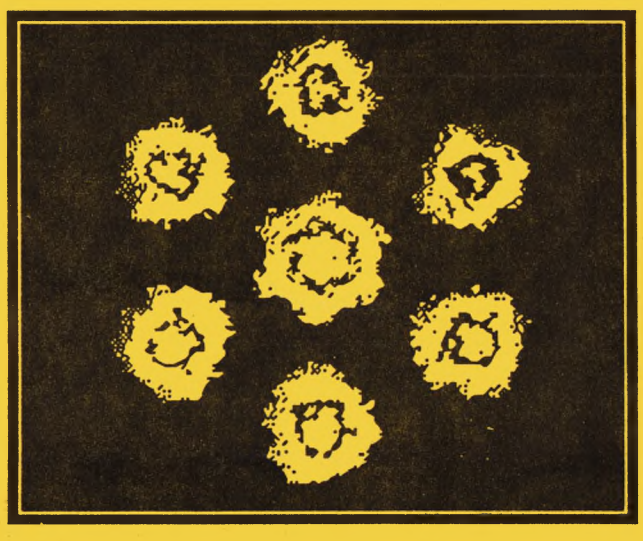
NOVA NOTES



Halifax Centre

Mar – Apr 1988
Volume 19
Number 2

1988 Halifax Centre Executive

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President	-	Darrin Parker P.O. Box 249 Bridgewater, N.S. B4V 2W9	429-2110
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Observing Chairman	-	Mary Lou Whitehorne 53 Zinck Avenue Lr. Sackville, N.S. B4C 1V9	865-0235
Centre's Address	-	Halifax Centre, R.A.S.C. c/o 1747 Summer St. Halifax, N.S. B3H 3A6	

Notice of Meetings

Date: Wednesday, March **2nd**, 1988: **7:00 P.M.**

Place: Halifax Planetarium, Dunn Building, Dalhousie University

Topic: **BEGINNER"S GROUP MEETING**
We will be teaching beginners how to find the constellations and planets of the winter sky using the planetarium.

Date: Friday, March 18th, 1988

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

Topic: The **7:00** video presentation will be part one of the PBS show **The Creation of the Universe.**
Our **8:00** speakers will be **Joe Yurchesyn** who will give a slide show of his recent trip to Mount Palomar; **Doug Pitcairn** who will show some slides taken through a very improvised camera and **Pat Kelly** who will show some slides of astronomical interest taken on a recent trip.
In addition, we will be having a "sale" of books, eyepieces, bumper stickers etc. All proceeds will go to the centre. Members are encouraged to bring any items that they no longer use and would like to donate.

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

About the cover: The cover this issue shows an image from a transmission elecron microsope. The "blobs" (which in the original had computerized false color) are uranium **atoms** in a microcrystal of uranyl acetate. The uranium atoms are each spaced 0.32 **nanometres** apart. The magnification factor is 120 million.

Editor's Report

Patrick Kelly

Hopefully I am now on my way to getting **NOVA NOTES** back on a better schedule. A few quick comments on some of the items in this issue. **Joe Yurchesyn** has done an excellent job on this year's financial statement. He now has it all set up on a spreadsheet and hopefully this will make his job a lot easier in the upcoming year. Although it may seem long, the executive received one with **three** sets of financial statements!

Mary Lou has also submitted a report as observing chairman. It may not be quite obvious in her report (Mary Lou is not one to openly make complaints, so I will do it for her) but as observing chairman it is **not** her responsibility to find drives to the observing site for other members. Due to the distance involved to get reasonably dark skies, most people who go out on a regular basis already share space in their cars with other members that they already know, and either accept some money to help pay for the gas or rotate turns taking cars. Because of this, some newer members seem to feel that if you aren't part of "the group" you aren't welcome. That is not true, it is just that in most cases, there is only so much room and people are only willing to go a certain distance out of their way to pick someone up if they do have free room.

A casualty of the last issue as well as this one is **Gazer**. Due to space limitations last issue, he was not able to put in an appearance. I had reserved two pages for him for this issue, but at the last minute I received some competition! **Glenn Roberts**, who is now the observing chairman for the Athena Astronomy Club in Summerside thought the the idea of a portable observatory using a truck was such a good idea that he decided to start a cartoon series called **R.A.S.C. Star Truck**. the "premier" is in this issue. He hopes to send over new ones on a regular basis, so with any luck, we might soon have two "semi-regular" cartoon strips!

Lastly, I should mention that this year, **NOVA EAST** (alias the C.O.W.) will be held in Fundy National Park from August 12th - August 15th. **This is not the Natal Day long weekend.** It is the weekend of the new moon, however, and we are confirmed to have meeting areas for both our public sessions as well as our own "in-house" talks. More details will be announced in upcoming issues, as well as a new map of the areas of the park of special interest (such as where the pool parking lot is located!!). Glenn has told me that about ten people from Summerside are interested in coming and **Len Larkin** of the Saint John astronomy group has been in contact with groups in New England. Make plans now as this looks like it will be the biggest and best yet.

One last word, Doug would like to remind those who have not yet returned Observatory Questionnaires to do so as soon as possible. Ω

Observing Chairman's Report

Mary Lou Whitehorne

The Gawker's List is in need of a revision. With your cooperation I will be putting out a new updated list. Do you still wish to be on the list? If so, contact me. Once I have an updated list it will be made available to you either at the next regular meeting or in the next issue of **NOVA NOTES**. I would encourage all of you observers not to wait for me to call you, but to start calling around for an "observing buddy" yourself. Any time after the last quarter moon when the sky is clear is a good time. Chances are good that the other night owls will be going to Beaverbank even if it isn't a regularly scheduled session. Chances are even better on weekends when the temperature is above 0°C! Recent observing sessions have indicated that there are a lot more people showing up and they are showing up more often than in the past. This has forced a revision in the "rules" for determining the dates of observing sessions.

At the last executive meeting, we decided to change the format of the schedule for the observing sessions. **We will no longer be having any regularly scheduled observing sessions!** This is not because of a lack of interest, but due to the fact that there have been people observing at the Beaverbank Road site just about every clear night! Thus, observing sessions will be "scheduled" for any clear night between the last and first quarter moon. Starting with this issue of the "Calendar of Events" (inside the back cover) all of these dates will be indicated as observing sessions.

Why a Light Pollution Filter?

Jim MacGuigan

The bane of astronomers in or near a city is the unwanted light - especially sky glow. There are several ways of fighting this. Those of us with long focus telescopes can darken our sky by virtue of the long focus, but even this does not solve the problem. Another option is to observe in the country, but not all of us have the time or gas money to drive out of town every clear moonless night.

Since much of our observing is done in the city, the only other option is a light pollution filter. An LPF works by suppressing certain wavelengths of light (those of man-made lights) and allowing the wavelengths of emission nebulae to pass through. In this way one is able to view faint objects from a city location.

There are various types and all of the basic ones work well at suppressing unwanted light. The ultra high contrast ones are more expensive, but are good on special targets. In addition to suppressing light pollution, LPF's will allow one to tell very small emission objects from stars when viewing from a dark location. Flicking the filter in and out of the optical path, will cause the stars to dim while the emission object does not. With an LPF one may even be able to see some of the larger emission objects with the naked eye! Ω

1987 Treasurer's Report

Joe Yurchesyn

Introduction

After reviewing past treasurer's reports, I came to the conclusion that it would be more meaningful to provide a financial statement covering the membership year rather than the calendar year. Matching membership year revenue to membership year expenses provides a clearer picture of the financial status of the centre. Additionally, membership revenue, handbook income and operating expenses are not complicated by the business activities of the following calendar year. The resulting financial statement is almost directly comparable to that of the previous year.

With this in mind, I have decided to make two reports; the traditional one based on the calendar year (which will be sent to National Office for inclusion in the Annual Report) and another one based on the membership year. *[Editor's note: I have included only the membership year report due to space limitations. Members will find the calendar year report in their Annual Report]* For comparative purposes I have also converted the entries to percentages. Common size percentage #1 expresses each entry in terms of total membership fees. In addition to showing how the membership fee is spent, it illustrates how our centre is dependent on other sources of revenue. Common percentage #2 expresses all entries as a percentage of total revenue.

To differentiate between expense expenditures (i.e. newsletter) and asset expenditures (i.e. library) , I felt that a

balance sheet was required. The surplus or deficit result from the Income Statement can be misleading when examined out of context. It is the change in Capital which represents the change in worth of the Centre.

Comments

The following notes apply to the membership year report:

Membership Fees

The drop is largely due to the eight life members who converted in 1986:

1) life member fees collected	8*$300=	$2400
2) lost annual fees from lifers	8*$ 25=	$200
3) increase in fees over 1986		$620
4) adjustment for early payment of dues		$919

Life Member's Grant

There are two reasons for the increase:

1) increase in life members grant to $10 from $8	21*$ 2=	$42
2) increase of eight life members	8*$10=	$80

The $80 grant offsets the associated $200 loss in collected revenue, since only 40% is retained by the centre.

Donations

This is a much neglected source of revenue. You may be interested to know that ant amount paid to the centre (above membership dues) is income tax deductible. A receipt will be provided.

Educational Activities

Last year, $30 - from the sale of the "Halley's Comet" NOVA NOTES . This year, nothing.

Interest

There are two reasons for the increase: 1) higher interest rates and 2) the change in handbook billing to the **end** if the membership year. This gives the centre free use of all handbook revenue for most of the year.

Handbook Income (net)

As stated in last year's Treasurer's Report, "The figures on this line are as usual, true, but almost meaningless". Unfortunately the change to a membership year accounting period still gives a questionable value of $89.92! However, adding a $174 credit owed by National Office and $16 in incorrectly posted postage income gives $279.92. This is reasonably close to the $275.12 figure quoted in the Handbook Report. The discrepancy is probably due to the incorrect posting of other associated expenses. Similarly, the corrected 1986 value is $208.24 as compared to $205.61 quoted in the Handbook Report. I'll try to do better next year!

The Income Statement shows the importance of handbook revenue to the centre. Each sale represent $3 of income, but more importantly, it helps to promote interest in amateur astronomy. This provides other beneficial spinoffs to the centre. I would like to urge everyone to try to promote handbook sales.

General Assembly

The net cost of this expense to the centre is down to around $300 from the usual $400. This is probably due to bargain air fares and last year's relatively close Toronto location. The trip to Victoria should see a substantial cost increase next year.

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 $900, which I rounded up to $1000 to avoid muddling the other figures. It is important to point out that given present financial conditions, **NOVA NOTES** can be issued only with the generosity of the Nova Scotia Museum.

Advertising

Occasional advertisements in **NOVA NOTES** bring in welcome revenue

Miscellaneous

Miscellaneous income is derived from the sale of pins and crests.

Fees to National Office

Only 40% of the collected membership fees stay with the centre. The remainder is sent to National Office. In the case of life membership fees, the entire amount is forwarded to National Office.

Library

A substantial library purchase occurred in 1987. The library material was becoming dated and new selections were required.

Meetings and Newsletters

Even after ignoring the fictitious $1000 printing cost, a substantial increase has occurred during 1987. Although I am at a loss to completely explain why, it can be attributed to three reasons:

1) increased postal rates
2) increased mailing list for **NOVA NOTES**
3) increased attendance at meetings with additional demands on refreshments

Awards & Donations

Costs include the following:

1) prizes at the June meeting
2) Simon Newcombe Award
3) inventory of last year's Simon Newcombe Award reprints to serve as writing guides for future entrants

Membership

The following are the membership statistics to date:

YEAR	REGULAR	YOUTH	LIFE	ASSOCIATE	NEW	TOTAL
1986	?	?	21	?	?	**121**
1987	98	11	29	6	42	**144**
1988 paid	90	11	29	6	36	**136**
1988 unpaid	24	6	-	3	-	**33**

Royal Astronomical Society of Canada - Halifax Centre
COMPARITIVE BALANCE SHEET - YEARS ENDING Sept. 30th, 1986 and 1987

	Year ending September 30th		Amount of increase or (decrease) during 1987	Percent of increase or (decrease) during 1987	Common Size Percentage #1		Common Size Percentage #2	
	1987	1986			1987	1986	1987	1986
ASSETS:								
Cash	$1,540.60	$1,547.47	($6.87	-.44%	100.00%	100.00%	31.42%	33.82%
Estimated Membership Receivable (net)	-	-	-	-	-	-	-	-
Estimated Handbook Receivable	174.00	174.00	0.00	0.00	11.29	11.24	3.55	3.80
Estimated Handbook Inventory	-	-	-	-	-	-	-	-
Merchandise Inventory	98.00	84.00	14.00	16.67	6.36	5.43	2.00	1.84
Prepaid Expenses	-	-	-	-	-	-	-	-
Investments	--	-	-	-	-	-	-	-
Estimated Library	1,749.87	1,470.05	279.82	19.03	113.58	95.00	35.69	32.13
Observatory Equipment	1,241.00	1,200.00	41.00	3.42	80.55	77.55	25.31	26.23
Estimated Miscellaneous	100.00	100.00	0.00	0.00	6.49	6.46	2.04	2.19
Total Assets	$4,903.47	$4,575.52	$327.95	7.17%	318.28%	295.68%	100.00%	100.00%
LIABILITIES:								
Estimated Handbook Payable	--	-	-	-	-	-	-	-
Estimated Operating Expenses	--	-	-	-	-	-	-	-
Other	--	-	-	-	-	-	-	-
Total Liabilities	$0.00	$0.00	$0.00	-	0.00%	0.00%	0.00%	0.00%
CAPITAL:								
Equity	$4,903.47	$4,575.52	$327.95	7.17%	318.28%	295.68%	100.00%	100.00%
Retained Revenue	--	-	-	-	-	-	-	-
Total Capital	$4,903.47	$4,575.52	$327.95	7.17%	318.28%	295.68%	100.00%	100.00%
Total Liabilities and Capital	**$4,903.47**	**$4,575.52**	**$327.95**	**7.17%**	**318.28%**	**295.68%**	**100.00%**	**100.00%**

Royal Astronomical Society of Canada - Halifax Centre
COMPARATIVE INCOME STATEMENT - YEARS ENDING Sept. 30th, 1986 and 1987

	Year ending September 30th		Amount of increase or (decrease) during 1987	Percent of increase or (decrease) during 1987	Common Size Percentage #1		Common Size Percentage #2	
	1987	1986			1987	1986	1987	1986
REVENUE:								
Membership Fees	$2,072.04	$4,971.43	($2,899.39)	-58.32%	100.00%	100.00%	55.34%	87.16%
Life Members Grant	290.00	168.00	122.00	72.62	14.00	3.38	7.75	2.96
Donations	5.00	-	5.00	-	.24	-	.13	-
Educational Activities	-	30.00	(30.00)	-100.00	-	.6	-	.53
Interest & Dividends	133.28	85.18	48.10	56.47	6.43	1.71	3.56	1.49
Sales of Handbooks (net)	89.92	113.24	(23.32)	-20.59	4.34	2.28	2.40	1.99
Advertising	-	25.00	(25.00)	-100.00	-	.50	-	.44
General Assembly (including grant)	125.40	224.40	(99.00)	-44.12	6.05	4.51	3.35	3.93
Other Grants	1,000.00	-	1,000.00	-	48.26	-	26.71	-
Miscellaneous	28.44	86.35	(57.91)	-67.06	1.37	1.74	.76	1.51
Total Revenue	$3,744.08	$5,703.60	(1,959.52)	-34.36	180.70%	114.73%	100.00%	100.00%
EXPENDITURES:								
Fees to National Office	$1,110.00	$4,043.06	($2,933.06)	-72.55%	53.57%	81.33%	29.65%	70.89%
Library	279.82	53.95	225.87	418.67	13.50	1.09	7.47	.95
Meetings & Newsletter	1,593.93	332.79	1,261.14	378.96	76.93	6.69	42.57	5.83
Annual Dinner (net)	25.00	(12.78)	37.78	-295.62	1.21	-.26	.67	-.22
General Assembly (including grant)	426.80	621.40	(194.60)	-31.32	20.60	12.50	11.40	10.89
Equipment & Supplies	41.00	1,2000.00	(1,159.00)	-96.58	1.98	24.14	1.10	21.04
Office Administration	125.18	88.10	37.08	42.09	6.04	1.77	3.34	1.54
General Expenses & Audit	-	-	-	-	-	-	-	-
Educational Activities	-	-	-	-	-	-	-	-
Insurance	-	-	-	-	-	-	-	-
Awards & Donations	141.86	141.97	(.11)	-.08	6.85	2.86	3.79	2.49
Observatory	-	-	-	-	-	-	-	-
Miscellaneous	7.36	40.00	(32.64)	-81.60	.36	.80	.20	.70
Total Expenditures	$3,750.95	$6,508.49	($2,757.54)	-42.37%	181.03%	130.92%	100.18%	114.11%
Operational Surplus or (Deficit)	**(6.87)**	**(804.89)**	**798.02**	**-99.15%**	**-.33%**	**-16.19%**	**-.18%**	**-14.11%**

Gawker's Report

compiled by Pat Kelly

Time: Saturday, December 26th
Place: Round Hill, Annapolis County
Observer(s): Doug Pitcairn
Equipment: 10x70 binoculars
MVM: 6.0
Weather conditions: Clear, -10°C
Comments: A quick scan with the 10x70's

Objects Observed:

Nebulae: M42, M43
Open Clusters: M35, M36, M37, M38, M41, M45 (beautiful as always), NGC 1893, NGC 1907
Galaxies: M31, M33, Couldn't see NGC 891
Comets: Looked for Borrelly with no luck

◊◊

The dates of the best observing periods can be obtained from the "Calendar of Events" inside the back cover. Any clear night in this period is likely to find people at Beaverbank. If you wish to doublecheck to see if anyone is going out, please call either the Observing Chairman, the Second Vice President or the NOVA NOTES Editor.

Billions of Galaxies?

Roy L. Bishop

The estimated number of stars in our Milky Way Galaxy is quoted in virtually every popular astronomy book as being on the order of of ten raised to the eleventh power, 10^{11}, or one hundred billion. However, estimates of the number of *galaxies* are more nebulous. Some books say millions, and others may suggest billions. Using modest telescopes, active amateur observers have no trouble locating a few hundred galaxies, and the NGC lists several thousand. But I have wondered if there really are *billions* of galaxies... enough to fill millions of NGC-type catalogues (few libraries hold this many books). Is Carl Sagan exaggerating when he says "billions and billions"?

A photograph relevant to this question appears in the March 1987 issue of Physics Today (p.19). It is a composite of three two hour CCD images obtained with the four metre Cerro Tololo telescope in Chile. By using special image processing techniques to remove nearly all of the sky background light, galaxies as faint as magnitude twenty-seven were reached. The photo covers a tiny piece of sky, only 2.3 x 4.2 minutes of arc, near the south galactic pole where obscuration by dust in our own galaxy is at a minimum. The photo is mottled with fuzzy blobs, most being galaxies fainter than magnitude twenty-four. The caption to the photo gives the number of galaxies imaged as about 1500.

There are 41,253 square degrees in the sky (see p.16 of your Observer's Handbook) or 41,253 x 60 x 60 square arc-minutes. Dividing by the size of the photo (2.3 x 4.2 square arc-minutes) gives 15.4 million, the number of such photos needed to cover the sky (no wonder Palomar surveys are done with Schmidt cameras!) Thus the number of galaxies of the sort recorded in the photo must be 15.4 million times 1500 (galaxies per photo) which gives 23 billion. The galaxies recorded would only be the bright spiral and giant elliptical systems — the numerous faint elliptical galaxies would not even show up in such a photo. Thus the number of galaxies must be at least on the order of 100 billion. There really are about as many galaxies as there are stars in our own galaxy. Carl is right!

The number one hundred billion (10^{11}) appears in contexts other than astronomy. Not only is it the number of galaxies in the universe and the number of stars in our galaxy, but it is also a common estimate of the number of neurons in the human brain, of the number of birds on Earth and of the number of running paces in an astronomical unit. (I will it to the reader to calculate how long it would take a jogger to run from the Earth to the Sun).Ω

[Editor's Note: Doug informs me that 10^{11} is also an approximation of the number of grains of sand on Lawrencetown Beach assuming a depth of one metre!]

To Blazes With It, We'll Go Anyways!

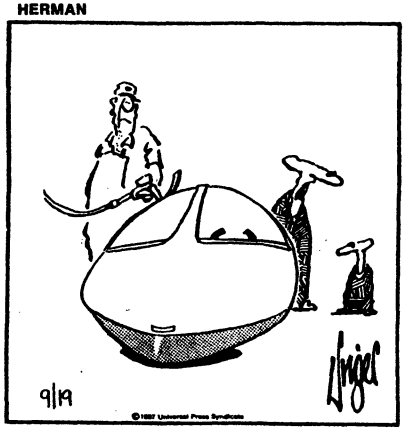
Doug Pitcairn

Friday, Jan 29th, 1988. I was sitting down to supper with my family. Judy (my dear understanding wife) comments with a sigh "I suppose you'll be going observing tonight". The mouth starts to say no, but the brain interrupts, the seed is planted, the crusty gears which substitute for brain cells in the old "CPU" start whirring. A quick check of the window reveals, **CLEAR SKY!**; but wait, that enemy of all that is faint and subtle, the Moon is up. In a flash, the "Bible according to Bishop" tells the tale: the Moon is riding high, ten days old, that's the end of that. Besides, the weatherman is calling for fifteen below, that's cold! Moments pass, another gear engages, I haven't done any serious lunar gazing in a while, I wonder if Joe is busy. (It had nothing to do with the fact that his six inch refractor is the finest planetary scope in the centre), I'll give him a call. Joe picks it up on the second ring. "Oh hi Doug, I was just about to give you a call, you want to go observing?" (I forgot, that refractor is in six heavy pieces). That did it, if misery loves company, lunacy craves it, "Sure, see you at seven."

I even took the Odyssey. I thought it might be nice to compare the views between the two scopes. Theory indicates that the f/12 refractor should outperform the f/4.5 Newtonian easily, I was curious. You who have small cars can appreciate the packing job Joe accomplished. In his Omega, we placed a six inch f/12 refractor (six feet long), dew cap, equatorial mount, large counterweight (is that a truck wheel?), tripod and legs, three boxes of accessories, two star charts, a ten inch Dobsonian, binoculars, two large cushions, two parkas and various other paraphernalia of the trade, then actually got in ourselves and got the doors closed. Off to Beaverbank!

Half a dozen trips up the hill later, (I can't be cold yet, I just got here), the scopes were set to go. You forget how bright the Moon can be, especially with all that snow to bounce the light around. I could actually make out my notes without a flashlight. A quick check of several deep sky favorites confirmed it. The great Orion Nebula barely showed up, and M31 looked like a faint globular. It was like trying to observe from the Mic Mac Mall parking lot. So we turned our attention to the moon and had a look. There is a real advantage to using an aperture stop on these fast Newtonians. Without the stop in place, the image was so bright and poor as to be useless, but when the cardboard disk was inserted, the moon's image at 120x was quite impressive. In moments of good seeing, it almost rivaled the image from Joe's refractor. The views through the big refractor were awesome, but our time was cut very short due to the temperature. It seems to be the case that a moonlit night is OK on a warm summer's evening, and the cold is tolerable for a good dark sky, but the combination of cold and the moon renders such nights useless. Next time, I think I'll stay at home with a hot chocolate, the wood stove and do my observing from the latest copy of Sky & Telescope! Ω

HERMAN

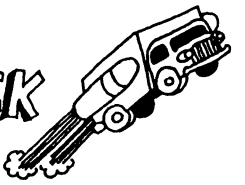


"You'd better go now. I'm not stopping halfway across the galaxy."

The Adventures of

R.A.S.C.

STAR TRUCK

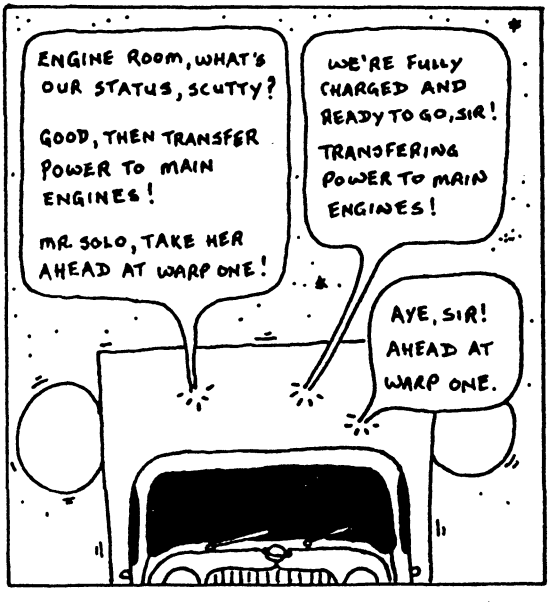


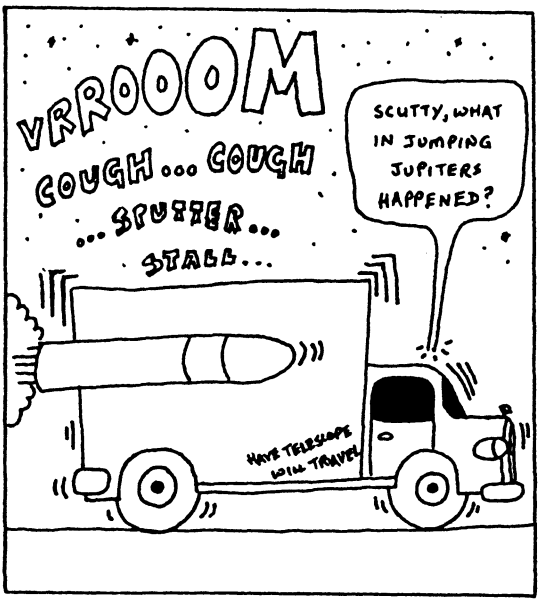
SPACE... THE ULTIMATE OBSERVING SITE.
THESE ARE THE VOYAGES OF THE R.A.S.C.
STAR TRUCK. ITS NIGHTLY MISSION...
TO FIND A DECENT DARK SKY SITE AND
OBSERVE SOMETHING.

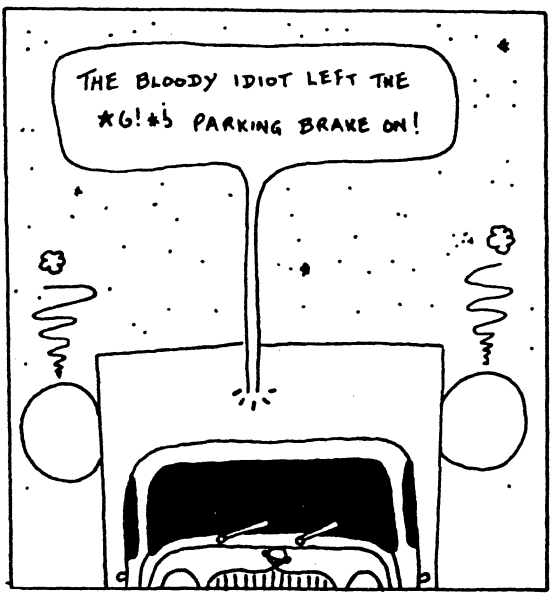
CAPTAIN'S LOG, STARDATE 0.1

R.A.S.C. STAR TRUCK COMMISSIONED FOR DUTY.
TRUCK'S CREW ASSIGNED AS FOLLOWS:

CAPTAIN QUARK - OBSERVING CHAIRMAN
DR. "STARS" AHOY - FIRST AID
LT. "SCUTTY" SCUTT - MECHANIC
LT. SOLO - DRIVER
LT. OHURRY - RADIO
LT. CHECKOFF - CHARTS AND ROAD MAPS
MR. SPECK - TELESCOPE OPERATOR







NOVA NOTES INDEX

March - April 1988 **Volume 19, Number 2**

NOVA NOTES is published bi-monthly by the Halifax Centre of the Royal Astronomical Society of Canada in January, March, May, July, September and November. Articles for the next issue should reach the editor by March 18th, 1988. Articles on any aspect of astronomy will be considered for publication. The editor is:

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

March 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		

April 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

May 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				

June 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			

Key to calendar:

Meetings: **Shadowed and outlined**
Special days: ***bold and italicized***
Possible observing sessions: **underlined**

Special Days:

March 3 - Lunar eclipse that we can't see
March 6 - Venus 2° North of Jupiter
March 20 - Vernal Equinox
March 22 - Mars 1.4° South of Neptune
April 22 - Lyrid Meteors
May 4 - Eta Aquarid Meteors
May 6 - Venus at maximum brightness (-4.5)
June 21 - Summer Solstice

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