

Focal Point



Newsletter of the Milwaukee Astronomical Society

September & October 2004

Picnic Wrap-up

Written by Vern Hoag

The weather for the picnic this year turned out to be the best in years. Mid 70's, no clouds and very comfortable. A-scope was opened with the solar filter on and many people enjoyed sunspots on the sun. Tim Burrus brought out his hydrogen alpha scope and we were treated with a view of solar flares, thanks Tim.

There was a very nice crowd out. As usual there were the old familiar faces of friends and family. Plus there were also some new faces that I hope become familiar. I hope everybody enjoyed the food prepared by my wife Diane and myself. As usual Chris Weber and I did the cooking, with Bob Manske messing a few burgers up this year. After the cake was cut the door prizes were drawn. The grand prize this year was a 40 mm 2" Super Wide eyepiece, donated by Meade.

The sky that night was clear, although the seeing was not very good. But that did not stop about 30 members and friends from staying or coming back to observe. All the scopes were being used plus many personal scopes set up. At 2:00 there was still 7 observers with the last few leaving after 3:00.

I'd like to thank the following companies for their generous donations. Astronomy Magazine, Jim's Mobil, Meade Instruments, Orion Telescope and Binocular, Sky and Telescope, and Yerkes Observatory. These organizations have supported us for years. Please show your appreciation by purchasing your equipment from them.

I would also like to thank Gerry and Chris for all the help. And a special thanks to my wife Diane for all her time and effort. It would be very difficult without her help, thank you Diane.

The picnic is a time to get together with fellow members and their families to relax and have some fun. If you made it out, thank you, I hope you enjoyed yourself. Make sure you set some time away next July for next year's picnic. See you all next year.

September Meeting Program

Written by Gerry Samolyk

The program at the September MAS meeting will be called "Transit on the Egyptian Sun". It will feature photos of the transit of Venus plus some travel photos.

Hello everyone, my name is Chris Limbach and I'm a member of the MAS. I wrote both a technical paper and a made-for-publication article on telescope building. Basically I had some ideas but not the funds to do anything. So I wrote an article about it. Please read it and/or forward it to someone who knows a lot about the topic that would be great. I'm definitely looking for constructive criticism and input. The hyperlink contained in the following article will take you to my full paper.

Thanks, Chris

Giant Aperture, Low Price, CCD Capability. Can it be done?

By Christopher Limbach

Being an amateur astronomer, and moreover a teenager, I know the pangs of aperture fever all too well. Before I got my hands on a 12" LX-200 all I could do was browse websites and reviews, surveying the market for the best buy. Well, not much has changed, despite being preoccupied with my own telescope and photometry. The only difference is in content; larger aperture, larger mount, and of course a larger expense.

What puzzled me when I began scanning the websites of "high-end" telescope and mount makers was the great increase in prices. With only an added 31% great light grasp the 16" LX-200 costs over \$10,000 more than a 14". And to confuse matters more a 'small' 10" RCOS optical tube assembly costs \$12,100. Even the Paramount ME German Equatorial mount alone is \$12,500. The higher prices of these instruments reflect the giant step up in quality from any 14" or smaller SCT currently dominating the amateur telescope market.

These days almost all computerized telescopes, especially those in the \$10,000+ range, cater to the CCD imager. Tracking, pointing, and guiding on all high-end mounts are phenomenal. Moreover, telescope optical quality is superb, providing a large, sharp field of view. The question I began pondering while looking at all these websites was this: 'Is it possible to get a large (18"+) aperture telescope capable of high-quality CCD imaging without spending a fortune?' A "yes" answer to this question would obviously make a lot of amateur astronomers very happy, but the more pertinent question at this point is 'how?' I don't claim to have all the answers, but after a lot of research on the current telescope market I've come up with some interesting ideas.

In my paper, "The Future of Amateur Astronomy: Bringing Larger Aperture CCD Imaging To More Amateurs" I describe the logical design solution to the problem presented above. Through a strategy of minimalism, while not sacrificing the quality necessary for great CCD imaging, I believe it is possible to make a 20" f/4 German Equatorial telescope for \$7,500 or less. Sound impossible? Let me run through some of the telescope's features that allow it to be built for such a low price.

Newtonian Optics – When considering apertures of 16" or greater the Newtonian beats all when it comes to price. The off-axis star field is plagued by coma, but a high quality commercial or custom corrector can relieve this problem.

No Secondary – CCD imaging doesn't require any visual observations, and common CCD's

the secondary mirror expendable and also reduces the weight of the optical tube assembly (OTA).

Lightweight OTA – By making the optical tube as light as possible less stress is put on the telescope mount. The absence of a secondary mirror, carbon fiber truss tubes, and a thin primary mirror all contribute to achieving this design goal. With a weight between 80 and 85 lbs. the OTA would still be quite heavy, but when compared to a 150 lb. 20” truss Ritchie-Chrétien, this OTA is quite light.

Belt-Worm drive – Most, if not all commercial mounts use a large worm/worm gear drive to achieve excellent pointing and tracking. The large worm gears are very expensive to manufacture, and eliminating this expense will go a long way towards driving down mount prices. The Belt-Worm drive presents a great solution because it incorporates both the worm and belt’s positive features while canceling their respective limitations. With this design a 2” worm gear and 6:1 belt reduction can achieve a tracking performance equivalent to a single 12” worm drive at a significantly lower cost and with less backlash.

Few Parts, Simple Parts – Most commercial telescope mounts require some kind of pricey machining in order to make all the necessary parts. By designing a mount with few and simply fashioned components a lot of money can be saved on machining. Drive components excluded, a German Equatorial mount with a fixed latitude setting can be machined out of only two simple parts. This makes the German Equatorial the best mount design choice.

Computer-Based Electronics – A bundle can be spent on developing hand-paddle and micro-controller electronics for a telescope drive system. Basic stand-alone functionality should be preserved, but computer software should be the main hub of operation. Besides, most CCD imagers only use a computer for telescope control anyways.

But, Limitations – Sacrifices are necessary in any design under cost constraints. With this telescope design both compactness and instrument capacity are sacrificed. The Newtonian optical design is a fast f/4, but with 20” of aperture this is still over 80” of tube length. Placing the mount low the ground is only a partial remedy to the size issue, and a relatively large observatory will be required. In addition, weight limitations are placed on detector equipment because of the prime focus configuration. This telescope simply cannot carry a spectrograph or other large, heavy instrumentation at prime focus.

In my paper I analyze each of these points in more detail and give real-world implementation examples, references to commercial products, tables and photos. Other aspects of the telescope design are also discussed, such as the focuser, mirror cell, and thermal issues. You can read the full paper at: <http://www.freewebs.com/skyrunning/article.htm>. Please feel free to email me with comments, suggestions or questions. I’m always looking for improvements and input. Making larger apertures available to more amateurs won’t only make for prettier pictures. Many amateur astronomers are currently using their instruments for scientific research of variable stars, asteroids, supernova, and other astronomical phenomena. Moving up to 20” (0.5 meters) of aperture puts telescope light grasp a whole magnitude fainter than a 14” Schmidt-Cassegrain. The next revolution in amateur astronomy will make larger aperture CCD imaging affordable and will consequently continue to bridge the gap between amateur and professional astronomers. The ideas mentioned above are only the beginning to a long list of design innovations waiting to happen. Aperture fever may never be cured, but a 20” CCD-ready telescope available on a budget would sure make *me* happy!

For Sale:

Bushnell Voyager 6" Dobsonian Reflector Telescope
All metal tube, 1200 mm f.l. (f/7.8)
1.25" Rack & Pinion Focuser
6x30 Finder Scope
Includes 25 mm Kellner Eyepiece.
Like new. Used only twice.
Make offer. Call Ann Warford at 414-325-3658

New Members:

Alfred Hovey, Waukesha
Glen Scott, Waukesha
Thomas Consi, Milwaukee
Stephen Wiencek, Waukesha
Raymond Jamieson and Family, Newburg
Olaf Harken and Family, Pewaukee
Michael Buffington and Family, Greenfield

Space Explorers

by Scott Laskowski

On August 7, several MAS members helped students from Chicago to learn about the universe while using telescopes. This is an educational project which began in 1991 to promote higher learning within a group of promising students.

The Space Explorers spend about a week at Yerkes doing projects like measuring the speed of light, tracking the moons of Jupiter, sunspots and radio astronomy. This year's topic was "What are stars made of?"

Traditionally the week long astronomical experience begins with a star party on the Yerkes south lawn. Volunteers set up telescopes and teach the kids about a telescopes mechanics, optics, use and purpose.

Unfortunately the sky conditions were not favorable this year. It was mostly cloudy. Still the Space Explorers watched and learned about telescope set-up and how they are used by amateurs. They were taught data gathering for variables, how stars change brightness for various reasons, astrometry, positional calculations, and star gazing just for fun. One telescope revealed a double star in a hole in the clouds. Another hole revealed Arcturus, which by chance was the name of one of the study teams, symbolic and cool for them. Limited views, but all the advisors said the kids had fun.

The MAS has had a long standing relationship with Yerkes Observatory on many special projects. Thank You, from the University of Chicago to all the volunteers. The Yerkes annual star party is posted yearly on the MAS website. Other U of C projects listed can be acquired at the Yerkes website: <http://astro.uchicago.edu/yerkes> and other links.

September Asteroid Occultations

by Gerry Samolyk

This month there are three asteroid shadows that will pass close to our area. Although none of them are predicted to pass over the observatory as this is being written, the predictions may be updated as we get closer to the events. All of these events are on a Sat night or Sun morning. The website links listed will provide the latest updates as well as finder charts for the target stars.

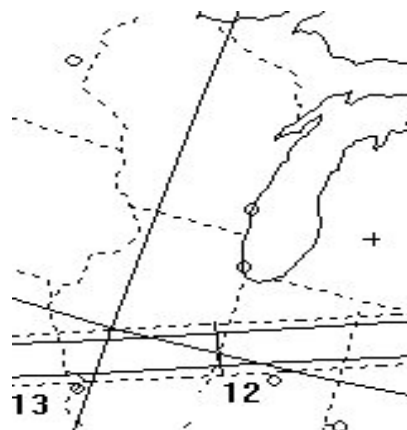
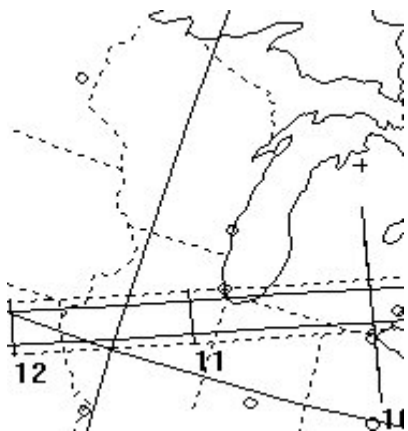
On Sunday morning, Sept 5 the 12.0 magn asteroid, 107 Camilla, will occult a 11.8 magn star. This will result in a drop in the combined magnitude of 0.9. This should be observable visually or with a video camera. The predicted path, as of this writing, is across central Wisconsin (see map to the right). The predicted time is 8:53 UT (3:53 AM CDT). For the latest updates, go to the link below.

http://www.asteroidoccultation.com/2004_09/0905_107_1897.htm

One week later, on Sat, Sept 11, there will be a double header as the 12.4 magn asteroid, 914 Palisana, will occult two stars a minute apart. The first event is predicted for 4:11 UT (11:11 PM CDT) when a 9.6 magn star will be occulted. One minute later the shadow of a 7.2 magn star will pass south of the first path. The maps below show the path of the two events as of Aug 23. Again the predicted paths can change. The links below will provide details of each occultation.

http://www.asteroidoccultation.com/2004_09/0912_914_2478.htm

http://www.asteroidoccultation.com/2004_09/0912_914_1908.htm

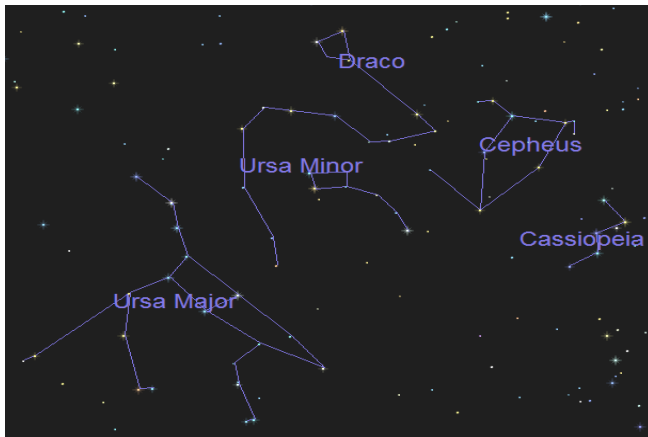


Observers should observe these type of events, even when the path is predicted to be a miss. First, although these predictions have gotten much better over the years, they can still be off by a path width or so. Second, some asteroids have been found to have natural satellites (moons). Most of these have been discovered by amateurs while observing occultations.

THE NEWBIE NOOK

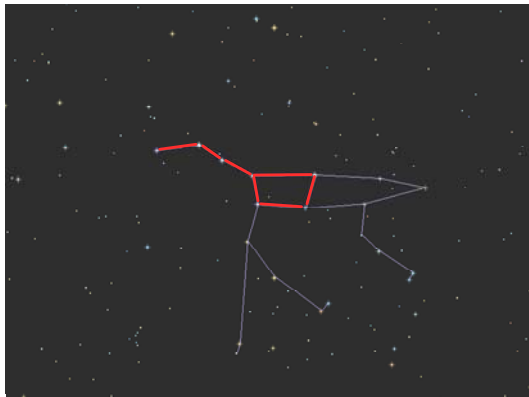
by Steve Diesso

The ability to find and locate astronomical objects is becoming a lost art. The availability of computer-driven telescopes has allowed new telescope owners to bypass this important step in their knowledge of the evening sky. I believe that becoming familiar with the constellations is a very important aspect of amateur astronomy. If you think of the sky as a globe of the earth, constellations are the countries. Once you can locate and identify a country, the cities and towns are a whole lot easier to find.



So, let's start with the Circumpolar Constellations. These are the constellations that are always visible from the northern hemisphere. Let's take a look at five of them.

Ursa Major (The Great Bear)

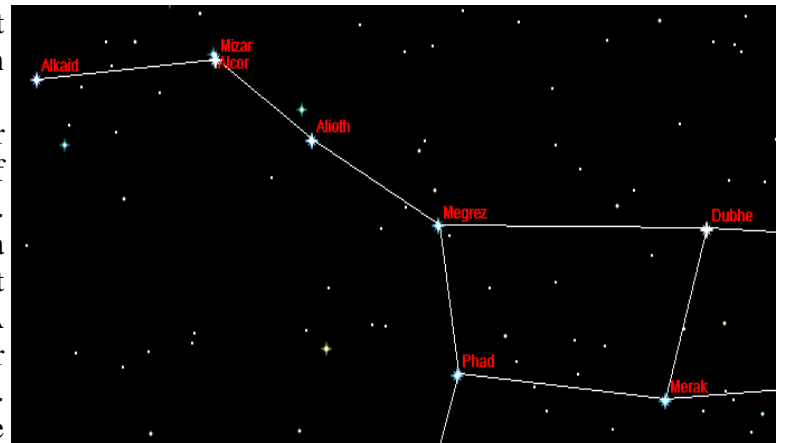


Most people believe that the big dipper (in red) is a constellation, but actually it is not. It is part of the constellation of Ursa Major.

The bowl of the big dipper is the central part of the main body of the bear. The head, fore and hind legs are visible to the west and south of the dipper. The handle of the big dipper represents the Great Bear's tail! Only one problem... bears don't have large tails. But according to myth, the Great and Little Bears were thrown up into the sky, stretching their small tails into large ones!!

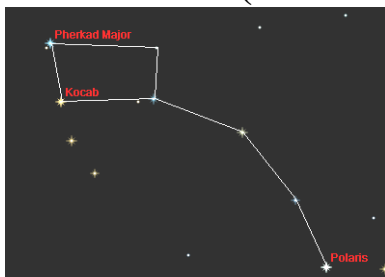
Of course, the Big Dipper is one of the most recognizable star patterns in the northern hemisphere.

A good visual challenge is the central star in the handle. Mizar and Alcor are a pair of stars that can be viewed with the naked eye. A good pair of binoculars (you should have a good pair if you took my advice in last month's column) will easily resolve them. A good telescope will reveal that both Mizar and Alcor are true multiple star systems. More details on double/multiple stars will be covered in a future column.



As any scout would know, a line drawn from the two stars on the bowl (Merak and Dubhe) will point to Polaris, also known as the North Star, in the constellation of Ursa Minor.

Ursa Minor (The Little Bear)

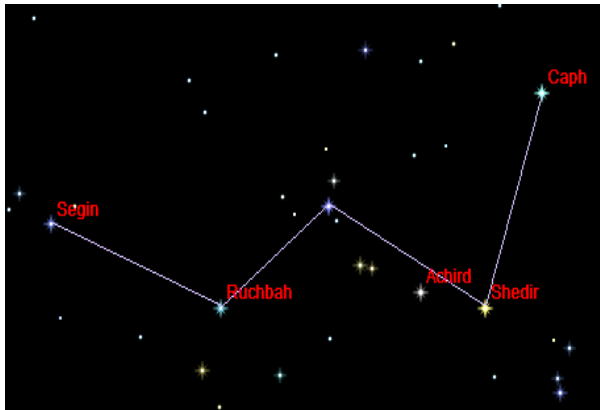


Ursa Minor is not as clearly defined as its larger counterpart. In fact, from most urban areas, including the MAS observatory site, only 3 of its 7 stars are easily visible. Of course Polaris, the North Star, never sets as seen from northern latitudes. It is positioned directly over the earth's north pole, so the entire sky seems to rotate around it from east to west. Contrary to popular belief Polaris is NOT the brightest star in the sky; it is actually a very average star.

Telescope owners with clock-driven equatorial mounts, must align their telescopes on Polaris so their telescope will easily track the stars.

The two other easily visible stars in the constellation are Pherkad Major and Kocab. The remaining 4 stars can be difficult to see from city and suburban skies due to light pollution and sky glow. If you can see them, then you either have very good eyesight, or you live in a dark sky location. If it's the latter, then consider yourself VERY LUCKY!!!

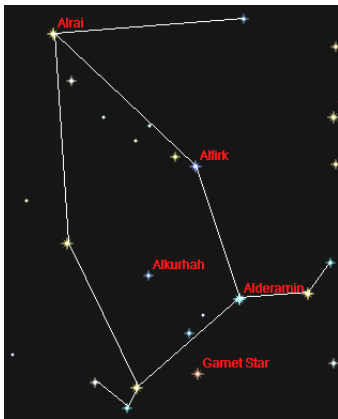
Cassiopeia (The Vain Queen)



This easily located constellation looks more like a W, E, 3, or M, depending on the time of night. Cassiopeia can be located by drawing a line from the handle of the Big Dipper through Polaris until you locate Cassiopeia.

According to mythology, Cassiopeia compared her daughter's beauty to the Sea Nymphs. They became angered, and the god Neptune/Poseidon forced her to sacrifice her daughter to the sea monster. Of course it all worked out when the hero Perseus saved the day, got the girl, and rode off into the sunset. Meanwhile, the gods placed Cassiopeia in the heavens where she perpetually circles the North Star on her head as punishment for her vanity!!

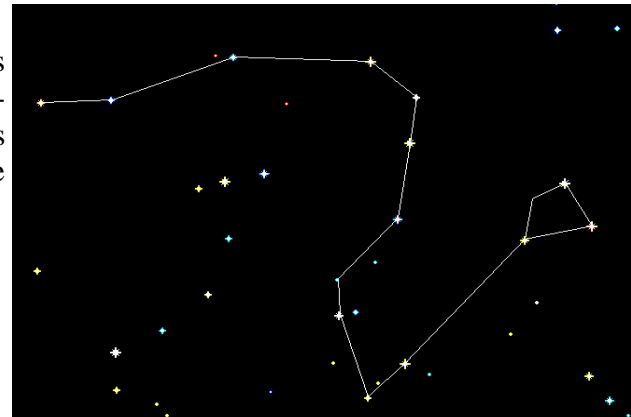
Cepheus (The King)



Cepheus is a very dim constellation located near Cassiopeia. It is supposed to depict the husband of Cassiopeia sitting on his throne. But to a baseball fan like me, I think it looks like home plate, or even a child's drawing of a house. Also, if you want to try to see a very nice double star, train your telescope on the star in the center of the constellation, Alkurhah.

Draco (The Dragon)

A long serpentine thread of stars winds its way between Ursa Major and Minor, ending with a diamond shaped head. Draco is one of the longest constellations in the sky. It is easily seen in the northern sky.



Since these are circumpolar constellations, they never set when viewed from Wisconsin or the remainder of the Northern Hemisphere. They are visible all night, every night of the year. So try using this article and your star charts to locate them.

According to the feedback from our newsletter editor, Jerry Bialozynski, it sounds like this column is needed, and wanted by our membership. Thank you for your support and again, drop me a line and let me know what topics you would like this column to cover. You can contact me at diessos@yahoo.com, and **please** attend the monthly meetings. Being a member of the club is much more fun when you participate.

Clear Skies!!

MAS Officers / Staff

President: Bob Manske (608) 849-5287
Vice President: Steve Diesso (262) 641-0331
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Gerry Samolyk (414) 529-9051
Assistant Observatory Director:
Paul Borchardt (262) 781-0169
Focal Point: Jerry Bialozynski (262) 895-7461

Upcoming MAS Events:

Sept 10 & Oct. 8 - Observatory Open Houses
Sept. 17 to 19 - MAS Campout

MAS Membership is open to anyone interested in Astronomy who wishes to enrich their knowledge of the Universe.
Yearly Membership Dues:
Individual \$34/yr, Family \$40, Non-resident (individual \$22, Family \$40), Student (under 18) \$16. For more information, contact Membership Chairman, Carlos Garces, 16430 Melody Drive, New Berlin, WI. 53151.
Phone: (262) 786-2623 Email : cgarces@wi.rr.com

Focal Point Publishing Guidelines
The "Focal Point" is published bi-monthly (Jan, March, May, July, Sept, Nov). Articles, Announcements, Graphics, Photos, Swap/Sale Ads etc. should be **submitted at least 10 days** prior to the first of the month (of the pending issue). Article inputs are preferred via email in a Text or Word compatible format. Submit Focal Point inputs to: **focalpoint@bialozynski.com**

Saturday Night Key Holder:

September
4 Jerry Bialozynski (262) 895-7461
11 Paul Borchardt (262) 781-0169
18 Tim Burrus (262) 548-6372
25 Steve Diesso (262) 641-0331

October
2 Brian Ganiere (414) 961-8745
9 Carlos Garces (262) 786-2623
16 Henry Gerner (414) 774-9194
23 Chris Hesseltine (414) 482-4515
30 Vern Hoag (262) 548-9130

November
6 Tim Hoff (262) 662-2212
13 Scott Jamieson (262) 896-0119

Loaner Telescopes (available to members for local use)

Lee Keith (Franklin) (414) 425-2331 8" Dob reflector
Scott Jamieson (Waukesha) (262) 896-0119 8" Dob reflector
Paul Borchardt (MAS site) (262) 781-0169 6" Dob reflector
Chris Weber (New Berlin) (262) 789-7128 8" Dob reflector

MAS Observatory (262) 542-9071

MAS Web Page: www.milwaukeeastro.org

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Wind Lake, WI 53185-5516

ADDRESS CHANGE SERVICE REQUESTED

**Next Board & General meetings of the MAS will be held on Sept. 24 & Oct. 15.
The Board will meet at 7:00 PM, the General Membership Meeting will follow at 8:00 PM at the Observatory.

