the urge to try something else can work into a lot of greenbacks.

I have discovered that there is a great range of instruments out there, and the best one is not necessarily the most expensive one. For instance, I was observing last week with a skilled fellow amateur who had recently purchased an 8 inch reflector, paying extra for an equatorial mount. He has since built the thing into a (sorry Roy) Dobsonian mount and referred to the idle and useless equatorial mount as a "piece of junk". The equatorial mount, with its heavy and cumbersome parts was not necessary for this person's observing habits.

Others have laid out $2000 plus for a Schmidt-Cassegrain in an eight inch range, only to find out that they prefer the views in a fast light bucket, costing less than one third as much. It can't be said often enough: unless you wish to do astrophotography, don't lay out the money for a CAT, a Dobsonian light bucket works just as well, is just as PORTABLE, (regardless of what Celestron's brochure says) and costs much, much less.

I myself owned a fine working 4 inch Bausch&Lomb Schmidt-Cassegrain. It was a lovely scope, but I got tired of running over to see what an object really looked like, usually in Glen Robert's C8. I had the dreaded aperture fever! Four inches will show you all the objects listed in the Observers Handbook, but if you wish to have much luck examining all those little symbols on the Sky Atlas 2000, I now believe that 8 inches is a minimum aperture for any serious deep space observing (Hugh's scope excepted). He got tired of being stuffed into his scope and learned karate!

Then there are the refractors. These new three element apochromats are awesome even though limited to apertures of 7 inches or less. They perform as well as reflectors quite a bit larger, and are acceptable as deep space scopes, as well as the absolute best high resolution scopes on the market. Planets and double stars have not been seen until they are seen in a large refractor. But they are EXPENSIVE! A six inch refractor costs TEN TIMES as much as my light bucket. They are awkward as they come apart in five, HEAVY pieces and require some effort in assembly. I think I am safe in saying that these scopes are best for permanent installations. Again, a light bucket will perform almost as good on some targets, better on some others, and is much more convenient. You tell me if it's worth it.

One place you do seem to get what you pay for is in eyepieces. I know there are a lot of people out there who will disagree on this one, but so far the more expensive the eyepiece, the better I liked it. I recently sold a C90 I had used for some time and used the money to buy a set of three TeleVue wide field eyepieces. They cost over 400 sams, but it has been my experience that these are worth it. So far. the best low power field I have ever experienced was using a 24 mm Widefield in my 10" Dobsonian. And the best high power telescopic view I have ever had the pleasure to experience was Jupiter, through Roy Bishop's scope using a Nagler eyepiece. (All four of Jupiter's moons still in the field at 175x!)

The views through the less expensive Orthos and Kellners are OK, but they'll seem like tunnel vision compared to a widefield. The older wide designs like Erfles suffer from poorer edge images and have more field curvature.

So what's the point of this ramble? I suppose I am fishing for support (debate ?) about what to tell the people who so often come up to me and ask for a recommendation about which scope to buy. What do you recommend?

I first ask the person some questions to find out what they know and what they hope to accomplish with a scope. If they are raw beginners, I send them after a copy of Nightwatch, or The Stars or some other good book and a pair of 10x50 binoculars. Get the $50 ones from Consumer Distributing, there as good as ANY under $150. If the person seems to know a bit, and wants to start more involved observing, I usually recommend either an Astroscan, a Comet Catcher (5" f/3.5), an eight inch Coulter bucket or a half decent refractor (not a Tasco) as a first scope. All can be obtained for about $450 Canadian and all work equally well in their own areas. If a person wants a serious scope for visual work, I stand behind Coulter's 10" bucket. You need to purchase a finderscope and a better rack & pinion focuser, but the total tag of about $700 still undercuts the competition soundly. If a person wants to do serious astrophotography, I tell them to expect a tag of about $3000 and to call Mary Lou Whitehorne, as the amount I know about astrophotography can be written on the eyelens of an H4mm Tasco eyepiece in 18 point font!

Do I seem hard on Tascos? I am tired of a company which sells half a telescope for a whole price. The main optical tube is OK, but the finderscope and eyepieces are garbage, and the mount is only passable. If you are the proud owner of a Tasco, (I have owned four of them!) Get a 40 mm .965 diameter eyepiece from Celestron, and buy a half decent finder scope, then you'll have a reasonable chance of finding something in the night sky. Clear skies!! Ω

The Burke-Gaffney Award
Halifax Centre

The Burke-Gaffney Award was established by the Halifax Centre to promote the development of the writing skills of non-professional members of the centre. The award also acknowledges the contribution of the centre's first Honorary President to the formation of the group and to his long and tireless efforts to educate the public in the mysteries of astronomy. This year's submissions must reach the President or Editor by March 17th, 1989.

Rules

1. Topic: 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 nature.

2. Presentation: Articles should be no longer than 2500 words, written in proper grammatical form and presented typewritten and double spaced. Diagrams should be complete and ready for drafting and photographs should, if possible, be submitted with the original negatives.

3. Eligibility: Any member of the Halifax Centre in good standing may submit entries with the exception of those who are professional astronomers.

4. Judging: Articles will be judged on scientific accuracy, originality and with a strong emphasis on the overall literary merit. Papers must demonstrate that the author(s) has/have read widely and has/have contributed some original thought to the discussion. Judging will be carried out a judging committee which will consist of the President, NOVA NOTES Editor and a third person appointed by the Halifax Centre's executive

5. Prize: The award will be given once annually. The winning contribution then becomes the Halifax Centre's official entry in the Simon Newcombe Award competition which is held annually on a nation-wide basis. The winner of the Burke-Gaffney Award will have the choice of one of several prizes.

6. Submission of Entries: Entries will be received anytime until March 17th, 1989. You may direct inquiries concerning the rules to the President.

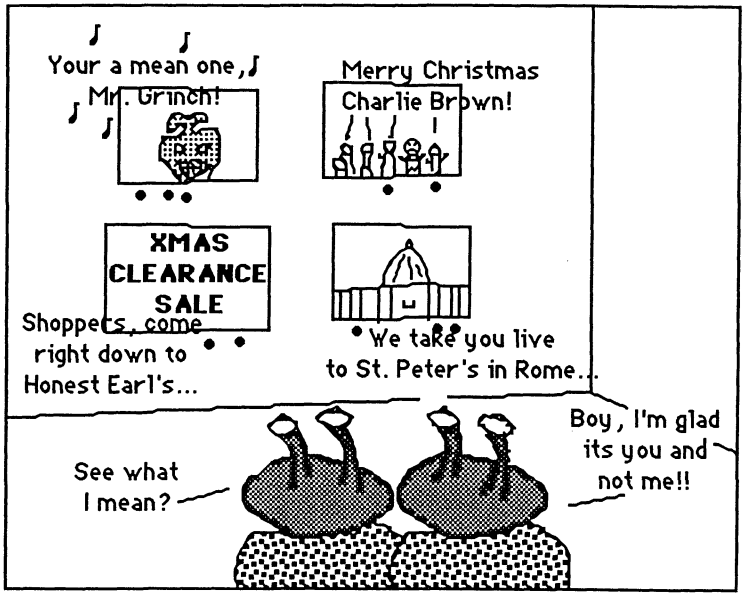
7. Previous Awards: The Burke-Gaffney Award has been won on five previous occasions: Bill Calnen (1979 and 1980), Dianne Brooks (1981), Michael Boschat (1982), Jennifer Wells (1983) and Dan Falk (1988). No awards were given in 1984, 1985, 1986 and 1987.Ω

Royal Astronomical Society of Canada - Halifax Centre
COMPARITIVE BALANCE SHEET - YEARS ENDING Sept. 30th, 1987 and 1988

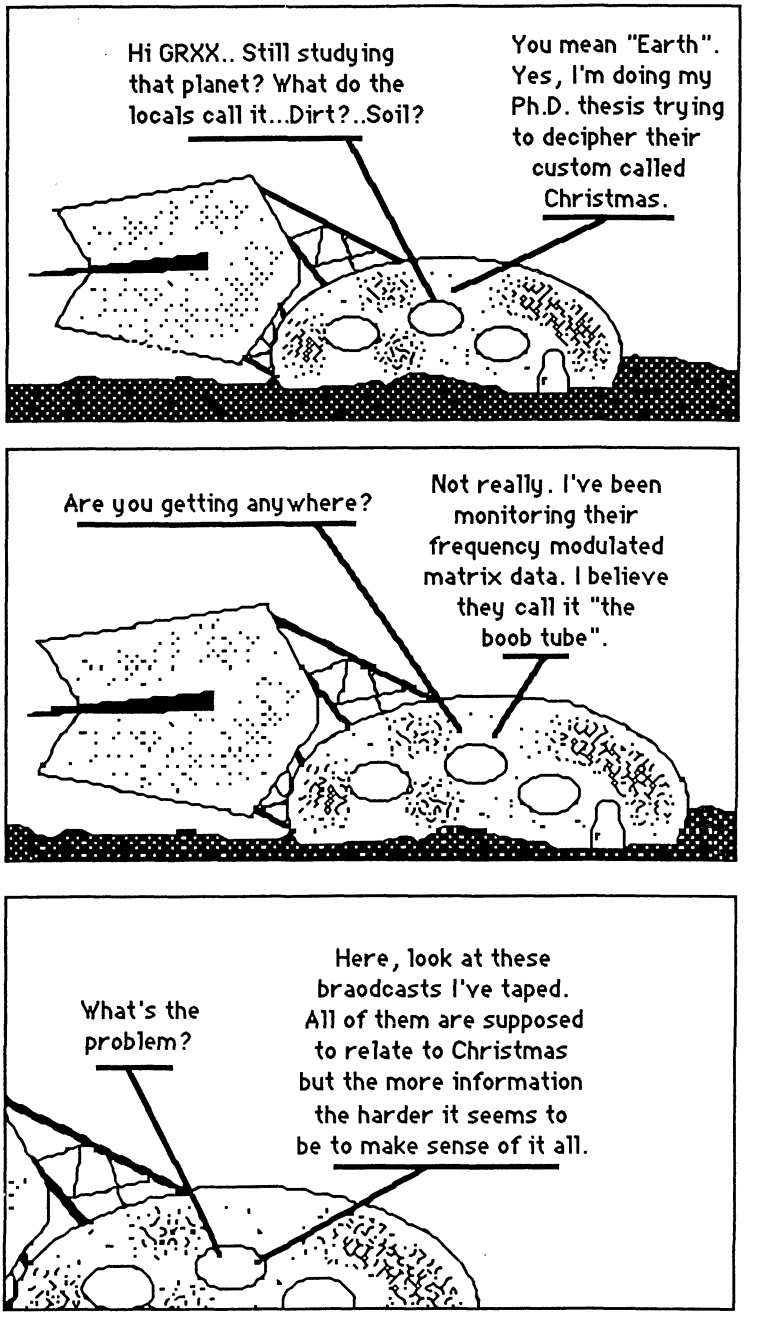
	Year ending September 30th		Amount of increase or (decrease) during 1988	Breakdown per member for 1988	Percentage of Cash		Percentage of Total Assets	
	1988	1987			1988	1987	1988	1987
ASSETS:								
Cash	$1,704.22	$1,305.60	$398.62	$11.67	100.00%	100.00%	28.90%	27.97%
Estimated Membership Receivable (net)	-	-	-	-	-	-	-	-
Estimated Handbook Receivable	525.00	174.00	351.00	3.60	30.81	13.33	8.90	3.73
Estimated Handbook Inventory	-	-	-	-	-	-	-	-
Merchandise Inventory	367.29	98.00	269.29	2.52	21.55	7.51	6.23	2.10
Prepaid Expenses	-	-	-	-	-	-	-	-
Investments	-	-	-	-	-	-	-	-
Estimated Library	1,791.82	1,749.87	41.95	12.27	105.14	134.03	30.38	37.48
Observatory Equipment	1,409.17	1,241.00	168.17	9.65	82.69	95.05	23.89	26.58
Estimated Miscellaneous	100.00	100.00	-	0.68	5.87	7.66	1.70	2.14
Total Assets	$5,897.50	$4,668.47	$1,229.03	$40.39	346.05%	357.57%	100.00%	100.00%
LIABILITIES:								
Estimated Handbook Payable	$100.00	$166.25	($66.25)	$0.68	5.87%	12.73%	1.70%	3.56%
Estimated Operating Expenses	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Total Liabilities	$100.00	$166.25	($66.25)	$0.68	5.87%	12.73%	1.70%	3.56%
CAPITAL:								
Equity	$5,797.50	$4,502.22	$1,295.28	$39.71	340.18%	344.84%	98.30%	96.44%
Retained Revenue	--	-	-	-	-	-	-	-
Total Capital	$5,797.50	$4,502.22	$1,295.28	$39.71	340.18%	344.84%	98.30%	96.44%
Total Liabilities and Capital.	**$5,897.50**	**$4,668.47**	**$1,229.03**	**$40.39**	**346.05%**	**357.57%**	**100.00%**	**100.00%**

Royal Astronomical Society of Canada - Halifax Centre
COMPARATIVE INCOME STATEMENT - YEARS ENDING Sept. 30th, 1987 and 1988

	Year ending September 30th		Amount of increase or (decrease) during 1988	Breakdown of the $25 membership fee	Percentage of Membership Fees		Percentage of Total revenue	
	1988	1987			1988	1987	1987	1986
REVENUE:								
Membership Fees	$2,640.00	$2,590.43	$49.57	$25.00	100.00%	100.00%	50.22%	58.39%
Life Members Grant	290.00	290.00	-	2.75	10.98	11.20	5.52	6.54
Donations	132.00	5.00	127.00	1.25	5.00	0.19	2.51	0.11
Educational Activities	-	-	-	-	-	-	-	-
Interest & Dividends	151.75	133.28	18.47	1.44	5.75	5.15	2.89	3.00
Sales of Handbooks (net)	595.37	279.92	315.45	5.64	22.55	10.81	11.33	6.31
Advertising	80.00	-	80.00	0.76	3.03	-	1.52	-
General Assembly (including grant)	348.00	125.40	226.60	3.30	13.18	4.84	6.62	2.83
Other Grants	1,000.00	1,000.00	-	9.47	37.88	38.60	19.02	22.54
Miscellaneous	20.00	12.44	7.56	0.19	0.76	0.48	0.38	0.28
Total Revenue	$5,257.12	$4,436.47	$820.65	$49.78	199.13%	171.26%	100.00%	100.00%
EXPENDITURES:								
Fees to National Office	$1,593.00	$1,542.00	$51.00	$15.09	60.34%	59.53%	30.30%	34.76%
Library	41.95	279.82	(237.87)	0.40	1.59	10.80	0.80	6.31
Meetings & Newsletter	1,630.86	1,593.93	36.93	15.44	61.78	61.53	31.02	35.93
Annual Dinner (net)	-	25.00	(25.00)	-	-	0.97	-	0.56
General Assembly (including grant)	696.00	426.80	269.20	6.59	26.36	16.48	13.24	9.62
Equipment & Supplies	188.17	41.00	147.17	1.78	7.13	1.58	3.58	0.92
Office Administration	118.29	125.18	(6.89)	1.12	4.48	4.83	2.25	2.82
General Expenses & Audit	-	-	-	-	-	-	-	-
Educational Activities	5.00	-	5.00	-	0.19	-	0.10	-
Insurance	-	-	-	-	-	-	-	-
Awards & Donations	58.18	141.86	(83.68)	0.55	2.20	5.48	1.11	3.20
Observatory	-	-	-	-	-	-	-	-
Miscellaneous	102.05	7.36	94.69	0.97	3.87	0.28	1.94	0.17
Total Expenditures	$4,433.50	$4,182.95	$250.55	$41.94	167.94%	161.48%	84.33%	94.29%
Operational Surplus or (Deficit)	**$823.62**	**$253.52**	**$570.10**	**$7.85**	**31.20%**	**9.79%**	**15.67%**	**5.71%**



Seasons Greetings from the Executive of the Halifax Centre of the Royal Astronomical Society of Canada


Hi GRXX.. Still studying that planet? What do the locals call it...Dirt?..Soil?
You mean "Earth". Yes, I'm doing my Ph.D. thesis trying to decipher their custom called Christmas.
Are you getting anywhere?
Not really. I've been monitoring their frequency modulated matrix data. I believe they call it "the boob tube".
What's the problem?
Here, look at these braodcasts I've taped. All of them are supposed to relate to Christmas but the more information the harder it seems to be to make sense of it all.

The 1988 Treasurer's Report

Joe Yurchesyn

Introduction

After reviewing past Treasurer's reports last year I came to the conclusion that it would be more meaningful to provide a financial statement covering the membership year rather than the calender year. This year I am continuing this practice for the reasons stated in last year's report.

The Income Statement provides a concise report of the amount of money collected and the amount of money spent on expenses or to procure other assets. One change over last year's report is the column based on $25 of total membership revenue. It shows how the membership fee is added to by other revenue and how the total revenue is expended. It also illustrates our centre's dependence on sources of revenue other than membership fees and how we maintain our activities without the need for a surcharge on the $25 membership fee which some centres must impose.

The Balance Sheet is used to differentiate between expense expenditures (e.g. newsletter) and asset expenditures (e.g. library). The surplus or deficit result from the Income Statement can be misleading when examined out of context. For example, the Income Statement shows a surplus of $823.62 for 1988 and the Balance Sheet shows an increase in net worth of $1,295.28 for the same year. Of the $1,295.28 increase, $398.62 is cash and $525.00 is money owed the centre, which equals the $823.62 from the Income Statement. The remainder is money spent to procure other assets, or a reduction in money owed by the centre. The Income statement expresses the change in the cash position, while the balance sheet expresses the worth of the centre. Needless to say, 1988 was a very prosperous year for the Halifax Centre. It will be difficult to top in 1989!

[Editor's Note: The Income Statement and Balance Sheet are back to back on a separate sheet of paper. It makes for easier reading if you pull it out of the newsletter.]

The following notes apply to the membership year report:

Membership Fees:

The increase is due to an additional two members in 1988.

Life Members Grant:

The same as last year, but it will decrease by at least $10 in 1989 due to the loss of one of our life members. This grant of $10

per life member is equivalent to the 40% of the membership fee retained by our centre. Life membership can be purchased at a cost of $500.

Donations:

This was a much neglected source of revenue until this year when we had several very successful junk sales. Any amount paid to the centre (above membership dues) is income tax deductible. A receipt can be provided.

Interest:

Interest income is 14% higher primarily due to an increase in the amount of cash in the bank account for the following three reasons: 1) payment for the handbooks at the end of the year; 2) increase in collected revenue throughout the year due to very successful donation and sales activities and 3) the 1987 surplus represented 20% of that year's "year end" cash.

Handbook Income (net):

This year close to $600 was brought in through the sale of nearly 200 handbooks. This was the best sales record yet to date to my knowledge! The Income Statement shows the importance of handbook revenue to our centre. Each sale represent $3 in income, but more importantly it helps to promote interest in amateur astronomy. This provides other beneficial spinoffs for the centre. I would like to encourage everyone to try to promote handbook sales.

General Assembly:

The substantial increase in the GA grant from National Office (to subsidize the travel expenses of our representative to the GA) was due entirely to location. In 1987, the GA was held in Toronto while in 1988 it was held in Victoria. This increase in revenue, however, was more than offset by the increased travel costs funded by the centre (see Expenditure - GA).

Other Grants:

The Nova Scotia Museum prints Nova Notes as a free service to the centre. Since this service represents a substantial cost saving, I have decided to record its estimated value as revenue – with a corresponding expenditure as part of the newsletter cost. The value of the printing service was conservatively estimated at $1,000. It is important to point out that given present financial conditions, Nova Notes can be issued in its present form only with the generosity of the Nova Scotia Museum.

Advertising:

Occasional commercial advertising in Nova Notes bring in welcome revenue. 1988 was a very successful year in that regard.

Miscellaneous:

Miscellaneous income is derived from the sale of pins and crest, hats and T-shirts, and bumper stickers. This figure represents the net profit of these sales. We broke even on the hats and T-shirts with the "profit" being in the ones that are still not sold yet. This shows up on the Balance sheet as the jump in value of our merchandise inventory.

Fees to National Office:

Only 40% of the collected membership fees stay with the centre. The remainder is sent to National Office to provide members with the handbook, National Journal and National Journal. In the case of a life membership, the entire $500 is forwarded to National Office.

Library:

A substantially smaller library purchase occurred in 1988. A fairly large outlay of funds for the library occurred in 1987 to bring it up do date in several areas.

Meetings and Newsletter:

After ignoring the "fictitious" $1,000 Nova Notes printing cost, a marginal cost increase has occurred during 1988, which can probably be attributed to increased postal rates. A very substantial increase in this expense occurred in 1987 (78%) and a further increase of 6% occurred again in 1988. I was at a loss to completely explain the 1987 increase and the similar total cost for 1988 indicates it was due to spurious reasons. Special efforts were taken in 1988 to minimize these expenses, which saved a substantial amount of money.

The gifts of munchies for some of the meetings represents unacknowledged donations. I would like to thank those persons who made such donations during 1988.

Office Administration:

No substantial change over last year.

Awards and Donations:

A significant reduction over 1987. This is due largely to the purchase of an inventory of "Earth-Venus Orbital Resonance" reprints in 1987 for future use as samples of submissions for the Simon Newcombe Award.

Membership :

The following membership statistics are as of Dec. 4th, 1988:

Year	Regular	Youth	Life	Associate	Total
1986	?	?	21	?	121
1987	98	11	29	6	144
1988	99	11	29	6	146
1989(Paid)	66	8	28	2	104
1989(Unpaid)	55	6	-	3	64 Ω

Double Shadows and Your Handbook

Patrick Kelly

How often have you received your new Observer's Handbook and wondered "Is there more that I can get out of all of this information?" or "Is there any way to make better use of the data in here?" These are obviously loaded questions, because if the answer to either of them was "No!" I wouldn't be writing this article! I am often amazed at the uses one can find for the handbook, especially when the use is not an obvious one. By that I mean that there are a lot of interesting things you can extract from your handbook that aren't listed in the index. I'm going to give you an example of one of these.

In a recent issue of Sky and Telescope (Oct. p. 393) they featured a drawing of Jupiter with the shadows of two of its moons on it at the same time. Since the drawing was made in 1980, one would assume that it is quite rare for Jupiter to be visible in this particular state. In fact, I had expected that the drawing was there to accompany a note about another of these "rare" occurrences. Instead, the article was about how to interpret a table explaining the transits, occultations, etc. of Jupiter's moons for the month of October. The article even featured a copy of a table listing all such events from a world-renowned astronomical publication. (Guess which one?!).

Well, I ran upstairs to check my copy of this publication to see if two shadows would appear on Jupiter at the same time during the rest of the year. This is a fairly easy task to do. When a shadow ingresses Jupiter's disk (first starts to cross it) the notation used is Sh.I. Similarly, when a shadow egresses, the notation is Sh.E. Since almost all shadow transits occur one at a time, if you scan down the columns you find pairs of Sh.I. followed by Sh.E, with occasionally a few other events in between. If one is looking for two shadows to be found on Jupiter at the same time, one is looking for **two** Sh.I.'s with **no** Sh.E. in between. As I had expected, this did not occur at all during the rest of 1988.

However, as soon as my 1989 Handbook arrived, I decided to check out the data for the coming year to see if there might be at least one such case in 1989. Well, imagine my surprise when I found that there was not one, there were **nine** such occurrences when Jupiter is up in a dark sky as viewed from Nova Scotia. At least this allows for the possibility that it will be clear for at least one of them! I have collected these occurrences together in the accompanying table.

Date (UT)	"Original"	Event	Time (UT)	
March 25	Ganymede	Europa Ingress	3:53	
		Ganymede Egress	5:05	
April 1	Europa	Ganymede Ingress	6:45	
		Europa Egress	8:51	
October 17	Europa	Io Ingress	9:04	
		Europa Egress	9:41	
October 27	Europa	Io Ingress	23:54	
		Europa Egress	1:36	*
November 2	Ganymede	Io Ingress	7:19	
		Ganymede Egress	9:23	
November 4	Europa	Io Ingress	1:47	
		Io Egress	3:59	
November 11	Io	Europa Ingress	4:13	
		Io Egress	5:53	
November 18	Io	Europa Ingress	6:50	
		Io Egress	7:46	
November 25	Io	Europa Ingress	9:26	
		Io Egress	9:40	

*the next day

It is interesting to note that Io is involved in most of these phenomena. That is due to its closeness to Jupiter. Io orbits Jupiter more quickly than the rest of the moons, and thus can have more transits than the others. In addition,its closeness means that geometry favors and actual transit as opposed to Io appearing to simply pass above or below Jupiter's disk. All but one of these events have a similar form. One shadow is already on the Jupiter's disk and another moves onto the disk to give two. At some later time the "original" shadow leaves Jupiter's disk leaving the "newcomer" all by itself. However, the event of November 4th is especially noteworthy. In this case, the shadow of Europa ingresses at 1:37. Ten minutes later, Io's shadow also ingresses. But, remember that Io moves faster than all of the other moons. In fact, Io's shadow will **catch up to and pass** Europa's shadow and egress from Jupiter's disk a full 14 minutes before Europa's!

Just so that I don't give you everything on a silver platter, I also found three "near misses" which I define as there being 15 minutes or less between the time that one shadow egresses prior to the second shadow ingressing. Can you find them? I hope that this will convince you that the handbook contains a lot more than meets the eye! Ω

NOVA NOTES INDEX

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HALIFAX CENTRE - R. A. S. C.
1988/89 CALENDAR OF EVENTS

December 1988

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	**14**	15	16	17
18	19	20	21	**22**	23	24
25	26	27	28	29	30	31

January 1989

S	M	T	W	T	F	S
1	2	**3**	4	5	6	7
8	9	10	11	12	13	14
15	**16**	17	18	19	20	21
22	23	**24**	25	26	27	28
29	30	31				

February 1989

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March 1989

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Key to calendar:

Regular Meetings: shadowed and outlined
Special days: **bold**
Possible observing sessions: underlined

Special Days:

December 14- Geminid Meteors
December 22 - Ursid Meteors
January 3 - Quadrantid Meteors
January 16 - Venus 0.6° South of Saturn
January 24 - Moon occulted by Regulus!!
February 1 - Mercury 4° North of Venus
March 12 - Mars 2° North of Jupiter

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