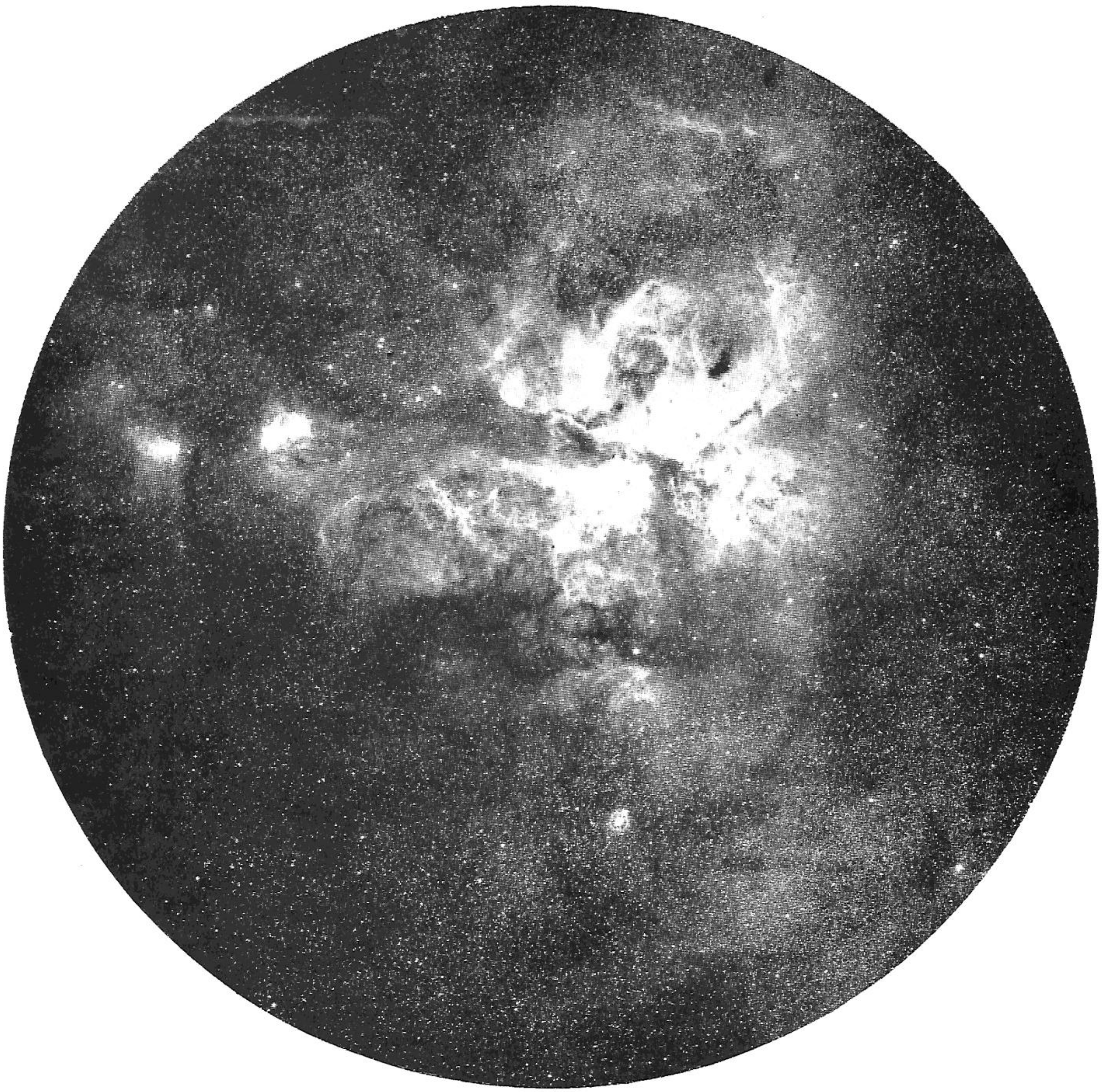
The WASP

Journal of the Warren Astronomical Society



JULY 1980

Southern Skies

The Warren Astronomical Society Paper

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The W.A.S.P. is the official publication of the Warren Astronomical Society and is available free to all club members as a privilege of membership. Requests by other clubs to receive the W.A.S.P. and all other correspondences should be made with the editor at the above address. Articles should be submitted at least one week prior to the date of the general meeting. W.A.S. members may advertise free of charge in the "W.A.S. Exchange".

Cover photograph: A dense star field near Eta Carinae

W.A.S.

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

The Warren Astronomical Society is a local, nonprofit 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 8:00 p.m.	Cranbrook Institute of Science 500 Lone Pine Road Bloomfield Hills, MI	3rd Thursday 8:00 p.m.	Macomb County Community College-South Campus K Building 14500 Twelve Mile Road 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:

Student	$12.00	College	$15.00	Senior Citizen	$16.00
Individual	$20.00	Family	$25.00		

Stargate

Observatory Chairman: Dave Dobrzelewski
979-3273

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 9:00 p.m. on the evening of the observing session. The lecturers for the coming month are:

June 20/21	Jim Yax 463-7315	July 18/19	John Root 464-7908
June 21/28	Dave Dobrzelewski 979-3273	July 25/26	Lou Faix 1-781-3338
July 4/5	Marty Kunz 477-0546		
July 11/12	Ray Bullock 879-9458		

Emergency back-up lecturers:
Doug Bock (533-0898), Dennis Jozwik (754-2037)
Don Misson (727-9083)

<u>MINUTES OF THE MAY 15, 1980 MEETING OF THE WARREN ASTRONOMICAL SOCIETY</u>

The meeting was called to order by President Dave Harrington at 8:20 p.m.

Tim Skonieczny made an announcement regarding the E. John Searles Award. Mention of this award appeared in a recent issue of the REFLECTOR. Frank McCullough was the recipient of this award at the Christmas party December 13.

Pete Kwentus gave a last minute update on the G.L.A.S. meeting being held at the University of Toledo May 16 & 17.

Jeff Stanek brought T-shirts to the meeting. See Jeff for purchase of your shirt.

Further mention was made of the annual Apollo Rendezvous being held in Dayton, Ohio, June 13 & 14.

After the announcements were made, W.A.S. then held its annual election of officers. The following persons were elected:

President: Frank McCullough

1st Vice President: Doug Bock

2nd Vice President: Dave Dobrzelewski

Treasurer: Nancy Tomczyk

Secretary: Connie Shannon

Following the elections the meeting was recessed for refreshments.

Russ Carrol of the University of California-San Diego was the speaker for the evening's program. Russ spoke on binary stars.

The meeting was adjourned at 11 p.m.

Respectfully submitted,

Connie Shannon
Secretary

WILLIAM HERSCHEL, Amateur Telescope Maker

by David Dobrzelewski

a. Amateur cum Laude.

This is part one of a five part series exploring the work of the German-born astronomer, William Herschel, who may well be considered among the great amateur observers in astronomy's historical heritage.

Born at Hanover in November, 1738, Herschel's early child and adult life was dominated by the stressful, incessant lifestyle, of a concert musician and teacher. In time, however, he phased into his age-old interest of astronomy, leaving behind his years of musicianship in order to pursue a growing preoccupation with the study of the heavens, which was initially impressed upon him by his father. It is in his adult life that he explored many fields in astronomy and even an early stage of modern cosmological thought. Today, we are indebted to him for having pioneered in observational and theoretical astronomy from which later advances in astronomy came forth. We shall group the various topics which intrigued him from approximately the 1770's, until his death in 1822. It is not intended as a purely chronological essay of his studies, as he characteristically worked on several at anyone time, and would switch from one to another as interest or insight dictated. In this way, his several astronomical interests were not mutually exclusive, but often dovetailed to piece together the whole ultimate question: the nature of the Universe.

His earliest known recorded observations date to 1766, and related to the planet Venus, and a lunar eclipse. His younger Sister, Caroline, was to later join him in his astronomical work, and indeed, his son, John, had begun his scientific apprenticeship under William. When he moved to Bath, England, he brought Caroline with him, in the hopes that as he continued his work in astronomy and association with the Royal Philosophical Society, she would have the opportunity to pursue her budding musical career. As fate would have it, however, she followed her brother into the realm or Science, where she was to devote her life to. Herschel had already marked a distinguished career in astronomy when he was introduced to the King, George III, who eventually became a benefactor of Herschel's. One of his achievements in observational astronomy was the construction of some of the finest quality telescopes obtainable in Herschel's day, in addition to a lucrative telescope business.

b. Telescope Making.

In the construction of telescopes, Herschel depended heavily on a current textbook on astronomy in his day, by Robert Smith in 1738, called “Complete System of Opticks”, which contained an historical overview of telescopic astronomy up until it's writing, and gave an extensive discussion on the grinding and figuring of telescope mirrors, then called specula, and the construction of telescopes. A common problem which the A.T.M.er had to overcome was the proper combination of materials out of which to produce the mirror. As the mirrors were then metal in construction, the various materials combined to provide the best qualities for the particular telescope had to be poured into a mold in the molten state, and the initial shape of the mirror was cast in this mold. Copper, tin, antimony, silver, and arsenic were the preferred metals Herschel had come to the conclusion that five pounds of tin to twelve pounds of copper gave the best results in a speculum mirror, as they seemed to be slow to tarnish.

Herschel, in his experiments with telescope making, enjoyed successes with superior optics for the day, utilizing a great dexterity for polishing a very accurate figure. But, of course, there were mishaps along the way. Often, the molten metal would run over the edge of the mold while in the furnace, leaving a miserable mess to clean up as the metal cooled. Once, much to consternation (and danger) to Herschel's assistants, the metal ran out of the furnace, over the paving stones, which cracked, and blew-up!! (HORRORS!!)

The specifics of telescope making from pounding of the mold, to figuring of the speculum, to construction of the telescope are fascinating, especially from an historical point of view. He never openly discussed the details of his optical work, as he considered them trade secrets in his telescope business. However, he has left a four-volume manuscript on "Experiments on the Construction of Specula" and a work on mirror-making for modern day examination.

c. The 40-foot Telescope

Herschel had considered his early work with telescope making and experimental optics as 'preparatory' for a great ambition he was working towards: the construction of a telescope of forty foot focal-length. The undertaking would have been prohibitively expensive, but in 1785, Sir Joseph Banks, then President of the Royal Society, brought the project to the attention of George III, who in turn generously financed the operation. When it was completed, the King established a 200-ponnd-per-year budget for upkeep of the telescope, on top of the 9,000-pound investment in the building of the instrument.

The 40-foot telescope consisted of a sheet iron tube, nearly forty feet long, at the rear end of which was secured the enormous metal speculum, four feet (48 inches) across, and the whole of which was supported in a great wooden framework so designed as to enable the telescope to move vertically like an alt-azimuth design. But while the telescope was hoisted by pulleys for simple vertical movement, horizonta1, or side to side motion was restricted to only a few degrees. The whole structure was moved horizontally through the design of resting the structure upon a centrally-pivoted wooden circular platform, which could turn revolutionarily on its twenty rollers in a circular track of masonry.

Herschel also modified the traditional Newtonian design for reflecting telescopes, which became known as the Herschelian design. The Herschelian telescope removed the need of the secondary mirror because the reflected light directly entered the eyepiece, which was positioned on the inside wall of the front of the tube. Herschel believed that the secondary obstructed some of the starlight reaching the main mirror, so this would supposedly return lost light to the optical system. Of course, you still stood to lose some of the light, due to the partial eclipse by the observers head as he observed, but again this loss became insignificant as the telescopes aperture increased. As a result, Herschel usually utilized this method in larger scopes. Herschel's 40-foot telescope used this design, but it hardly saw effective use, as the telescope proved impractical in use. Rarely was the night good enough to enjoy the scope's full advantage, and when it was, the telescope was difficult to maneuver around the sky. In addition, the mirror tarnished rapidly, due to the materials use to lighten the weight of the speculum, and it needed polishing every year.

While the forty-foot telescope unfortunately saw mothballs even in Herschel's time, it was still an example of his unbelievable genius to successfully construct a telescope apparatus of modern day research proportions, which also possessed the optical quality transposed from his own small telescope endeavors.

d. Space Penetration.

Herschel had made the connection between the aperture of an instrument and the greatest distance into space which the instrument allows the observer to see. Herschel was fascinated with what he called the ‘shape of the heavens’, as it were; the distribution, of stars in the sidereal system, and its extent. He introduced to astronomy a new way to look at the question of what the Universe was truly composed of, as far as stellar populations and distributions are concerned, and what it was shaped like. His quest in these matters are dealt with in a later article, but he surmised that in order to better investigate the nature of the sidereal system, its size, shape, and distributions of stars, it was necessary to be able to observe far into its depths.

The vast multitude of stars are faint, hence, surveying this ocean of stars was dependent principally upon the aperture of the speculum, or the diameter of the telescope’s mirror. He addressed this idea in a paper read to the Royal Society. Herschel made a clear distinction between the INTRINSIC and ABSOLUTE brightness of an object in space, whereby he considered the intrinsic brightness of an object to be the luminosity of a unit area of its surface, while the absolute brightness was the total of all intrinsic surface brightness of the object combined. In the case of the stars, he realized that they were all so far away, that they could only be seen as point sources of light; thus the stars' absolute brightness determines their visibility in a telescope. If a star's true distance could be varied from the observer, he reasoned, then its absolute brightness would vary inversely as the square of its distance. Hence, twice the star's distance yields one-quarter its original brightness. If a faint star were just visible in a given telescope, and were then moved to twice further out, a telescope of TWICE the aperture (thus four times the light collecting area) would be needed to just see the faint star again, as it would now be one-quarter its former brightness.

Herschel also pondered the nature of magnification in a telescope in his paper to the Royal' Society. He had found that a telescope's ability to resolve close double stars or clusters depended not only on the magnifying power of the instrument, but again largely on the aperture of the speculum mirror: the greater the aperture, the greater the resolving power. He found that every telescope had an apparent magnification limit, beyond which the image quality and resolution were increasingly sacrificed. Herschel, in his contemplations of stars and telescopic observations, realized that time is needed for starlight to travel from the star to the telescope, and with such enormous distances as must exist in space, correspondingly enormous spans of time must be consumed for the light of the stars to travel across the space. As he put it,

"A telescope with a power of penetrating into space … has also, as it may be called, a power of penetrating into time past."
An axiom of modern cosmology'

Next time, we'll discuss some observations made with his telescopes in particular, in "WILLIAM HERSCHEL: Planetary Astronomy".

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OCCUL080 cont.
610      PRINT USING 620;M(L4),D(L4),Y(L4),E(L4),M1(L4)
620      IMAGE #,2D,2X,2D,2X,2D,4X,4D,5X,D.D,5X
630      PRINT USING 640;Z9(L4),P(L4),F1(L4),F2(L4),F3(L4)
640      IMAGE 3D,7X,D,6X,2D,2X,2D,2X,2D
650     NEXT L4
660    PRINT LIN(59-N)
670   NEXT L3
680  END
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<u>W.A.S. Exchange</u>

3¼" f/11 refractor with Unitron deluxe focuser and Unihex, long drawtube for 1¼ or .965" eyepieces, sunglass, five eyepieces, 2x Barlow, dew cap, mounting cradle with camera holder, no mount or finder. $215.00. R.J. Shannon, 194 Moran, Grosse Pointe Farms, MI 48236. Call (313) 885-4283.

THE CAL - COMP USERS GROUP

by
Larry F. Kalinowski

The first meeting of The W.A.S. calculator and computer users group met on May 22nd, the fourth Thursday of the month in room 317, K building, on M.C.C.C.'s South campus.

Eight people attended this first meeting and enthusiasm was quite evident. Ken Kelly, Mike Kanir, Jim Graham, Ray Bullock, John Baditoi and yours truly represented The W.A.S. and Les and Rob Ericson were attending on behalf of The D.A.S.

Ideas about how to conduct the following meetings were discussed. Since the group was considered to be small, formality will be dropped for the time being. However, a group leader will preside over the meetings in order to control any possible outbreaks of hostility.

Ray Bullock and I represented the calculator users portion of the group while the rest of those attending leaned toward the computer. I will admit though, that I do possibly see a computer in my future and because of that I want to gain a better understanding of what they're all about. Some of those attending have had considerable experience with computers and programming and, no doubt, will have to carry the burden of bringing the rest of us “up to speed”.

We all pretty much agreed that the most popular language for those getting started in the computer field is the “BASIC” language (Beginners All-purpose Symbolic Instruction Code) so most or all of the programs to be discussed during our meetings will involve BASIC.

Ken Kelly has volunteered to take on the task of explaining BASIC terminology and will be the principle speaker for our next meeting…same place, same time (7:30 P.M.) on June 26th. It is advised that all interested parties contact me at 776-9720 for verification of the meeting date, time and place, a day or two in advance, just in case there is a change of plans.

The first program presented by the users group is one written by John Baditoi. The program is published in the W.A.S.P. as a service to its computer oriented readers. Any questions that might arise about the program should be presented to John at 751-6574. John's program will list local times of occultation phenomena for any location within 250 miles of the standard Toronto station. It’s hoped that our group can present a workable program each month.

If you missed last month’s cal-comp meeting, don't fret. We’re just getting started and you're welcome to attend our next one. This is your chance to get in on the ground floor of something that could open new vistas in your life…see you there!

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10 REM *** JONATHAN BADITOI ...12/18/79 ***
20 PRINT 'THIS PROGRAM FINDS LOCAL TIMES OF OCCULTATION'
30 PRINT 'PHENOMENA FOR ANY LOCATION WITHIN 250 MILES'
40 PRINT 'OF THE STANDQRD STATION IN TORONTO, USING'
50 PRINT "DATA PUBLISHED IN THE 'OBSERVER'S HANDBOOK OF"
60 PFUNT "THE ROYAL ASTRONOMICAL SOCIETY OF CANADA' ....."
70 PRINT
80 DIM A$(25)
90 LET T3=43.7
100 LET T4=79.4
110 INPUT 'INPUT NUMBER OF ROUNDS REQUIRED:';N
120 INPUT 'INPUT DESIRED LOCATION:';A$
130 PRINT 'INPUT LATITUDE AND LONGITUDE OF DESIRED'
140 INPUT 'LOCATION:';L8,L9
150 PRINT
160 PRINT 'FOR EACH ROUND, INPUT THE FOLLOWING DATA:'
170 PRINT '(1) DATE (MO.,DY.,YR.) (2) Z.C. NUMBER OF OBJECTf
180 PRINT '(3) ELONGATION OF MOON (4) PHENOMENON (DIS.=1, REAP.~2)'
190 PRINT '(5) UNIVERSAL TIME OF EVENT (HR.,MIN.) FOR TORONTO'
200 PRINT "(6)'A' AND 'B' VALUES FOR TORONTO (7) MAGNITUDE"
210 PRINT 'OF OBJECT...'
220 PRINT
230 DIM M(60),D(60),Y(60),E(60),Z9(60),P(60),M1(60)
240 FOR L1=1 TO N
250   PRINT
260   INPUT 'DATE, Z.C.#, ELONG.:';M(L1),D(L1),Y(L1),E(L1),Z9(L1)
270   INPUT "PHEN., TIME, 'A' AND 'B' VALUES:";P(L1),T1,T2,A,B,M1(L1)
280   LET C=T1*3600+T2*60
290   REM *** C CONVERTS U.T. INTO SECONDS ***
300   LET C1=60*(A*(L9-T4)+B*(L8-T3))
310   REM *** C1 IS CHANGE IN TIME (IN SECONDS) ***
320   LET T6=C1+C
330   REM *** T6 IS LOCAL TIME (IN SECONDS) ***
340   IF T6<0 THEN 420
350   IF T6>=86400 THEN 450
360   DIM F1(60),F2(60),F3(60)
370   LET F1(L1)=INT(T6/3600)
380   LET F2(L1)=INT((T6/3600-F1(L1)*60)
390   LET F3(L1)=(T6/60-INT(T6/60))*60
400   REM *** 'F'S ARE LOCAL TIME (IN HRS.,MINS.,SECS.) ***
410   GOTO 480
420   LET T6=T6+86400
430   LET D(L1)=D(L1)-1
440   GOTO 370
450   LET T6=T6-86400
460   LET D(L1)=D(L1)+1
470   GOTO 370
480 NEXT L1
490 PRINT LIN(2)
500 INPUT 'HOW MANY COPIES';Z
510 FOR L3=1 TO Z
520   PRINT TAB(14);'LOCAL OCCULTATION PREDICTIONS FOR'
530   PRINT TAB(30-INT(LEN(A$)*.5»;A$;LIN(2)
540   PRINT TAB(4);'DATE';TAB(13);'Z.C. NO.';TAB(24);'MAG.';
550   PRINT TAB(31);'ELONG.';TAB(40);'PHEN.';TAB(48);
560   PRINT 'U.T. OF EVENT'
570   PRINT TAB(1);'MO.';TAB(5);'DY.';TAB(9);'YR.';TAB(50);'H';
580   PRINT TAB(54);'M';TAB(58);'S'
590   FOR L4=1 TO N
600         PRINT TAB(1);
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(Continued on page 4 of Herschel article)