Star Stuff

The Ford Amateur Astronomy Club Newsletter

Volume 5, Number 9 September 1996

BINOVIEWERS: ENJOYING THE SKY WITH TWO EYES

An equipment review by Todd Gross (Toddg@shore.net)

It sounds so simple, split the view into two beams, and turn your telescope into virtual binoculars! Well, in practice, it's not quite so simple. Binocular viewers (binoviewers) for telescopes come in several different styles, can throw your focus into a tizzy, and work well with certain eyepieces and not others. Throw into the mix different people's ability to "merge" two images, increased magnification due to changes in focal length on a Schmidt-Cassegrain scope, changes in focus when different people view through some units, limited clear aperture on most, barlow options, and various misconceptions, and you have one big mess to sort out!

A recent article on binoviewers in a popular Astronomy magazine barely scratched the surface of these issues. Viewing through a binoviewer is just so incredibly satisfying, that I wanted to "spread the word" about them (as I have tried several of them) and yet clear up all the misunderstandings. Meanwhile, as many folks are getting into Astrophotography, and CCD Astronomy, I have decided to, at this point, focus my attention on the cutting edge of "visual" astronomy (gee, does anybody still look through their scopes with their EYES?) and this of course includes great eyepieces (such as the Naglers), great filters (such as the Lumicon UHC/OIII) and of course, binoviewers..... sooooo here we go:

Let me start by telling you that looking through a really good binoviewer (like the Televue unit) is absolutely wonderful. Star clusters which you are accustomed to seeing with 10x70 binoculars as fuzzballs, are now "alive" and resolved, similar to the way you would view the Pleiades in a regular pair of binoculars. Planets seem to show more features, and nebula are easier to dwell on. In fact, the impression you get is exactly the same as looking through binoculars. You can't see 3-D in binoculars when looking at objects at infinity, and you can't see 3-D in binoviewers either, although it does have a false "3-D" effect just like binoculars, which is very impressive.

EYESTRAIN RELIEF:

I will get to the controversial "light sharing" issue in just a moment, but first, let me pose this question to you: If you were told for now on, to only look through ONE of your eyes when using your pair of regular binoculars, how would you feel? Certainly you would make out almost as much with one eye, but how do you feeeeeel? The answer is: just plain uncomfortable. The main advantage of a binoviewer, has nothing to do with the obvious ability for two eyes to be able to perceive more than one, it is more the lack of eyestrain than anything else that impresses me! This is the key reason why I am no longer able to use my telescopes without the binoviewer comfortably.

THE LIGHT SHARING ISSUE:

I want to dispel the myth about not being able to use binoviewers for deep sky objects right off the top here. As you will read below, certain units, such as the Televue binoviewer, are designed to be able to be used at low power, with a wide clear aperture and large prisms that enable you to use 1.25" eyepieces down to 35, 40mm without any vignetting. The most commonly quoted disadvantage of binoviewers (other than price!) is that they split the same beam of light into two beams, thus decreasing the amount of light you are seeing by at least 50%. While this is true on paper..... Just as you have an additive advantage when using binoculars over a monocular, you take away very little light gathering with a binoviewer, as your brain seems to somehow account for this split. In fact, since you are perceiving the image better with two eyes anyway, you end up almost where you started from, after splitting the beam, and then viewing with two eyes. True, I have measured between a 1/4 and 1/2 magnitude starlight loss in an 8" scope, and at first glance globulars are less resolved, indicating less light gathering, but the amount of the loss seems far less than 50% in practice. Perhaps closer to 25%. I have written about this in detail before on the newsgroup sci.astro.amateur on the Internet. Try this experiment:

In a somewhat darkened room, look at a piece of white paper while covering one eye with a piece of cardboard. Take away the cardboard and now view it with two eyes. Do this several times. Did you notice the shade of white seems to "brighten" a bit as you use both eyes? Do the same now with a regular pair of binoculars (this is additive unlike binoviewers, which subtract light, but it will show you the point) View a starfield with one eye, then two. You can make out MORE stars with two eyes! A good pair of 70mm binoculars will give you a better view overall, light gathering wise, than a low power 70mm telescope of the same star field. And then of course, two eyes can perceive more detail, which also helps to off-set the light loss.

Anyway, the bottom line is that you will have a more enjoyable view, but *slightly* dimmer using a binoviewer. Thus on my 10" scope, I notice that deep sky objects are not quite as bright as without the binoviewer, but certainly brighter than my old 8" scope without the binoviewer. I have effectively lost about an inch of aperture light wise, although this is purely subjective. I have noticed the same thing with a 4" refractor, I am seeing more than a 3" scope, but not as much deep sky brightness as with the 4" scope without the viewer attached.

KINDS OF BINOVIEWERS:

There are three basic kinds of binoviewers all with different "quirks":

1. Microscope-head style binoviewers (Celestron-Orion type):
Adapted from Microscope heads, small prisms with limited clear aperture, 45 degree angle rather than straight through or 90 degree angle. Most will plug right into a 1.25" star diagonal, some like Orion's screw right onto the back of a Schmidt - Cassegrain scope. You can adapt Celestron's binoviewer to fit onto a schmidt-cassegrain like that using their standard visual back.

The disadvantage of this binoviewer is that you cannot easily use eyepieces much over 18 or 20mm before you will see significant vignetting. The general light throughput may not be quite as good, and the 45 degree angle can be somewhat distracting. You cannot easily use these at all on reflectors. The other major disadvantage is the problem with focus shift as you adjust the two eyepieces (push-pull) for the different distances required for different sets of eyes. In fact, even with just ONE user, you sometimes have to change this interpupilary distance to accommodate different sets of eyepieces, and here again you will need to refocus every step of the way as you adjust the width between the eyepieces.

The advantage of this style is the price, they tend to run around $500-$600 or so new, and a bit less second hand. (Orion's list is $649) They come in and out of availability and when I checked several months ago, the Celestron unit was not available, the Orion unit was. The other advantage is that on the Moon and planets at high power, you seem to be able to get as good performance, or just about anyway, as the more expensive units. Like all binoviewers, it takes a lot of focus travel to be able to accommodate them, see further down for details.

(continued on page 6)

NASA NEWS: RELEASE 96-172

from NASA HQ Public Affairs Office (NASANews@luna.osf.hq.nasa.gov)

NEW OBJECT MOVES LIKE A COMET BUT LOOKS LIKE AN ASTEROID

Scientists at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, have discovered a unique and baffling object that may be either an unusual asteroid or an extinct comet. The object, designated 1996 PW, was detected by astronomers using data from the Near-Earth Asteroid Tracking (NEAT) program that employs a JPL-developed camera mounted on a U.S. Air Force telescope atop Mt. Haleakala on Maui, Hawaii.

Puzzled scientists are still striving to understand exactly what object 1996 PW is and where it came from. "This is a misfit in the grand scheme of things," according to Eleanor Helin, a planetary astronomer at JPL and the NEAT Principal Investigator. At first look, the object, which has a diameter of about five to ten miles, appears to be an asteroid, a chunk of rock that orbits the Sun, Helin said. However, unlike most typical asteroids, which inhabit orbits no further out than the planet Jupiter, 1996 PW has a highly elongated, comet-like orbit that stretches into the vast outer reaches of the Solar System far beyond Neptune and Pluto. Its orbit has a period currently estimated at 5,000 years, according to JPL research scientist Dr. Michael Keesey.

Although 1996 PW is in an orbit resembling that of a long-period comet, no gaseous emissions or other normally expected comet-like activity such as a dust coma have been observed, even during its current closest approach to the Sun, Helin said. Helin and other astronomers studying the object believe that this raises the possibility that it was once an active comet, but is now inert, either because its ice and gases have been stripped away or because it is covered and insulated by a crust of non-volatile materials.

This puzzling object was discovered through a combination of high-tech telescopes, sophisticated computer software and human detective work. The NEAT program at Haleakala, carried out under the direction of Helin and task manager Dr. Steven Pravdo, also of JPL, is the world's first fully autonomous near-Earth object imaging system. It consists of a computer controller and a highly sensitive CCD camera sensor mounted on a telescope. The system is designed to discover and track asteroids and comets as they approach Earth from deep space. The NEAT system is mounted on the U.S. Air Force's Ground-Based Electro-Optical Deep Space Surveillance System's one-meter telescope at the Maui facility.

Observational data from NEAT on the night of August 9 recorded the appearance of 1996 PW, along with similar observations of 150 other more typical asteroids in the belt between Mars and Jupiter. More observations were made three nights later. While computer-processing the data at the Smithsonian Astrophysical Observatory in Cambridge, MA, Gareth Williams noticed the object had an unusual apparent motion. Due to the current position in space of 1996 PW, scientists will have an excellent window of opportunity to study the object more thoroughly over the next six months.

The NEAT camera was installed at the Air Force's Maui facility in December 1995 to conduct a systematic search for asteroids and comets that come near Earth. With its short exposure time and fast electronics, NEAT is able to achieve wide-sky coverage. NEAT was built and is managed by JPL for NASA's Office of Space Science, Washington, DC. ☆

COMET COMMENTS

from Don Machholz (DonM353259@aol.com)

Comet NEAT, discovered March 16 by a CCD camera attached to a 39-inch telescope atop Mt. Haleakala in Hawaii, has brightened to a magnitude that is observable in amateur's scopes. NEAT was designed to detect earth (orbit) crossing asteroids and comets. It is one of several new comet and asteroid discovery systems currently being developed.

Meanwhile, Comet Brewington remains in our evening western sky while Periodic Comet Kopff fades in our evening southern sky. Comet Hale-Bopp, still some 250 million miles away from us, is visible to many astronomers without optical aid. A telescope sho ws a coma that is about a quarter-degree in size and a tail nearly a half-degree long. The comet is slowly moving northward; it remains within eight degrees of the equator until early 1997.

[NOTE: see the last page of this newsletter for comet finder charts] ☆

STAR STUFF
Monthly Publication of the Ford Amateur Astronomy Club

Star Stuff Newsletter
P.O. Box 7527
Dearborn, Michigan 48121-7527

1996 CLUB OFFICERS

President:	Bob MacFarland	33-79750
Vice President:	Patti Forton	84-51740
Secretary:	Harry Kindt	313-835-1831
Treasurer:	Kevan Granat	24-87628

GENERAL MEETINGS

The Ford Amateur Astronomy Club holds regular general meetings open to the public on the fourth Thursday of the month at 5:00 PM. Meetings are held at the Ford Motor Credit Company (FMCC) building, Northeast of the World Headquarters build in Dearborn, in conference room 1491, lower floor, East side of the building.

OBSERVING SITE

The Ford Amateur Astronomy Club has an established observing site, by permit, at the Spring Mill Pond area of the Island Lake Recreational Area in Brighton, Michigan located near the intersections of I-96 and US-23. Members are responsible for opening and closing the gate after the parks 10:00pm closing time. The combination for the lock should be available on our hotline number. Always close the gate behind you after 10:00pm whether entering or leaving the park.

OBSERVING HOTLINE NUMBER - (313) 39-05456

On Friday and Saturday nights, or nights before holidays, you can call the hotline number up to 2 hours before sunset to find out if we will be observing that night. Assume that any clear Friday or Saturday night is a candidate observing night unless something else is going on or none of the club officers are able to make it.

WWW PAGE

Computers inside the Ford network or on the Internet can access the F.A.A.C. web page at one of the following addresses:

Ford Intranet:	http://av3168.pd8.ford.com:8080/faac/faac.html
Internet:	http://www.id.net/~erik/faac.html

MEMBERSHIP AND DUES

Membership to the Ford Amateur Astronomy Club is open to both Ford and Non-Ford Motor Company employees. The general public is also welcome to join. The dues structure is as follows:

Annual Individual/Family	$20.00
Lifetime Membership	$100.00

Membership benefits include a subscription to the Star Stuff newsletter, discounts on subscriptions to Astronomy and/or Sky & Telescope magazine(s), after hour use of the observing site at Island Lake, and discounts at selected area astronomical equipment retailers.

NEWSLETTER STAFF

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NEWSLETTER SUBSCRIPTION

A yearly subscription at a rate of $12.00 is available to those who are not members of the Ford Amateur Astronomy Club. Subscriptions are free to other astronomy clubs wishing to participate in a newsletter exchange.

SEPTEMBER 1996

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22 Autumnal equinox	23	24	25	26 FAAC Meeting	27	28
29	30					

Sep 03 Asteroid Thyra at Opposition
Sep 04 Last Quarter Moon (2:37 pm)
Sep 04 Venus Passes 3 Degrees South of Mars
Sep 05 Possible Occultation of 58982 (6.4 Magnitude Star)
Sep 08 Asteroid 476 Hedwig Occults SAO 108482 (8.7 Magnitude Star)
Sep 09 Comet Wirtanen Closest Approach to Earth (1.4917 AU)
Sep 09 Asteroid 1994 PC Near-Earth Flyby (0.1706 AU)
Sep 10 Possible Occultation of SAO 80009 (9.1 Magnitude Star)
Sep 11 Asteroid 66 Maja Occults PPM 271079 (9.3 Magnitude Star)
Sep 12 New Moon (6:37 pm)
Sep 14 Asteroid 1996 EN Near-Earth Flyby (0.1466 AU)
Sep 16 Asteroid 1989 RS1 Near-Earth Flyby (0.1937 AU)
Sep 20 Possible Occultation of 64658 (9.0 Magnitude Star)
Sep 20 First Quarter Moon (6:54 am)
Sep 21 Comet IRAS Closest Approach to Earth (0.9715 AU)
Sep 22 Autumnal Equinox (1:29 pm)
Sep 26 Saturn at Opposition
Sep 26 Full Moon (10:21 pm)
Sep 26 Lunar Eclipse
Sep 27 Jupiter Occults SAO 180954
Sep 29 Possible Occultation of 67580 (8.7 Magnitude Star)

MEETING ANNOUNCEMENT

The Ford Amateur Astronomy Club (FAAC) holds regular general meetings on the fourth Thursday of each month, except November and December. Our next meeting will be **Thursday, September 26, at 5:00 pm.** The program for the meeting has not been determined at this time.

The FAAC meets in the Ford Motor Credit Company (FMCC) building, conference room 1491, located on the lower east side of the building. FMCC is the low building immediately northeast of (but not attached to) Ford World Headquarters in Dearborn. The FMCC building is secured with a card entry system. The easiest way to enter the building for meetings is to park in the northeast lot (Employee Lot 7) and enter through the lower northeast or lower east doors. At 5:00 pm no one seems to have trouble getting in because many people are leaving around that time. At the east door you can dial 0911 on the security phone and say you are here to attend a Ford club meeting, and security will admit you. You may find your way into the building any way you see fit, but direction signs will only be posted at lower northeast and lower east doors. ☆

MEETING MINUTES 8/22/96

by Don Klaser

The meeting was called to order at 5:10 PM by club president Bob MacFarland. There were 21 members and guests present. Bob announced that Harry Kindt, FAAC club secretary, is having surgery at Grace hospital - our thoughts and prayers are with Harry and Ada.

Bob made several general announcements, and Kevan Granat gave the treasures report - our balance is currently about $900. George Korody announced that he has not set a date for the telescope making sessions at this time.

Don Klaser gave a report on using Abrams sky Chart as a give away at our September 7th Star Party. Ray Fowler announced that a couple of the companies he contacted have donated items for drawing prizes. Bob MacFarland stated that Howard Penn at City Camera is also obtaining a number of items to be used as additional prizes. Bob also displayed this year's Star Party t-shirt and Patti Forton made several advanced sales ($8 each, black and red on white or silver on blue).

The new FAAC banner was on display along the side wall of the meeting room. The idea of having all-year club outer apparel (i.e., jackets, hooded sweatshirts, etc.) was discussed and approved by the general membership. The idea of having alternate meeting times (7:30?) was also discussed, but no decision was made.

During the pizza break, those present introduced themselves and briefly discussed their viewing activities since our last meeting. Bob MacFarland then went over more details for our upcoming Star Party. Paul Mrozek gave a demo of the 8" pink glow bracelets that will be sale at the party for $2 each. Bob passed out an equipment survey and a fun group discussion project, which will be included in a future newsletter edition.

The meeting was adjourned around 6:45 PM. ☆

1996 FAAC CALENDAR OF EVENTS

September 7	**4th Annual F.A.A.C. Star Party** Island Lake Recreation Area, Brighton, Michigan
September 13-15	Bad Axe Campout & Star Party
September 13-15	Fall Campout at the NCO wilderness location west of Cadillac BYO everything. Rustic Camping. Contact Doug Bock @ 810-750-0273
September 26	Lunar Eclipse (enters penumbra 8:12pm, mid eclipse - 10:54pm edt)
September 26	F.A.A.C. General Membership Meeting
October 19	F.A.A.C. Mini-Star Party Island Lake Recreation Area, Brighton, Michigan
October 24	F.A.A.C. General Membership Meeting
December 5	F.A.A.C. General Membership Meeting ☆

SEPTEMBER SPACE HISTORY

The following September events come from the 7/31/96 edition of "Space Calendar." This calendar is compiled and maintained by Ron Baalke (baalke@kelvin.jpl.nasa.gov).

Sep 03 20th Anniversary (1976), Viking 2 Mars Landing
Sep 12 30th Anniversary (1966), Gemini 11 Launch
Sep 13 35th Anniversary (1961), Mercury Atlas 4 Launch (Unmanned Mercury)
Sep 15 5th Anniversary (1991), UARS Deployment from Space Shuttle Discovery during STS-48
Sep 23 150th Anniversary (1846), J. Galle's Discovery of Neptune
Sep 28 25th Anniversary (1971), Luna 19 Launch (Soviet Moon Orbiter) ☆

SEPTEMBER 1996 SPACE EVENTS

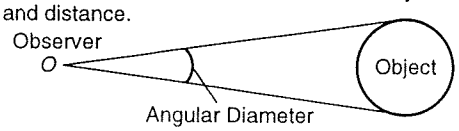
The following September 1996 events come from the 7/31/96 edition of "Space Calendar." This calendar is compiled and maintained by Ron Baalke (baalke@kelvin.jpl.nasa.gov). Note that launch dates are subject to change.

Sep 04 Galileo, Orbital Trim Maneuver #10 (OTM-10)
Sep 05 Progress M-33 Launch (Russia)
Sep 06 Galileo, 2nd Ganymede Flyby (Orbit 2)
Sep 09 Galileo, Orbital Trim Maneuver #11 (OTM-11)
Sep 10 Echostar 2 Ariane 4 Launch
Sep 12 Launch, Atlantis, 4th Mir Docking
Sep 12 GPS II R-1 Delta Launch
Sep 18 Loral DBS Atlas Launch
Sep 24 Minisat-1 Pegasus XL Launch ☆

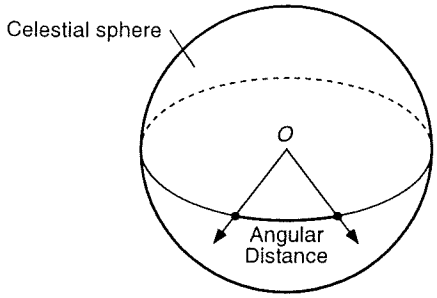
ASTRO LINGO

by Paul Mrozek (pmrozek, pmrozek@ford.com)

Angular Diameter: The apparent diameter of an object in angular measure (i.e., radians, degrees, arc minutes, ...) as determined by the combination of true diameter and distance.



Angular Distance: The angle between imaginary lines from an observer to two points on the celestial sphere (the sky).



Binary Star: A pair of stars in orbit around each other under their mutual gravitational attraction. Also know as double stars, there are several types of binary systems:

Astrometric Binary - pairs in which one star is very faint, and its presence can only be revealed by the orbital motion of its brighter companion.

Visual Binary - pairs in which the separation is great enough for the two stars to be distinguished when viewed through a telescope.

Spectroscopic Binary - pairs which are too close to be seen as separate stars. Instead, the Doppler effect changes their combined spectrum.

Polarization Binary - pairs which illuminate the gas and dust in the space between them. Their changing position then effects the way the scattered light is polarized.

Eclipsing Binary - pairs whose orbital plane is nearly in the line of sight, so that one star passes in front of the other, causing the total brightness to vary on a regular cycle.

Optical Double: Two stars that, by chance, appear close to each other in the sky, but are not physically associated with each other.

Multiple Stars: A group of three or more stars bound together by mutual gravitational attraction. Normally, two of the components form a close binary, with a third star moving in a larger orbit.

REFERENCES:

Oxford Illustrated Encyclopedia of the Universe by Archie Roy.
The Penguin Dictionary of Astronomy by Jacqueline Mitton.

ANGULAR WIDTH OF FIST

by Robert Swarts (ramshorn@ix.netcom.com)

The following article was reprinted from ASTRONET, Issue 36, April 15, 1996. For more information, please contact resource@resource-intl.com.

You can quickly and easily compute the width of your own fist, or any other object. The angular extent of the object is:

angle = arctan ((width of object)/(distance from eye to object))

For angles up to 15-20 degrees, this is well approximated by:

angle in degrees=57.25*(width of object)/(distance from object to eye)

Measurement units for the width and distance can be anything as long as they are the same for both. The 57.25 simply converts from radians to degrees. My fist measures about 9 degrees, or 10 degrees including my thumb. If you want more precision, make up a sighting stick consisting of a two or three foot bar with a shorter bar crossing it at the end. Place the other end near your eye. The angle subtended by the short bar at the other end is:

angle=2*arctan (.5*(length of short stick)/(length of long stick))

The factors of two and .5 are used because it is assumed the short stick will be attached at its midpoint to the long stick. The bar (or your fist) can be used either horizontally or vertically.

FERA NEWS - FERA NEWS - FERA NEWS - FERA NEWS - FERA NEWS

Relive the Days of Knights!

The Ford Amateur Astronomy Club is selling Michigan Renaissance Festival tickets in association with FERA. The Renaissance Festival is a very popular event and there shouldn't be any trouble in selling the 80 tickets we took. As a club within the Ford Employees Recreation Association, we are required to participate in one FERA sales event each year. It is because of FERA that we can use Ford facilities, i.e.. meeting rooms, profs, copy machines, etc..... Let's show our support by doing our best to sell these tickets!! Contact Patti Forton (313-845-1740 PFORTON) if you would like to sell or purchase tickets.

ADULTS $10.50 ($12.95 at the gate)

CHILDREN $4.50 ($5.95 at the gate)

August 17-18, 24-25, 31
September 1-2, 7-8, 14-15, 21-22, 28-29, 1996
10:00 am to 7:00 pm -- Rain or Shine

Michigan Renaissance Festival

BEWARE! SERIOUS PENALTIES!

by Tony Cecce (CECCE_AJ@corning.com)

The following article was reprinted from ASTRONET, Issue 40, June 1, 1996. For more information, please contact resource@resource-intl.com.

(the following originally appeared in August, 1991 issue of Astronomy - by Dave Clyburn)

Police those Star Parties!

The star parties staged by our astronomy club were becoming unruly and chaotic. Perhaps you've noticed the same trend in your own club observing sessions. Do your typical group nights consist of telescopes careening rapidly from one bright object to another a minute on M13, another minute for the Andromeda Galaxy, a brief glimpse at the Ring Nebula? Observing at excessive speeds is a common infraction. Another is the stunting that some observers revel in. They claim to see targets like Palomar 4, a magnitude 14 globular cluster, in a 4-inch telescope and then have the nerve to boast for all to hear, "But it's real easy to see!"

Another insidious practice that is becoming more widespread occurs when lazy observers rush over to see an object that a more disciplined amateur has found after spending half the night star hopping to its obscure location. Such thievery of photons is unconscionable. What's more, these parasitic observers then glance through the victim's finderscope or Telrad finder so they can sight the location of the target and quickly sweep up the same object in their telescopes. They then add insult to injury by claiming to have found the object themselves. Such claims are illegitimate in our minds. Guilty parties should be stripped of their Messier badges.

The disorderly conduct was becoming too much to handle. The trend had to stop. To stem the tide of unruly observing, our club formed a much feared but effective Observing Police. Their job: bring discipline and good observing skills to the uncontrolled nighttime mob. It was a tough job, but someone had to do it. To enforce order, our Observing Police regularly patrol local star parties. Armed with red flashlights, they inspect observers and hand out citations for any observing they feel does not conform to the high standards we are attempting to instill. Citations that the Police have recently issued include:

OBSERVING TOO QUICKLY
A speed of 5 objects per hour is in force at our observing site. All objects must be sketched and sketches must be available for inspection during random spot checks. PENALTY: Confiscation of eyepieces.

OPERATING A TELESCOPE IN AN UNSAFE MANNER
Includes bonking people on the head with the tube of a long refractor or wiring a telescope tube to a high voltage generator to create a giant "dew zapper" effect. PENALTY: Observing with said telescope.

STUNTING
Such as claiming to see invisible objects. PENALTY: Thirty days Solar observing. A further crime is claiming to actually see detail in invisible objects. PENALTY: Immediate promotion to club president.

RECKLESS OBSERVING
You're guilty if you think you see objects not actually being viewed. (such as exclaiming that "the Cocoon Nebula is really bright!" when the telescope is pointed at the Andromeda Galaxy). Also includes viewing objects with inappropriate filters and magnifications (such as scanning the Pleiades at 900X with an O III filter). PENALTY: One night in the Coma Virgo galaxy cluster with a 60 mm telescope and an old Norton's Star Atlas as your only guide.

IMPAIRED OBSERVING
On one occasion an observer was caught trying to find an apparently interesting object called NGP. "But it's marked right here on my atlas!"he protested, not realizing the object was, in fact, the North Galactic Pole. Carefully searching for deep sky objects with a sub-aperature planetary mask in place over a Dobsonian is also subject to ticketing. TYPICAL PENALTY: Tracking down all the Messier objects in numerical order.

IMPERSONATING AN OBSERVER
Infractions include arriving at an observing site in July with a 20-inch telescope with the intention of observing the Orion Nebula. Or owning a 20-inch telescope with digital setting circles and never looking at anything except the brightest Messier objects. PENALTY: A mandatory one night Messier Marathon WITHOUT the digital circles.

Our Observing Police have also found a lucrative method of raising money for Club activities - mostly to purchase Nagler eyepieces for all the club executives. We now require that all observers buy observing licenses. We set the highest fees for the brightest objects. This discourages people from partaking in the tiresome and unproductive practice of observing the same bright objects over and over again. Our license fee structure is as follows:

Moon	$1000.00
Planet	$500.00
Galaxy	$20.00
Planetary Nebula	$10.00
Orion Nebula	$1000.00
All other diffuse nebulae	$2.50
M13	$1000.00
All other globulars	$1.50
Open clusters and double stars	FREE
Comets and Meteors	3 for $1.00

In addition, novice observers must obtain a learner's permit, at a cost of $50.00.

By enforcing these regulations we have found that our star parties are now much easier to manage. Gone is the boisterous, uncontrolled enthusiasm of the past. The chaos has been replaced by a quiet, disci plined observing that is a credit to amateur astronomy. Perhaps your club will follow our lead. (Club affiliation of the Author withheld) ☆

AMATEUR ASTRONOMY

by Kevan Granat, FAAC

Amateur Astronomy: Observations on the Hobby

For some time, I've had good intentions about writing an article for the *Star Stuff* newsletter. As most good intentions, these remained unfulfilled for some reason or another. But now I've changed my thinking. I used to think i had no qualifications to write about astronomy because I'd really just begun about a year ago. Well, maybe it's true that I have no qualifications to write about astronomy - but *amateur* astronomy... now that's different. I've got all of the qualifications of an *amateur*. So with that in mind, I'm committing to writing a series of observations on the hobby called amateur astronomy. I really encourage some of you fellow FAAC members to do the same.

I officially got started in August of 1995 when I purchased a used C8 - a Celestron 8-inch Schmidt-Cassegrian. I started viewing any bright stars that were easy to point at and the moon. Now the moon is purely fantastic. If it can't inspire some awe in a beginner, then I can't think of what will. Stars however, pretty much look like stars, most of them weren't too exciting. I got my first look at a deep sky object when a fellow FAAC member helped me trap M13 with my scope (Thanks Gery). I think it took about an hour. After finding a couple more deep sky objects, I was surprised to find that in some ways I was getting disappointed. Disappointed!? It seems strange now, but I think all of the incredible, multi-color, glossy images found in magazines had got my expectations a bit out of kilter. Through my new scope, there was no color to speak of and you had to really concentrate to see a lot of detail in certain objects. Sometimes it's hard work!

Well, if you're experiencing a similar disappointment, I'm happy to say it's short-lived. One of the astronomy books I read described astronomy as a mainly "cerebral" activity, and to some extent this is true. Some of the items you observe may seem dim and not real pleasing on the surface, but when you read and think about *what* you're observing, they take on a whole new appearance. Remember, the beautiful images you see in magazines come from 30 minute exposures or maybe even the Hubble telescope - somewhat high expectations! But the image you see, in the telescope you pointed at some fuzzily invisible spot, may be the remnants of a supernova, or a galaxy of a hundred billion suns. Good stuff. Definitely food for thought.

[Editors Note: The Star Stuff newsletter is always in need of articles by FAAC members. Please contact Paul Mrozek, or any one of the club officers, if you would like to share your astronomy related interests, opinions, observing reports, etc. See the shaded area on page 2 for info on how to reach us.] ☆

(continued from page 1)

2. True binocular style binoviewers:
The Astrophysics/Zeiss binoviewer, the ATM binoviewer, and the Televue Bino Vue are the only ones that I know of that fit this style. Unfortunately (but fortunately for Televue) the Astrophysics is not currently available, and the ATM has basically become extinct as Televue has apparently taken over the designing of this unit (and done a great job). This means that the ONLY AVAILABLE HIGH QUALITY binoviewer, new, is the Televue unit! Now that's what I call "cornering" the market. This style of binoviewer is very expensive.. running almost $1000.00 (includes a barlow lens with the Televue unit) I am not sure what goes into the production of these binoviewers, but it does seem extraordinarily expensive. However, the performance improvement is quite substantial...and worth the price.

The advantages of this style of binoviewer is firstly, that they are built just like binoculars. That is, you can adjust for the distance between your eyes in the same exact fashion, with no change in focus, as you adjust. The less expensive pairs are more of a push-in/pull-out proposition, which throw off your focus as you adjust for eye distance. The second BIG advantage is that this style of binoviewer has full size prisms which fully illuminate 1.25" eyepieces. No vignetting is noticeable even at low power, or with 20-40mm focal length eyepieces. The light throughput also seems to be higher on these units, and makes them totally suitable for deep sky observing.

The next advantage is that these units are NOT built in a 45 degree style, you can use these binoviewers either straight through, or utilizing a star diagonal. (The A/P unit has a built in diagonal, the Televue unit requires a 1.25" (or 2") star diagonal). This allows you to use this type of binoviewer in a Newtonian reflector, which is difficult with a unit built at a 45 deg. angle. However, coming to focus on a Newtonian will require barlowing (see below, there is an exception) Also.. viewing straight-through on the Televue unit, and even in it's "diagonal" position on the Astrophysics unit, it is possible on many refractors to actually reach focus without introducing a barlow lens before this type of binoviewer. This makes it possible to enjoy truly low power viewing. (more on this later, reaching focus some scopes is a snap, others quite difficult)

3. The Russian alternative, right in between:
There is a unit on the market (name?) available from Earth and Sky Adventure Products that falls right in between the first two alternatives. Featuring a binocular style that will not lose focus as you adjust for the width between your eyes, they appear to have somewhat more clear aperture than the cheaper units, but less than the more expensive ones. These are 45-degree style binoviewers, and other than their lack of inter-ocular focus problems, are more similar to the Celestron type binoviewers than the Televue type. Planetary and lunar images were as sharp (but not as bright) when tested head to head with Televue's binoviewer. In it's most usual position, you should be aware that the unit appeared "upside down", which did not affect the view, but just took a bit of getting used to.

"MERGING" THE IMAGES:

The way binoculars, and binoviewers work, is to collimate each side perfectly with each other, so that your eyes can "merge" the two images into one. Some people, it turns out, do this more readily than others. High power eyepieces make it more difficult to merge images, than low power ones, as explained later.

COMING TO FOCUS WITH YOUR BINOVIEWER, and BARLOWING:

Perhaps the greatest inconvenience in using a binoviewer, is that it requires that you rack your focus way in to account for the extra travel path of the light to reach your eyepieces. In fact, on most scopes, you simply CANNOT reach focus without using a barlow ahead of the binoviewer, to counteract this. That doesn't sound like a big problem at first, but because the distance is also greater between that barlow, and the eyepieces after travelling through the binoviewer itself, the barlowing is "magnified" to somewhere between 3 and 4 times, on a regular 2X barlow! For some scopes, this will strap you to such high power, that wide field and low-medium power viewing is impossible. There are several exceptions, and tricks to help dodge this issue:

1. On many refractors, the (no-longer-available) Astrophysics/Zeiss binoviewer will come to focus w/o a barlow. I am not sure about reflectors. There seems to be less focus travel required for this unit, perhaps because of the special color-correcting lens that comes with it.
2. On many refractors (but probably not many reflectors) the Televue binoviewer will come to focus w/o a barlow if used "straight through", and not in a star diagonal. Inconvenient, but it works.
3. Reflectors have, and can be custom made or re-configured to come to focus with a binoviewer
4. Cadiatropic scopes such as Schmidt Cassegrain that come to focus by moving the primary mirror will likely have no problem coming to focus with a binoviewer... in most configurations.
5. You can use a lower power barlow to try to minimize the magnification. A 1.8X Televue or a 1.5X 2" Vernonscope Barlow (called 2X barlow, but that is when it is used ahead of a star diagonal, in reality it is 1.5X) will help.

Even with all of the above, finding the exact focus position that works with your scope mated to your binoviewer with, or without a barlow can be a bit tricky. With that in mind, the Televue binoviewer and it's accompanying barlow have been designed to be almost exactly parfocal with your normal focus position, but at the expense of approximately 3.8X magnification.

The SCHMIDT-CASSEGRAIN ENIGMA:

The most versatile scopes to use a binoviewer with are the standard Schmidt-Cassegrains such as those widely available from Celestron or Meade. The reason is that the primary mirror is shifted forward and back to reach focus, allowing a very wide latitude of focus adjustment, which is exactly what these lengthy units require.

However, whenever I looked through my LX200, S-C scope with a binoviewer, I could swear that I was much more magnified than when viewing with a regular star diagonal and the same eyepiece. I couldn't, at first, figure out why. It turned out that indeed the Astrophysics unit I was using included a special correcting lens which boosted magnification by 20%. However, I still noticed a 15-20% increase in magnification on my Televue binoviewer when using the LX200, but NOT while using a refractor. The reason, of course, turned out to be the change in focus position. It turns out that whenever you re-focus most schmidt - cassegrain scopes, you are moving the main mirror, and because of the shape of the secondary mirror, you are changing your focal length a little bit. However, the primary has to be moved in so much to compensate for the length of the binoviewer, that on a 10" f/6.3 scope, I was seeing 15-20% growth in apparent focal length. (This supposedly does throw a bit of spherical aberration into the mix as well, as S-C scopes are designed so that only ONE focus position holds the minimum spherical aberration for the scope, but this is unraveling a whole different topic, and I could not detect a difference in image quality)

The bottom line, is that with a C8 as an example, running at f/10, you may very well find it harder to reach low enough power for many objects even without barlowing. Why? Well first off, you are limited to 1.25" eyepieces, so a 32mm 50 degree field eyepiece is about as wide as you can get. With your now increased focal length, the eyepiece is going to act more like 27mm or so. (comparing it to without the binoviewer.) The problem gets even worse at 10" f/10, and 12" f/10, etc, which already are limited in their wide fields without 2" eyepieces. Making the problem even worse, is that you cannot compensate this by throwing on a f/6.3 reducer-corrector, as that unit requires you to bring in your mirror substantially to reach focus, and therefore you cannot reach focus using a binoviewer PLUS a reducer corrector.

I guess, what I am leading up to, is that it is best to go with an f/6.3 scope if possible if you are planning to use the binoviewer for medium-low power, and wide field viewing. You may find yourself kind of boxed in at high power with an f/10 scope.

CHOOSING EYEPIECES FOR YOUR BINOVIEWER:

Selecting eyepieces for your binoviewer is a tricky proposition. The first problem you will immediately stumble into is the price! You have to match eyepieces EXACTLY, and double up on your supply. You can use your barlow to reduce the number of eyepieces, but the doubles can run into some serious money.

The second problem, I have run into several times, and you will not realize it until it is too late... eyepiece designs change with time, and you have to match the exact STYLE of that eyepiece! For instance... both the Meade Superwides and the Televue Naglers have undergone design changes in the last few years..in fact, the Naglers have undergone 3 or 4 design changes, the latest of which brings the top lens flush with the top of the eyepiece. You MUST match exact designs, so buying eyepieces second hand becomes very risky when putting pairs together.

The third problem is also obvious.. size and weight. If the eyepiece is over 50mm wide, you will start running into problems with them being too large to use, and if they are too heavy, they weigh your scope down, throwing off balance. The 22mm Panoptics are the largest possible eyepieces to use in practice in most

cases with these binoviewers (but the weight may still deter you.) The 22mm Panoptics, by the way, offer an unbelievable wide field view, with good eye relief, akin to the most expensive binoculars on the market.

The fourth problem is selecting eyepieces carefully with consideration to eye relief. If the eye relief is too long, then holding the view becomes even harder when you attempt this with two eyes. 35mm-40mm eyepieces typically exhibit this problem. Eye relief that is too short, also becomes just a bit more bothersome than normal with a binoviewer. Mid-range eyepieces in the 10-25mm category usually work out just fine in terms of eye relief.

The fifth problem is the field size. Unfortunately, you can comfortably only take in about 60-65 degrees of apparent field before having to seriously shift your head around. This means that on the 7 and 9mm Naglers, for instance, you will sacrifice some field when using the binoviewer.

The sixth problem has to do with high power eyepieces. Turns out that the lower the focal length of the eyepiece, the harder it is for the brain to "merge" images. The critical alignment of each side of the binoviewer can be best maintained with eyepieces of 10mm focal length or higher. I was NOT able to merge images on a pair of 4mm Vixen Lanthanums as an example! Some people merge images more easily than others. As an aid in selection, here is a sample of some of the eyepiece pairs that I have tried:

* 35mm Celestron ultimas: Widest possible field, however, hard to hold the view.
* 24.5mm Meade Superwide: Almost the widest possible field, very comfortable view
* 22mm Panoptics: Incredible wide field views. Very comfortable eye relief. The problem with this eyepiece is that for children it may be too large, (their eyes are closer) and the weight is a real problem for many scopes.
* 18mm Meade Superwides: Wonderful in all ways.
* 17mm Orion Sirius Plossls: Excellent viewing.
* 16mm, and 12mm Naglers: Quite large and heavy, can't take in the whole field. Not that good, especially for folks with eyes that are closer.
* 13.8 Meade Superwides: Very good, just a bit tight on eye relief. Fogged easily.
* 12.5 Celestron Ultimas: Nearly perfect, plus the "horn" style eyecups work well with binoviewing
* 10mm Zeiss Orthos, .965, 1.25" adapter: Good view, but too short on eye relief in my opinion for comfortable binoviewing
* 9mm Vixen Lanthanums: Very good, although the eye relief is actually a bit "long" for binoviewing, and the view is just a tad hard to hold..but this is minimal.
* 9mm Naglers: A bit on the heavy side, and it is very hard to take in the whole view, about 70 apparent degrees realistically. The eye relief is a bit short too. Still a good view.
* 7mm Naglers: More comfortable than the 9mm Naglers by far, but still just a bit short on eye relief, making it even harder to take in the whole view.

I am currently in the process of trying to put together 3 more pairs including Takahashi LE eyepieces, Orion Ultrascopic, and the formidable Docter Vario Zoom eyepieces. (The latter may be too heavy and large) As with single eyepieces, eye relief of over 13mm or so is necessary when using glasses.

BINOVIEWERS ON PLANETS & THE MOON

As already hinted, the traditional use of binoviewers has been on the Moon and planets The less expensive binoviewer adapted from microscope heads, works just fine on them. There is a two, or even threefold benefit from using a binoviewer on these brighter objects.

a. Even though the amount of light that you "perceive" is not reduced greatly, the splitting of the beam into TWO eyes results in a less glaring object, especially on the Moon.

b. Two eyes can perceive more detail than one. If you ever took an eye exam, you know this is a fact, you can read the fine print easier with two eyes.

c. The most important difference is the comfort factor. Eyestrain becomes a non-issue, and it allows you the time, and relaxation if you are seated comfortably (and no mosquitoes are biting you) to really pick up on detail that you would have otherwise missed. This is the definitely the most important difference to me.

BINOVIEWERS ON DEEP SKY:

Deep sky viewing can be achieved on all binoviewers, but best results, especially at lower power is with the more expensive units. Here are some of the wonders I have observed using both eyes:

a. Firstly, like planetary and lunar viewing, objects take on a false, but very truly awesome three dimensional look. Although this effect struck me strongest when first using a binoviewer, as the moons of Jupiter appeared to pop out at me, I also have found that this takes place while viewing nebula. Star clusters seem to have some dimension, and are much, much more interesting.

b. Galaxies, and nebula become something that you WANT to dwell on. Passing over them for another object becomes less appealing. Brighter nebula are particularly fascinating. I picked out intricacies on the Orion nebula that I would never had normally looked for...and really studied the subtle blue-green color differences within the nebula. The lack of eyestrain makes this possible.

c. Globular clusters at first glance are a bit less resolved than using a single eyepiece.... however, they seem to throw a punch right out at you like you have never seen before when you do the right things.

1. Get the magnification up, for better resolution
2. Use a scope with more aperture (10" or larger)
3. Darkest skies, and higher dark adaptation help a lot.

Unfortunately, the view is so great breaking up globulars with two eye vision, that it leads to the worst possible case of aperture fever, as greater aperture allows you, in general to resolve globulars much more than smaller aperture.

OTHER CONSIDERATIONS:

Optically, in terms of quality, I found that on all units that I tried (the Celestron Binoviewer, the Televue Binoviewer, the Astrophysics Binoviewer and The Russian Binoviewer, views were equal to or better than single eyepieces on the Moon and planets. The more expensive units such as Televue's also showed no aberrations on stars and deep sky. Apparently the special correcting lens in the Astrophysics unit also was responsible for color correcting, and holding aberrations down. (Televue indicated that this was not necessary on theirs). I did notice however, that with certain eyepiece/barlow combinations, that annoying reflections, almost like ghost images, showed up nearby bright objects such as Jupiter. I noticed this on the Televue and Astrophysics binoviewers most, especially the Astrophysics.

At highest magnification, on a large scope, in a side to side test, one user did report to me that the Astrophysics unit held up the best on planets (we are talking about 600 to 800x here) However, in all fairness, this could have been a fluke, as I could not verify this. Finally, the weight of the binoviewers, even with small eyepieces, will require that you think about appropriate ways to counterbalance you scope.

SUMMARY:

As the word about dual eye viewing spreads, more amateur observers are getting in the act. With the growing number of large binocular telescopes being built by amateurs each year, it is only a matter of time before they become more commercially available. Yet, one has to wonder if there is an easier way to view the sky with two eyes, than to use and/or pay for a dual-telescope system. For instance, a binoviewer utilized on a 12" scope will likely yield views equal to,or perhaps even better than two 8" scopes combined as a binocular. Put in that perspective, the price of a really good binoviewer may be well worth it.

If you want to feel like you are flying over the moon, more easily observe the festoons of Jupiter, or to be "wowed" by a seemingly 3-dimensional Wild Duck Cluster (M11), with some careful consideration and planning, you too can turn both eyes to the sky through your scope, instead of just a lonely one.

PARTIAL/LIMITED LIST OF CURRENTLY AVAILABLE UNITS:

1. Televue (914)357-9522 http://www.rahul.net/Astro-Mall Bino Vue
2. Orion Telescope (408)763-7030 Binocular Viewer
3. Earth and Sky Adventure Products (408)778-1695 Russian Binoviewer (name?)

Thanks for reading my explanation about binocular viewers. Please note however, that while I believe all the information included to be accurate, it is likely that I have unintentionally omitted, or mis-stated some point of fact. If so, I welcome feedback. This article, and others can be found on my home page on the Internet: http://www.weatherman.com ☆

SEASONS IN JAPAN

From Steve Renshaw (stever@gol.com)

The following article was reprinted from ASTRONET, Issue 40, June 1, 1996. For more information, please contact resource@resource-intl.com.

The Azure Dragon Comes: This post is a preliminary section on Japanese star lore associated with "palaces" and moon stations that Saori Ihara and I hope to have on the Astronomy in Japan page soon ... hope you enjoy it...

Recently I asked Japanese students in a comparative culture class to talk about the kinds of things they felt were most important in their background... in "making them who they were". Interestingly, virtually every student mentioned the strong ties with nature they experienced as children and the strong sensitivity they felt to seasonal change. After a little more than a year here, I can (in my non central air-conditioned house) vouch for the profound sense of seasonal change in this climate. Despite more and more mountains being "shaved" to give way to urban and industrial sprawl, a sense of nature and seasonal change is still quite prominent in Japanese culture, even among members of its younger generation. This tradition... this sense... dates far back in Japanese history and has roots which are not only Shinto in nature but which were derived from ancient Chinese views and delineations of the sky (from which so much early Japanese "astronomy" was borrowed).

For ancient Chinese and later Korean and Japanese sky watchers, four talismanic animals marked the four seasons and four cardinal directions... the azure dragon of the East (Spring), the red bird of the South (Summer), the white tiger of the West (Fall), and the black tortoise of the North (Winter) [actually there were five, the other "direction" being "center"... earth]. Origins of these seasonal associations are somewhat obscure but appear to be at least 3500 years old, some estimates dating much earlier. In Japan, their first confirmed "existence" is found in the 7th century (probable dating) Takamatsu Zuka Kofun (Pine Tree Burial Mound). In Japan, like imported Buddhism, these associations were absorbed and adapted according to geographic circumstance.

Japanese interpretations of these associations tended to revolve around agricultural needs and animistic views of nature. Unlike many Western myths and traditions, there were few if any perceptions in the myths of "active" god(s) creating or wreaking good or bad on the cosmos and/or humankind. Rather, especially in Japan with its Shinto base, gods like the talismanic animals were seen as manifestations of nature... stars and celestial events were signs of change in season, life, politics, etc... sometimes good... sometimes bad.

Determination of the talismanic animals and associated star "palaces" together with the associated 28 "sei shuku" or moon stations (7 in each animal's palace or quadrant) represent some of the most complex aspects of Asian "astronomy". Indeed, the sei shuku are found in the lore of a number of cultures. The associations have not only been adapted over the centuries but are heavily tied to the astrology of each culture and full of anomalies, at least to eyes accustomed to "Western" views.

Cultures using these associations were/are located in the Northern hemisphere. Not the least of anomalies is the fact that the actual positional path of the sun moves in a direction opposite the seasonal associations. While "genbu" (translated as the black tortoise of winter, a name which fails to really convey the fearsome nature of this snakelike shelled "creature") and the red bird of summer have the sun nicely positioned in them during their respective seasons, the white tiger of autumn and blue dragon of spring lie "opposite" the sun's actual perceived path. In many ways, these associations reflect the mirror or "shadow" relation of earth to sky... human to nature... nature to cosmos... that was so prominent in pre-scientific cosmologies in this part of Asia. Like myths and traditions in Western cultures, these views still wield influence in the daily life of people in China, Korea, and Japan... this despite quite prominent scientific literacy.

The season of Spring is marked by the late evening appearance of the Azure (blue) Dragon of the East. In much of this part of Asia, it signaled (signals) the wind and rain to come primarily from that direction. While older star charts of China, Japan, and Korea are often difficult to read, this talismanic animal appears prominently and is (like its included Scorpio in the West) one of the easiest collections of asterisms to actually visualize in the sky. The stars forming parts of the dragon include six of the seven "sei shuku" or moon stations associated with this quadrant.

Using Bayer designations, station one includes Alpha and Zeta Virgo, marking respectively the right and left horns of the dragon. Kappa, Phi, Iota, and Lamda Vir, the second station, represent the neck. Shoulders may be visualized in the third station, sometimes also seen as a hill and delineated by the stars Iota, Alpha, Gamma, and Rho Scorpio. The breast of the dragon may be visualized in the fourth station... Delta, Pi, Beta, and Rho Sco... (includes the Scorpio three stars, quite prominent in Japanese star lore). The fifth station is probably the most significant and has associated with it some of the most complex lore. This station is composed of Sigma, Alpha, and Tau Sco; it is the heart of the dragon... the red (perhaps "bloody") and virulent Antares (in agricultural Japan, the heart of the seed perhaps) being the most prominent and also "center" star that ancient Chinese, Koreans, and Japanese used to mark the Spring Dragon's quadrant. Finally, everyone can recognize the tail of the dragon... including Epsilon, Eta, Theta Sco etc. moving round to the Lamda and Nu Sco pair.

Next to "Tsuzumi Boushi" (The Drum, Orion), Subaru (Pleiades), and Hokuto Shichisei (North Seven Stars, the Big Dipper), the "Azure Dragon" region of the sky has some of the most rich and unique Japanese star lore to be found, some of it having ironic commonality with a number of cultures throughout the world.

Of course, here in Japan, the Azure Dragon also signals that soon the rainy season will begin... a very pragmatic blessing to the agricultural base of this country while a somewhat bittersweet aspect of the dragon's "breath" to amateur and professional observer alike. Anyway, as you are able to stay up and observe into the late evening... while you are logging Virgo galaxies or waiting while others look at M4, 6, 7 etc. in your scope, you might also grasp a sense of how anxiously people looked and still look forward to the appearance of the "heart" star and the "feel" of its season. You might then peruse the beauty of what is probably one of the oldest sky patterns seen by ancient people. ☆

ASTRONOMY TEST

from George Korody (NYLA70A@prodigy.com)

Here is a little test in astronomy that was just posted on the Prodigy Astronomy Bulletin Board. It seems to be quite a challenge. The key to taking the test is to do it all from memory and not use any reference material (e.g. CHEATING (G)).

Board: SCIENCE & ENVIRON
From: ERIK ALDER (PCGX80E@prodigy.com)

Here's a test to test your astronomical skills. All of these question have to do with stars and constellations so if you do not excell in this area the test will be very far beyond your standards. First I would like to ask that you do not look up any of the questions, I would prefer to see what you know without the help of a reference. There are 20 questions which gradually become more difficult.

1. What is the best known constellation?
2. What is the famous "noth star's" true name?
3. The great summer triangle is actually made up of three constellations, what are those constellations and what are the names of the three stars that make up the triangle?
4. What is the largest constellation?
5. What is the brightest star in all of the Zodiacal constellations not including the sun?
6. There are two constellations that outshine all of the other constellations, what are they?
7. What are the ten brightest stars?
8. Today's north star was not only the center star it is, what was the former north star?
9. Variable stars are stars the vary in their luminosity, what is the most famous of those stars?
10. What are the constellations of the zodiac?
11. What is the largest zodiac constellation?
12. Binaries are stars that rotate around each other. Of the many binaries there only two where the second star can be seen with the naked eye, what are they and what constellation are they in?
13. What was the first discovered variable star?
14. Circumpolar constellations are constellations seen year round. Name the circumpolar constellations of north?
15. What is the brightest circumpolar star in the north?
16. What are the south circumpolar constellations?
17. What is the brightest circumpolar star of the south?
18. Name the stars nearest to our planet earth.
19. The Pleiades is a famous star cluster between Taurus and Perseus. In greek mythology they were seven sisters, what were their names?
20. Aqilla is an eagle constellation, it now stands alone in the sky. Believe it or not, this contellation once had a companion. It has now mysteriously disapeared. What was that constellation? ☆

STATISTICALLY SPEAKING

Location (Dearborn, MI): 42°19'12" N, 83°10'48" W, 180 meters elevation
Local Time = Universal Time - 4.5 hours (Eastern Daylight Time)

Abbreviations used in reports:

FM	Full Moon	FQ	First Qtr Moon	LQ	Last Qtr Moon	NM	New Moon
MR	Moon Rise	MS	Moon Set	SR	Sun Rise	SS	Sun Set

September 1996

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 SR: 6:28 SS: 19:36 MR: 22:00 MS: 10:57	2 SR: 6:29 SS: 19:34 MR: 22:38 MS: 12:01	3 SR: 6:30 SS: 19:33 MR: 23:19 MS: 13:02	4 SR: 6:31 SS: 19:31 MR: None MS: 13:58	5 SR: 6:32 SS: 19:29 MR: 0:04 MS: 14:50	6 SR: 6:34 SS: 19:27 MR: 0:51 MS: 15:37	7 SR: 6:35 SS: 19:26 MR: 1:41 MS: 16:20
8 SR: 6:36 SS: 19:24 MR: 2:34 MS: 16:58	9 SR: 6:37 SS: 19:22 MR: 3:29 MS: 17:33	10 SR: 6:38 SS: 19:21 MR: 4:25 MS: 18:05	11 SR: 6:39 SS: 19:19 MR: 5:22 MS: 18:35	12 SR: 6:40 SS: 19:17 MR: 6:20 MS: 19:05	13 SR: 6:41 SS: 19:15 MR: 7:18 MS: 19:34	14 SR: 6:42 SS: 19:13 MR: 8:18 MS: 20:05
15 SR: 6:43 SS: 19:12 MR: 9:19 MS: 20:37	16 SR: 6:44 SS: 19:10 MR: 10:21 MS: 21:12	17 SR: 6:45 SS: 19:08 MR: 11:23 MS: 21:52	18 SR: 6:46 SS: 19:06 MR: 12:25 MS: 22:37	19 SR: 6:47 SS: 19:05 MR: 13:25 MS: 23:28	20 SR: 6:48 SS: 19:03 MR: 14:23 MS: None	21 SR: 6:49 SS: 19:01 MR: 15:16 MS: 0:26
22 SR: 6:50 SS: 18:59 MR: 16:04 MS: 1:30	23 SR: 6:52 SS: 18:58 MR: 16:48 MS: 2:38	24 SR: 6:53 SS: 18:56 MR: 17:28 MS: 3:49	25 SR: 6:54 SS: 18:54 MR: 18:06 MS: 5:02	26 SR: 6:55 SS: 18:52 MR: 18:42 MS: 6:14	27 SR: 6:56 SS: 18:51 MR: 19:17 MS: 7:25	28 SR: 6:57 SS: 18:49 MR: 19:54 MS: 8:35
29 SR: 6:58 SS: 18:47 MR: 20:32 MS: 9:42	30 SR: 6:59 SS: 18:45 MR: 21:13 MS: 10:46			Lunar Events LQ: 14:37 Sep 04 NM: 18:37 Sep 12 FQ: 6:54 Sep 20 FM: 22:21 Sep 26		

Lunar Eclipse Report for September 26, 1996

Partial phase begins:	20:45
Total phase begins:	21:52
Time of maximum eclipse:	22:26
Total phase ends:	23:00
Partial phase ends:	0:07

Planet View Info Report for September 1996

Date	Rise	Set	RA	Dec	Elongation	Ill Fr	DIST(AU)
Mercury							
9/ 1/1996	8:38	20:08	12h05m06s	-4°34'29"	24°25'06"	0.328	0.76627
9/ 8/1996	8:09	19:36	12h03m18s	-5°00'10"	17°38'14"	0.162	0.67983
9/15/1996	7:12	19:00	11h45m07s	-2°26'18"	6°19'39"	0.022	0.64018
9/22/1996	6:07	18:28	11h23m19s	2°00'52"	8°40'07"	0.053	0.69127
9/29/1996	5:32	18:11	11h21m48s	4°33'14"	16°41'42"	0.311	0.84223
Venus							
9/ 1/1996	2:44	17:18	7h39m45s	19°12'44"	45°23'51"	0.563	0.79968
9/ 8/1996	2:51	17:18	8h10m43s	18°21'39"	44°48'17"	0.596	0.85314
9/15/1996	3:00	17:16	8h42m11s	17°06'28"	44°01'29"	0.626	0.90568
9/22/1996	3:11	17:13	9h13m52s	15°27'40"	43°05'32"	0.655	0.95719
9/29/1996	3:23	17:09	9h45m34s	13°26'34"	42°01'47"	0.683	1.00761
Mars							
9/ 1/1996	2:37	17:36	7h45m57s	22°03'38"	44°25'29"	0.946	2.11624
9/ 8/1996	2:31	17:23	8h04m44s	21°17'34"	46°46'42"	0.942	2.08056
9/15/1996	2:26	17:10	8h23m06s	20°24'53"	49°12'47"	0.938	2.04214
9/22/1996	2:21	16:56	8h41m00s	19°26'23"	51°43'49"	0.934	2.00103
9/29/1996	2:15	16:41	8h58m27s	18°22'49"	54°19'52"	0.930	1.95729
Jupiter							
9/ 1/1996	16:21	1:25	18h34m12s	-23°23'12"	119°00'05"	0.993	4.61068
9/ 8/1996	15:54	0:58	18h34m18s	-23°23'46"	112°14'15"	0.992	4.70718
9/15/1996	15:27	0:31	18h35m04s	-23°23'44"	105°36'07"	0.991	4.80864
9/22/1996	15:01	0:05	18h36m30s	-23°23'05"	99°05'43"	0.991	4.91351
9/29/1996	14:35	23:36	18h38m34s	-23°21'46"	92°42'43"	0.991	5.02031
Saturn							
9/ 1/1996	20:38	8:45	0h24m02s	-0°12'04"	153°17'34"	0.999	8.61357
9/ 8/1996	20:10	8:15	0h22m19s	-0°24'19"	160°30'11"	1.000	8.56806
9/15/1996	19:41	7:45	0h20m28s	-0°37'13"	167°43'09"	1.000	8.53650
9/22/1996	19:13	7:15	0h18m30s	-0°50'25"	174°40'56"	1.000	8.51954
9/29/1996	18:44	6:44	0h16m31s	-1°03'35"	176°11'35"	1.000	8.51748
Uranus							
9/ 1/1996	17:48	3:18	20h14m28s	-20°28'18"	142°23'52"	1.000	18.97284
9/ 8/1996	17:20	2:50	20h13m41s	-20°30'39"	135°25'37"	1.000	19.05259
9/15/1996	16:52	2:21	20h13m02s	-20°32'35"	128°27'38"	1.000	19.14270
9/22/1996	16:24	1:53	20h12m32s	-20°34'01"	121°30'18"	1.000	19.24181
9/29/1996	15:56	1:25	20h12m11s	-20°34'57"	114°33'48"	0.999	19.34840
Neptune							
9/ 1/1996	17:23	2:52	19h48m44s	-20°36'18"	136°28'09"	1.000	29.41931
9/ 8/1996	16:55	2:24	19h48m15s	-20°37'42"	129°34'18"	1.000	29.50698
9/15/1996	16:27	1:56	19h47m52s	-20°38'51"	122°40'09"	1.000	29.60388
9/22/1996	15:59	1:28	19h47m35s	-20°39'45"	115°45'59"	1.000	29.70855
9/29/1996	15:32	1:00	19h47m25s	-20°40'23"	108°51'56"	1.000	29.81942
Pluto							
9/ 1/1996	12:47	23:55	16h03m56s	-7°41'11"	81°50'04"	1.000	30.04951
9/ 8/1996	12:20	23:28	16h04m16s	-7°45'43"	75°19'05"	1.000	30.16374
9/15/1996	11:54	23:00	16h04m42s	-7°50'27"	68°48'29"	1.000	30.27451
9/22/1996	11:27	22:33	16h05m14s	-7°55'18"	62°18'47"	1.000	30.38024
9/29/1996	11:00	22:06	16h05m51s	-8°00'13"	55°50'24"	1.000	30.47947

Planet Conjunction/Opposition Report for September 1996

9/17/1996	Mercury @ Inferior Conjunction	Hour:	19
9/26/1996	Saturn @ Opposition	Hour:	4

Moon Apsides Report for September 1996

9/ 8/1996	Moon @ Apogee	Hour: 22	Distance: 405757(km)	Diameter: 0.4908°
9/24/1996	Moon @ Perigee	Hour: 17	Distance: 363053(km)	Diameter: 0.5486°

Meteor Showers Report September 1996

Date	Meteor Shower	ZHR	RA	DEC	Illum. Frac.	Longitude
9/ 7/1996	Piscids	10	0h36m	7°	0.23	166°
9/20/1996	Piscids	5	0h24m	0°	0.54	178°

Twilight Report for September 1996

Date	Sun Rise	Sun Set	Astronomical Begin	Astronomical End	Nautical Begin	Nautical End	Civil Begin	Civil End
9/ 1/1996	6:28	19:36	4:44	21:20	5:21	20:44	5:55	20:09
9/ 8/1996	6:36	19:24	4:54	21:06	5:29	20:31	6:03	19:57
9/15/1996	6:43	19:12	5:03	20:52	5:37	20:17	6:10	19:44
9/22/1996	6:50	18:59	5:12	20:38	5:45	20:05	6:18	19:32
9/29/1996	6:58	18:47	5:20	20:25	5:53	19:52	6:26	19:19

SKY & TELESCOPE NEWS BULLETINS

from the editors of SKY & TELESCOPE magazine

TUSSLE OVER TUNGUSKA

More than 50 scientists from a wide range of countries met in July in Bologna, Italy, to discuss the Tunguska event, a multi-megaton airburst in 1908 that devastated about 2,000 square kilometers of marshy Siberian forest. In recent years Russian scientists have remained steadfast in their belief that a cometary object entered the atmosphere and triggered the explosion, whereas Western researchers feel a small asteroid was the cause. No part of the impactor has ever been found, despite repeated expeditions to the remote site — a fact the Russians use to bolster their comet hypothesis. But independent calculations by two teams of American theorists imply that a comet would have come apart much higher in the atmosphere than the altitude at which the explosion occurred, about 8 km. The meeting in Bologna ended with no consensus, though further trips to the site are planned.

SPOTS ON SATURN

Astronomers at Pic du Midi Observatory in the French Pyrenees report that several bright spots have appeared in the South Equatorial Zone of Saturn. A moderate storm erupted in the planet's North Equatorial Zone in 1994, but things have since been quiet. Observations of the new spots will aid in determining the planet's atmospheric circulation and rotation period at their latitudes.

MORE VIEWS FROM GALILEO

NASA released more spectacular images from the Galileo spacecraft on August 13th. Among the fascinating views were an eruption from one of Io's volcanoes, revealing a plume of sulfur dioxide towering 100 km above the surface of the satellite. Another eruptive site actually glows in the dark. It is believed that high-energy particles in Jupiter's magnetosphere cleave atoms of expelled sulfur dioxide and then cause the resulting ions to fluoresce. Other pictures from this round of images taken during Galileo's first orbit of Jupiter include high-resolution views of Europa. The detailed images of its frozen surface show the moon riddled with fractures, some more than 1,500 km long. These cracks and other areas that give Europa a youthful-appearing surface lead some researchers to conclude that somewhere below the surface is soft ice or possibly liquid water. ☆

PHYSICS NEWS UPDATES

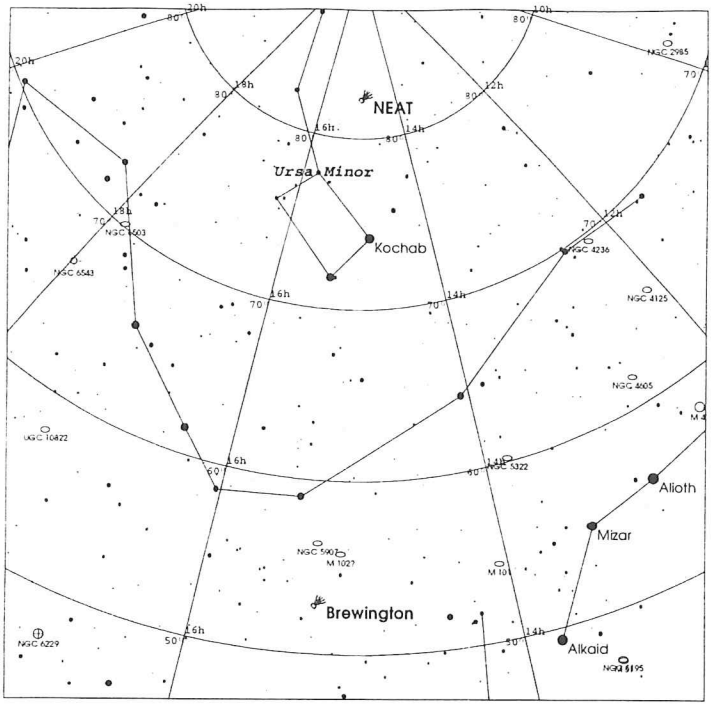
The American Institute of Physics Bulletin of Physics News (physnews@aip.org)

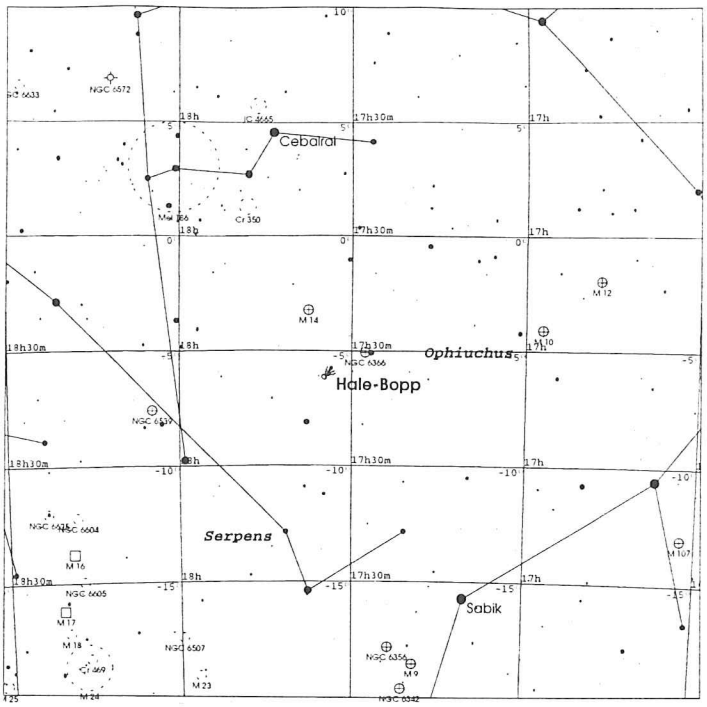
POLARIZED LIGHT AS A BLACK HOLE SIGNATURE

Number 276 June 21, 1996 by Phillip F. Schewe and Ben Stein

How can astronomers be sure that black holes exist? The motions of stars and gas near presumed black holes provide provisional evidence, but additional assurances are desirable. Paul Wiita and his colleagues at Georgia State suggest that the polarization (the preferential orientation) of x rays coming from some celestial objects such as x-ray binaries and active galactic nuclei can be used to demonstrate the presence of a black hole. These x rays are thought to arise when material pulled from nearby stars toward black holes piles up on (and heats up) the accretion disk hovering closely about the hole. According to Wiita , light coming from the inner part of the disk will not only be more energetic than light from further out on the disk, but will show greater changes in polarization as well. Furthermore, the degree of the polarization should be enhanced in a characteristic way by the lensing action of the black hole's huge gravitational field. It will, however, be difficult to test this hypothesis in the near future since the apparatus for measuring polarization was recently dropped from plans for the orbiting AXAF x-ray telescope, to be launched in 1998. (Gang Bao, Paul Wiita, and Petr Hadrava, Physical Review Letters, 1 July 1996.)☆

FINDING COMETS NEAT, BREWINGTON, AND HALE-BOPP (9/7/96)





STARS	SOLAR SYSTEM			NOTES
<0 • 5 1 • 6 2 >7 3 4	☿ Mercury ♅ Uranus ♀ Venus ♆ Neptune ♂ Mars ♇ Pluto ♃ Jupiter ☄ Comet ♄ Saturn ⚳ Asteroid	⬭ Galaxy ⊕ Globular Cluster ∴ Open Cluster ✧ Planetary Nebula □ Diffuse Nebula ○ Other Object		

Local Time: 20:00:00 7-Sep-1996 UTC: 00:30:00 8-Sep-1996 Sidereal Time: 18:06:42
Location: 42° 19' 12" N 83° 10' 48" W RA: 15h00m00s Dec: +67° 30' Field: 40.0° Julian Day: 2450334.5208

STARS	SOLAR SYSTEM			NOTES
<0 • 5 1 • 6 2 >7 3 4	☿ Mercury ♅ Uranus ♀ Venus ♆ Neptune ♂ Mars ♇ Pluto ♃ Jupiter ☄ Comet ♄ Saturn ⚳ Asteroid	⬭ Galaxy ⊕ Globular Cluster ∴ Open Cluster ✧ Planetary Nebula □ Diffuse Nebula ○ Other Object		

Local Time: 20:00:00 7-Sep-1996 UTC: 00:30:00 8-Sep-1996 Sidereal Time: 18:06:42
Location: 42° 19' 12" N 83° 10' 48" W RA: 17h30m00s Dec: -5° 00' Field: 30.0° Julian Day: 2450334.5208

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