

# the WASP

THE MONTHLY JOURNAL OF THE WARREN ASTRONOMICAL SOCIETY



**MERRY CHRISTMAS!**

**DECEMBER 1974**

The Warren Astronomical Society Paper (W.A.S.P.) is published monthly by and for the members of the Warren Astronomical Society. Subscriptions and advertisements are free to all warren Astronomical Society members. Non-member subscriptions and advertisements are available, upon arrangement with the editors. Contributions, literary or otherwise, are always welcome.

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Louis Faix and Roger Civic

COVER BY: Ken Wilson

The Warren Astronomical Society maintains correspondence with the following organizations:

THE ASTRONOMICAL LEAGUE

THE GRAND RAPIDS AMATEUR ASTRONOMICAL ASSOCIATION

THE KALAMAZOO ASTRONOMICAL SOCIETY

THE OLYMPIC ASTRONOMICAL SOCIETY

THE OLGELTHORPE ASTRONOMICAL SOCIETY

THE MIAMI VALLEY ASTRONOMICAL SOCIETY

THE FORT WAYNE ASTRONOMICAL SOCIETY

THE ORANGE COUNTY ASTRONOMICAL SOCIETY

Other organizations are invited to join this list. The editors of the W.A.S.P. will exchange copies of this publication for other club publications on an even exchange basis.

.....Coming attractions.....by Kenneth Wilson.....

Dec.

- 5        Messier Club Meeting, contact Frank McCullough 791-8752 (be sure to bring your Messiers!).
- 12       Astrophotography Club Meeting, contact Larry Kalinowski, 776-9720 for details.
- 14       Tycho Brahe's birthday (1546)
- 19       Warren Astronomical Society General Meeting at 8:00 p.m. in room B311(?) at Macomb County Community College.
- 20       Annual W.A.S. Christmas Banquet at the Paradise Villa, including an infamous Christmas slide show. For details contact: Frank McCullough 791-8752.
- 25       Merry Christmas from the editors and staff of the W.A.S.P. Isaac Newton's birthday (1642).
- 27       Johannes Kepler's birthday (1571)

### Club News

By Kenneth Wilson

Many thanks to Robert C. Victor of the Abrams Planetarium for the excellent Sky Calendars that we've included in the W.A.S.P. for the last few months.

\*

Congratulations to Diane "Lee" McCullough, our recording secretary. Her fine article on the 1974 Astronomical League Convention appeared in the November issue of "Sky and Telescope". She is the first W.A.S. member to have an article published by a National astronomy magazine. Keep up the good work Diane!

\*

A metal lathe has recently been purchased by Pete Kwentus, Louis Faix, Don Misson, Ken Wilson and Gary Boyd. Some memberships in this co-op may still be open. Contact Pete Kwentus (771-3283).

\*

Many fine articles are finally beginning to come in for the W.A.S.P. But we must increase the flow. Remember, this publication put together for You and it will only be as good as YOU make it! So, please, get out your Ticonderoga No. 2's and let us know what you're doing!

\*

\* STAR \*

\* PARTY \*

December 4<sup>th</sup> or 5<sup>th</sup>  
(Wed.) (Thurs.)

7:30 p.m.

depending which day is clear!

at water court of Macomb College (South Campus)

Bring your scopes!

[Star Party to promote astronomy to new members in our club  
and students of M.C.C.C.]

G.A.S.

Christmas Party

All Invited

Place

Location : Paradise Villa — Long Lake (18 miles) \* Livermore  
(In the Sunset Bluffs)

Time : 7:30 p.m.

Date : December 20<sup>th</sup> (Friday)

Events : Popcorn and a Christmas Program

(no not Pete's observatory report!)

CONSTELLATION of the MONTH  
&  
OBSERVATIONAL ASTRONOMY  
By  
Frank McCullough

TRIANGULUM: The Triangle

Location: A line drawn from the star  $\gamma$  Pegasi to Algol in Perseus passes through  $\beta$  Trianguli.

The triangle, isosceles in form, lies on its side, a clearly defined and beautiful figure just below Andromeda, and above Aries. It was this locality that Piazzi discovered the asteroid Ceres, January 1, 1801, the first asteroid to be discovered.

$\alpha$  Trianguli is sometimes called "Caput Trianguli" It culminates at 9:00 December 6<sup>th</sup>.

$\alpha$  and  $\beta$  Trianguli were in ancient times known as the "Scale Beam". The Triangle is a very ancient constellation, being formerly named Deltoton, from the Greek letter Delta. It has been likened to the Trinity, and the Miter of St. Peter.

Aratos thus refers to the constellation:

Beneath Andromeda, three lines compose  
The Triangle. On two sides measured equal,  
The third side less.

For the telescope Triangulum offers a fine double star.

<u>Double Star</u>	<u>Magnitude</u>	<u>Dist.</u>	<u>Designation</u>	<u>Remarks</u>
		<u>Secondary</u>		<u>Yellow-Blue</u>
	5.0-6.4	4	020629	An exquisite pair

Both components of this double star are spectroscopic binaries.

The nebula M33, discovered by Messier in 1764, is worth observing. It is 30° in extent. According to Webb, it is a very large, faint, and ill-defined. A curious object fit only for low powers.

(Cont next page)

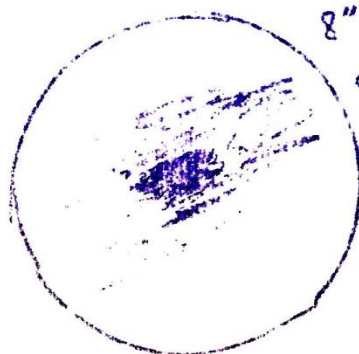
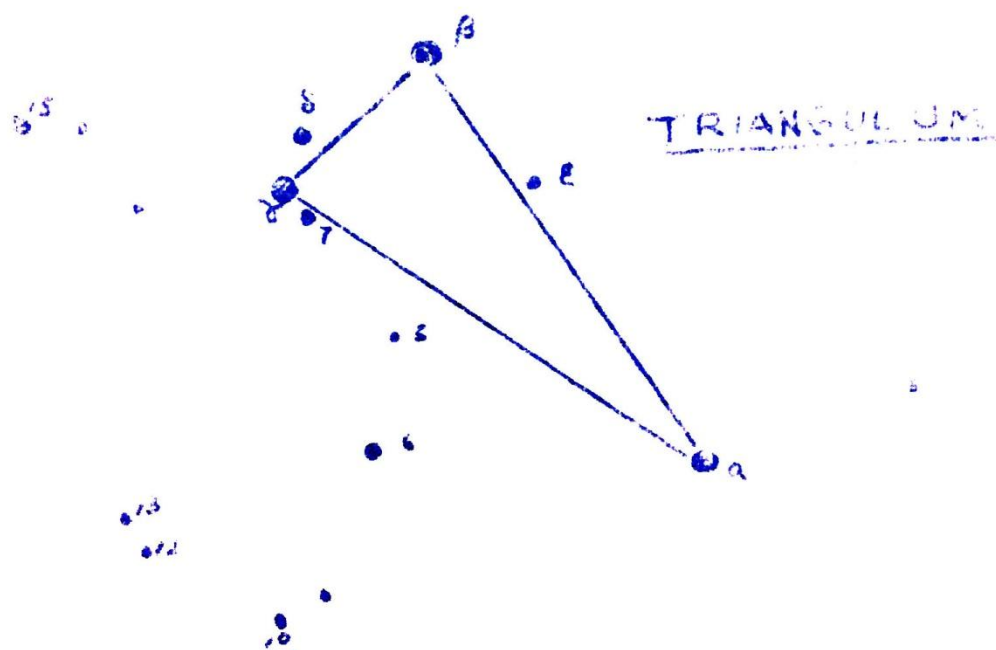
(Taken from Olcott's Field Book of the Skies)

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W.A.S. Slide Processing  
Call 791-2752  
\$1.00 20 exposures  
1.25 36 exposures

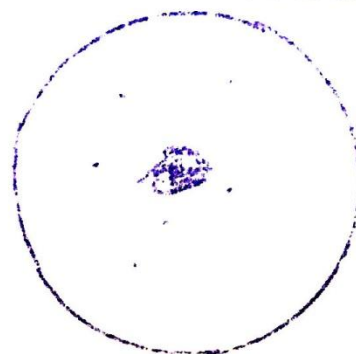


# Constellation of the south Observational Astronomy



8" f8  
at  
100x

M-33  
NGC-598



8" f8  
at  
100x

## Salute of the Month

by Kenneth Wilson

This month's salute goes to all of the fine people that helped out with the national convention of the Astronomical League, this summer. This convention was officially hosted by the Warren Astronomical Society. For one reason or another, many W.A.S. members did not attend this excellent convention. I have good news for those members; the good name of the Warren Astronomical Society is still intact. Thanks to the efforts of this dedicated group, this summer's convention was a success. In particular, I would like to mention several people who have otherwise gone unmentioned. Special thanks to: Tim Skonieczny, John Sears, James Marron, Rick Bishel, Dr. Lee Shapiro of the Abrams Planetarium, Dave Harrington and all the commercial people that donated door prizes. And thanks to Walter Scott Houston for just being there!

If I have forgotten anyone, which I'm sure I have, please accept my apologies. To everyone who helped, the W.A.S.P. salutes you!

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## Want ads

- FOR SALE: one 6 X 30mm Criterion finder with adjustable mounting rings. \$15. 268-9337, ask for Ken.
- WANTED: Articles for the W.A.S.P. No previous experience necessary. Contact one of the editors: Ken Wilson (268-9337) or Frank McCullough (791-8752).
- FOR SALE: one 15-60x60mm zoom spotting scope with an alt-azimuth mount with slow motions. \$200 268-9337, ask for Ken.
- WANTED: Want ads for the W.A.S.P. Free to W.A.S. members, by arrangement with the editors for others.
- FOR SALE: Twenty-page booklet (8½ by 11 in.) contains exposure data for the sun, moon, planets, and has a recently expanded eclipse section. Seventeen exposure guides list shutter speeds for all films (4 to 2000 ASA). Includes instructions for first focus, afocal, negative and positive projection telescope photography.  
\$2.25. Larry F. Kalinowski, 15674 Flanagan Ave., Roseville, Michigan 48066. 776-9720.

## A Convertible Telescope

By  
Roger Civic

(Refer. Sky & Telescope Dec. 1973 pgs. 405-410)

A telescope with a prime (first focus) focal length of f.8 to f.15 is great for viewing the Sun, Moon and planets, but leaves a lot to be desired when used for deep sky objects. First of all the field of view is not more than one degree, the apparent light gathering power is reduced because of the distance light must travel from the objective to the first focus.

If you are interested in deep sky objects such as nebula or galaxies an instrument of short focal length such as f.4 to f.6 is more useful, but the short f-ratio telescope cannot give the image size most useful for planetary studies or photography ( $3/32$  to  $1/4$  inch in diameter).

Every astronomer has faced this same problem. The most obvious answer is to buy or construct two telescopes, one of f.10 or f.15 and one of f.4.5 or f.6. This method will be expensive and/or time consuming. Let me suggest a simple and inexpensive way to solve the problem. Use a focal reducing achromat lens!

With an achromat lens of the appropriate focal length is placed inside the first focus of any telescope, the effective focal length of that telescope can be reduced by a factor of 1, 2, or 3. If you start with a field of view that measures  $3/4$  of a degree, it can be increased to  $1\frac{1}{2}$  degrees, with marked increase in the apparent brightness of objects in the new field of view. With the focal reducer you can have one telescope that will do two jobs, planetary and deep sky viewing, or photography.

I have used this method with startling results on a 6" f 15 Cassegrain telescope. The prime focus image of the moon at f 15 is  $7/8$  of an inch in diameter, with full field of view measuring 36 minutes of arc. The moon which is 32 min. of arc in diameter just fits on a 35 mm negative. This format is great for large bright objects. Now with the achromat lens set in a camera adaptor for photography is placed inside the prime focus of the 6" cassegrain and refocused to a sharp image, the moon appeared  $1/3$  the size it was before.

I took some shots in color and black & white and examined the negatives. I found the new size of the moons image to be  $5/16$  of an inch in diameter or 11.25 min. of arc. The field of view was increased to 92 minutes of arc or about  $1\frac{1}{2}$  degrees. The new f ratio of the 6" telescope was found to be f 5.36. The apparent light increase for photography is about 2 photographic stops! The new brighter fields of view allows the faint nebula and galaxies to be more easily seen and photographed.

The cost of the achromatic lens for this system was \$5.00, the T-ring camera adaptor cost \$2.75, and the lens cell was made from spare parts. Total cost was \$7.75. I really like this system with the 6" Cass. because it is a very compact, ultra portable system that two jobs to my satisfaction.

I hope the diagrams and specifications on the next page will give you a better understanding of how the system works. If you wish to use the focal reducing formula to construct own system,

TRY IT, YOU'LL LIKE IT!

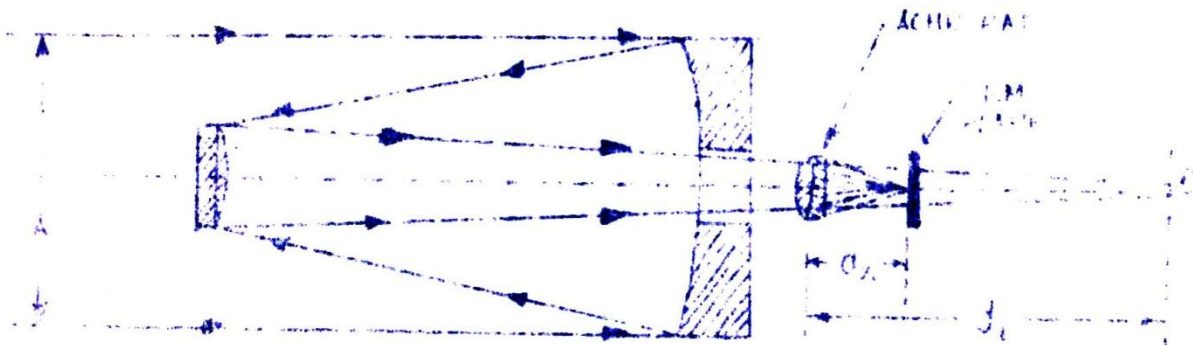


# CONSTRUCTING A FOCAL REDUCER

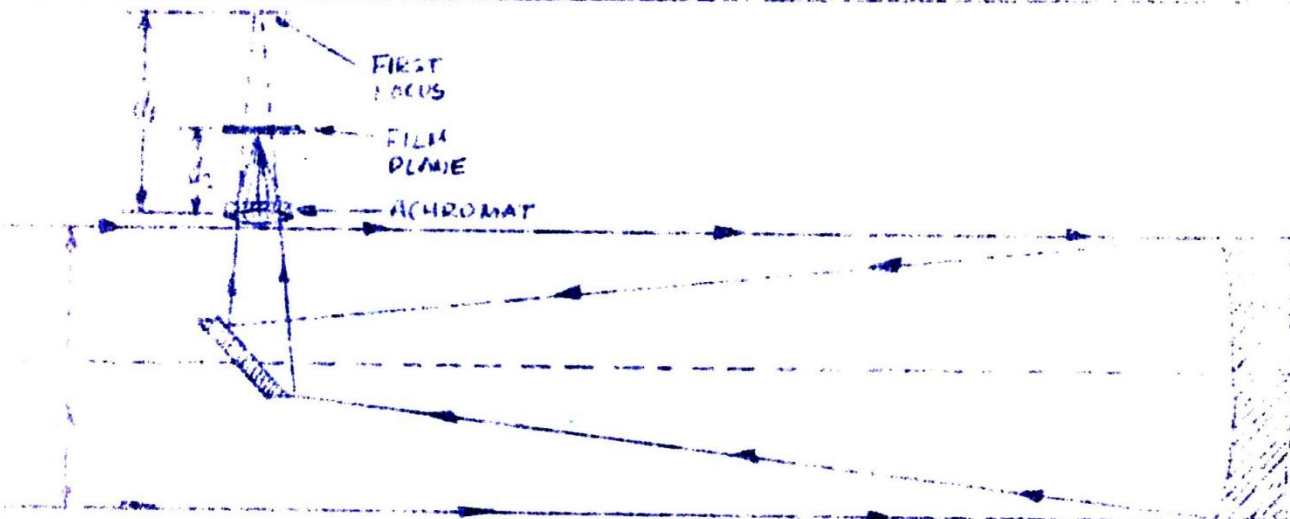
DRAWINGS BY R. CIVIC

FOR THE 6" CASSEGRAIN I USED AN ACHROMAT, 42 MM IN DIA. AND 88 MM IN FOCAL LENGTH. THE FILM PLANE WAS 2" IN BACK OF THE 1.71" DIAMETER LENS.

THE FORMULA FOR CONSTRUCTING THE SYSTEM IS  $E.F.L. = FD_2/D_1$ , FOCAL RATIO =  $E.F.L./A$ ,



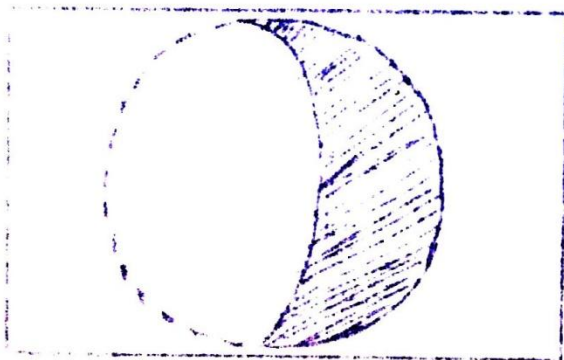
NORMAL 6" CASSEGRAIN F/15 (WITH ACHROMAT F/11)



NEWTONIAN TELESCOPE

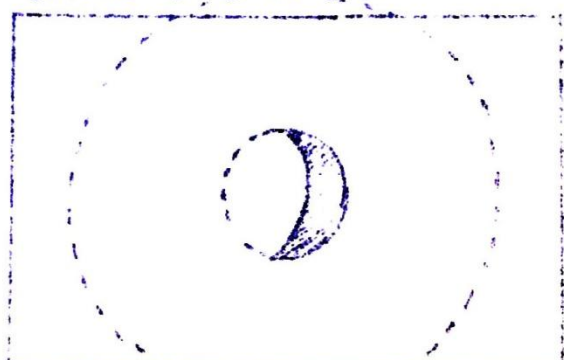
## SIZE OF IMAGE ON FILM

ORIGINAL 6" F/15 IMAGE



35 MM FRAME

EFFECTIVE FL = 13.36  
IMAGE WITH ACHROMAT F/11



35 MM FRAME

## Two Methods of Increasing Sensitivity of Kodak Spectrographic Emulsions

by  
Kenneth Wilson

Professional astronomers have increasingly come to rely on photoelectric devices, in place of the traditional photographic emulsions. This trend has been due to the greater quantum efficiency (Q.E.) inherent in the photoelectric devices (up to 10-15% Q.E.). But it seems that the photographic emulsion may yet stage a comeback with two new hyper-sensitizing processes developed by Eastman Kodak.

Professor Hiltner of the astronomy department at the University of Michigan informs me that Kodak has known about the two processes for about five years, but only released them at a conference in Rochester, New York last year. It seems that Kodak kept them secret while trying to patent them for marketing. Finding it unfeasible, they released them to the scientific community. As of yet, nothing has been published about either process.

Method I is the easiest, but least effective and uniform, of the two. One simply bakes the emulsion in a nitrogen ( $N_2$ ) atmosphere at  $-60^\circ C$  for about six hours.

Method II is a little more involved but has reportedly produced Q.E.s of 15% (i.e. equaling the efficiencies of the best photoelectric devices). First, one places the emulsion in a vacuum about  $10^{-7}$  mm of mercury (Hg) for one day. Then, one bakes the emulsion for a few hours at  $\sim 60^\circ C$ . After baking, place the emulsion into hydrogen ( $H_2$ ) for a few more hours.

Emulsions sensitized by either method can be stored in a freezer for several days, losing a factor 2 in sensitivity per week. The loss is due to the recombination of water and oxygen ( $O_2$ ) molecules (removed by the above processes) and the emulsion.

These methods were found to be most effective on 103a--J emulsions with lesser effect on IIa-O. Neither showed any appreciable effect on grain size.

I feel that application of these methods to spectroscopic emulsions available to the amateur is within the capabilities of several Warren Astronomical Society members.

## THE ILLUMINATED DUPLEX CROSSHAIR EYEPiece

There is hardly an amateur astronomer who has not become annoyed at the conventional crosshair eyepiece for one reason or another. The crosshairs on a conventional eyepiece although visible when looking at the moon or bright sky, completely disappear when attempting to guide on dark nights. Though this can be rectified by illuminating the crosshairs, this leads to other problems such as the obscuring of dim stars by the brightness of the illumination.

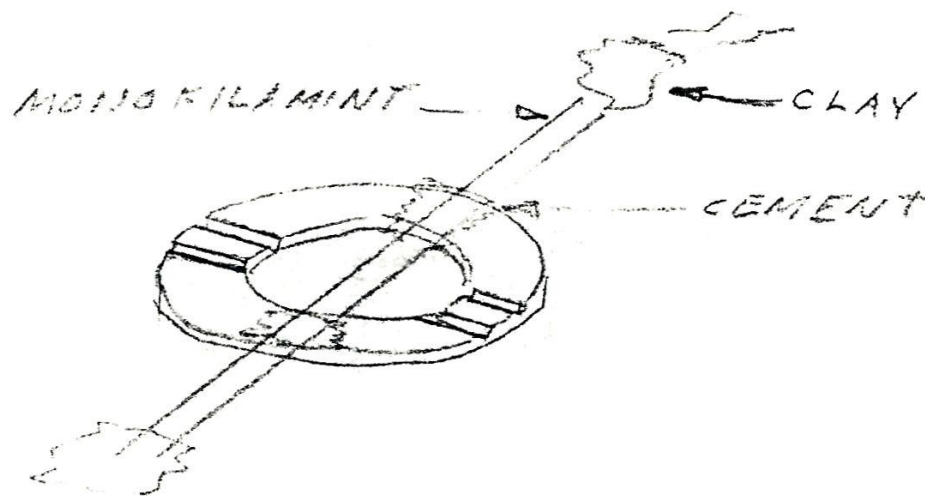
The other major problem with the conventional crosshair comes to light when guiding the telescope for long photographic exposures. The standard method of keeping the telescope oriented is by bringing the guide star to an out of focus diameter equal to the maximum variation allowable (This is dependent on the focal length of the camera, telescope, and magnification to be used on the negative.) With long focal length cameras this diameter can be smaller than the diameter of the crosshair. Also dim guide stars are difficult to see since they are placed behind the illuminated crosshairs resulting in eyestrain.

FAITUS Enterprises, however, has come up with a solution to the problem by using a side illuminated orthogonal pair of precision spaced polyester monofilaments. As can be seen in the diagram, this forms an accurately positioned square in the center of the eyepiece field. A considerable advantage results from this design with particular application to the amateur astronomer who takes long photographic exposures.

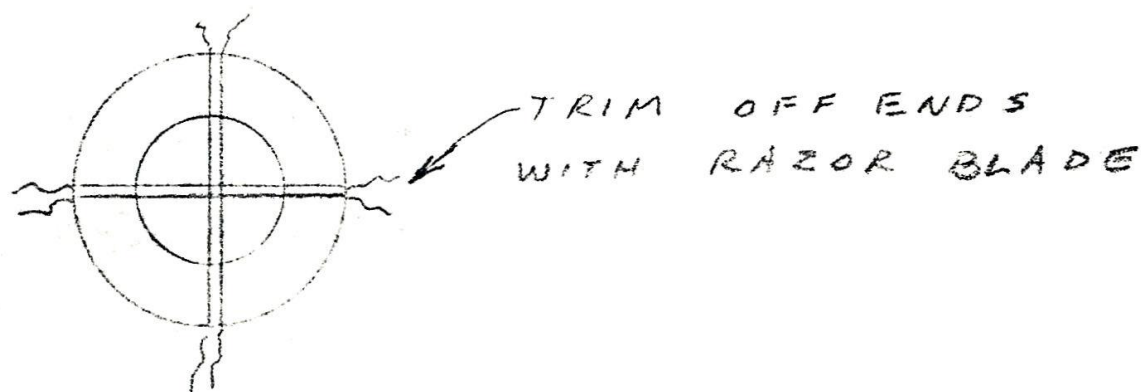
In use the guide star is positioned in the center square and the guiding motions of the telescope are used to keep the star centered. Since the star is not directly behind any of the illuminated hairs there is no chance of the brightness of the hairs obscuring it. There is also less eyestrain in this arrangement due to a higher contrast than the conventional crosshair eyepiece. Since the guide star on the "Faitus" system is kept in focus and the crosshairs have dark sky between them and the star much dimmer stars can be used for guide stars. Compared to the regular type where there is a dim extended-area out of focus star behind a relatively bright crosshair it is easy to see why one can guide for much longer periods.

Now to get on to the construction of the duplex crosshairs. Of the several methods we tried, the best\* is scribing two lines .005" each side of the centerline of the eyepiece on a washer fitted to the diameter of the inside of the eyepiece tube. (If a

baffle is presently in the barrel it can be utilized for this purpose.) The washer is then turned 90° and two more lines are scribed. Stretch the monofilament across the washer and place them in the scribed grooves, holding flat, and stretching tight with small pieces of modeling clay. DuPont household cement or ambroid cement will secure the monofilament to the washer.



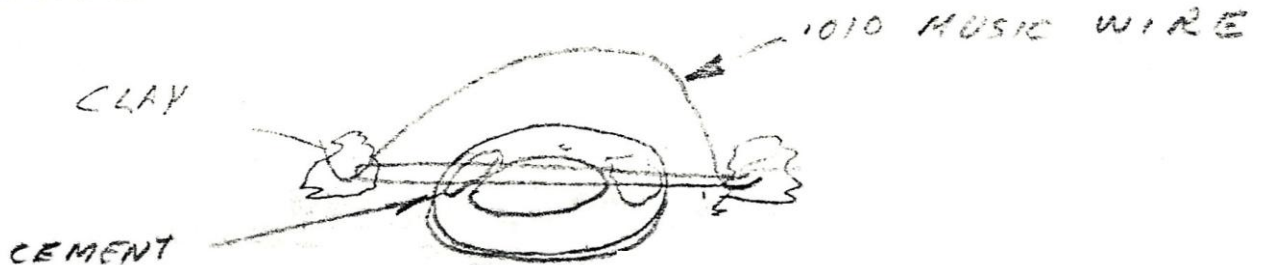
Rotate the washer 90°, and repeat the above steps to complete the crosshairs.



The crosshairs can then be heat set with a hair dryer or low heat source after the cement has dried.

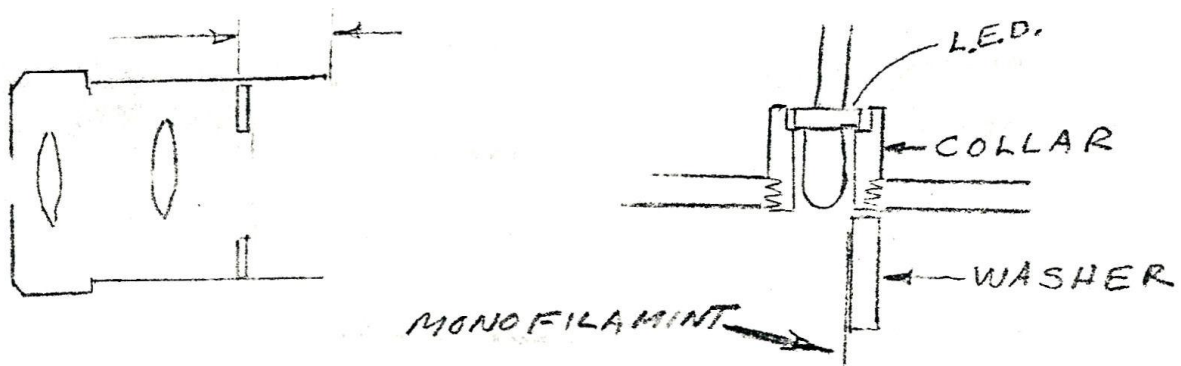
\*As there is argument over whether this is the best method another will be presented.

Another method of spacing the monofilament is to use a length of .010" music wire (or any other thickness), bending the wire in an arc. Loop a length of monofilament tied together at the ends across the arc. This will position the monofilament until it is secured with the glue.



Next we will shed some light on the crosshairs. The miniature LED (light emitting diode) is one of the best small sources of light. (Available from Radio Shack or Olson's Electronics. Follow Larry Kalinowski's guide sheet for wiring.)

Position the washer in the eyepiece at the best focus point for your eye and measure the distance from the end of the eyepiece barrel to the washer face. Remove the washer, measure and prick punch on the outside of the barrel for drilling.



A collar drilled to the diameter of the LED used and threaded on the outside can be installed in the threaded hole in the eyepiece to support the LED in position for guiding.

If you have any questions about this project feel free to ask us. . . . .Pete Kwentus, Donald Misson

\*\*\*\*\*This project was sponsored by FAITUS Enterprises\*\*\*\*\*



## HOW BIG IS IT?

The amateur astronomer often wonders about size and distance in space. Star charts and atlases usually do not provide the desired information. Using simple techniques and plain arithmetic, the amateur astrophotographer can measure the size of a galaxy, the diameter of a nebula and the separation between double stars. The astrophotographer may also desire to know the minimum resolution of his pictures.

The first step in answering these questions is to photograph the desired object with an optical system of a known effective focal length. Larry Kalinowski's guide and Sam Brown's book on astrophotography describe the methods of measuring a telescope's effective focal length. The graph on the next page will reveal the total field angle of the long side of a 35 mm slide mounted in a standard cardboard frame (1-3/8" x 15/16").

To determine the true angular size or separation of objects in the photograph, project the picture on a wall and measure the long dimension of the projected image and the unknown dimension with a yardstick. Multiply the total field angle by the unknown distance and divide by the long dimension. The resultant is the true arc angle of the object.

Example: How far apart are double stars on a photograph made at prime focus with a 6" f/8 (e.f.l = 48") telescope? When projected on a screen, the width of the photo was 40" and the star images are 1/2" apart.

From the graph we determine the total field angle of the picture is 1.630.

$$\frac{1.63^\circ \times .50''}{40''} = .020370 \text{ degrees}$$

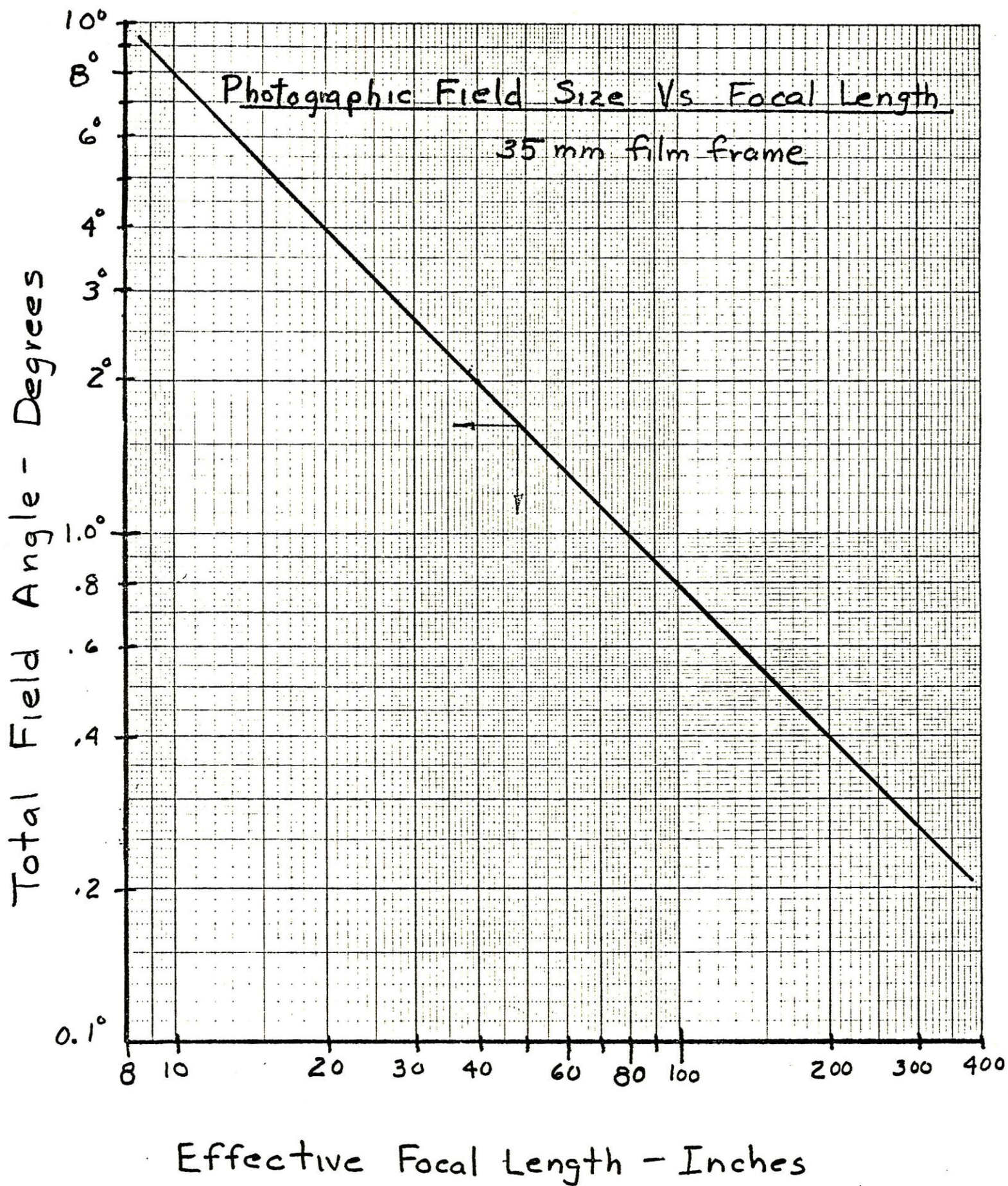
$$\text{or: } .020370 \times 60' / \text{degree} = 1.222' \text{ arc minutes}$$

$$\text{or: } .02060 \times 3600'' / \text{degree} = 73.33'' \text{ arc seconds}$$

For longer or shorter focal lengths than the graph displays, simply change the graph scales: If you divide the focal length scale by ten, multiply the angle scale by ten; if you multiply the focal length scale by one hundred, divide the angle scale by one hundred.

Got a question? Ask Lou.

Can you measure the width of Saturn's rings? The distance between the trapezium stars?





# SKY CALENDAR DECEMBER 1974

Information for helping teachers and students observe the sky

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p>45 min before sunrise: Face SE and look for faint red Mars 30° lower left of Spica. Binoculars may show Mercury rising 5½° lower left of Mars.</p>	<p>One hr before sunrise: Bright "star" close to moon is Saturn. Note Pollux and Castor, the Gemini Twins, nearby.</p>	<p>Jupiter passes due south near 6 pm local time. Add 4 minutes per degree of longitude if you are west of your time zone's meridian, subtract of east. Add an hour if DST is in effect.</p>	<p>Mercury has faded from view (in 15 days it passes behind sun), but Mars is slowly getting easier to see, rising a little farther ahead of sun each morning.</p>	<p>One hour before sunrise: Bright star near moon is Regulus, the heart of Leo, the Lion.</p>	<p>Last Quarter. Moon about 90° from sun this morning. As you face the rising sun the moon is ¼ turn to your right.</p>	<p>Look for Pleiades Cluster, or Seven Sisters, well up in east 2 hours after sunset. It is a beautiful sight in binoculars. It is about 400 light years distant.</p>
<p>Below the Pleiades in the eastern evening sky note reddish twinkling Aldebaran. The dim stars near Aldebaran form another cluster, the Hyades, 130 light-years away.</p>	<p>One hr before sunrise: Bright star near moon is Spica, the ear of corn or spike of wheat in Virgo's hand.</p>	<p>Watch for moon each morning thru Dec 12. Note moon is a thinner crescent each morning as it moves closer to the sun.</p>	<p>Moon is still easily visible this morning, but tomorrow it rises less than an hour before sunup.</p>	<p>10pm to 6am tonight and next two nights are best for Geminiid meteor shower. Meteors may appear anywhere in sky, but appear to move away from Gemini.</p>	<p>New Moon. Partial eclipse of sun visible in 48 states. Greatest eclipse occurs near 11am EST on east coast, and near sunrise in western states CAUTION: See below.</p>	<p>One hour before sunrise: Mars very close to 3rd magnitude star Beta in Scorpius. Use binoculars. Evening: Look for thin crescent moon low SW 45 min after sunset.</p>
<p>Moon easily visible in SW early evening sky. Note earthshine on moon's dark side tonight and next few nights.</p>	<p>Orion rises due east about 2 hours after sunset. Compare colors of Betelgeuse and Rigel. Note Orion's belt, a vertical row of 3 stars, between them.</p>	<p>Two hours after sunset note Capella well up in NE, to left of Pleiades. Below Capella, near horizon, note Saturn, Castor, and Pollux.</p>	<p>In late evening, when Saturn is high enough, it is about equal to Capella in brightness.</p>	<p>The brilliant object near the moon tonight is Jupiter.</p>	<p>Only 7 weeks ago Venus was behind sun and not visible. Now it sets 3/4 hr after the sun. Look for it ½ hr after sunset, a few degrees left of sunset point. Binoculars help.</p>	<p>First Quarter. Moon about 90° from sun this evening. As you face the setting sun the moon is ¼ turn to your left.</p>
<p>Winter Solstice. Today's midday sun is the lowest of the year, 24° above horizon for latitude of E. Lansing. For several weeks, sun's midday altitude changes very little, hence solstice, "sun stands still".</p>	<p>The Summer Triangle (Vega, Altair, Deneb) is still visible in western evening sky. At beginning of summer, it was in east in evening and was visible all night.</p>	<p>Face low SE 1 hr before sunrise. Mars 4½° north (upper left) of Antares, the "rival of Mars". At present Mars is only half as bright as Antares.</p>	<p>Mars rises about as morning twilight begins. Mars rises progressively earlier as months pass; by mid-Dec 1975 it will rise at sunset and be very brilliant.</p>	<p>Bright star near moon tonight is Aldebaran, the eye of the Taurus the Bull and the follower of the Pleiades.</p>	<p>Watch Summer Triangle disappear from view in coming weeks. Each evening at same time, it is a little lower in the west.</p>	<p>Full Moon. Moon rises very close to time of sunset, in opposite direction. Watch from place with unobstructed view toward SW and NE.</p>
<p>Moon rises about an hour after sunset. The bright "star" close to the moon is the planet Saturn. Castor and Pollux left of Saturn.</p>	<p>Moon rises more than an hour later each evening, but you can also see moon in morning, after sunrise.</p>	<p>Venus now sets a full hour after sunset. It should be an easy naked eye object ½ hr after sunset, to upper left of sunset point.</p>	<p>SAFE METHOD of observing PARTIAL SOLAR ECLIPSE: Make a 1/16" pinhole in index card, and with your back to the sun, view PROJECTED IMAGE on 2nd card, held 2-3 feet away in shadow of first card.</p>	<p>Evening Planets: Jupiter is prominent in S in early evening, and sets just S of due W before middle of night. Venus becomes visible this month. See Dec 20, 31.</p>	<p>Saturn, the brightest "star" in Gemini, is visible most of night. It rises in ENE within 3 hrs after sunset Dec 1, and within ½ hr after on Dec 21. See Dec 2, 17, 18, 29.</p>	<p>Morning Planets: Mars rises in ESE near beginning of morning twilight. See Dec 1, 4, 14, 24, 25. Saturn is in W 1 hr before sunrise, below Castor and Pollux.</p>

Magnitudes of the Planets: Venus -3.4; Jupiter -1.9; Saturn -0.1; Mars +1.8

Motions: Jupiter moves 4° eastward in Aquarius, passing 0.8° S of 4th-mag Lambda Dec 17-18.

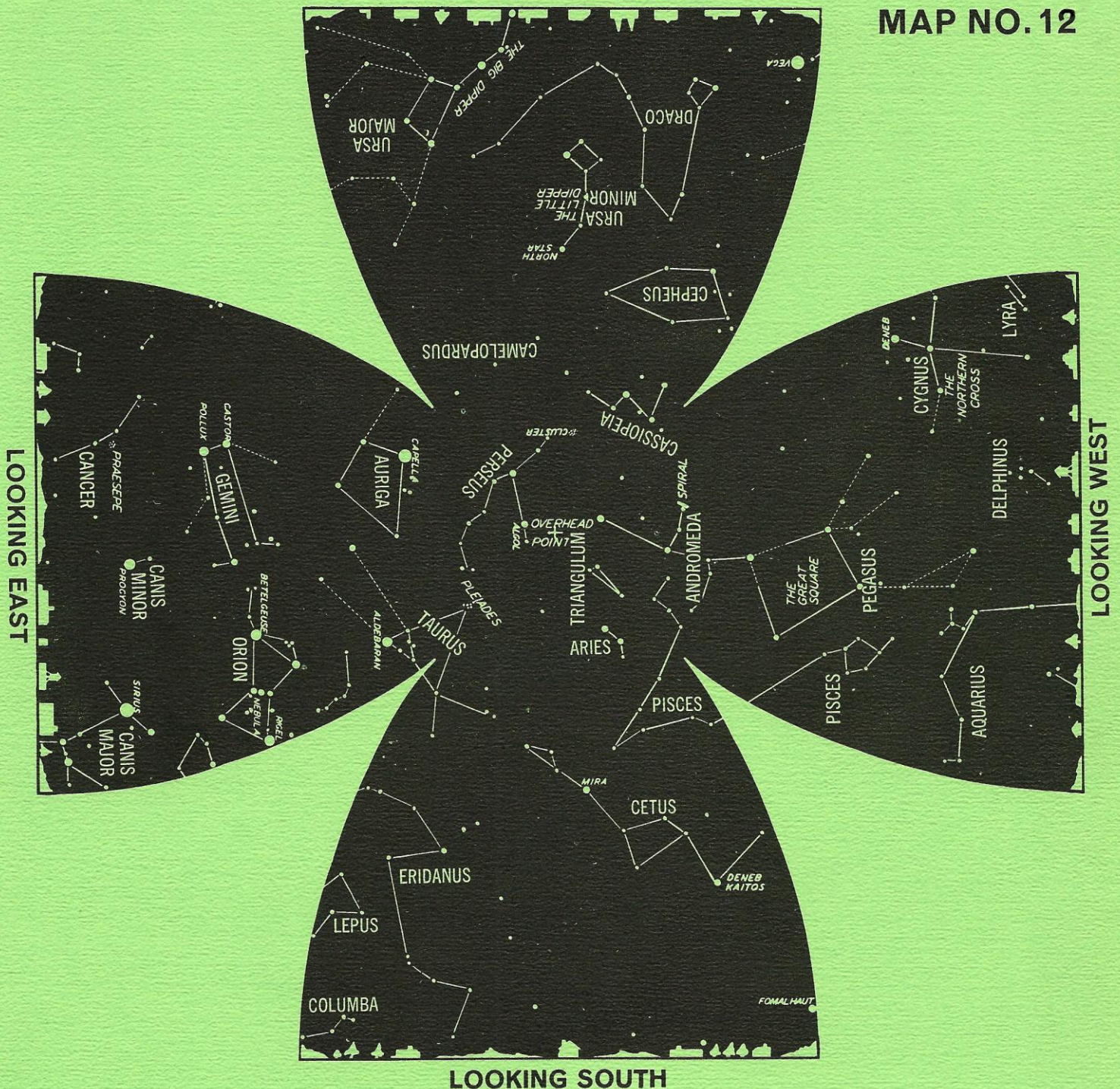
Saturn retrogrades 2.2° in Gemini; note 3½-mag Delta nearby.

Mars, while moving eastward 0.7° per day, passes 4½° N of Antares Dec 24.



LOOKING NORTH

MAP NO.12



THIS MAP REPRESENTS THE SKY AT THE FOLLOWING LOCAL TIMES:

(Lansing area add 40 minutes to change local time to E. S. T.)

December 1 at 10 p. m.  
December 16 at 9 p. m.  
January 1 at 8 p. m.  
January 16 at 7 p. m.  
February 1 at 6 p. m.

Take this star map outside with you when you observe the sky. Remember that planets are not plotted on this map. At chart time, 10 stars of first magnitude or brighter are visible. In order of brightness, they are: Sirius, Vega, Capella, Rigel, Procyon, Betelgeuse, Aldebaran, Pollux, Fomalhaut, Deneb. How many can you locate?

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