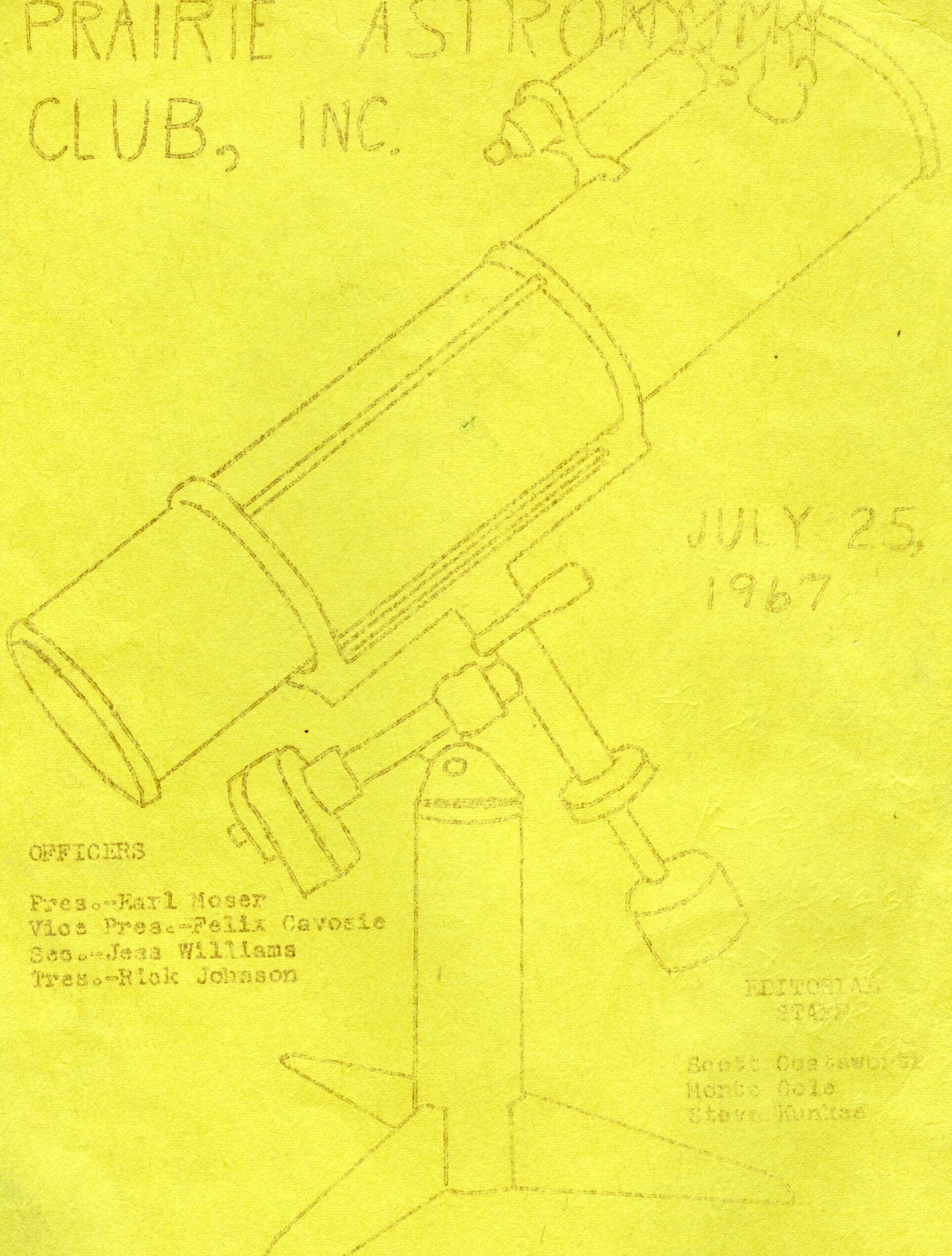
7-67 - EM

PRAIRIE ASTRONOMY CLUB, INC.



JULY 25, 1967

OFFICERS

Pres.--Earl Moser
Vice Pres.--Felix Cavosie
Sec.--Jess Williams
Tres.--Rick Johnson

EDITORIAL STAFF

Scott Gustaworth
Monte Cole
Steve Kuntze

Earl Moser

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Editorial

With the coming of summer, our club projects are really taking shape, especially the observatory. Another new undertaking is changing the newsletter, we plan to have more pictures as in this issue, the editorial, and the president's report along with feature articles in the interest of everyone.

This editorial is devoted to interesting everyone in the club to contribute their ideas to the newsletter for the benefit of everyone. Any feature articles, want-ads, negatives for pictures, cover designs, or diagrams will be deeply appreciated. How about naming the newsletter? "Under Nebraska Skies" or "The Prairie Astronomer" for instance, lets vote for a title at the meeting. (Any other titles may be nominated also.)

Let's all turn out at the meeting and the star-parties. Good observing!

-Scott Coatsworth

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The Meeting

Our meeting will be held on Tuesday, July 25, 1967 at 7:30 p.m. in the old Science Building at Wesleyan University.

The main topics will be the observatory, planning star-parties, and voting for the title of the newsletter. There will be refreshments

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The President's Report

Things are moving ahead again in our observatory program. The telescope has been selected. It is a 12½ inch F6. The price is $800. We have sent the first payment of $100 to Mr. Herrett in Idaho.

Pledges to date amount to about half the price of the telescope. We plan to borrow the rest of the money and obtain the telescope as soon as possible. With the telescope on display and in use at public sky shows, I am sure it will take no time at all untill it is paid for. After the scope is paid for, then we will look for a permanent location for it. But first things first. Until an observatory site is selected, we will store the scope in some convenient place in Lincoln.

The skies have been very good for viewing the past week (June 28-July 3). Quite a few club members have been out at my place the past five nights. Many found a lot of Messier objects and some have their lists nearly completed for eligability in the Messier Club.

-Earl Moser

This month's feature picture was taken by our secretary, Jess Williams. The print was made from an 8 power enlargement from two superimposed negatives. Each negative was taken with a 300 mm. lens for three minutes on Agfa Record, speed 500, developed 13 minutes in D-76 diluted 1:1 to give an effective speed of over 1000.

(Note: During the printing, the negatives slipped slightly to cause some elongation of the images, this was not a fault of either negative. -Scott Coatsworth)

THE GREAT ORION NEBULA

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ASTRONOMICAL MISADVENTURES

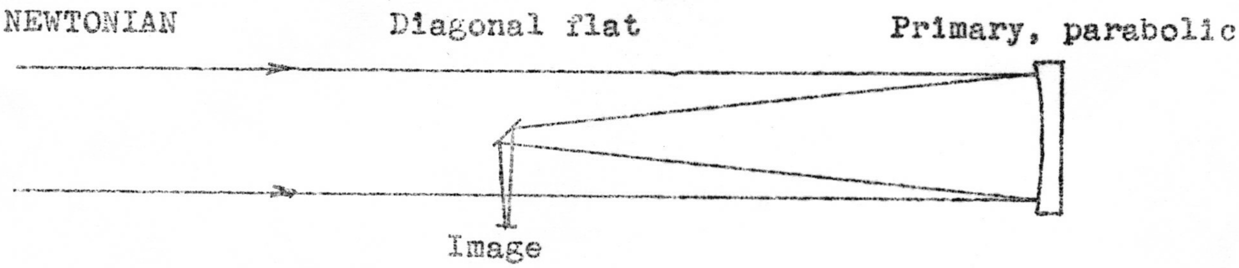
Astronomy is really a great hobby, and as such, it has its "interesting" sidelights. Personally, I have the unfortunate habit of leaving equipment on top of my car when coming home from an observing site. In this manner, I have managed to loose an entire box of eyepieces and to destroy a pair of 7x50 binoculars. While looking for the binoculars that fell off the car, we tried to turn around in the middle of the road and in doing so, we got stuck in the roadside ditch. Finally a truck came along, pulled us out, and we got home about 2;30 that morning. I have participated in other fiascos also. Two grazing occultations: the first was clouded out (though the ride to the site was nice); the second got so cold that we forgot the occultation, took off our shoes, and heated our cold feet on the dome light of the car! I have learned to look at these events as nothing more than the things that make one day different from the next and have accepted the fact that astronomy is in my life to stay!

-Monte Cole

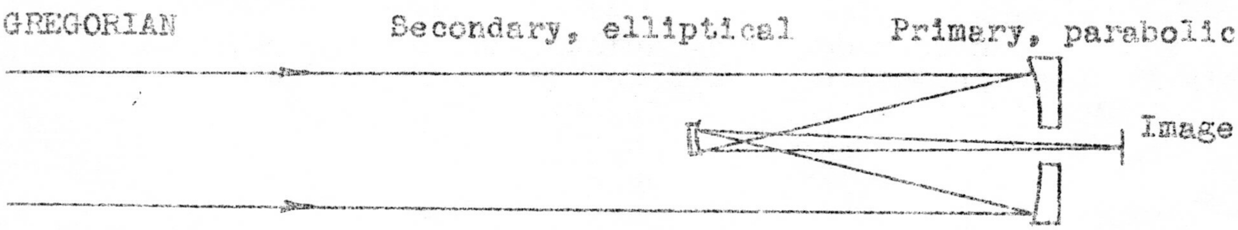
Telescope Systems

Many of us amateur astronomers are interested in different types of telescopes and how the optics form the image. But when terms like Schmidt-Cassegrain, catidioptric, shiefspeigler, and Maksutov are tossed around, many of us become lost. So, in the next two issues, I will try to explain briefly the basic makeup of the most common optical systems, and the considerations in their design. This part will cover all-reflecting systems and kinds of surface curves, and the next one will catch 'catidioptrics' and the various image defects, or abberations.

In all my diagrams, parallel lines starting at the left side of the page represent light coming from a distant object. The light path and image position are shown. As there is only one basic type of refractor, I'll explain it with next month's part. The Newtonian is the simplest design, because of the single mirror surface and diagonal flat. Comparatively easy to make, it is the least expensive of all, and some amateurs make their own.

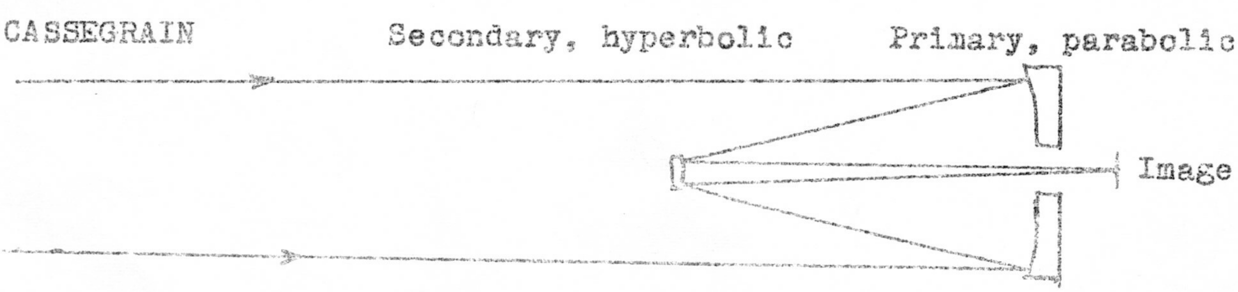


After Newton invented his, other reflecting systems came. In the 18th Century, Gregory came up with this design, now named after him:



This gave an erect image, but its field was small and light from the sky illuminated the focal plane. Baffles cure most of the stray light.

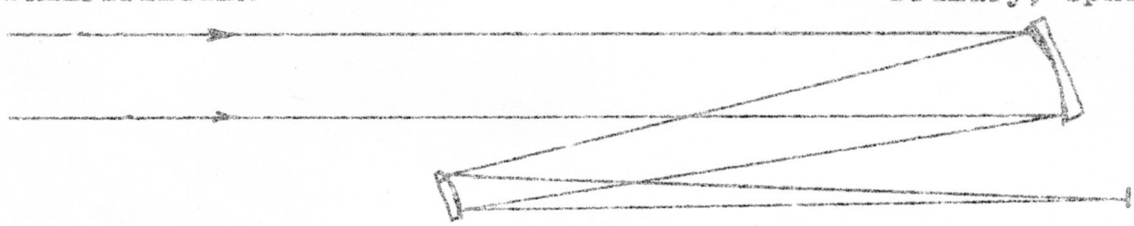
A similar system was invented later, called the Cassegrain after its inventor. It gave an inverted image and had a wider, brighter field. However, it was harder to baffle against stray light than was the Gregorian.



The difference between the two is in the type of curvature of the secondary and where it is placed around the focus of the primary. (The curves are exaggerated.) Both types give good definition and high magnification. The main disadvantage is the diffraction caused by the secondary and its supports.

In the present century, two men came up with a variation of the Cassegrain, using a spherical primary and and elliptical secondary. After the inventors, it is called the Dall-Kirkham. It has similar performance, but the surfaces are much easier to make than the classic Cassegrain.

The last all-reflection system, which for definition outperforms them all, is the shiefspiegler (if I spelled it wrong, tell me), or, more simply, off-axis reflector. It looks like this, with the usual exaggerations:

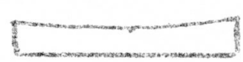


Both mirrors have spherical surfaces, both with the same radius of curvature. It's a reflector, therefore eliminating the chromatic abberation of refractors; its off-axis design eliminates the diffraction from the central obstruction inherent in nearly every other telescope design. Because of the off-center reflections, the reflected light path is astigmatic, but the design is such that each mirror's astigmatism cancels the other out, giving an astigmatism-free image.

Notes, Section 1; Curves

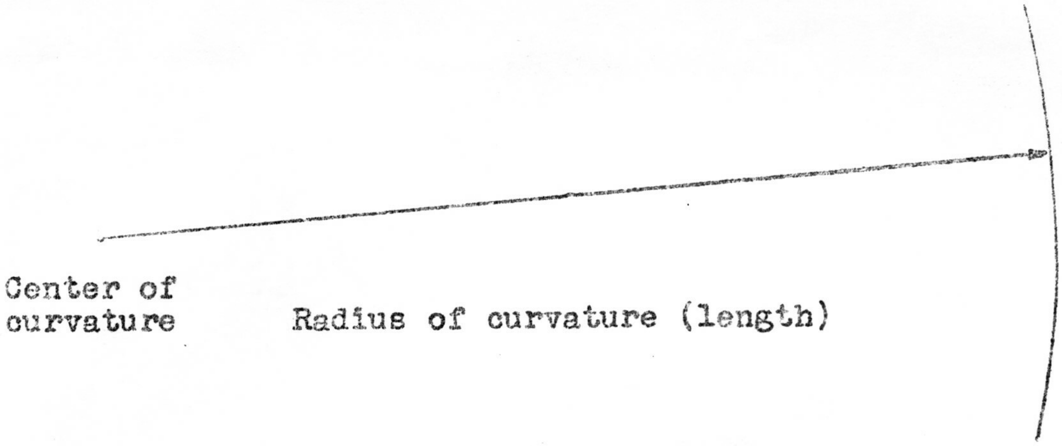
In the past section, and in the part coming up, I have and will use some terms pertaining to the contour of the surface on optical components. Therefore, I'd also better explain them. This section is called "Notes" because it's something extra but needed in an article on telescopes. Next month, Sec. 2 will be on abberations.

Perhaps the easiest way to illustrate optical surfaces is to use geometrical figures to represent the "cross-section" of the surface. The cross-section is the figure you would see if you cut a mirror or lens exactly down the middle and looked at the newly exposed glass straight on. For instance, this is the cross-section of a concave mirror, the top line representing the curved surface.

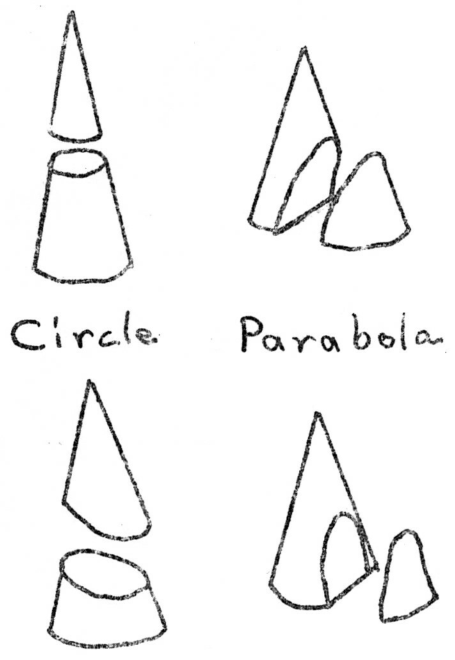


Now let's look at what the shape of these curves is. The simplest curve is the sphere. It can be represented by a circle. A few other terms can be illustrated in the diagram, too.

"TimeOut" Our Club will Have a public Showing and Sky Party In the Hickman Nebr Park - Aug 12

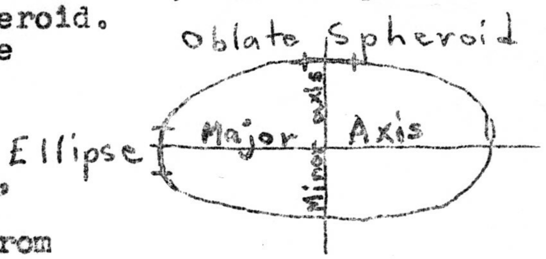


The five most common curves in telescopes, the sphere, parabola, hyperbola, ellipse, and oblate spheroid, can be represented by looking at a cone and imagining it sawed at different angles. The drawings are from the Time-Life Science Series book, Mathematics.



We have already discussed the circle as representing the sphere. the next on in line is the parabola, the curve on our telescope mirrors. In cutting the cone, the cut is made parallel to the side of the cone opposite the side being cut.

The hyperboloid is represented, as shown, by a cut at right angles to the base of the cone. Just right for the Cassegrain secondary, it is 'overcorrected' for a Newtonian. Last comes the ellipse, which can represent two surfaces, the ellipse and oblate spheroid.



The ellipse is taken from the end of the figure, the oblate spheroid from the side. Just one more thing remains to be explained about these surfaces.

That is what we call the 'surface of revonution'. If we look closely at the cross-section concept, we can see that the surface is made up of many cross-sections, taken along different diameters. Each of these diameters has a common point, the center. There is a line going through the center at right angles to the surface. Looking at the cross-section, this line is also the center-line of the figure. It is the 'axis of revolution'; turning the line figure on this axis, in space, forms the surface of revolution.

Thus is the geometry of telescope optics. I hope no one got lost, but if anyone does have a question or three, we'll talk about it at the meeting.

I would like to put in a plug here. I recently purchased a metal turning lathe, and would kike to make my serviced available to members. I have not decided wheather or not to charge, or if I do, how much.