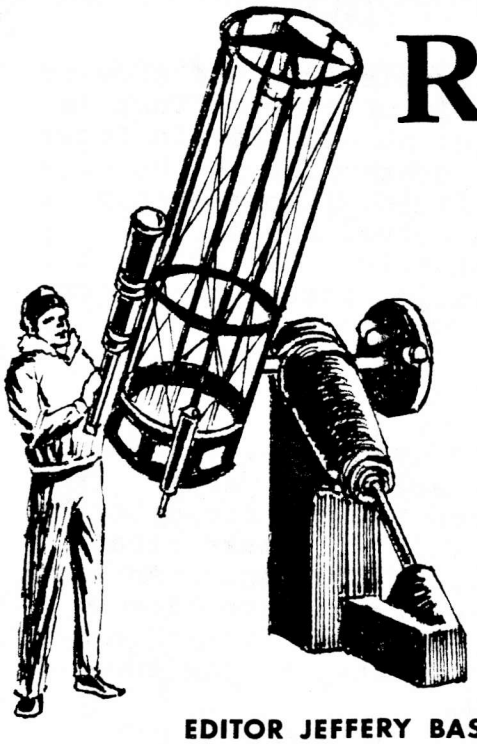


REFLECTIONS

of the

UNIVERSITY

LOWBROW

ASTRONOMERS

EDITOR JEFFERY BASS

vol. **V** *no.* **XII**

PREVIEW

This Friday's meeting of the University Lowbrow Astronomers will feature a talk by Warren Club member Dave Harrington on the subject of this coming May 30 annular eclipse.

After the break, the meeting will resume with the nomination and election of new club officers. And not to forget, DUES ARE DUE for the next Lowbrow fiscal year! They are still the same, low $7.00 that they were last year, so bring your bucks and square up.

EYEPIECES

by Jeffery Bass

The eyepiece of a telescope is really used as a microscope to examine the tiny focal plane image of the objective. The eyepiece must be of the same high optical quality as the objective or else image deterioration will occur.

The primary effects that the eyepiece introduces into an optical system are modifications of magnification and field size. Eyepieces are categorized by their focal lengths and it is this parameter that determines the amount of magnification that they provide.

This simple formula is used:

$$\text{mag} = \frac{\text{objective focal length}}{\text{eyepiece focal length}}$$

If the focal length of your objective is 48 inches and you are using a 1 inch (25mm) focal length eyepiece, then you will have a magnification of exactly 48 times (48x). A 1/2 inch (12mm) eyepiece will give you 96x, and so on. Because the defects of the objective image are more prominent as the magnification of the eyepiece is increased, it is a good rule of thumb not to use more than 50x per inch of objective aperture. Thus, a 6 inch f8 (48" focal length) telescope should not go beyond 300x (by using an 1/8 inch or 4mm eyepiece). Actually 200x is a more realistic limit.

A simple eyepiece will have two lenses called the field lens and the eye lens. The field lens is designed to widen the field of view,while the eye lens magnifies the image formed by the field lens.

Below are explanations of the different parameters used to describe the eyepiece designs summarized on the next page:

Focal length:

Each different eyepiece design seems to function best in a certain range of focal lengths. That range is listed here.

Apparent Field:

As the eyepiece magnifies the objective image, the image spreads out. How wide this spread-out becomes is listed arbitrarily as good or poor based on how wide or narrow the field of view is.

Eye relief:

This is the distance between the eyepiece lens and your own eye as you are looking through the eyepiece. If the eye-relief is short, a person wearing glasses may not be able to focus properly on the image.

Curvature of Field:

A good eyepiece should provide a flat field of view. That is, the image should be in focus from the center out to the edge of the field. Some eyepieces produce a curved field, where it is impossible to bring the entire image into proper focus at once.

Distortion:

In some eyepieces, the magnification actually varies from the center of the field to the edge. This will make straight lines appear curved. An eyepiece free from distortion will provide the same magnification from the center to the edge of the field.

Ghost images:

Some eyepieces are subject to a certain amount of internal reflections which can result in ghost images. These can be especially distracting when viewing bright objects such as planets.

Chromatic aberration:

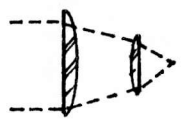
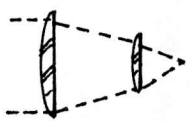
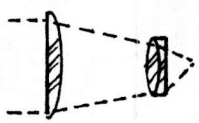
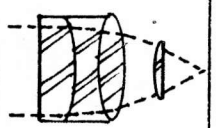
This results when light rays of different wavelengths (colors) are not focused to the same point, resulting in colored fringes around images.

Spherical abberation:

This results when all light rays entering the eyepiece fail to get focused at the same point. It is impossible to focus such an eyepiece at all, resulting in a considerable loss of image sharpness.

Cost:

Yep, you get what you pay for. The better the eyepiece is in providing you with that "perfect" image, the more expensive it is likely to be.

Eyepiece	Ramsden	Huygenian	Kellner	Symmetrical	Orthoscopic	Erfle
Optical Design						
Focal Length	12 - 30 mm	18-40 mm	7-60 mm	18-40 mm	4-25 mm	16-40 mm
Apparent Field of View	narrow	fair	fair	wide	moderate	very wide
Eye Relief	short	short	good	excellent	good	excellent
Curvature of Field	bad	bad	little	very little	none	very little
Distortion	some	alot	very little	very little	none	very little
Ghost Images	alot	none	alot	some	none	alot
Chromatic Aberration	bad	bad	very little	some	none	very little
Spherical Aberration	bad	bad	very little	some	none	very little
Cost	low	low	moderate	moderate	high	high
Comments	best for small reflectors	best for refractors of f/15 or greater	good for most telescopes	good for low powers	best for high powers	best for low powers and wide field

from an article appearing in Astronomy magazine Feb. 1979

Monthly Meeting

APRIL 13 *7:30 p.m.*

Detroit Observatory Classroom

program: Dave Harrington on the May 30 Eclipse and Club Officer elections

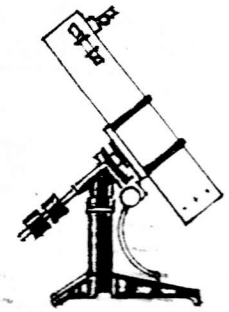
club address:

MSA Office Michigan Union

Ann Arbor, MI 48104

See you around!

—Jeff



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