The illustration above shows the exterior of the W.A.S. STARGATE observatory, located on Camp Rotary property off North Ave. on 29 mile road. The building contains a 12" cassagrain telescope of 200" focal length. The use of this observatory is the privilege of all members & guests of members. The equipment within the building will allow observational astronomy to be conducted at all times, weather permitting.
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 at the above address. 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: Doug Bock 533-0898
1st V.P.: Frank McCullough 759-5215
2nd V.P.: Alan Rothenberg 355-5844
Treasurer: John Wetzel 882-6816
Secretary: Nancy Tomczyk

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 two meeting locations are listed below:

1st Thursday – Cranbrook Institute of Science
500 Lone Pine Road
Bloomfield Hills, MI

3rd Thursday – Green Acres School
Cousino at Holmes
Warren, MI 48092
264-2509

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.

Student .................. $18.00  College .................. $22.00  Senior Citizen ................. $22.00
Individual ............... $27.00  Family ...................... $32.00

Stargate Observatory

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 19/29 .. Doug Bock ...................... 533-0898  April 16/17 .. Dave Harrington ............ 879-6765
March 26/27 . Ray Bullock ...................... 879-9458  April 23/24 .. Frank McCullough ........... 254-1786
April 2/3 ...... John Root ...................... 464-7908  April 30/May 1 Ron Vogt ..................... 545-7309
April 9/10 ..... Lou Faix ...................... 781-3338  May 7/8 ....... Alan Rothenberg ............ 355-5844
For Sale - 8 inch f/15 cassegrain telescope, equatorial mount with motor drive, slow Dec. control, ex 3.5mm right angle finder, 40 mm eyepiece. Best offer. Call Bob Shannon at 885-4283.

For Sale - Celestron 8, Exceptional condition. Complete system $1200.00 Call John Lippman at 884-4541.


For Sale - 60mm 9TE-5 Tasco refractor, 700mm focal length. 4, 6 and 12.5mm eyepieces, Barlow lens, star diagonal, solar wedge and sun screen. Make best offer. Used - good condition. Call Brian Klaus at 731-0011.

For Sale - 2.4 inch Unitron refractor, 4 eyepieces, tripod, new box, hardly used. 4.5 years old. Price $200.00. Call Henry Heatley at 885-5309.

For Sale - 8 inch f/6 with 8x50mm right angle finder, 2-inch rack and pinion focuser, pipe fit mount with pedestal. Price $350.00. Contact Doug Bock at 533-0898.

SCHEDULE OF EVENTS

April 1  Venus at greatest elongation, 46 deg. West of the Sun. Cranbrook meeting starting at 7:30. First Quarter Moon.

April 8  Full Moon
         14  Cosmology meeting - Call John wetzel at 882.6816

April 15  General meeting at Green Acres Elementary School.

April 16  Last Quarter Moon

April 22  Astro-photography meeting at Larry Kalinowski's house. 776-9720

April 23  New moon. Star Party at Stargate.

April 24  Star bowl competition at Michigan State University
MINUTES OF THE FEBRUARY 18, 1982 MEETING OF
THE WARREN ASTRONOMICAL SOCIETY

The meeting was called to order at 8:10 by Doug Bock, our president. 14 people attended the meeting.

OLD BUSINESS
Our last Cranbrook meeting was cancelled to save everyone from a very bad ride, due to the weather.
The observatory has been idle due to the buildup of snow and ice on the dome. Hopefully this weekend it will be cleared off.
The new balance in the treasury is $167.14

News on our sub-groups.
COSMOLOGY - JOHN WETZEL
  2/17-Meeting at Larry Kalinowski's house
  3/17 meeting at Doug Bock's house
ASTROPHOTOGRAPHY- LARRY KALINOWSKI
  2/25 next meeting at Larry's house on the slight diversion to 3D photography and projection. The how and why of it all.
OCCULTATION-DAVE HARRINGTON
  Next meeting will be announced at Cranbrook.
ATM-DOUG BOCK
  2/11 upcoming events were discussed.

NEW BUSINESS
Costs have gone up again for the printing of the WASP, therefore 3 proposals were brought up but we are not limited to these 3
  1. Add $3.00 to the dues
  2. Switch to bimonthly newsletter
  3. Frank wants to check into using U of D printer
We are still working on getting into Macomb, possibly if not south campus then center campus (Hall rd. and Garfield).
Doug wants to get a few individuals working on a club PR promotion to get ts more noticed. Radio spots are usually free. Volunteers please. Lou was not available to give us a full report on the 82 convention. Dave Harrington did let us know that we may get some speakers from U of M. Promotion letters have been sent to Sky and Tel and Astronomy magazines. Anyone who desires can submit a paper and give a lecture on it. April 17 is the annual STARBOWL. We have the duty of upholding our honor at this annual event. So get out your books and start studying. There will be a Messier contest in the evening.
At Frank’s house on 2/20 there will be a meeting to discuss the next launch of the space shuttle. The pass has arrived and anyone interested in going please contact Frank.

PROGRAM
Frank gave a talk on Virgo and covered star-hopping and equipment used in telling all those galaxies apart.
We also viewed a filmstrip from National Geographic titled “the Stars”. It gave a brief view of the history of man’s knowledge of the stars up to modern observing and thought. The filmstrip was the first in a series (THE UNIVERSE) which we will be seeing at successive meetings.

Meeting adjourned at 10:10.

Respectfully submitted,

Larry Tomaszek
PRESSING KEYS

by
Larry F. Kalinowski

A PROGRAM TO FIND YOUR TRUE FIELD OF VIEW

Ever wonder what your field of view was as you looked through the eyepiece of your telescope? If you’re a serious observer you have. Ever have a problem comparing your telescope field with a star chart? This month’s program will help you on both counts. With it you can determine your field of view to within one arc second accuracy. This is just what is needed if you like to use star charts that show more than just naked eye stars. A clear piece of plastic with two circles inscribed on it, one within the other, is a great help when laid on the chart. The larger circle can be made to represent the field of your finder scope and the smaller circle, the main telescope field.

The actual measurement of your telescope’s eyepiece field is done by timing a star as it drifts through your field. If you have a clock drive, it must be shut off. The only catch is the star used for timing must be on or near the celestial equator. One of the belt stars in Orion is a good choice. Your telescope should be adjusted so that the star will drift through the center of the eyepiece field. Center the star in your field, then manually move the scope westward until the star disappears. When it reappears, start timing its slow drift with a stopwatch or any device that measures one second intervals. When the star disappears on the opposite end of the field, stop your timer.

The program given below not only calculates your field diameter, it also calculates the proper size circle needed to represent your field when drawn on a star chart. As mentioned above, a scribed piece of clear plastic is much more practical. It’s also important to know the scale of the star chart you’re using. Take a ruler and measure the number of inches (or millimeters) there are in one degree on your star chart. You’ll have better accuracy if you use millimeters.

Here’s the program: LRN, RCL 1, +, RCL 3, =, STO 4, INV D.MS, FIX 4, R/S, INV FIX, RCL 4, X, RCL 2, =, R/S, RST, LRN, and RST.

Before running the program, the drift time of the star should be stored in register #1. The scale of your star chart (inches or millimeters) per degree in register #2 and the value 239.344 in register #3. Pressing R/S the first time will bring the true field of view up in the display. Degrees will be shown to the left of the decimal point. Minutes and seconds of arc will be to the right. Both minutes and seconds will have two digits each. Pressing R/S again will calculate the diameter of the circle that will best represent your true field of view. If you used inches for your chart scale, the diameter will be in inches.

Here’s some values for checking out the program: put 325, 10 and 239.344 in registers 1, 2, and 3. The first answer should be 1.2128, (that’s one degree, twenty-one minutes and twenty-eight seconds for your field diameter) and the second answer should be 13.578782 mm. for the diameter of the circle to best represent your field.
VARIABLE STAR OBSERVING

Chuck Fausel

The next time you are out looking at Orion with your telescope, why not try making a couple of variable star estimates, just for fun. It’s easy!

The charts on the following pages show the position of two variables, GT Orionis and V351 Orionis, both of which can be seen in the same low power field. The charts are inverted with north at the bottom, east to the right, as would be seen in a straight refractor or Newtonian reflector.

The chart headings identify the variable along with R.A. and Dec., but you don’t need setting circles or an equatorial mount.

On the (b) chart, note the star shown in the heading area designated ζ Ori. This is the easternmost star of the three stars in Orion’s belt. Find ζ Orion with your telescope and star-hop north. Use the chart as a road map. Check each bright star on the chart as you go and you won’t get lost. You need to move about 2° north and about 1½° east. Use your lowest power eyepiece.

Depending on the size of your telescope and your eyepiece, the view you may have might be more like that shown on the (d) chart. Once you find the variable’s field, increasing magnification will improve your limiting magnitude and make the (d) chart more useful.

The numbers beside the stars are magnitudes without decimal points (to avoid confusion with stars). Thus, 123 is 12.3, 88 is 8.8, 105 is 10.5, etc.

Double check the field. The 9.2/9.0 pair near the star almost on the 0°/Sh40m cross is a good key.

Now, to try an estimate, first, concentrate on V351. Find a star that is brighter and another that appears fainter. Is it brighter than the 8.8’s? Not usually. If it is fainter than 8.8, what is it brighter than? 9.0? 9.3? 9.7? Is it as much brighter than one comparison star as it is fainter than the other, or is it closer in brightness to one or the other? The closer the two comparison stars bracket the variable, the more precise your estimate will be. Use your judgment. With practice, you should be able to determine V351’s magnitude to the nearest tenth of a magnitude. V351 has been stuck around magnitude 9.0 for some time now, so users of small telescopes should be able to catch this one.

Now try GT Orionis. It may be somewhere in the 11-12 magnitude range. The same technique applies as used on V351, but you will need the (d) chart.

Both variables have undetermined periods and have only been observed by the AAVSO since about 1970. The chart headings state that GT is of spectral type FO, irregular in variation, has a period of about 86 days (?), with a variation in magnitude of about 11.1-12.9, photographic. V351 is of spectral type A2, no determined period, and is subject to irregular and rapid variations. It may be stuck at 9.0 magnitude, visual.
Observations of these stars can be made every clear night since they have short irregular periods. Data that should be kept includes: magnitude estimate; date, time, and comparison stars used.

Amateur astronomers as members of AAVSO submit their observations of stars such as these to AAVSO headquarters monthly for consolidation and computer generation of light curves. You can draw light curves for your own observations.

If you would like to try more stars, need some help with these, or would like to know more about AAVSO, please call me or look me up at a Warren Cranbrook meeting.

Next month in the WASP look for charts and a description of three variables easily found near Regulus.

Chuck Fausel
4095 Ironside
Waterford, MI 48095
(313) 1-623-1668

NOTE: The (b) chart is also an excellent finder chart for M78.
GT ORIONIS

1900: 05h 38m 22s + 00° 02' 2"
2000: 05h 43m 29s + 00° 05' 4"

Sp F0  Type SR  Per 86°?  Mag 11.1-12.9p

Scale 60" = 1mm

053900 V351 ORI
Sp A2  Per (?)  Type RW Aur
Mag 10.1-11.6p  1st at 9.0v?  1st Seq Vilnoobs 1964

AAVSO Chart (b) 1950 Grid
Drawn by CES 1/68  Traced by RNM 6/72
SOME ASTRONOMICAL REFLECTIONS

PART III

In our previous reflections, we examined the vastness of our Solar system and the volume of space dominated by our Sun and Alpha Centauri. A little additional discussion may help to put the vastness of space in better perspective.

In Part I, we saw that the distance from the Earth to the Sun is 93,000,000 Miles. We know this is a great distance but perhaps we might better appreciate the distance if we viewed it in familiar terms of our travel experience.

The Earth’s equatorial diameter is 7926 Miles. Its equatorial circumference then is 24,900 Miles. Flying this distance in a DC10 at 580 MPH would take 42.9 Hours.

The 93,000,000 Mile distance from the Earth to the Sun is equivalent to 3,735 trips around the Earth and, at 580 MPH, would take 18.3 Years.

In Part I, we also saw that the nearest star, Alpha Centauri, was 1.3 Parsecs from our Sun. Converted, the Distance would be 4.27 Light Years. Most generally, the distance is given as 4.2 – 4.3 Light Years. In order to fully appreciate this distance, let’s view it also in our terms of travel.

\[
\text{Time (Yrs)} = \frac{\text{Distance}}{\text{Speed}} = \frac{4.2 \times 186000 \times 3600 \times 24 \times 365.26}{580 \times 24 \times 365.26}
\]

Time = 4,848,828 Years

While this example may help to better appreciate the distance from our Sun to our nearest Star, Alpha Centauri, the actual initial speed must be greater than our Earth’s orbit velocity of 66,660 MPH. For a more realistic distance appreciation example, let’s assume an average speed of 70,000 MPH.

If we return to our formula and substitute 70,000 MPH for the 580 MPH, we find that the trip would require some 40,176 Years.

I would suggest that we don’t purchase any tickets or make any plans for a trip to our Sun or to Alpha Centauri. In fact, despite some of the imaginative writings concerning space travel, it is highly improbable that such distant trips will ever be made while we are in our present form.

In Part II, we indicated, in our miniature model, that some 29,941,000,000,000 Cubic Miles of Space are dominated by our Sun and Alpha Centauri. Accordingly, our Sun would dominate half of this total or 14,470,500,000,000 Cubic Miles of Space, which could be written as 1.44705 E13.
Now, let's examine the full scale volume dominated by our Sun and the
volume occupied by the Sun, Planets and our Moon. The volume of our
Sun, the Planets, and our Earth are shown in the following:

\[
\text{Vol } \text{Earth} = 3.963 \text{ cubed } \times \pi \times \frac{4}{3} = 260,712,000,000 \text{ or } 2.60712 \text{ Cubic Miles}
\]

<table>
<thead>
<tr>
<th>BODY</th>
<th>VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>1299000. x 2.60712 E9</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.06 x 2.60712 E9</td>
</tr>
<tr>
<td>Venus</td>
<td>0.85 x 2.60712 E9</td>
</tr>
<tr>
<td>Earth</td>
<td>1.00 x 2.60712 E9</td>
</tr>
<tr>
<td>Mars</td>
<td>0.15 x 2.60712 E9</td>
</tr>
<tr>
<td>Jupiter</td>
<td>1316. x 2.60712 E9</td>
</tr>
<tr>
<td>Saturn</td>
<td>755. x 2.60712 E9</td>
</tr>
<tr>
<td>Uranus</td>
<td>85. x 2.60712 E9</td>
</tr>
<tr>
<td>Neptune</td>
<td>60. x 2.60712 E9</td>
</tr>
<tr>
<td>Pluto</td>
<td>0.06 x 2.60712 E9</td>
</tr>
<tr>
<td>Moon</td>
<td>0.02 x 2.60712 E9</td>
</tr>
</tbody>
</table>

\[
\frac{1301218.14 \times 2.60712 \text{ E9}}{1301218.14 \times 2.60712 \text{ E9}} = 3.39243 \text{ E15 Cubic Miles}
\]

Volume of space dominated by our system = 14.97065 E29 Cubic Miles

Percent of space occupied by above bodies:

\[
100 \times \frac{3.39243 \text{ E9}}{14.97065 \text{ E29}} = 0.000000000000002266\%
\]

Percent of space not occupied by above bodies:

\[
= 99.9999999999997734\%
\]

From the above, we can see that almost all space is devoid of any
substantial bodies!

John J Wetzel

Note: Alpha Centauri A, our nearest star, excluding our Sun, is
classified as a main sequence star. Its 1970 RA and Dec. are 14h 37.6m
and -60d 43m and its visual magnitude is 0.01. It has a companion
dwarf with a visual magnitude of 1.40.