WHERE'S THE BEADS?!

Eclipse fever is running high as plans for the May 30th eclipse expedition are finalized.
EDITOR: Judy Butcher  
Send all articles to:  
(313) 254-1786  
48200 Keding Apt. 102  
Utica, MI 48087

The W.A.S.P. is the official publication of the Warren Astronomical Society and is available free to all club members. Requests by other clubs to receive the W.A.S.P. and all other correspondence should be addressed to the editor. Articles should be submitted at least one week prior to the general meeting.

Warren Astronomical Society  
P.O. Box 474  
East Detroit, MI 48021

President: Frank McCullough  254-1786  
1st V.P.: Joe Gulino  979-4041  
2nd V.P.: Ken Strom  977-9489  
Secretary: Ken Kelly  839-7250  
Treasurer: Bob Lennox  689-6139  
Librarian: John Wetzel  882-6816

The Warren Astronomical Society is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first and third Thursdays of each month. The meeting locations are as follows:

1st Thursday – Cranbrook Institute of Science  
500 Lone Pine Road  
Bloomfield Hills, MI  
MEETING STARTS AT 7:00 PM

3rd Thursday – Macomb County Community College – South Campus  
B Building, Room 209  
14500 Twelve Mile Rd.  
Warren, MI

Membership is open to those interested in astronomy and its related fields. Dues are as follows and include a year’s subscription to Sky and Telescope.

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<tr>
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Stargate Observatory Chairman: Ken Strom 977-9489

Stargate Observatory is owned and operated by the Warren Astronomical Society in conjunction with Rotary International. Located on the grounds of Camp Rotary, Stargate features a 12½" club-built Cassegrainian telescope under an aluminum dome. The observatory is open to all club members in accordance with the “Stargate Observatory Code of Conduct”.

Lectures are given at Stargate Observatory each weekend. The lecture will be either Friday or Saturday night, depending on the weather and the lecturer’s personal schedule. If you cannot lecture on your scheduled weekend, please call the Chairman as early as possible or contact an alternative lecturer. Those wishing to use Stargate must call by 7:00 p.m. on the evening of the observing session. The lecturers for the coming month are:

March 16/17 ........ John Root .................. 464-7908  
March 23/24 ........ Doug Bock .................. 750-9369  
March 30/31 ....... Stephen Franks ............ 255-7215  
April 6/7 ............ Frank McCullough .......... 254-1786  
April 13/14 ........ Ron Vogt .................... 545-7309  
April 20/21 ........ Alan Rothenberg .......... 355-5844  
April 27/28 ........ Ken Strom ................... 977-9489  
May 4/5 ........ John Root .................. 464-7908  
May 11/12 ...... Doug Bock .................. 750-9369  
May 18/19 ...... Stephen Franks ............ 255-7215  
May 25/26 ...... Frank McCullough .......... 254-1786


W.A.S.
COMING EVENTS

APRIL 5 - Meeting at Cranbrook Institute of Science to be held outdoors, weather permitting. (Last month's meeting was held indoors due to the snowing) Messier talk to be held indoors otherwise.

APRIL 7 - Observing meeting and star party at Doug Bock's.

APRIL 14 - Officers meeting at Frank McCullough's to start at 4:00pm. All members are welcome to attend.

APRIL 19 - Meeting at Macomb County Community College begins at 7:30 pm. Practice for the Star Bowl will take place. Have your questions and answers ready for a night of fun competition.

APRIL 28 - Observing meeting and star party at Doug Bock's.

MICROCOMPUTER RCPM/RBBS (616) 342-4062

The Kalamazoo Astronomical Society is pleased to announce that their Remote CP/M & Bulletin Board service is now in operation.

As a Remote CP/M system, you can run any of the programs on the system, and if you have the program MODEM on your microcomputer you can even transfer most of the programs to your own system.

As a Remote Bulletin Board Service, you can leave messages for other callers on the system, or search through the message file for any of interest to you.

As a message center for the KAS, you will be able to read the latest information on comets, auroras, and other astronomical events. You can also obtain information on KAS meetings, observing sessions, and schedules for nearby planetariums.

To access the system, set your modem to 300 baud, full duplex, and dial in. The system is available 24 hours a day, 7 days a week. Best of all, it's FREE!
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Observing Meeting and Star Party

Our next observing meeting and star party will be held March 31, 1984 at 7:00. We will meet at Doug Bock's house. The program will be a continuation of the Early Spring skies, moving into the spring and early summer skies. We will also be talking about any special events coming up in the near future.

The following is a schedule for the next few months of observing meetings.

<table>
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<td>April 7, 7:00</td>
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<td>April 28, 7:00</td>
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<td>May 5, 7:30</td>
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<td>June 2, 8:00</td>
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<td>June 23, 8:00</td>
<td>Bock's House</td>
<td>Project reports?</td>
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<td>June 30, 8:00</td>
<td>Bock's House</td>
<td>Late Summer skies</td>
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This is for the first half of the year. I have scheduled more than one meeting a month. This is to insure that we make progress in each individual's observing programs. Also, the probability of being clouded out is high, so the more you try to get out and observe the better chance of catching some clear weather. If by chance, we get clear skies for every meeting we will still meet at all the scheduled dates.

Each month I will be giving a progress report on the meetings. Also, the schedule may change, so watch here in the WASP for coming attractions.

Doug Bock
6383 Hartland rd.
Fenton, MI. 48430
1-313-750-9369
As most amateur astronomers are aware, the Earth's atmosphere often degrades our view of astronomical objects. What isn't always realized is the fact that one form of this degradation is dependent only on the altitude of the object above the horizon. The lower an object is in the sky, the longer the path through the atmosphere along which its light must travel. The longer this path, the greater the amount of light that gets absorbed and scattered by the atmosphere. The exact amount of light loss depends on such things as the amount of dust in the air, the amount of electrons and oxygen and nitrogen molecules etc. And, in general, the bluer wavelengths are scattered more than the red ones. There is a simple formula, however, for making a rough estimate of how much light loss to expect for a point source of light like a star:

\[ \Delta m = 0.2 \frac{\text{magnitudes}}{\cos z} \]

Where \( z \) is the zenith angle of the object, that is) the distance in degrees from the zenith down to the object (or 90° its altitude) and \( \Delta m \) is the change in apparent magnitude of the star. As always, your comments and questions are welcome at: 4131 V Townhouse Rd., Richmond, VA 23228

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16-inch Casagrain with heavy-duty equatorial mount, clockdrive. Feature story was done on it in Sky & Telescope November '72. $1800 or best
Fourteen foot diameter dome - $600
Call Jim 313/981-2487

6" Reflector full mount on wheels
5 eyepieces homemade
excellent condition--------$250.00 --------Call Ken-----
644-8458
The Leelanau Center

For Education

Facilities

The Lanphier Observatory is a three-story building designed for its hilltop location to give maximum elevation to the observing areas. Complete winterization and heating capacity allow use in the coldest weather.

The first floor provides space for a classroom that can seat up to 18 people. A large chalkboard and excellent teaching aids are available. In addition, the first floor contains a storage area, a rest room, and a well-equipped darkroom where black and white and color film and prints are processed.

Outside, on the second floor, there is an observation deck for group viewing of the sky, for study of constellations, and for the use of small telescopes. Inside, are a chart and reference room and a workshop for fabrication and repair of equipment.

The dome, containing the telescope and accessories, comprises the third story of the building. The telescope, a 14-inch Celestron, Schmidt-Cassegrainian, is mounted on a concrete column that is isolated from the rest of the building structure to reduce vibration of the instrument during photographic work. Accessories include an 8-inch Schmidt camera for wide angle photographs, a 35mm camera for planetary photography and a Williams Cold Camera for photographing deep-space objects. The dome, incorporating several custom-built features, was manufactured by the Ash Dome Manufacturing Co. to Charles Lanphier’s specifications. The most outstanding feature is an optical-quality, plate glass window, equipped with outside shutters. During windy or cold weather, the window can be positioned toward any part of the sky, so that viewing can be done in the protected and heated comfort of the work area. In most other observatories viewing must be done through an opening in the dome.

In addition to an excellent array of reference materials and small telescopes, a programmable calculator with printing attachment is available for complex calculations, offering students increased opportunity to work in the mathematical aspects of astronomy.

Programs

The Leelanau School makes the Observatory facilities available to all interested students for supervised instruction and use of equipment. This is done through astronomy and earth science courses.

All high schools in the surrounding area have been invited to participate in use of the Observatory.

Adult groups may arrange for tours and instruction throughout the year.

During the summer, the Observatory is open to the public for tours on scheduled nights.

Summer short courses in astronomy are offered, for which reservations and a small fee are required.

The Lanphier Observatory Astronomy Study Group, consisting of local residents, meets on the first and third Thursday of each month for discussions of astronomical interest, workshops and viewing sessions.

These, programs have proven to be popular, and it is anticipated that they will be expanded wherever possible.

Inquiries are invited and should be directed to:

Director
Lanphier Observatory
The Leelanau School
Glen Arbor, Michigan 49636
A Unique Gift

Few subjects capture the interest and imagination of today’s generations as do space, astronomy and related studies. These fields also represent one of the most rapidly developing and fascinating frontiers of science. What could be more timely for students attending an independent school than to be able to explore the techniques and discover the rewards and inner satisfaction known to the professional astronomer? Such an opportunity is rarely available on the high school level, yet thanks to the dedication and generosity of one man, the Leelanau School is able to offer this unique experience.

Charles H. Lanphier
(1909-1978)

was an electrical engineer by profession but long had a deep interest in astronomy and in building and working with some of the instruments used by astronomers. It had also been his desire for many years to share this exciting interest with others. This desire was fulfilled by the completion of an observatory which he designed, built, equipped and gave to the Leelanau School for the purpose of educating students and the public in the field of astronomy. Mr. Lanphier’s great foresight, meticulous planning, and unselfish generosity have added a valuable resource to the community which will be enjoyed by many people in the years to come.
Observational Astronomy
by Dr. Walt Bisard

A course of study designed to teach the student how to observe celestial objects with the naked eye, binoculars, cameras and small and medium size telescopes. All discussions will take place at the modern Langhier Observatory of The Leelanau School. The activities of the course include map skills, telescope utilization, sky-motions, constellation study, solar observation, and individual observations. No previous astronomy knowledge is necessary.

Dr. Walter Bisard is an associate professor of Physics at Central Michigan University. His research interests, publications, and experience include Astronomy Education and especially the development of Astronomy Laboratories for non-science students. He has been in several Astronomy Education Societies and is a member of the American Astronomical Society.

Presented by
The Leelanau Center
For Education

July 16-20
Observational Astronomy

Please send me more information on Outdoor Classroom 8 4

Name: __________________________
Street: _________________________
City/State/Zip: __________________
Phone: _________________________

Send further inquiries to The Leelanau Center for Education
Glen Arbor, MI 49636, or call:
616-334-3072.

Please indicate specific seminar interest: __________________________
WARREN ASTRONOMICAL SOCIETY

EXPEDITION TO THE SOLAR ECLIPSE OF MAY 30, 1984

Greensboro, North Carolina

David L. Harrington
Timothy D. Skonieczny

For this eclipse the committee has selected Greensboro, North Carolina, as our primary viewing site, with an eastern weather alternate of Petersburg, Virginia, and a western weather alternate of Greenville, South Carolina. We will be viewing the eclipse along with members of the Greensboro Astronomical Society near the Greensboro Science Center, which is fortuitously located inside the eclipse path only about a half mile from the centerline. The committee has obtained the most accurate maps available for the above three areas (a series of thirty topological survey maps, 7.5 minute series) and have calculated and plotted the eclipse path on them.

The members will be arriving in Greensboro at various times from Sunday, May 27 through Tuesday, May 29, depending upon the individual's schedule. There are NO formal plans for transportation to and from Greensboro, Richmond, or Washington, D.C. Transportation is up to the individual. If you choose to fly into Greensboro, a motel shuttle service is available. It is also up to each individual to pay for his or her own motel room when checking out. The eclipse committee only makes the block of reservations. A $10 total deposit per room (refundable) is required for those staying in Greensboro and an additional $10 deposit per room (refundable) is required for those going on the side trips after the eclipse. This money will be returned to you when you arrive in Greensboro and/or Richmond. If you cancel prior to May 10 your deposit(s) will be refunded; whereas, if you do not show up, and did not cancel prior to May 10, you forfeit your deposit to the club treasury.

It should be emphasized that the planning and sign-up sheet are only for your convenience. In the event that you would prefer to make your own motel reservations, you may stay at any motel you wish, and are welcome to join the rest of the members to view the eclipse. Or, if you would prefer to fly into and out of Greensboro on eclipse day, feel free to join us at our viewing site. In that case you would not have to sign up for anything.
EXPLANATION OF SIGN-UP SHEET

You may select any or all portions of the eclipse expedition and side trips.

EXAMPLE 1

Your schedule only permits you to arrive in Greensboro on Tuesday evening, and you wish to view the eclipse Wednesday and immediately return home. In this case you should check only the box for Tuesday evening, May 29. Leave all other boxes blank. We will obtain a room reservation for you for one night (Tuesday evening) at the Journey's End Motel in Greensboro. A $10 deposit is required.

EXAMPLE 2

You plan to arrive in Greensboro on Monday, May 28, but have to be back to work on Thursday, May 31. Thus you are not able to travel on to Richmond, Virginia, or Washington D.C. after the eclipse. In this case just check the boxes for Monday and Tuesday. We will get the room reservation for you for those two nights. A $10 deposit is required.

EXAMPLE 3

You are planning to participate in the eclipse expedition, plus all of the side trips, and are planning to arrive in Greensboro on Monday afternoon, May 28. You should check the boxes for Monday, Tuesday, Wednesday, Thursday, and Friday. A $20 deposit is required.
ECLIPSE MECHANICS

FUNDAMENTAL PLANE

M = DISTANCE FROM CENTER OF EARTH TO CENTER OF MOON
A = DISTANCE FROM CENTER OF EARTH TO CENTER OF SUN
U = LENGTH OF UMbral SHADOW
Q = DISTANCE OF UMbral-CONE VERTEX FROM CENTER OF EARTH
V = DISTANCE OF EQUA-ANGLE POINT FROM CENTER OF EARTH

f₁ = HALF OF THE PENUMBRAL CONE ANGLE
f₂ = HALF OF THE UMbral CONE ANGLE
L₁ = RADIUS OF PENUMBRAL SHADOW ON FUNDAMENTAL PLANE
L₂ = RADIUS OF UMbral OR ANTUMBRAL SHADOW CONE ON FUNDAMENTAL PLANE
a₅ = EQUATORIAL RADIUS OF THE SUN
aₘ = EQUATORIAL RADIUS OF THE MOON
aₑ = EQUATORIAL RADIUS OF THE EARTH
CALCULATED PARAMETER VALUES AT THE
TIME OF GEOCENTRIC CONJUNCTION OF
THE SUN AND MOON

MAY 30, 1984
U.T. = 16h 52m 38.70s
D. HARRINGTON
2/4/84

\begin{align*}
M &= 3.85338220 \times 10^8 \text{ meters} \\
S_m &= 930.3708680 \\
S_s &= 946.4155000 \\
T_m &= 3414.254139 \\
T_s &= 8.673049600
\end{align*}

\begin{align*}
A &= 1.516866460 \times 10^{11} \text{ meters} \\
W &= 1.513013000 \times 10^{11} \text{ meters} \\
\tan f_2 &= 1.588533900 \times 10^{-3} \\
f_2 &= 0.2629017800 \\
f_2 &= 946.4464100 \\
\sin f_2 &= 1.588485600 \times 10^{-3} \\
E &= 1.503249000 \times 10^{11} \text{ meters} \\
G &= 3.769000000 \times 10^8 \text{ meters} \\
\sin f_1 &= 4.611509100 \times 10^{-3} \\
f_1 &= 0.2642209400 \\
f_1 &= 951.1953900 \\
\tan f_1 &= 4.611558100 \times 10^{-3} \\
U &= 3.787940000 \times 10^8 \text{ m}
\end{align*}

\begin{align*}
\tan f_2 &= \frac{a_s - a_m}{A - M} \\
= \frac{6.544359400 \times 10^6 \text{ m}}{1.516866460 \times 10^{11} \text{ m} - 3.853382200 \times 10^8 \text{ m}} \\
\tan f_2 &= \frac{0.004588533900}{1.513013000 \times 10^{11} \text{ m}} \\
\tan f_2 &= 0.004588533900
\end{align*}