

# The WASP



M-17 in Sagittarius



## JUNE 1976

**THE JOURNAL OF THE WARREN  
ASTRONOMICAL SOCIETY**



THE WARREN ASTRONOMICAL SOCIETY PAPER (W.A.S.P.) IS PUBLISHED BY THE W.A.S., MONTHLY AS A PRIVILEGE OF MEMBERSHIP. THE W.A.S. IS ALSO A CAMPUS CLUB OF MACOMB COMMUNITY COLLEGE-SOUTH CAMPUS, WARREN MICH.

The Warren Astronomical Society (W.A.S.) is a local nonprofit organization of amateur astronomers. Membership is open to all interested persons. Annual dues are as follows: Student, K-12 \$3.00, College \$5.00, Senior Citizen \$7.50, Individual \$10.00, Family \$15.00. Add \$6.00 for a one year subscription to Sky & Telescope magazine.

Meetings are held on the first and third Thursday of every month. Subscriptions and advertisements are free of charge to all members. Non-member subscriptions and advertisements are available upon arrangement with the Editors of the W.A.S.P. Contributions of any kind are always welcome and should be submitted to the Editors before the first Thursday of the month.

THE EDITORS: Garry Boyd (839-0973)  
15850 State Fair  
Detroit, Michigan 48205

Roger A. Civic (775-6634)  
26335 Beaconsfield  
Roseville, Michigan 48066

The Editors of the W.A.S.P. will exchange copies of this publication for other Astronomy club publications on an even exchange basis.

The Warren Astronomical Society maintains contact, sometimes intermittent, with the following Organizations:

The Adams Astronomical Society  
The Astronomical League  
The Detroit Astronomical Society  
The Detroit Observational and Astrophotographic Assoc.  
The Fort Wayne Astronomical Society  
The Grand Rapids Amateur Astronomical Society  
The Kalamazoo Astronomical Society  
The M.S.U. Astronomy Club  
The Miami Valley Astronomical Society  
The Oglethorpe Astronomical Society  
The Orange County Astronomers  
The Peoria Astronomical Society  
The Saint Joseph County Astronomical Society  
The Sunset Astronomical Society

Other Amateur Astronomical Clubs are invited to join this exchange of publications.

# **CLUB NEWS**

Stargate Campout... as observed by Pete Kwentus.

The Easter weekend campout was an unqualified success! Some work was done on the dome; the sliding door slit was repaired. The drive system on the telescope was adjusted as the telescope was being balanced, thanks to Lou Faix, Rick Hill, Don Misson, Frank McCullough and the others who helped out during the long weekend. Solar observing with Rik Hill's 8" f/10 Celestron and Frank McCullough's 8" f/7 reflector was an afternoon attraction. Lou Faix was there with his fork mounted 10" f/5.6 Newtonian. When Lou plugged in his scope that evening, everyone cheered the lighted setting circles. Bill Whitney attended with his 4" f/15 Refractor, his wife Sandy stood by him most of the evening.

George & Carrol Cheatam, another famous team, were observing with their 8" f/5 reflector. The surprise of the weekend was when Roger Civic (The Nebula) showed up with his back breaking but compact 6" f/15 case. The recently reworked Pacific mount, I was told, worked well. Dave Harrington and his daughter, Debbie circulated among the cluster of different scopes, enjoying all the evening views. Jerry Alyea found many Messier objects with the clubs 12½" cass, providing all who attended with some enjoyable viewing.

Uranus showed a beautiful green disk thru the club's 12½". Resolving Cassini's division, the bands on Saturn and the satellites of Saturn was a delight not seen in smaller instruments. Messier 13, the globular cluster in Hercules, would get my vote for the finest object of the evening observed through Stargate observatory's 12½" cass. In the cluster you could even resolve the individual stars. Delores Hill provided another thrilling sight with her spectroscopic eyepiece on the 12½". Beyond a doubt, of the many fine instruments at the campout, the majority of the observers present picked the clubs 12½" cass. as the best giving image that nite. Lou Faix's 10" fought valiantly for second place. During the day, (Saturday) and long into the wee hours of the night some 35 people coming and going enjoyed the company of each other and the fine sky show.

Much thanks to all parties for making the week-end such a pleasant success, also a special thanks to Diane and Robin who organized the campout and kept it running right on.

# A letter from our President,

Dear Members of the W.A.S.:

I would like to take this opportunity to address the members of our Society and extend my thanks for allowing me to be your President for this past year. I feel that this club has a lot to offer the general community, and I hope that the work of this club will extend in the coming years.

Even though I came into the Presidency as a beginner, I leave almost an "expert" (this is however debatable!). I know that any new person who has any interest at all in astronomy can and will find interested persons to help him or her in the group known as the Warren Astronomical Society.

The one thing I can leave with you all is just a little bit of advice. Any group or organization cannot operate unless it has the full support of its members. Therefore, for the new officers let all of us extend a hearty welcome and congratulations for the coming future of the club.

I look forward to becoming a "regular" member again, and I'll see all of you at the meetings and the star parties, etc., etc.

Many happy clear nights,

Carl

Clnoble

I was wrapping up my course at Oakland University, (They shine so bright... a course in Astronomy intended for people who had done some reading in the subject and were interested in learning how to use and choose telescopes) and was giving my lecture on The Ogony of it all. This is my title for the evolution of the universe, past, future and the generation of life out of the primeval sub-atomic particles.

As I've taught this subject before I was going along fairly smoothly in my presentation. Suddenly I realized that I'd had an intuition and had incorporated it in my exposition of the Big Bang theory that obviated the necessity of the Big Bang theory. I went ahead with that one anyway but the students realized that it was no longer a necessity.

The Big Bang theory starts with YLEM, explodes into the condition of galaxies flying apart from each other that we observe now with the galaxies flying apart from ad infinitum so the time will come when the inhabitants of one group of galaxies will be unable to see any other galaxies as they will, be too far away thus too faint to see.. They will not be invisible, one from the other, as might be expected if you assumed the most distant galaxies have red-shifts indicating an appreciable fraction of the speed of light that if for example each were moving at  $\frac{3}{4}C$  then the addition of these velocities would equal  $1.5C$  and neither would be able to observe the other as the Lorentz-Fitzgerald equations show that in this case they would be moving apart at  $.96C$  and would be visible, but as I said, faint.

I've read that there was some indication on some of the plates taken with the Hale telescope of the most distant galaxies that the red-shift indicated a slight slowing of the velocity of departure... this has been taken by the proponents of the Big Bang theory as data in favor of the necessary slowing down until a dead stop at which point in space-time the universe will begin to contract until a new YLEM occurs and the cycle will repeat.

However another datum must be considered. I've read that some astronomers believe that two galaxies photographed at the limits of the Hale instrumentation are our Milky Way and M31 seen all the way around the space-time continuum as they were at a much younger stage of the universe.

Cont. next pg.

But let us consider the shape of space. The Steady state theory requires a flat space (Euclidean) which, since this is not the observed condition, obviates that rather uncomfortable theory. Topologists tell us that the universe is shaped like a four-dimensional Klein bottle, having neither inside nor outside, just one side, having neither past nor future but just now. This is difficult to put into words; picture it as an inverted doughnut.

My intuition was this: There is a YLEM, the galaxies fly apart, they don't slow down, they all come together at high velocity and form a YLEM. This changes the YLEM time scale. Big Bang says there was one YLEM that won't repeat. Big Bang says that from YLEM to YLEM is 80 billion years (the universe since YLEM is now 20 billion years, the farthest out galaxies are starting to slow down which would take 20 billion years to achieve a stop and then 40 billion years to return to the next YLEM). Perhaps I should call this Bang Smash Bang, to differentiate it from the -other theories ... Bang Smash Bang says that from YLEM to YLEM is 40 billion years (the universe is now 20 billion years, the farthest out galaxies have 'turned the corner' thus appearing to have slowed red-shift while really as the galaxies will now begin flying back together they will increasingly show a blue-shift therefore in 20 billion years we will have another YLEM).

Having cut your (future) by 40 billion years perhaps I can give you something to look forward to ... it should be possible to survive the next YLEM ... it would require an anti-gravity screen to overcome the pull of the massed galaxies at the site of the YLEM, a maneuverable planet self-contained that could choose at leisure a star to orbit after the YLEM; We have 20 billion years to solve the problems.... So I suggest we get cracking.



A.T.M. by: G. Boyd

"About a Radio Telescope  
built by Amateurs."

Amateurs traditionally make radios and telescopes, yet it appears that few of them make radio telescopes. Apparently the techniques of radio astronomy are too new to have filtered down from professionals to amateurs, or perhaps they are too demanding. To date descriptions of only two radio telescopes made by amateurs have reached this department. One was described in a past issue of the WASP. This instrument built by Lyndall McFarland, Clifford and Simpson, picks up signals from any given direction by means of a 15-foot paraboloid of aluminum and focuses them on a simple dipole antenna. The length and spacing of the dipole elements were chosen so that radio waves arriving from all but the desired direction interferes, whereas, those from the desired direction add constructively at the location of one dipole that feeds a radio receiver.

The dish antenna is steerable in altitude and azimuth and has detected the sun as well as the more energetic radio sources in Sagittarius, Cygnus, Cassiopeia and Orion. The resolving power of McFarland's telescope is about 11 degrees of arc; it detects the sun as being a disk some 20 times wider than it appears to the eye. In contrast, the 250-foot reflector of the radio telescope at Jodrell Bank in England resolves the sun as an object about twice the diameter of the optical disk. Toy spyglasses can disclose much more detail. But resolving power is only one measure of a telescope's performance. Another is the instrument's ability to detect distant objects. The clouds of interstellar dust that block many regions of the universe from view are transparent to some bands of the radio spectrum. The amateurs who built the Winston, Salem telescope set out to have a firsthand "look" at whatever lies beyond the dust, even if the view turned out to be Fuzzy.

"I began to work on my telescope," writes McFarland, "during my third year in college, partly as a project for thesis, and I hoped to finish it before graduation. But

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# SKY CALENDAR JUNE 1976

Information for helping teachers and students observe the sky

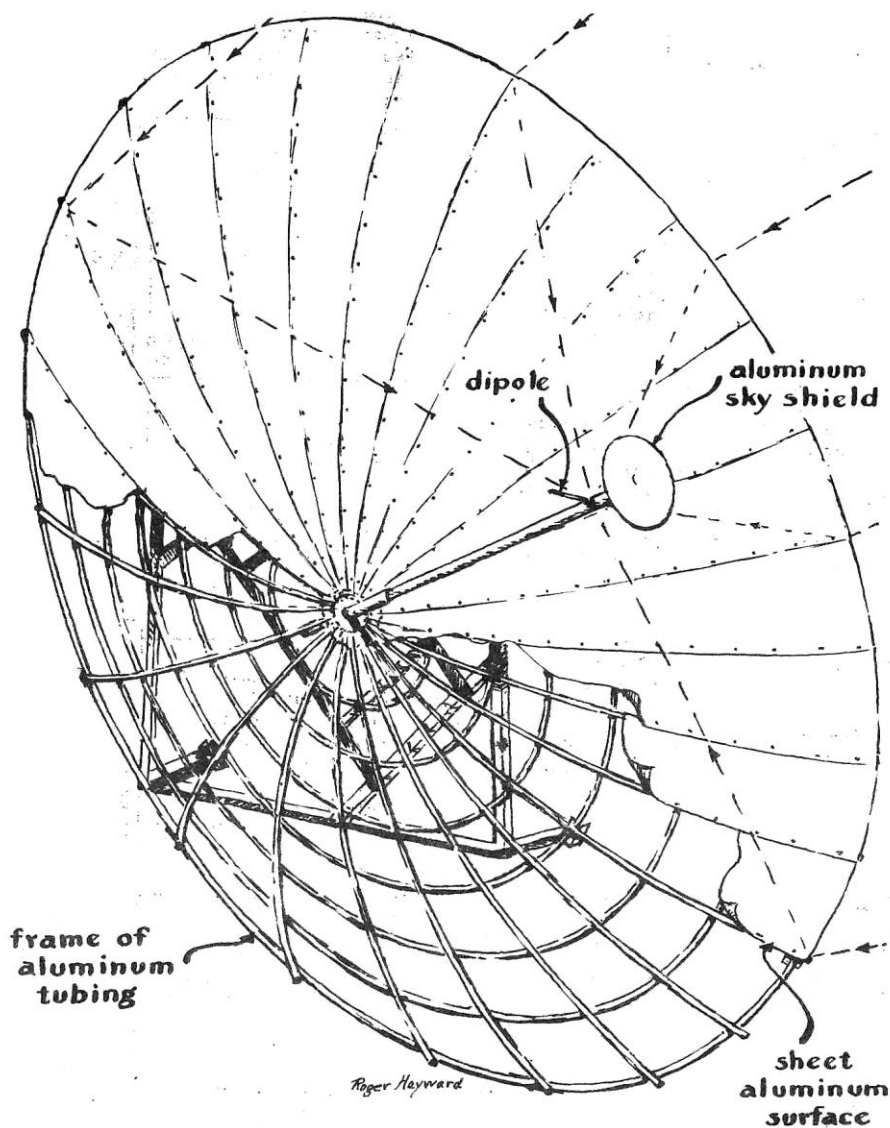
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p><b>Evening Planets:</b> Saturn is low in W to WNW at dusk, to left of "twin" stars of Castor and Pollux and brighter than either star. On June 1 Saturn sets more than 3 hrs after sun; on June 19 it sets as twilight ends, and by month's end it is difficult to see. Mars on June 1 is 10° upper left of Saturn and 20° lower right of Regulus. On June 30th the 2nd magnitude red planet is 3° lower right of Regulus. See block below June 26 for your red, white and blue Bicentennial gift.</p> <p>One hour after sunset (face south):</p> <p>Spica</p> <p>Tomorrow night moon will appear very close to Spica, hiding it from southern Mexico and Cuba.</p> <p>This month's map represents the sky about 1 hour after sunset tonight. Take map and flashlight outside, and identify the 9 stars of first magnitude or brighter and the two planets currently visible.</p> <p>Sun enters Gemini tonight. Watch for disappearance of Castor and Pollux near end of June. Summer solstice tomorrow: Sun rises and sets farthest north. Highest mid-day sun of year.</p> <p>New Moon, in conjunction with sun and not visible. No solar eclipse occurs because the moon passes 4° south of the sun.</p>	<p>Using binoculars beginning at dusk, follow moon's motion past Spica for several hours. Watch moon's northern edge barely miss Spica. Closest approach is near 10 pm PDT on West Coast, and after 2 am EDT in East.</p> <p>Note these objects close to the horizon in the northwest: Saturn, Pollux, Castor and Capella. If you look at same time each night they get a little lower each evening.</p> <p>Regulus</p> <p>Mars</p> <p>Mars now 4° to lower right of Regulus. They easily fit within the view of 7X binoculars, and their contrasting colors make a pretty sight. One week from tonight Mars will be only 2/3 degree from Regulus.</p>	<p>One hour after sunset (face south):</p> <p>Spica</p> <p>Beginning tonight, the moon rises late enough to allow dark skies for an interval during the evening. As dusk turns into night, watch for the Milky Way in the east.</p> <p>Western sky, 1 hour after sunset June 22: Mars 8° lower right of Regulus; Saturn 20° to lower right of Mars.</p> <p>1 hour after sunset (face WNW):</p> <p>Regulus</p> <p>Mars</p> <p>Moon</p> <p>Saturn</p>	<p>One hour after sunset (face west):</p> <p>Regulus</p> <p>Mars</p> <p>Saturn</p> <p>As the sky gets dark, use the Big Dipper to locate Leo with its bright star Regulus (see map): "If the Big Dipper sprang a leak, loudly would the Lion roar!" He doesn't like to get his back wet!</p> <p>Arcturus passes due south about 1 hour after sunset: "Follow the arc (of the Big Dipper's handle) to Arcturus, and drive a spike to Spica". See map.</p> <p>One hour before sunrise: Face ENE.</p> <p>Moon</p> <p>Pleiades</p> <p>Jupiter</p> <p>Use binoculars for Mercury and Aldebaran</p> <p>1 hr after sunset:</p> <p>Regulus</p> <p>Mars</p> <p>Saturn</p>	<p>One hour after sunset:</p> <p>Regulus</p> <p>Mars</p> <p>One hour after sunset (face SE):</p> <p>Moon tonite</p> <p>Antares</p> <p>Moon tomorrow night</p> <p>Altair now rises at about sunset. As sky darkens, use this month's map to locate Vega, Deneb, and Altair in eastern sky. They form the Summer Triangle, so named because it is visible all night in early summer.</p> <p>One hour before sunrise:</p> <p>Pleiades</p> <p>Jupiter</p> <p>Morning Planets: Bright Jupiter on June 1 rises in ENE only 1 1/3 hrs before sun. By July 1 this improves to 3 hrs before sunup. Mercury may be visible with binoculars week of June 20-26. Look 17° to 24° lower left of Jupiter.</p>	<p>One hour after sunset (face SW):</p> <p>Regulus</p> <p>At sunset, Full Moon has just risen in opposite direction. Why is it the year's southernmost full moon? See June 20. Mars now halfway between Saturn and Regulus, 14° from each.</p> <p>Tonight Mars is 10° to lower right of Regulus. Viking I spacecraft enters orbit around Mars tomorrow; Watch Mars approach Regulus next 17 days as we await its landing.</p> <p>One hour before sunrise:</p> <p>Jupiter</p> <p>Pleiades</p> <p>Venus is not visible, since it remains within 5° of sun's brilliant disk all month. On June 17 Venus passes superior conjunction (far side of sun). In autumn and winter Venus will be brilliant "evening star".</p>	<p>Moon rises due east within 1/2 hr after local midday today. (Midday = midway between your local sunrise and sunset times.) The First Quarter moon follows sun by 1/4 day, setting in west around local midnight:</p> <p>One hour after sunset (face west):</p> <p>Regulus</p> <p>Mars</p> <p>Saturn</p> <p>The Last Quarter moon precedes the sun by 1/4 day, so it rose in east around local midnight this morning and sets in west today around local midday.</p> <p>Mars 5 1/2° lower right of Regulus. Can you still find Saturn? It sets before twilight ends. Look 22° lower right of Mars. On July 29 Saturn will be in conjunction with sun.</p> <p>Coming next month: July 4, 1976: Mars (red in color) and Regulus (bluish white) will be only 1° apart in western evening sky--a splendid Bicentennial gift for skywatchers. They'll be even closer the next evening.</p>

Magnitudes of the planets: Jupiter -1.6 to -1.7; Saturn +0.5; Mars +1.7 to +1.9; Mercury (June 26) 0.0  
 Positions of planets against star background: Mars 18° eastward, from Cancer into Leo; Jupiter 6.4° eastward in Aries; Saturn 3.4° eastward in Cancer.

East Lansing Sunrise: June 1 6:02 a.m.; June 16 5:59 a.m.; June 30 6:02 a.m. EDT  
 Sunset: June 1 9:09 p.m.; June 16 9:19 p.m.; June 30 9:20 p.m. EDT



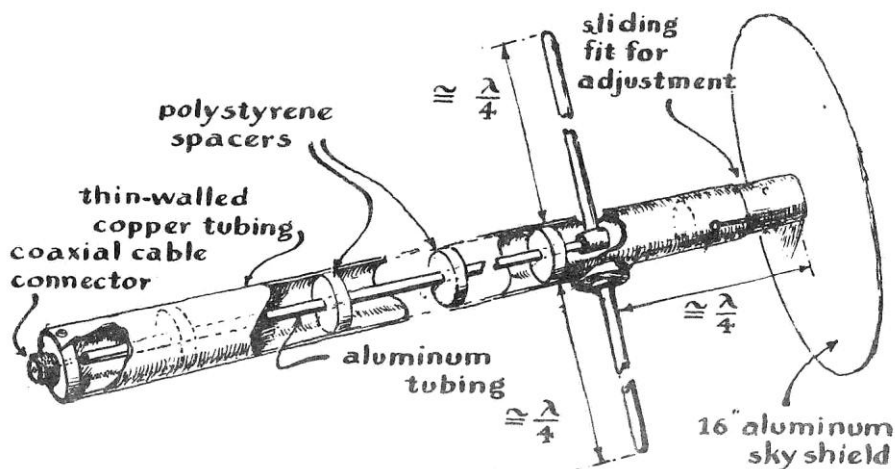
a number of bugs developed, and it was not ready for a trial run until the summer following graduation. The telescope has four major components: the antenna and its mount, a high-gain, low-noise receiver, an automatic pen recorder and a noise generator that is used to test the system and as a standard for comparing the strength of the radio sources in space. The design and procurement phase of the project took 18 months of spare time and the construction about a year.



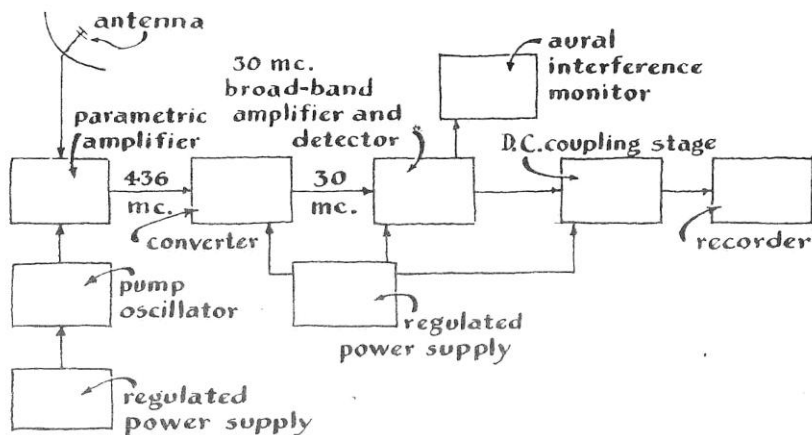
Construction of a radio telescope made by Lyndall McFarland of Winston-Salem, N.C.

"Much of the initial planning went into the antenna. The antenna of a radio telescope corresponds to the objective mirror or lens of an optical telescope and the performance of the completed instrument depend on it just as critically. In selecting a design for the antenna several configurations of the diffraction type were considered, including a broadside array of helices. These were dismissed in favor of a paraboloid because the complexity of interconnecting a broadside array increases in proportion to the number of dipoles. Moreover, I wanted an antenna that would pick up the broadest possible band of frequencies and discriminate strongly against all signals except those that come from a desired direction. A paraboloid best meets these requirements.

"Winston-Salem is a center of intense, man-made electrical disturbance, chiefly from sources such as automobile ignition systems, power lines and harmonic radiation from radio and television stations. By scanning the radio spectrum from 50 to 3,000 megacycles with a short-wave receiver, I spotted a relatively quiet region of the spectrum in the vicinity of 400 megacycles (a wavelength of 75 centimeters, or 29~in.) At this frequency a signal equal to a million of a billionth of a watt (10 to the 16 watts) would override the noise if the antenna were designed for maximum power gain; that is, if it strongly favored signals arriving parallel to the axis of the parabola.



*Coaxial feed line of McFarland's antenna*



*Block diagram of McFarland's radio telescope*

When the focal length of the parabola is equal to half the radius, the maximum power gain in decibels is equal to 10 times the logarithm (base 10) to the square of this ratio: 3.14 times the radius divided by the wavelength. Well enough on power gain, the next consideration was the physical structure. Aluminum was selected as the most attractive material, from the point of view of weight. A disadvantage in using aluminum is that all parts of the antenna must be welded. Otherwise voltage may drop across the joints of the adjacent parts and may be detected as noise.

The paraboloid was formed of sheet aluminum welded to a paraboloidal skeleton of aluminum tubing series of concentric rings supported by radial ribs bent so the sheet took the desired shape to within 1/8 inch.

Aluminum screening would doubtless have been a better choice from the point of view of wind resistance for covering the skeleton. But the only available material of this sort was ordinary house material, which is much too light to hold its shape or to weld. One disadvantage of the aluminum dish is that it must be painted some flat color. One day while observing the sun the dipole suddenly melted, including the 16" sky shield. I then had to paint the dish a flat white, in prevention of another solar oven.

## OBSERVATORY SCHEDULE

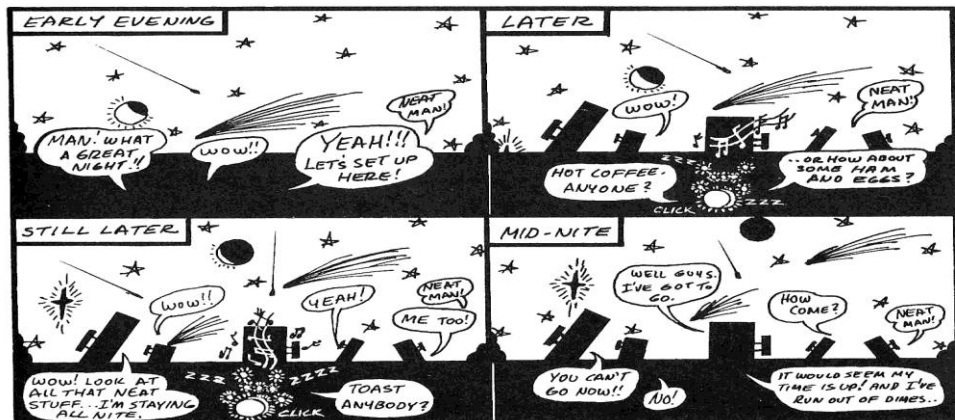
Lectures for the coming month are listed below.

May 21/22 ..... Pete Kwentus ..... 771-3283  
May 28/29 ..... Roger Civic ..... 775-6634  
June 4/5 ..... Don Misson ..... 776-0424  
June 11/12 ..... Larry Kalinowski ..... 776-9720  
June 18/19 ..... Frank McCullough ..... 791-8752  
June 25/26 ..... Gary Boyd ..... 839-0973

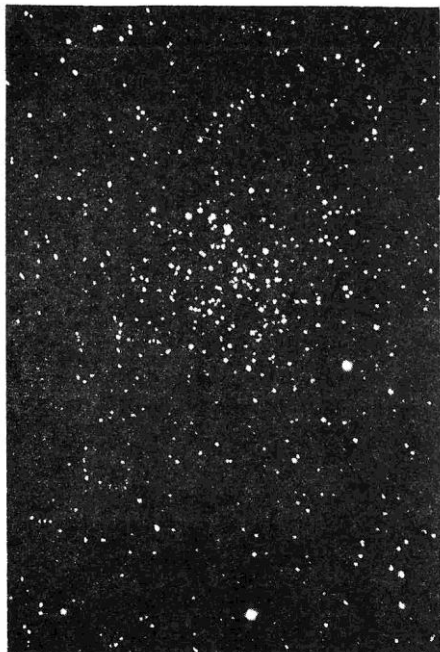
The lecturer may select either the Friday or Saturday depending on the weather and their personal schedule. W.A.S. members wishing to be instructed on the operation of the observatory & telescope controls should contact the lecturers directly. Additional lecturers and assistants are needed to lessen the load on these faithful old time members. Their efforts have maintained our relationship with the Rotary over the years and have made it possible for us to keep an observatory in a secured location. All members who make use of the facility are reminded to be aware of the implied obligation for using the observatory and volunteer for lecture duty, you may find it very enjoyable.

ATTENTION, all members.

Next month's issue of the WASP will have pre-touchdown information and articles on the Viking mission to Mars.



# Messier Objects~



**M67** NGC 2682 11h47m.8 +12° 00'  
Galactic cluster in Cancer

Basic data. Through small binoculars Messier 67 appears as a 6th-magnitude patch about to across. It is a rich swarm, with over 150 members brighter than magnitude 15½, according to Ake Wallenquist.

A recent determination by O. J. Eggen and A. R. Sandage placed M67 at a distance of about 2,250 light-years. Hence, the angular diameter of the object corresponds to about 11 light-years.

Unlike most open clusters, which are concentrated near the plane of our galaxy, M67 lies about 1,500 light-years above it. The great age of this cluster (perhaps 10 billion years) ranks it among the oldest known.

NGC description. Remarkable cluster, very bright and large, extremely rich, little compressed, stars from 10th to 15th magnitude.

Visual appearance. The slightest optical aid will readily reveal M67 as a soft cloudlike spot. The predominant star hues are rust, orange, gold, and yellow.



**M109** NGC 3992 11h55m.0 +53° 39'  
Galaxy in Ursa Major

Basic data. This conspicuous barred spiral lies 2/3° southeast of Gamma Ursae Majoris. It is about 7" long and 4' wide on long-exposure photographs. Through its bright central core extends a stubby bar, from the ends of which trail narrow sharp spiral arms. The total magnitude of M109 is about 9½.

A supernova that appeared in this barred spiral in 1956 briefly attained photographic magnitude 11.2. If this supernova outburst had occurred inside our own galaxy at the distance of Alpha Centauri, the supernova would have been as brilliant as the full moon!

NGC description. Quite bright, very large, pretty much extended, suddenly brighter in the middle to a bright mottled nucleus.

Visual appearance. A splendid galaxy for small apertures, though only the brighter central region can be seen. It is pear-shaped, with a strong suspicion of a granular texture, and close to a faint star whose glow obliterates the outer regions.

## •buy-sell-trade•

For your own FREE ad to buy, sell, or trade anything astronomical, contact the Editors of the W.A.S.P.

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6" R.F.T • .Reflector Telescope, tube only. Coulter mirror, Parks fiberglass tube, diagonal holder by Novak, spiral focus eyepiece holder , Only \$100.00, FIRM. Contact:Bill Whitney 588-1073.

Complete set of .965" eyepieces & accessories. For use with any refractor. Excellent condition: 25mm-12.5mm-9mm-6mm-4mm, 2X Barlow, star diagonal, erecting prism, adaptor for 1¼" eyepiece holder. Cost new, \$86, only \$36.00, firm. Contact: Roger Civic, 775-6634.

The L.F.K. Astrophotographic guide. Special price to all club members, \$1.00. Other guides not as complete are priced at \$4.00 & \$6.00. Contact: Larry Kalinowski, 776-9720.

Edmund Equatorial mount, tripod legs, will carry a 4" refractor or a 6" reflector- 1" shafts, 3" Dia. gears on R.A. & Dec. Needs some work. An absolute steal at \$15.00. Contact: Dennis Jozwik, 754-2037.

For sale: Beautifully sculptured full relief models of the Moon's central section, 30" square. Full color plaster castings- 4" X 4" X ½" thick. Great for framing.

Special price for all club members, \$6.00, also simulated aluminum casting of the same model, \$3.00. Contact: Roger Civic, 775-6634.

K-Mart Spotting scope, 20X to 60X Zoom. 60mm Obj. Alt-azimuth table top tripod with slow motion controls. A steal at \$20.00, Contact Ken Wilson, 268-9337.

Solar filter: Full aperture solar filter for a Celestron 8. Only 6 months old, with case. 25% off at \$150.00. Contact: Rick Hill, 517-835-5548.

Camera lens- perfect condition, like new- 55mm f 1.7  
Rexatar automatic, straw coated lens, Pentax threads. Only \$40.00. Contact:Roger Civic -775-6634.

Wanted: Rack & pinion eyepiece holder. Under \$10.00 for a 6" f/10 Refl., also need a tube at least 60" long for the same telescope. Contact:Joe Tocco,573-8547.

Superb quality Dakin 3X Barlow by Vernonscope. 1¼" Dia. W/case. Only \$30.00, Firm. 3X Barlows are no longer being manufactured, they are hard to find. Contact: Larry Kalinowski, 776-9720.