Ford Amateur Astronomy Club

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See last page.

Volume 1 Number 1

July 1992

THE CELESTIAL SPHERE

submitted by Joe Sprys

"When we look toward the sky, we know that we are looking into limitless space; we have learned that the stars are actually great blazing suns many trillions of miles away. We are familiar with the idea that beyond these stars lie billions more, all together forming a vast disc-shaped aggregation called the "Milky Way Galaxy." We know that this galaxy is, in turn, only one among hundreds of millions. All these things we know. Yet, for our present purpose, we must temporarily ignore such facts and return to a concept which may seem quite primitive, but which was once regarded as literally true. For purposes of observing convenience, we are going to pretend that the sky is a great hollow sphere with the Earth at its center, We must imagine the stars as being fixed to the inside surface of this "Celestial Sphere." We can see only half the sphere at any one time, of course, the other half being out of sight beneath the horizon. ...This fictitious sphere is in slow rotation, making one turn in four minutes less than a day. The north and south celestial poles, upon which the sphere rotates, are located directly above the Earth's north and south poles. The Celestial sphere likewise has an equator, which is a great circle drawn around the sphere midway between the poles. It passes directly overhead as seen from any point on the Earth's equator.

The North Celestial Pole is thus located directly above the true north point of the horizon, and its altitude is equal to the observer's latitude on Earth, The South Celestial Pole, of course, is always below the southern horizon for observers in the Earth's northern hemisphere.

Another great circle on the Celestial Sphere is the Ecliptic, the apparent yearly path of the Sun and the approximate path of the Moon and planets. It is also the path of the Earth as seen from the Sun, Moon, and planets. The ecliptic is tilted at an angle of 23½° from the celestial equator and intersects the equator at two points called the "equinoxes." The Sun passes the equinoxes at March 21 and September 21, The Spring or "Vernal Equinox" is also called the "First Point of Aries," although the point is now actually located in the constellation of Pisces.

The twelve constellations lying along the ecliptic form a band around the sky called the "Zodiac." All the bright planets will always be found somewhere within this band. The twelve zodiacal constellations are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius, and Pisces,

We may now begin to see why an imaginary "Celestial Sphere" will prove useful for observational purposes. Since the sphere has both poles and an equator and since the stars are (for all ordinary purposes) fixed in their positions upon it, it is evident that we can set up a system of "Celestial coordinates" for the location of objects in the sky."

From Burnham's Celestial Handbook. □

NEWCOMER'S CORNER

by Dave Garrett

For someone starting out in amateur astronomy the amount of information that one must absorb can sometimes be staggering. The intent of this column is to provide the beginner with some basic tools. The first thing that most people want to know is: How much will my telescope magnify. The formula for magnification is:

$$\text{MAGNIFICATION} = \frac{\text{FOCAL LENGTH}_{\text{objective}}}{\text{FOCAL LENGTH}_{\text{eyepiece}}}$$

Using this formula, if your telescope has a focal length of 2500 mm it will magnify an object 62.5 times when you use an eyepiece that has a 40 mm focal length.

There are practical maximum and minimum limits to magnification. We will discuss the reasons for those but as a rule of thumb they are

MINIMUM MAGNIFICATION	>= .15*OBJECTIVE DIAMETER (MM) or 3.5*OBJECTIVE DIAMETER (INCHES)
MAXIMUM MAGNIFICATION	<= 2.5*OBJECTIVE DIAMETER (MM) or 60*OBJECTIVE DIAMETER (INCHES)

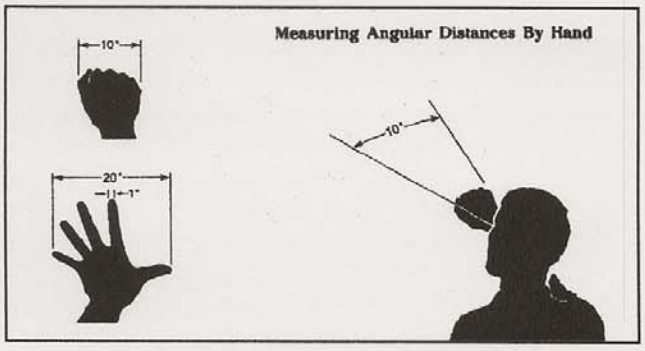
The next most frequent question asked is how much can I see? The angular field of view can be calculated by the following formula.

$$\text{ANGULAR FIELD}_{\text{telescope}} = \frac{\text{ANGULAR FIELD}_{\text{eyepiece}}}{\text{MAGNIFICATION}}$$

The 40 mm eyepiece we used in the magnification example has an angular field of 44 degrees. The angular field of the telescope would be 0.7 degrees (42 minutes of arc). Burnham's Celestial Handbook gives a diameter of the M42 nebula in Orion as 65 minutes of arc. Obviously the whole nebula could not be seen in this eyepiece (regardless of what the manufacturer showed in the ad's!).

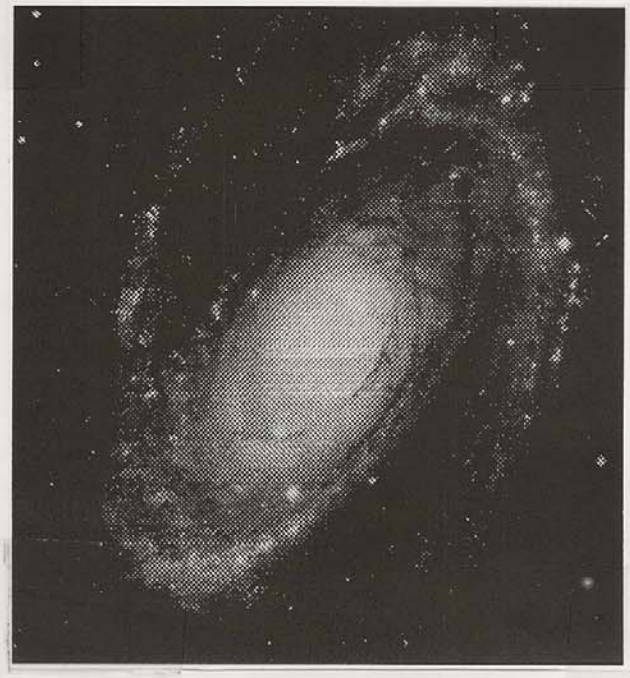
There are two good ways to get a "feel" for what these angular fields mean. One method is done outside, the other inside with a star chart.

METHOD 1 (outside) Everyone's hands and arms are generally proportional to anyone else's. If you make a fist and hold it out at arm's length the distance across your knuckles is roughly ten degrees. From the tip of your thumb to the tip of your little finger is approximately twenty degrees. At arm's length your thumb is approximately two degrees across. At arm's length the distance from the tip of your thumb to the first joint is approximately five degrees. A finger is approximately one degree thick. The full moon is approximately a half degree in diameter.



METHOD 2 (inside) Get a star chart. Make some little wire rings that have a scale diameter to the angular field that you have calculated. Alternately you can use a plastic circle template (from a drafting supply store).

Enough for this month. Next month we will discuss Exit pupils and the reasons behind minimum / maximum magnification.



"I spot a new nebula every time I trot out my 60mm refractor!!!"

Beware of misleading ads.

□

Off Axis

by Brian Gossiaux

As this is the first article I am writing for the newsletter of the newly formed Ford Amateur Astronomy Club, I would like to take this opportunity to welcome all members and any new prospective members who may have just heard about the club. This organization seems to have started with much enthusiasm and it is my sincerest hopes that it will continue at an exciting pace. The weather on the other hand would seem to have other ideas in mind. At the time of this writing, we have yet to meet as a group for an observing session. Although I

enjoy talking about astronomy and participating in related activities, there is nothing like the first hand view of celestial objects under darkened skies, especially through a telescope or pair of binoculars. I would therefor like to use this opportunity to describe to those who have never been to an observing session what they might expect at such an event and what preparations they should make in order to have their first experience an enjoyable one.

First, an observing session can take many forms. It can range from a small group of seasoned observers with telescopes tracking and photographing an object for hours to well publicized 'star parties' in which hundreds of people from across the country meet to spend a weekend viewing objects from a myriad of telescopes and discussing astronomy. The type of observing session that you will most likely first attend with this astronomy club will be somewhere in between. It will be a smaller crowd of perhaps a dozen or so people and the telescope bearing astronomers present will not be attempting any precision exercises. It will also be a casual event where you can move from telescope to telescope, viewing the celestial objects and talking to the telescope owner/ operator about the subject or other topics of astronomy. My reference to a telescope owner/operator is purely one of biased experience. It is rare that you will find a telescope alone and unsupervised, especially at a casual event where those unfamiliar with the instruments will be present. Many of these telescopes cost well over several thousand dollars and are indeed very delicate. If you ever want to know who the owner of an apparently unattended telescope is, just state out loud while reaching for the scope, 'What does this knob do?'. I will guarantee that your hand will never touch the instrument as its owner will miraculously appear in a visible state of relief.

Preparation for a scheduled star gazing event begins with the confirmation that the event will take place. Unless alternative activities are planned, star parties are generally canceled if the sky is overcast or it is raining. (Some of you may think that it should be unnecessary to even mention this fact as common sense would dictate that it would be impossible to observe anything under these conditions. However, I was surprised to learn just in fact how many people did not know that a telescope could not 'see' through clouds.) If the weather seems promising, pack the following items before leaving your home. Extra warm clothing will be required if you plan to stay late into the night. While it may have been in the mid-seventies during the day, it can get quite cool in the early morning. Inspect repellant, especially the deep woods type, is essential for certain locations. While the mosquitos are also out at night, they are not particularly interested in astronomy; only astronomers! Bring a pair of binoculars, a star chart and a red lens flashlight if you have them. They are great to use in dark locations and help in the learning of constellations. For those staying for more than a few hours, scrounge up a folding lawn chair and a blanket then pack some munchies along with your favorite beverage. There are no rules against being comfortable at these events.

Try to arrive at the observing site prior to dusk so as to easily find parking and locate the telescope setup location while there is still light. If you arrive later, remember to turn off your headlights well in advance of the observing location. This is done to preserve the observers' night vision which is attained after many minutes in near darkness. Failure to do this will make you the unwanted center of attention for all around. It is best to make the first impression a good one so please - Kill The Lights!

While observing at a telescope it is not necessary for you to actually touch the scope in any way. Bring your eye into alignment with the eyepiece and move your head towards the eyepiece until the image appears in your field of vision. If you are having difficulty seeing the object in any way, try covering your other eye with your hand while leaving the eye open, or, to prevent seeing any surrounding light, use your hand to block your peripheral vision or just ask someone to help you. Most telescope owners are only more than accommodating when it relates to someone's ability to view through their instrument. Don't be afraid to ask questions regarding the object or make comments on your impressions of what you are seeing. (Some oohs and ah's are always good. Not only does this inflate the scope owner's ego, it also helps them in justifying the price they paid for the instrument.)

Finally, these events are to be enjoyable and a learning experience for all in attendance. Don't feel awkward or put off if you don't understand an explanation given to you because it may be filled with unfamiliar terms. Most amateur observers enjoy explaining their hobby to the unfamiliar. Remember that many of the questions you may have were also asked by the amateur observers. There are a multitude of things to learn in astronomy and all in attendance can benefit from the questions and experiences of others. So until next time, may your evenings be cosmic.

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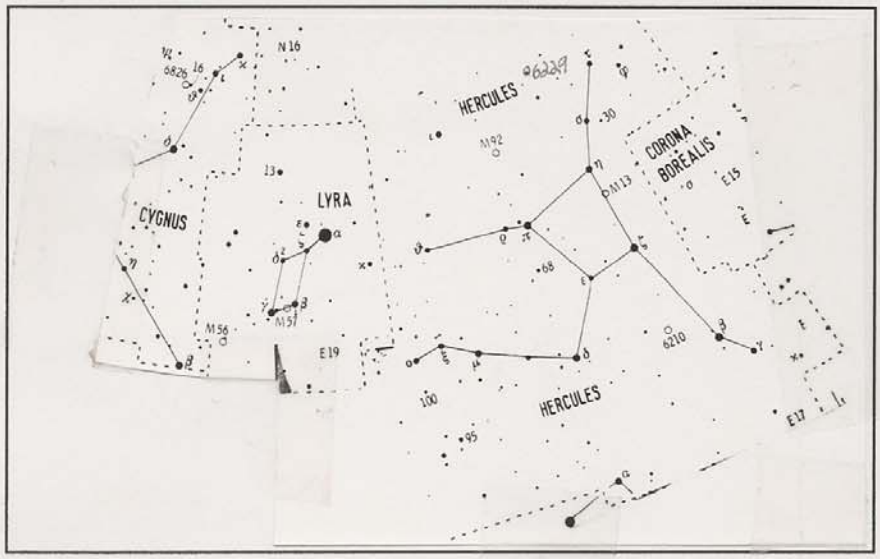
Newcomer's Corner; *Angular Distances* figure, from Backyard Astronomy, Sky Publishing. Figure of *M81*, from Astronomy, Kalmbach Publishing.

JUST LOOKING

By Brian Gossiaux



NGC	Msr.	Type	Cnst.	R.A.	DEC
6205	M13	Glob	Her	16^h42^m	+36.5°
6210		Plan	Her	16 44	+23.8
6229		Glob	Her	16 45	+47.0
6341	M92	Glob	Her	17 17	+43.1
6720	M57	Plan	Lyr	18 53.5	+33.0
6779	M56	Glob	Lyr	19 16.5	+30.2

F.	Bayer/Name	Type	R.A.	DEC
64	α Her, Rasalgethi	Binary	$17^h14.6^m$	+14.39°
44	η Her	Single	16 42.9	+38.92
95	Her	Binary	18 01.5	+21.60
10	β Lyr, Sheliak	Binary	18 50.1	+33.36
14	γ Lyr, Sulaphat	Single	18 58.9	+32.69
4,5	ε Lyr	Binary	18 44.4	+39.64
6	β Cyg, Albireo	Binary	19 30.7	+27.96

This section will introduce a particular area of the sky each issue; describing items of interest for both novice and serious observers. Most of the celestial objects detailed have been viewed from the author's backyard located within the Metro Detroit area where seeing conditions are fair at best. The objects should therefor be easily found from more ideal locations. Refer to the star charts to locate the general position of the described object. For those with knowledge of celestial coordinates, the objects' RA and DEC are provided. It is hoped that readers will try to find these objects while star gazing and respond with their impressions, difficulties, or experiences.

Our tour this month will concentrate on the constellations Hercules, the mythological Greek hero, and Lyra the lyre or harp. Now located almost directly above or near zenith, these constellations are easily found by searching for their familiar asterisms. Hercules can be located by looking for four bright stars which form a keystone shape approximately 7° by 5°. From the northern most star of the keystone, η(Eta) Her, and measuring approx. 30° due east, you will come upon one of the brightest stars in the sky, Vega, shining at 0.0^m. Within Lyra, Vega is accompanied by an asterism which is in the shape of a parallelogram and located within 5° to the southeast.

In Hercules, the spectacular globular cluster **M13** (NGC6205) lies approx. 3.5° south of η Her. Under dark skies, you can see this cluster as a faint dot using only your eyes. Low powered binoculars reveal a fuzzy patch 15'(minutes of arc) in diameter. Higher powered binoculars and small telescopes resolve the globular into thousands of pinpoints of light with some nebulosity concentrated around the center. This globular is located some 25,000 light years outside our galaxy. Another noteworthy globular in Hercules is **M92** (NGC6341). Located about 7° northeast of η Her, this globular is only half the apparent diameter of M13, but its higher density core challenges M13 in brightness. Use high powered binoculars or a medium size scope to resolve its stars. For those with larger scopes, try finding the globular cluster **NGC6229**. At about 7° to the northwest of M92, this globular is much smaller(4.5') and fainter(9.4^m) than the others. High magnification is required to resolve its stars. Returning to M13 as a reference, try locating the planetary nebula **NGC6210** at about 12° south of M13 and 3° northeast of β(Beta) Her. This blue-green nebula is difficult to resolve from the background stars in poor skies and moderate magnification was needed (120x+) to spot it. Using β Her as a reference point find at about 13° to the southeast a binary system **α(Alpha) Her** or **Rasalgethi**. At low powers, the bright yellow and apple green stars are narrowly separated and provide a stunning contrast. While a colorful binary, Rasalgethi is also a semiregular periodic variable, changing 2.2^m over a 6 year span. About 10° northeast of Rasalgethi is another bright binary **95 Her**. The pale yellow and blue system has a separation of 6.3"(seconds of arc).

From the bright star Vega in Lyra, at about 1.5° to the northeast is the famous binary system of **ε(Epsilon) Lyr** or the **Double Double**. Small scopes are able to resolve the two main stars into their component pairs displaying four stars in all. Almost halfway between the lower two stars (β and γ(Gamma)) of the Lyra asterism is one of the most popular planetary nebula, **M57** (NGC6720) or the **Ring Nebula**. This doughnut shaped object is the gas remnant of the outer shell expelled from the star located at its center. Small telescopes will define a nebulous disk while larger aperture scopes at moderate powers will show the ring in more detail. About 5° east-southeast of M57 and halfway between M57 and β Cyg is the globular cluster **M56** (NGC6779). Small and dim, this globular requires a larger scope to resolve its stars. Finally take a look a the bright star **β Cyg** or **Albireo** in the constellation Cygnus the Swan. With a wide separation, Albireo is one of the prettiest binaries in the sky with brilliant yellow-orange and blue components. It is easy to see in a pair of binoculars or small scope.

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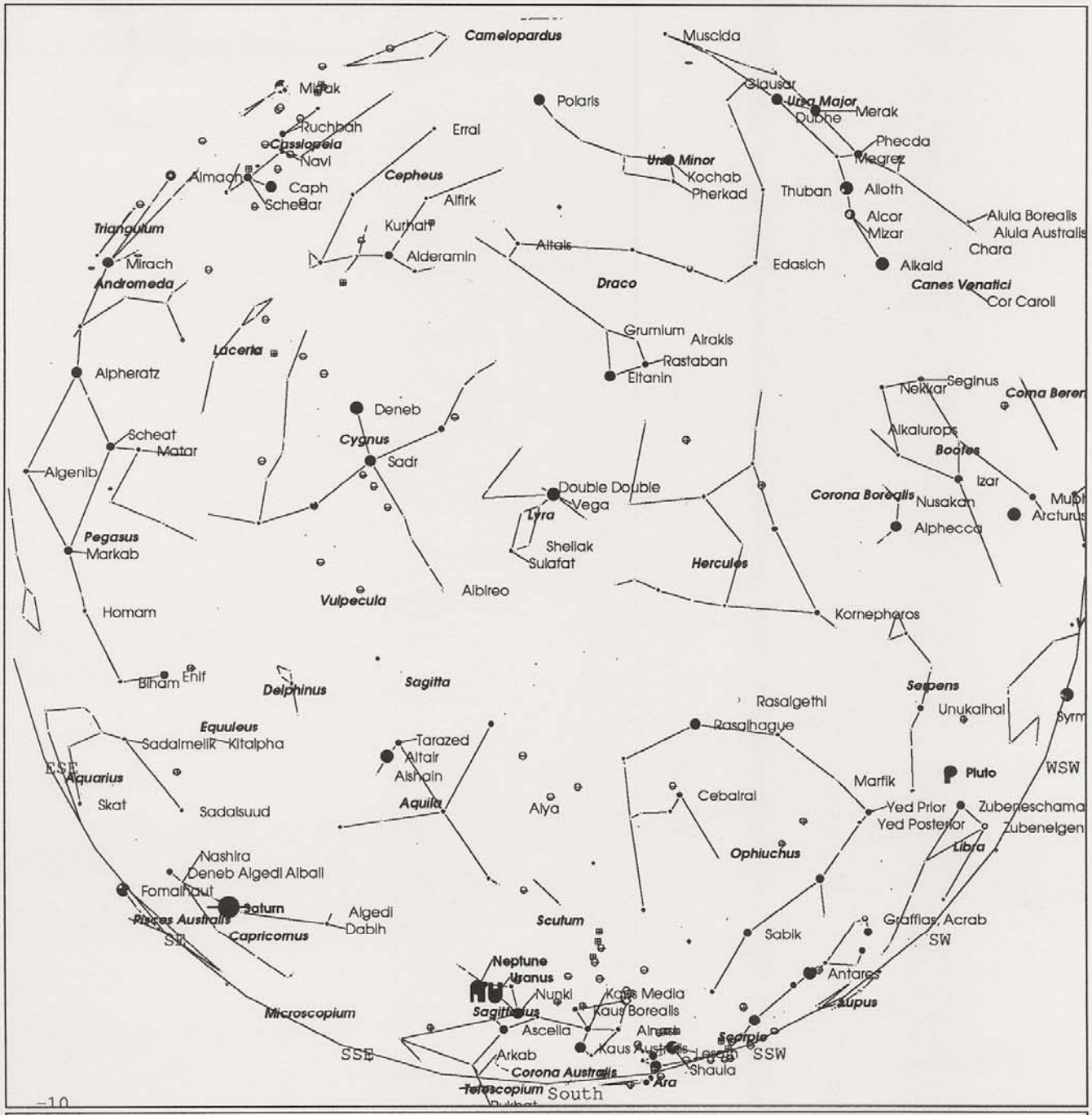
Star charts reprinted from The Observer's Sky Atlas, Karkoschka, Springer-Verlag Pub., New York. Additional coordinate data obtained from Peterson Field Guides, Stars and Planets, Menzel/Pasachoff, Houghton Mifflin, Boston.



True Spherical View, August 1992 - Ford Amateur Astronomy Club

Stars:

9.5	5.0
9.0	4.5
8.0	3.8
7.5	3.1
7.0	2.8
6.0	2.5
5.6	2.0
5.3	1.0

NGC Objects:

- Galaxy
- Open Cluster
- Globular Cluster
- Planetary Nebula
- Nebula
- Cluster+Nebulosity
- Star
- Other NGC Objects

Solar System Objects:

Sun	Uranus
Mercury	Neptune
Venus	Pluto
Mars	Moon
Jupiter	Comet
Saturn	Asteroid

Center @ RA:18h41m46s Dec:+32d22'00"
Date: 8/01/1992 Time: 23:30

STAR CHART USAGE

How many maps have you ever seen with East on the right? We all learned in elementary school that maps are made to be oriented with North at the top of a page and South at the bottom. With that orientation East was always on the right and West was on the left. The reason for that is that most maps are maps of land or sea, and are constructed with the point of view that you're out in space someplace looking down on the Earth. Sky Charts are completely different. A sky chart is printed with North at the top and South at the bottom. BUT, East is on the left and West is on the right. It is also printed from the viewpoint that you're standing on Earth and looking up at the sky. Try it.

> Orient yourself so that you are facing south with the map over your head so that South on the map corresponds to South of the earth; north of the earth is behind you and the map is pointing that way also. Without looking at the map which way is East? Look at the map. See how it corresponds to what you are seeing in the sky.

Sometimes star charts are printed in universal time (UT). UT is a 24 hour system, not the 12 hour system we normally use. To convert to eastern daylight time subtract 4 hours from the UT time. In many cases you will end up with a negative number. If so, add 24 to the negative number and subtract one day from the date.

Example: During the eclipse of the moon in June, the moon entered the penumbra at June 15, 3:27 UT.

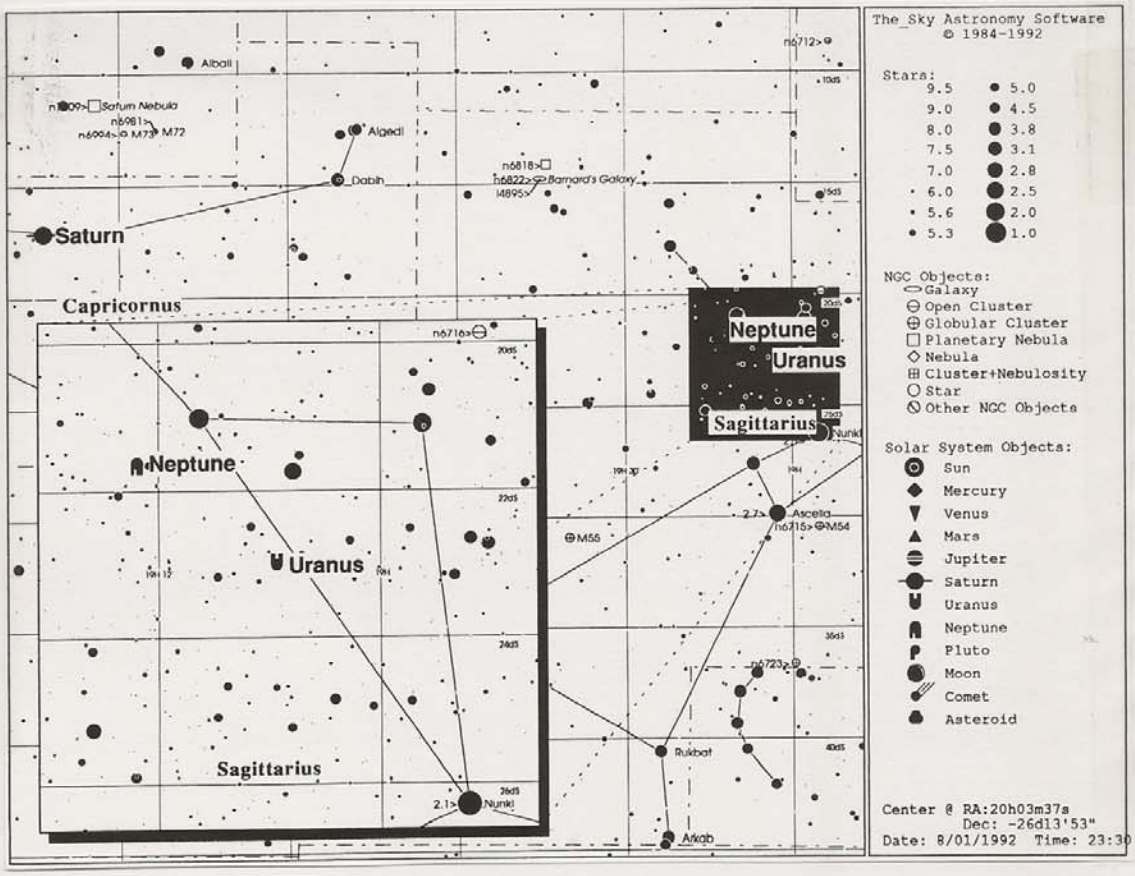
3:27 - 4 = -1:27	June 15	Subtract 4 hours. It yields a negative time.
		So add 24 hours to the negative number and subtract 1 day.
-1:27 + 24 = 23:27	June 14	or 11:27 PM June 14

An alternative method for those who don't like calculating with negative numbers is;

3:27 - 4 = -1:27	June 15	Subtract 4 hours. If it yields a negative time, add 24 hours to the original time, then subtract 4 hours and subtract 1 day.
(3:27 + 24) - 4 = 23:27	June 14	

In autumn, when we return to Eastern Standard Time, use 5 hours for the correction instead of 4.

Finding Saturn, Uranus, and Neptune



AUGUST

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 Jupiter 7° N. of moon
2	3	4	5 ◐	6 Venus 1.1° N. of Regulus in Leo	7 Saturn at opposition ★	8 ★
9 ★	10 Uranus 1.8° and Neptune .8° S of Moon	11 Mars 5° N. of Aldebaran in Taurus	12 Perseid Meteor Showers	13 ○ Saturn 5° S. of Moon	14	15
16	17	18	19	20 FAAC Meeting, 5:00pm at FMCC Rm.8001	21 ◑ Mercury greatest elong	22 Mars 1.4° S. of Moon
23 Venus 0.3° N. of Jupiter	24	25	26	27 Mercury 5° N. of Moon	28 ●	29 Venus 7° N. of Moon
30	31	★ Southeastern Michigan Universal Regional Festival of Stargazers Star Party in Clare, MI.				

REQUEST FOR ARTICLES/PICTURES

We are not *Sky & Telescope*, *Astronomy*, or the *Astronomical Society of the Pacific*. We are The Ford Amateur Astronomy Club newsletter.The newsletter staff is in need of articles (from members or astronomy magazines) and pictures (photographs, cartoons,...). Our primary interest is **to publish articles/pictures that were done/made by our members**. Articles/pictures for the newsletter should be sent to any of the newsletter staff members or brought to the monthly club meetings. Any article/picture submitted by this meeting deadline will be considered for potential publication for the following month. Local events, announcements, and classified items may be submitted up to one week prior issue and will be printed if layout space is available. All originals will be returned as soon as possible. Preferably, articles should be typed with WordPerfect 5.1 and submitted on disk. The newsletter staff members do have access to optical scanners and can convert typed articles/pictures to WordPerfect 5.1 format. Hoping to hear from you!

Your Photograph Could Be Here!

Request for Newsletter Names

If you noticed, the top of our letterhead is rather blank. True, we do have our club name up there, but the newsletter staff would like the club members to have a say in the newsletter title. To date we have the following suggestions:

- The Sky Observer
- The Astronomical Observer
- Astro News
- Skylink News or Skylink
- Sky & Scope
- Skylight to Infinity
- Nebulights
- At Zenith
- Sidereal Times
- Radiant

Some titles suggested have been known copyrighted names. Please, help your newsletter staff and do not submit known copyrighted names. We will PROFs the list of suggested newsletter names to all members one week prior to the August meeting.

Who ya gonna call?

Comments are welcome and criticism is tolerated. Please direct correspondence and any and all suggestions to improve this newsletter to the staff.

Joe Sprys	JSPRYS	52-33363
Brian Gossiaux	BGOSSIAU	39-03935
Dave Garrett	DGARRETT	52-31343

Next Meeting: August 20th

The FAAC monthly meetings are held on the third Thursday of each month at 5:00 PM at the FMCC building, lower level, Room # 8001.

SMURFS Star Party

The Southeastern Michigan Universal Regional Festival of Stargazers star party will be held August 7-9 at River Valley Campground near Clare MI. This is a casual observing party with family oriented activities.

- Separate observing hill w/5° horizon and dark sky
- Use own scope or view through some 20" & CCD's
- Elec. & water at campsite, restrooms w/hot showers
- Camp store, firewood, ice, coin laundry, Rec building
- Swimming, paddle boats, fishing, basketball, arcade
- $14/night per group. $2/vehicle. Security patrolled.

There are motels in vicinity if you do not wish to camp. Reservations for utility supplied areas must be made by July 17th. Rustic campsites available. Sponsored by the Genesee Astronomical Society. No actual scheduled events. Talk with others about astronomy or check out the 'stuff'. Friday and Saturday night observing on hill. (There is no power on the hill so battery or generator required). If interested contact Brian Gossiaux 39-03935, PROFS BGOSSIAU for more details.

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