

the Spectrum

BUFFALO ASTRONOMICAL ASSOCIATION INC.
BUFFALO MUSEUM OF SCIENCE
HUMBOLDT PARKWAY
BUFFALO NEW YORK 14211

Editor:
Ernst E. Both

SEPTEMBER - OCTOBER 1971

SPECTRUM CHANGES: Beginning with this issue, the EAA Spectrum will become a bi-monthly publication. Increases in production and mailing costs make this move necessary - the alternative would be an increase in dues, a step we definitely do not want to take. At the same time we will make every effort to improve the quality of this newsletter by introducing several new features and by enlarging it to six pages per issue. We encourage each member to submit material to us for possible use in the Spectrum; we need news items - let us know what you are doing, what instruments you have made or bought or are making; we need short book reviews; we want to know more about what you are observing; and we can always use short articles - helpful hints to the instrument maker and the observer. Articles should, in general, not exceed five double-spaced, typewritten pages (your long-hand is welcome, too!). And by all means let us know if there is any subject you would want to see discussed in these pages! In short: we need your help to make this as useful as possible.

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SEPTEMBER MEETING: Our first meeting of the new season (September 10, 1971, 8:00 PM, EDT) will feature short reports by several of our members on their recent activities. Among these will be Larry Hazel, who visited the Ford Observatory in California; Ed Lindberg, who attended the Summer Seminar at the new observatory of the Syracuse Astronomical Society; John Riggs, who is working on a new classification of deep-sky objects; Bob Burdick, who has just completed a 12-inch Cassegrain; and Dale Hankin, who is busily producing "The Amateur Astronomer," a new astronomical magazine. As an added attraction, and by way of raising money for our Newstead Observatory, we will raffle-off a copy of Abell's book "Exploration of the Universe" - a truly magnificent general astronomy text (tickets are 50¢ - also annual dues are due, so be prepared!). Refreshments as usual, and (weather permitting) observing Mars with the 8-inch refractor. We are happy to present MEMBERS' NIGHT - see you there!

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OCTOBER MEETING: For our second meeting (October 8, 1971, 8:00 PM, EDT) we are pleased to present our own Walter Semerau, who will speak to us on "Solar Activity." Walter has been busy this past year perfecting his instruments and he has tried many new techniques. He has also been working on a film illustrating his work, a film he hopes to show at this meeting. Walter Semerau certainly needs no introduction - he has won national and international acclaim and he owns the most sophisticated private solar observatory. We are proud to have as our speaker WALTER SEMERAU! --- Please remember: your next issue of the Spectrum will be the November-December issue. There will be no further announcement of the October meeting. ALSO: henceforth we pledge to make a determined effort to start the meetings promptly at 8:00.

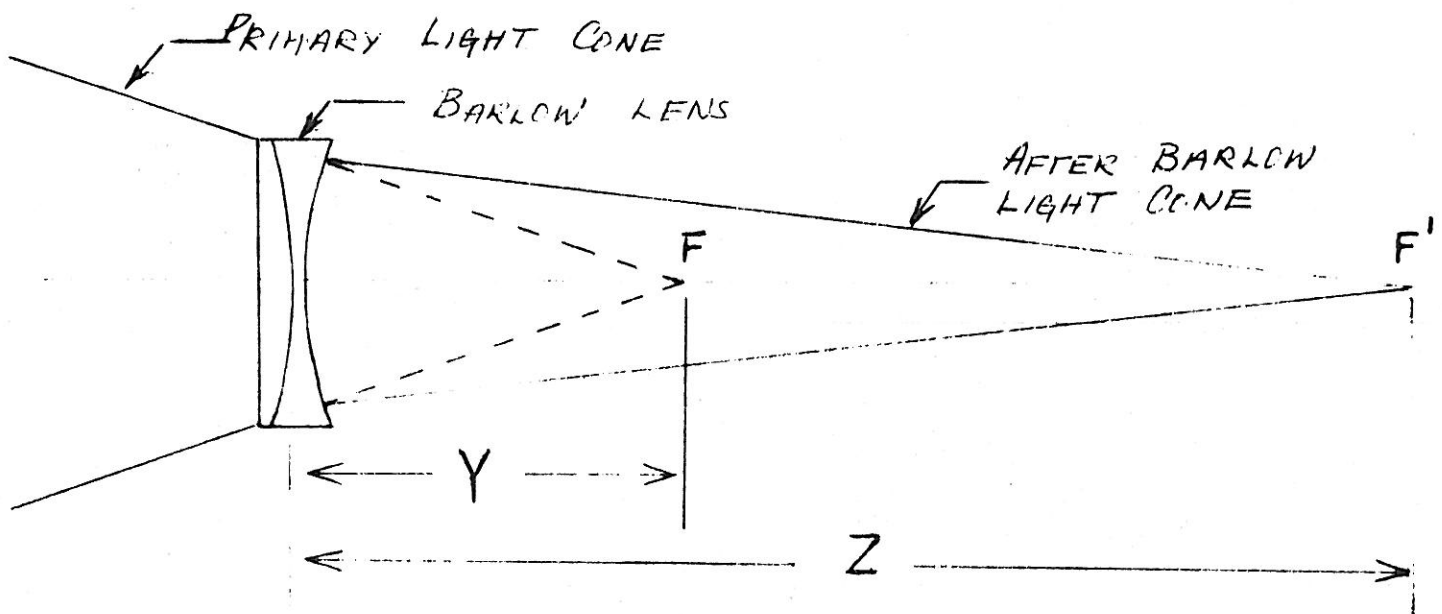
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WANTED: 7 X 50 Binoculars in good condition. Call Les Stoklosa, 695-3606 after 6 PM.

* THE BARLOW LENS - What it is and how to use it * By Ralph K. Dakin

The Barlow lens, one of the most useful telescope accessories, is the least understood and most maligned attachment used by amateur and professional astronomers. It is simply a concave lens which is positioned a short distance inside the focus of an objective or mirror and increases the equivalent focal length of the system by an amplification factor, dependant upon the location of the lens. The Barlow is used to substantially increase the focal length with only a small increase in the over-all length of the system.

The accompanying diagram shows how the Barlow lens is used. Its action is similar to that of the rear element of a telephoto lens or the convex secondary mirror in a Cassegrainian telescope. Without the Barlow the image would be formed at F (see figure below), the prime focus of the objective. When the Barlow is a distance Y inside this focus, the image will be shifted to F', a distance Z from the Barlow.



The ratio of the distances Z/Y is the magnification factor M for that combination of Y and Z . If the Barlow lens is placed at F , there will be no amplification. If the distance Y is equal to the negative focal length of the lens, distance Z becomes infinite and you have in effect a Galilean telescope with its negative lens eyepiece.

For a Barlow lens of focal length f , the required distances can be determined, for any desired magnification, from the following equations:

$$Y = \frac{f(M-1)}{M}$$

$$Z = f(M - 1)$$

Assuming a Barlow lens focal length of 60 mm (2.36 inches) and a desired magnification of 3X, the distance Y inside the prime focus is 60×2 , divided by 3 = 40 mm (1.57 in.) and Z is $60 \times 2 = 120$ mm (4.72 in.). The focal length of the telescope is now 3 times longer with an eyepiece position extension of only 120 mm minus 40 mm = 80 mm (3.15 in.).

The advantages of using a Barlow instead of short focal length eyepieces to obtain higher powers are as follows:

1. Relatively long focal length eyepieces can be used with their longer eye-relief distances, which is extremely important to observers who must wear corrective eye glasses. In fact, using a Barlow lens with an eyepiece actually results in a slight increase in the eye-relief of that eyepiece. A 25.4 mm (1 inch) focal length eyepiece, when used with a Barlow at a magnification of 3X, gives a power equivalent of an 8.46 mm (1/3 inch) eyepiece.
2. As a result of increasing the focal length, the f number of the instrument is increased by the same factor. An f/8 telescope, when used with a 3X Barlow, becomes an f/24 telescope. Very few eyepieces perform well when used with objectives faster than f/8. Increasing the f number of the instrument substantially improves the performance of all types of eyepieces.
3. For photography of the planets and the Moon when long equivalent focal lengths are needed, the Barlow lens method completely outperforms the eyepiece projection system. Eyepieces are not designed to be used as projection lenses. It is also much easier to compute the final equivalent focal length and the f number.
4. A good Barlow lens can be used successfully at many different powers, but do not slide the lens in and out unless it can be kept precisely squared up in the mount. This point will be discussed in more detail later.
5. Barlows can be stacked. The writer has two Barlow assemblies; one set for 3X magnification and one for 4X. When stacked together the total magnification is 3 X 4 or 12X, converting a 50 inch focal length telescope to one with a 600 inch equivalent focal length.

Single lens Barlows on the market do not perform well because a single lens cannot be corrected for either chromatic or spherical aberration. A good Barlow must have at least two lens elements to correct these aberrations. The Tel-X-Tenders used to double or triple the focal length of camera lenses are Barlow lenses and may work very well on a telescope. Theoretically, a lens should be used at the conjugate distances for which it was designed. Two good Barlow lenses have been tested at magnification ratios from 2X to 6X with no appreciable difference in performance.

A good telescope will perform better when a properly squared-up and mounted Barlow lens is used to obtain high power than with an equal power, short focal length eyepiece because that eyepiece works better at the larger f number. Most Barlows on the market are sold in tubes (bathroom plumbing) that do not hold the lens optically centered and square to the optical axis of the telescope. They are even supplied with a plastic or wooden stick so you can change power by pushing the lens up or down the tube. A Barlow lens is nearly as sensitive to alignment as the convex secondary mirror in a Cassegrainian telescope. Improper mounting is the main reason that Barlow lenses have had a poor reputation (see editor's note below). One commonly available book on telescopes even makes the statement "High power can also be obtained using a Barlow lens - if you must." A poor quality or misaligned telescope will not perform with a short focal length eyepiece or with a Barlow lens.

One problem with Barlow lenses, especially when mounted in 1 1/4 inch tubes, is internal wall reflections of bright objects. This problem can be eliminated by cutting a fine thread on the inside of the tube and painting it with a dull black lacquer or, if a lathe is not available, lining the tube with a thin black felt or flocked paper.

I hope that this article has dispelled some of the mistaken notions about the Barlow lens, pointed out some of the advantages and will encourage its greater

utilization. Author's address: 720 Pittsford-Victor Rd., Pittsford, NY 14534.

EDITOR'S NOTE: For years I have disliked using Barlows, in retrospect mainly because those I did use were of poor quality. Recently I have been using a 3X Dakin-Barlow (available from Vernonscope & Co., Candor, NY 13743, \$ 29.50) and I can only testify to its superb quality. It is a real joy, especially when using it with our f/10 refractors. eeb.

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* OBSERVING SECTION RE-ORGANIZED * By John Riggs

Western New York has never been known for its high percentage of clear nights and never will be. However, when there is an occasional break in the weather pattern, observations of all types of objects ranging from the Sun to the faintest galaxies in Coma may be carried out in this area. Recently there has been an increasing demand among our members who observe during these clear spells, and those who would be interested in observing, for a new observing section. As a result, starting this month, a revised observing section will reconvene and we invite all who are interested to attend.

The purpose of the section will be to promote the observation of objects for the sheer enjoyment rather than trying to carry out scientific work. The number of contributions to science that an amateur can now make is limited and should be done in co-operation with the larger organizations set up for this purpose, such as the A.A.V.S.O. (American Association of Variable Star Observers), the Association of Lunar and Planetary Observers (A.L.P.O.), or the American Meteor Society. Since by the very nature of our own association the number of members is small, it would be foolish to remain apart from these larger organizations and attempt scientific work. The new observing section will therefore concentrate on the pleasure derived from just looking at a star cluster or lunar crater and not worry too much about exact numerical details. The individual alone will set his own pace.

The observing section will meet on the fourth Friday of each month, the same night as the instrument section, at the Museum of Science at 8:30 PM for about an hour. In this way, if the instrument section meets at 7:30 PM and ends roughly at 8:30 PM, interested members will be able to attend both meetings if they so wish without a time conflict. If that Friday night is clear, members may choose to observe after the meeting at either the Museum with the 8-inch refractor, or at Newstead Observatory with the 12 $\frac{1}{2}$ -inch reflector.

I hope that these short notes will give prospective members a rough idea of the section's objectives. Further details will be discussed at the organizational meeting on Friday, September 24, 1971 (8:30 PM, EDT at the Museum).

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SPY AND TELL: The Les Stoklosa's are the proud parents of Philip John, born August 1, 1971. PJ, as young Stoklosa will be known, has not as yet shown any interest in astronomy (a situation, we trust, which will be remedied in due time) - congratulations are in order! * * * Congratulations are also in order for Dale Hankin who recently joined the ranks of the married (details unknown). * * * We hear that Edith Geiger dropped her camera and now is unable to snap those embarrassing pictures - what a shame! Edith's new 12 $\frac{1}{2}$ -inch Dynascope has arrived but remains unpacked (you've got to be kidding!) * * * This summer Walter Semerau has been using his prominence

telescope more often than usual (even though prominence activity has been less than spectacular) - was it because you have to pass that cherry tree to get to the telescope, Walt? * * * Irv Goetz and his observatory were featured in the April 14, 1971 Hamburg Photo News - full-page spread! We are proud of you, Irv! * * * The Kellogg Observatory's Langford Field Station now has two pipe-piers in the ground; we hope to schedule a star party there next summer. * * * Message to all telescope owners: please drop us a line about your instruments, would like to compile a list of who's got what! * * * Rick Janas has joined the ranks of the Museum's security guards (where is your badge, Rick?). * * * DUES ARE DUE IN SEPTEMBER - SEE EDITH!!!

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* Design and Construction of a 20-inch reflector * By George Keene
(Notes on a talk given to the Lockport Astronomy Association, submitted by Orrin Christy).

Some general principles:

- "I've built a few telescopes, so permit me a bit of philosophy if you will.
1. START AT THE TOP: Design it right from the eyepiece, downward. Don't start out with the fact that you have a pedestal that you want to use and build up to it. Start out with the stuff up top and make things bigger and bigger and bigger as you go down; just like a Christmas tree. You'll have a happier and more solid design.
 2. USE LARGE DIAMETER, BUT LIGHT WEIGHT: You don't need a lot of mass. Seven hundred pounds is not a lot of mass for a 20-inch telescope. It's got to be in the right place. Bearings have to be big in diameter - the bigger the better. Russell Porter said early in his book, the bearings in the telescope should be the same diameter as the mirror. This is in ATM #1 (Amateur Telescope Making) and everybody laughs and laughs because they're beginners and they're thinking he's overdoing it. That was way back in the twenties. That's still true. They could be as big as the mirror and you'd be just about right. Keep everything with large lever arms.
 3. WORRY SMALL, BUT PLAN BIG: If you ever sat back and really thought about what you're trying to do on a project like this, both you and your wife would go nuts. It's a long job, takes a lot of persistence, but you can go at it if you whack away at it just little by little. You try to improvise, which is really the 4th point, to ease yourself over some of the financial burdens. I won't tell you what all this thing (his 20-inch, f/5 reflector, eeb.) costs, but it's ridiculously low. If you can substitute time for going out and buying castings or things like that or expensive machining, you can put one together pretty reasonably."

Orrin Christy wrote: "I recorded his talk with a tape recorder and have taken this section out of his speech."

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* LETTER FROM VIETNAM * Excerpts from a letter by 1st Lt. Orrin D. Christy, 30 Jul. '71

How are things back in the world? I've found one thing is the same from both hemispheres - the sky. I'm sorry that I didn't get up to talk to you while I was home. Seven weeks of leave, and I didn't see half the people I wanted to. ...

Well, the nights are generally very clear, so clear, that it's rare not to see the milky way even with the Moon out - early in the night a bit hazy, but later fantastic. But observing is hampered by two things: First is the continual use of flares to detect enemy movement; second, the fear to look up rather than

around you, for movement. This is especially true on the perimeter. When I'm out there I look constantly out rather than up. I'd rather come back to hazu Buffalo, than not come back at all. ...

We use devices called starlight scopes. They allow you to see 800 meters out in the darkness. It's like looking through 4X binoculars in the daytime. The few times I've turned it to the skies have been fantastic. I'd estimate that you can see 12th mag. stars - M 80 in Scorpio is fantastic. Mars blinds you. I'm not sure the principle by which they work, but they're powered by a very small battery. Oh - the price \$ 4,600 a piece.

Well, I better run now. Tonight is letter writing night. It's quiet - no rockets tonight, I hope. So we'll see you - I leave in 270 days. Fantastic!

Peace,

Orrin.

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POSTSCRIPT: I am sure Orrin would like to hear from some of our members. Herewith his address: 1st Lt. Orrin D. Christy ** * * * * *
125-38-3654 ** WANTED - **
Machine Gun Battery (Prov) ** MATERIAL FOR THE SPECTRUM - **
23rd ARTY GROUP **
APO 96266 ** * * * * *

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