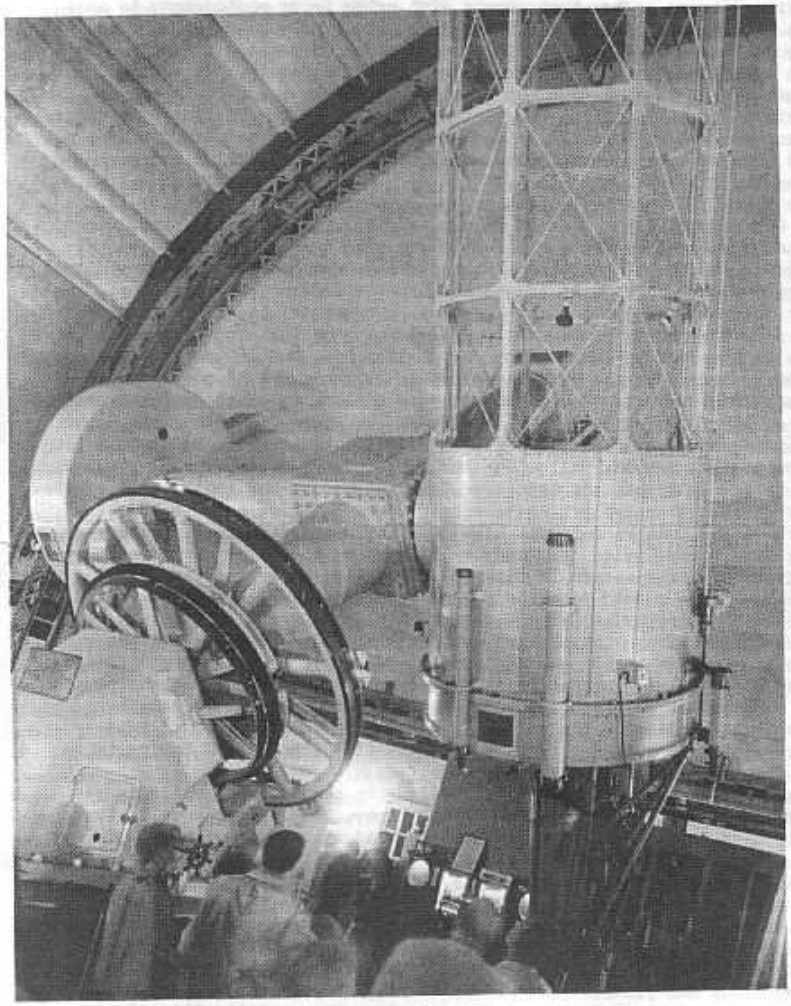
Stardust

A Monthly Newsletter of the

Royal Astronomical Society of Canada

Edmonton, Centre



* * * ANNUAL BANQUET MEETING NOTICE * * * Please take notice that the Edmonton Centre of the Royal Astronomical Society of Canada will be holding its annual banquet-meeting on Thursday, October 13th, commencing at 06:30 p.m., at the R.C.A.F. Association 700 Wing on Kingsway Avenue. The guest speaker will be Dr. Eric PINNINGTON of the Physics Department of the University of Alberta. His topic will be SPECTROSCOPY. The fare will be Smorgasbord, and will cost $2.50 per person. Dr. D. Hanlan and Bill Cable, President, will greet members at the door. Liquid refreshments can be purchased in the club lounge, upstairs., the dinner is downstairs.
PLEASE PHONE THE PLANETARIUM 455-0119 IF YOU INTEND TO ATTEND AS SOON AS POSSIBLE YOUR CO-OPERATION HERE IS NECESSARY *****

Herewith is the remainder of the article on Lunar and Planetary Astro-photography, submitted by David Roles: (The first part appeared in the June issue. ed.)

For prime focus photography with a reflecting telescope, the mirror must be moved some distance forward in the telescope tube so that the image may be brought to a focus outside the drawtube of the telescope(i.e. the image must be brought to a focus at the film plane of the camera attached to the scope). Thus, to use a reflector for prime focus photography, the telescope must either have an adjustable mirror cell or an extra set of holes drilled in the scope tube to accommodate the new position of the cell.

Using a rangefinder or box type camera with prime focus photography is more difficult but not impossible. Remove the lens of the camera and mount the unloaded camera on the telescope. Open the camera back and place a piece of groundglass against the film plane. Open the camera shutter using the "B" setting and move the camera toward or away from the drawtube until the image is in focus. Lock the camera in position, close the shutter, load the film and close the camera back. You are now ready to shoot. Before you do, however, check the finder scope (which should have been aligned with the main telescope) and put the telescope "on target" again.

In prime focus photography be sure to use fine-grain film especially if the focal length of your objective lens or mirror is short. Prime focus photography will only resolve reasonably large craters on the moon unless your telescope has a very long focal length. Photography of the smaller craters (or planetary detail) requires an extension of the focal length of the main lens of the telescope.

One method of extending the focal length is through the use of a negative-type lens such as a Barlow and is consequently called the negative projection method. A Barlow lens is standard equipment with some telescopes, but if yours doesn't have this handy gadget, you can buy it separately from any one of several companies. Using a Barlow lens you can project onto a film, an image of the moon or a planet two or three times the size of the image you would get with prime focus photography.Consequently, you should get more detail in your photographs. To take photographs using this method, follow the instructions for prime focus photography, but slip the Barlow lens into the telescope drawtube before you install the camera. Note, however, that with a reflecting telescope it is not necessary to move the mirror forward in the tube as before. Also note that magnification increases as the distance between the Barlow lens and the film plane increases(re-focusing will be necessary if the distance is altered). Finally, note that the curved side of the Barlow lens should face the camera (see the diagram for negative projection astro-photography). Using negative projection astro-photography, you should be able to photograph the central peaks of large lunar craters with a 2.4 inch refractor. With a six inch reflector, you should be able to photograph a few belts of Jupiter. If you can't get good resolution in the first photograph don't fret. Any kind of astro-photography usually requires a bit of experimenting. Also, the quality of the optics in a telescope will decide to some extent, the resolution possible. Thus, a good quality "achromatic" Barlow is best for negative projection photography.

Eyepiece projection photography (also called the positive projection method) is similar to negative projection photography. The only change is that an eyepiece is used in the telescope drawtube instead of a Barlow lens. Refrain from using very high power eyepieces since it will cut down on the brightness of the image immensely, making it difficult to focus and photograph the subject. Also, refrain from poor quality eyepieces (note that some movie camera lenses make good eyepieces). My experience has been that positive projection photography is more difficult than negative projection photography.

The last method for long range astrophotography (Afocal system) is used for those cameras with a non-removable lens. With this method, parallel light leaving the eyepiece of the telescope is brought to a focus at the film plane of a camera by its lens. First of all, note that the exit pupil of the telescope should be located approximately at the diaphragm of the camera lens. The exit pupil is simply an image of the objective lens (or mirror) of the telescope and can be found by pointing the telescope at the open sky (daylight) and holding a piece of wax paper behind the eyepiece. Move the paper to get the smallest circle of light. After knowing the required distance between the eyepiece and camera lens focus both the telescope and camera lens at infinity and install the camera behind the eyepiece. A cardboard tube between the eyepiece and camera lens will keep out stray light. With the Afocal system of photography, more experimentation than usual may be required before satisfactory results are obtained.

One of the most complicated problems in astrophotography involves the determination of exposure time. This problem can only be licked by a fair amount of experimentation. It is recommended that astrophotographers record the results of this experimenting and prepare a chart showing what exposure to use in a particular situation for a particular film. To start with, the astrophotographer should know the f value of the system he is using. For prime focus photography, this is a piece of cake: simply divide the diameter of the objective lens (or mirror) of your telescope into its focal length. If for example, you have a four inch relfecting telescope with a 32" focal length mirror the f value of the system is 32"/4" = f8. If you extend the focal length of the mirror three times with a Barlow lens, the equivalent focal length would be 3 x 32 = 96 inches and the new f value of the system would be 96/4 = f24 (or simply multiply f 8 times 3 = f24). If you are photographing the moon you can find your approximate equivalent focal length in mm by measuring the size of the image of the moon (in mm) at the film plane and multiplying by 100. If you have an image of the moon 15mm in diameter, the focal length is 100 x 15 = f25. Once you have the f value of the system you are using, you can get some idea of what exposure time to use.

As mentioned the photo of the last quarter moon was taken at 1/50 sec. at f50 with a yellow filter using Tri-X film. A yellow filter helps to filter out the out-of-focus wave lengths of light. Exposure time for a half or gibbons moon should be less, and still less for a full moon. This is merely a guide, and the above figures may be extrapolated for other films and f values. For a 200 ASA film for example (1/2 the speed of Tri-X) the exposure should be lengthened to 1/25 sec. If you shoot without the yellow filter, double the shutter speed and so on. If you find your negatives turning out too dense use a higher shutter speed and if too thing, use a slower shutter speed. For planetary photography, even more experimentation is required than for lunar photography.

A few additional pieces of information may be of use to some astrophotographers. For single lens reflex cameras with interchangeable focusing screens, a clear screen with grid lines may be used in place of the conventional ground-glass screen. Focus the system until the image of the subject and the grid lines are in focus simultaneously.

Press cameras or special astrocameras that use sheet film may be used in place of the cameras described. Focusing is visual, so there is no problem there.

When photographing the moon, note that the first quarter moon is brighter than the last quarter. Thus, try using twice the shutter speed for the first quarter that you would use for the last quarter.

When photographing the moon or planets with a scope that doesn't have a clock drive, try aiming the scope ahead of the target. When the target has drifted into the center of the field (due to the earth's rotation) activate the shutter. When using a self-time, activate the self-timer slightly before the subject gets to the center of the field, since there will be a delay of several seconds.

When enlarging negatives of the moon give the limb of the moon more exposure than the terminator, otherwise the limb may turn out completely white. Make a test strip for the portion at the terminator. After the paper has received the exposure determined for the terminator, place a piece of cardboard halfway between the lens and paper, and move it slowly from the terminator to the limb. (The cardboard should be cut to the shape of the lunar phase.) Develop the paper and see if the limb of the moon has received enough exposure. A couple of test prints may be required before satisfactory results are obtained. The moon photo with this article was made using this technique.

With negative or positive projection photography of the moon and planets, try the following trick. Extend the focal length of your scope slightly beyond its "Practical" limit and use a high speed film (you can get 800 or 1600 from Tri-X with overdeveloping). By using a high speed film you can use a faster shutter speed, which will help to compensate for the movement of the moon and the earth's atmospheric turbulance. Thus, you will get a noticeably sharper photograph than you would get using a fine-grain film.

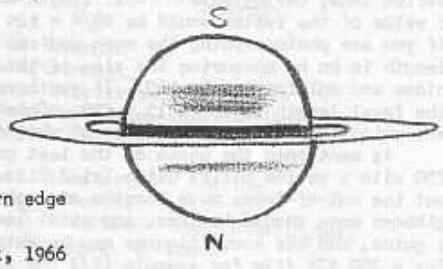
Finally, when photographing the moon and planets remember that experience and experimentation will produce the best results.

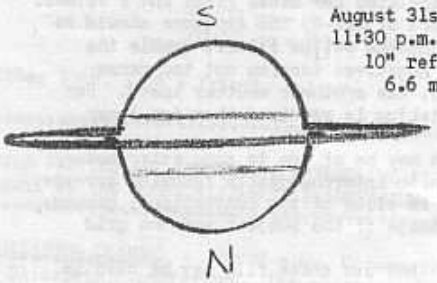
OBSERVING SATURN:

TO say that the past few months have been lacklustre for planetary observers, is putting it mildly! However, they are improving, and Saturn has become a prominent evening object. As many of you well know, Saturn this year presents its rings "edge-on". Throughout 1966, the rings will have been exactly edge-on three times--- April 2nd, October 29th, and December 17th and 18th. On April 2nd, Saturn was too close to the sun to be observed. During the summer as the ringed planet moved more conveniently into the evening sky. With our new f/6 ten inch reflector, we have watched as the rings have gradually narrowed.

You will note that on August 1st, the rings were fairly well open; enough that the space between them and the planet could be seen on either side. Note, too, the ring shadow on the southern edge of the ring.

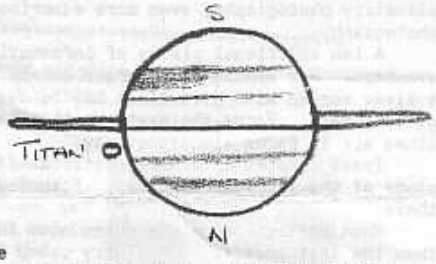
August 1st, 1966
01:10 a.m.
10" reflector
10mm lens





August 31st, 1966
11:30 p.m.
10" reflector
6.6 mm lens

In the August 31st drawing, the rings are much thinner.



On this occasion, the writer observed a reappearance of the moon, Titan from an inferior conjunction. There was also a distinct dark region in the South Temperate zone. Sometime in the next two weeks, the rings of Saturn are going to disappear completely. It will be most interesting to see exactly when; because there is no general agreement as to when this should occur. Of course, it will depend on the size of telescope used. All owners of telescopes are urged to keep a sharp and regular eye on Saturn to determine when the rings have disappeared for their particular instrument. Naturally, after October 29th, it will be interesting to see who spots the rings again first. Then we will go through the same procedure for the December 17th event. Write your observations to the "Stardust" editor.

Dave A. RODGER

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PLANETARIUM DIRECTORS from across Canada will meet at Edmonton's Queen Elizabeth Planetarium on Thanksgiving week-end. This will be the first gathering of its kind in Canada and reflects the accelerated interest in planetariums in the nation. Those attending will include Dennis Gallagher of Winnipeg, Don Davis of Montreal, R.J. Lockhart of the University of Manitoba, Ian McLennan of Rochester and representing Vancouver, and Sig Wieser, Bob Nelson, and Jim Wright of Calgary. Together with the Edmonton staff, they will discuss all major aspects of the operation, administration, and staffing of planetariums, and deal with production and programming. Each representative will report on progress and development at his planetarium Not represented will be Toronto, which has just appointed Henry King of London as Curator; and McMaster University, whose planetarium director, W. C. McCallion will be in Peru. After two days of meetings, the group will travel to Calgary to inspect that city's beautiful planetarium proper.

The proposed agenda follows:

Meeting of Canadian Planetarium Directors and Staff at Edmonton, Alberta.

Friday, October 7th, 1966 - 08:00 p.m. Register at Queen Elizabeth Planetarium.
09:00 p.m. To be announced.

Saturday, October 8th, 1966 - 09:30 a.m. at Queen Elizabeth Planetarium.
* Progress Reports - Dave A Rodger, Edmonton, Chariman
- 12:00 - Luncheon
* - 01:30 p.m. - Queen Elizabeth Planetarium
The Planetarium Association - Don Davis, Montreal, Chairman.
Open discussion
04:00 pm - Tour of City of Edmonton
06:00 pm - Dinner and entertainment

Sunday, October 9th, 1966 - 09:30 am - Queen Elizabeth Planetarium
* The Planetarium Show - W.J. McCallion, McMaster Univer-sity, Chairman.
12:00 - Luncheon
02:00 pm - Queen Elizabeth Planetarium - "On the Wings of Pegasus" showing.
* 03:00 pm - Planetarium Administration - Dennis Gallagher, Winnipeg, Chairman
06:00 pm - Dinner
* 07:30 pm - Educational Activities - George E. Williams, Edmonton, Chairman.

Monday, October 10th, 1966 - Trip to Calgary.

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ALL INTERESTED PARTIES ARE INVITED TO ATTEND THE LECTURE SESSIONS, DISCUSSIONS, ETC., AS LISTED ABOVE AT THE QUEEN ELIZABETH PLANETARIUM. (ONLY THOSE MARKED *).

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LUNAR OCCULTATION CLINIC - 08:00 p.m., October 21st, at the Queen Elizabeth Planetarium. The observation of lunar occultations is now considered to be extremely important to professional astronomers. Future lunar landings will require very precise information about any irregularities in the motion of the moon. This information is available from the analysis of lunar occultation timings. The precise time when the moon passes in front of a star is easily obtained by the amateur using a small telescope, a stopwatch and WWV time signals from a short-wave radio. Those that are interested in participating in this fascinating branch of astronomy are invited to the Lunar Occultation Clinic to be held on Friday, October 21st, at 08:00 p.m., at the Queen Elizabeth Planetarium. Further information may be obtained from Franklin Loehde, National Co-ordinator for Lunar Occultations at 429-1887.

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Bruce Bohannon - Recent visitor to Planetarium.

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PLANETARIUM RECEPTIONIST Miss Joanne NALDRETT is leaving the Planetarium staff at the end of October. She will be a hard secretary to replace. Her efficiency and devotion was well known to members of the Edmonton Centre, Royal Astronomical Society of Canada.

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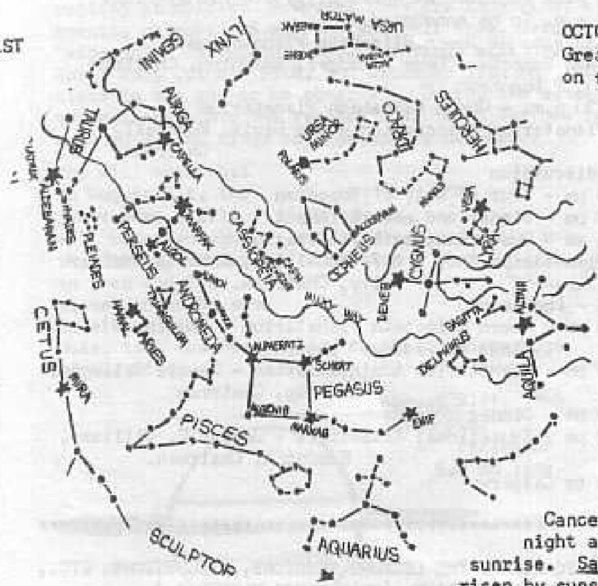
As you are all probably aware by now, the ephemeris for the planets in the last issue was correct, but for the year 1965. I had inadvertently picked up the wrong issue of the Observers Handbook. But then again, after a 17½ hour day, during which several planetarium presentations were performed by myself to some not so quiet school groups, the public, etc. and being that it was 02:00 a.m., perhaps, just perhaps I could be forgiven for this catastrophic, abominable, unforgiveable, earth-shattering, celestial shaking error????
IN ANY event, being that this is my last issue of STARDUST as EDITOR, (a new editor having been recently nominated) I would just like to say: "It's been fun, and a special thank you to WALTER FRANIEL without who's help, Stardust would still be being run off on the mimeograph machine." Good Luck to the new Editor!!

George E. WILLIAMS

NORTH The night sky - October 15 about 09:00 p.m. around 40° North

(HERE WE GO AGAIN!!!)

EAST



The planets for OCTOBER:

OCTOBER, 1966 a.d.: Mercury - Greatest eastern elongation is on the 26th, so that the planet might be seen as an evening star, but this is a very unfavourable elongation, Mercury being only about 10° above the S-W horizon, at sunset. Venus - Early in the month it may be seen as a morning star very low in the east just before sunrise, but by month's end it is too close to the sun for easy observation. Mars - In Leo it rises about 4 hours before the sun. On the 10th it is only 1° N of Regulus. Jupiter - In Cancer, it rises at about midnight and is near the meridian at sunrise. Saturn - In Pisces, it is risen by sunset and is visible until nearly sunrise. The earth is in the plane of the rings on the 29th.

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PRODUCTION - Walter FRANIEL

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