

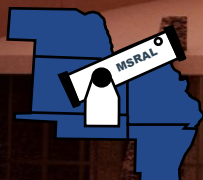
The Prairie Astronomer

December 2016 Volume 57, Issue #12

December Program: TMT Update Larry Stepp



Our guest speaker for the December meeting will be Larry Stepp, Telescope Department Head of the Thirty Meter Telescope Project. Larry is a Lincoln native and a member of PAC.



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT PAC MEETING: December 27, 6:30pm

At Mueller Planetarium

PROGRAM

Instead of the regular club meeting, we will have a private holiday gathering at Mueller Planetarium. Our guest speaker will be Larry Stepp, Telescope Department Head of the Thirty Meter Telescope Project. Larry is a Lincoln native and a member of PAC.

Larry Stepp will give us an update on the Thirty Meter Telescope Project.

FUTURE PROGRAMS

January: How to Use Your Telescope

CONTENTS

- 4 Meeting Minutes
- 5 Boller-Sivill Observatory Report
- 6 Astrophotography
- 9 Earl Moser Sundial
- 11 Observatory Update
- 12 Saturn
- 14 December Observing
- 15 Focus on Constellations
- 16 CubeSats
- 18 From the Archives
- 19 Club Information



Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy.

Order online from [Amazon](https://www.amazon.com) or [lulu.com](https://www.lulu.com).

EVENTS



PAC Meeting
Tuesday December 27, 2016, 6:30pm
Mueller Planetarium

PAC Meeting
Tuesday January 31, 2016, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday February 28, 2016, 7:30pm
Hyde Observatory

Newsletter submission deadline January 14

2017 STAR PARTY DATES



Photo by Brian Sivill

	Star Party Date	Star Party Date	Lunar Party Date
January	Jan 20th	Jan 27th	
February	Jan 17th	Feb 24th	
March	Mar 17th	Mar 24th	
April	Apr 21st	Apr 28th	
May	May 19th	May 26th	May 5th
June	Jun 16th	Jun 23rd	Jun 30th
July	Jul 14th	Jul 21st	
NSP	July 23rd - July 28th		
August	Aug 18th	Aug 25th	
September	Sep 15th	Sep 22nd	Sep 1st
October	Oct 13th	Oct 20th	
November	Nov 10th	Nov 17th	
December	Dec 15th	Dec 22nd	

Dates in **BOLD** are closest to the New Moon.



PAC E-MAIL:

info@prairieastronomyclub.org

PAC-LIST:

Subscribe through [GoogleGroups](#).
To post messages to the list, send to the address:

pac-list@googlegroups.com

ADDRESS

The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
P.O. Box 5585
Lincoln, NE 68505-0585

WEBSITES

www.prairieastronomyclub.org
<https://nightsky.jpl.nasa.gov>
www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
<http://www.darksky.org/>



Night Sky Network

PAC Meeting Minutes

Minutes for the meeting of November 29, 2016.

President Jim Kvasnicka called the meeting to order. Attending, 17 members and, at the beginning of the meeting (more may have come in later), 7 visitors were present for the program, "How to Buy A Telescope." Two responded to Jim's query of how they had heard about the program (for purposes of future promotional planning.) Both said they had read about it in the newspaper.

Upcoming events were noted:

- PAC star party at the farm December 2.
- "Santa Goes to Space" at the SAC Museum is scheduled for Saturday, December 3. We are looking for at least two PAC volunteers to set up a table.
- The December meeting will be at Mueller Planetarium, open to PAC members and their families. Larry Stepp will give an update on the 30-Meter telescope.
- The January meeting, on the 31st, will be "How to Use Your Telescope." Anyone can bring a

telescope that they might have received for Christmas and get help from club members on setting it up and using it.

- A reminder about the Great American Eclipse, August 21, 2017.

Jim discussed the benefits of club membership, and delivered his observing report which included upcoming star party dates, December 23 and 30 at the farm near Cortland.

Elizabeth Luther received her award for completing the Astronomical League's Sky Puppy program. She drew 15 constellations and identified them in the sky, described major stars and deep sky objects in those constellations, used binoculars to locate 5 deep sky objects, found the north star and milky way, and sketched a lunar crater to win her award. Jim said that she submitted a very detailed log for her first observing award, hopefully the first of many to come. Elizabeth is the first PAC member to complete the Sky Puppy program.

Jim brought us up to date on the status of the Zhumell telescope that the club acquired. We had voted to spend \$150 to provide a needed base. Ken Fiscus, an NSP attendee, has supplied the base for \$75. We were still missing the silver clutches, which were not available from the manufacturer/retailer, nor, after hours of fruitless searching on the Internet. Ken Fiscus came to the rescue again, finding a set for \$60. So, we will have spent \$135 on the scope, which will soon be available for checkout to club members.

Brian Sivill provided an update on construction at Branched Oak Observatory and planned star parties there.

The business part of the meeting concluded with some cautionary tips on telescope buying from Jim, who then adjourned to the program.

Submitted by
Lee Thomas,
Secretary

Observing Awards

Congratulations to 10 year old Elizabeth Luther for completing the Sky Puppy Observing Program. Elizabeth had to draw 15 constellations and identify them in the night sky. She has to identify and describe any major stars or naked eye objects in those constellations. Elizabeth had to use binoculars to locate and

identify 5 deep sky objects from a provided list. She was required to find the North Star, describe the Milky Way, and make a rough sketch of a lunar crater. Besides all of this Elizabeth provided excellent observing logs. Congratulations again to Elizabeth on her first observing award.



Boller-Sivill Observatory - Construction Update

Brian Sivill and Brett Boller

December has brought some pretty harsh weather, but it didn't seem to slow progress.

Early in the month, a full crew of volunteers helped erect a ham radio tower which will hold our wi-fi bridge, providing internet to the whole observatory grounds. Internet access will be an essential feature when we make the (warp) jump to full remote control. The same day, our volunteer crew took down three dead or dying trees. Brett and I were sore for days!

A few weeks later, we managed to get our solar panels re-configured after high winds had knocked them down. We pop-

riveted the cheap metal frames which support the panels.

On another visit, Brett did the rough-in and base wiring of the 120v system for the control room. This sets the stage for getting some PCs powered up to control telescopes, cameras and accessories.

But the *really big* news is that the 150mm Esprit refractor was permanently installed on a new pier support system!

The steel pier extension was designed by Brian and built by machinist Doug Hodgin. The end result is a very rigid support, fully isolated from the observatory building, making



the telescope very stable. This is one more critical step toward a fully-operational facility. Excitement continues to build for all of us involved!

Brian & Brett
for the Boller-Sivill Observatory



Astrophotography



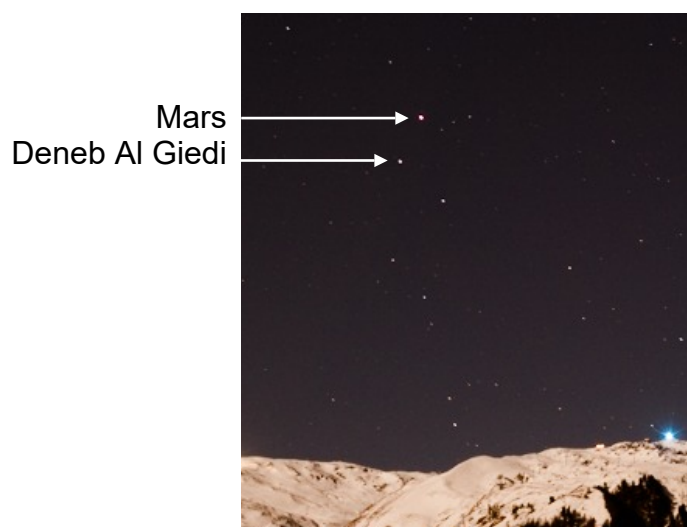
Above: the Gornergrat Observatory, Zermatt, Switzerland. December 10. These photos were taken with a Lumix GX8 with 14-42mm lens, f/5.6, 1/1000 sec.

Left: the Matterhorn. Panasonic Lumix GX8, 20mm prime lens, f/2.5 at 25 seconds, ISO 200. December 11 at 7:24pm UT.

Photos by Mark Dahmke.



*The Matterhorn. Panasonic Lumix GX8, 20mm prime lens, f/2.5 at 15 seconds, ISO 200.
December 11 at 7:00pm UT. Photo by Mark Dahmke.*





Boller-Sivill Observatory, December 11



Dedication of the Earl Moser Sundial

The dedication of the Earl Moser sundial took place on November 26th at Hyde Observatory.

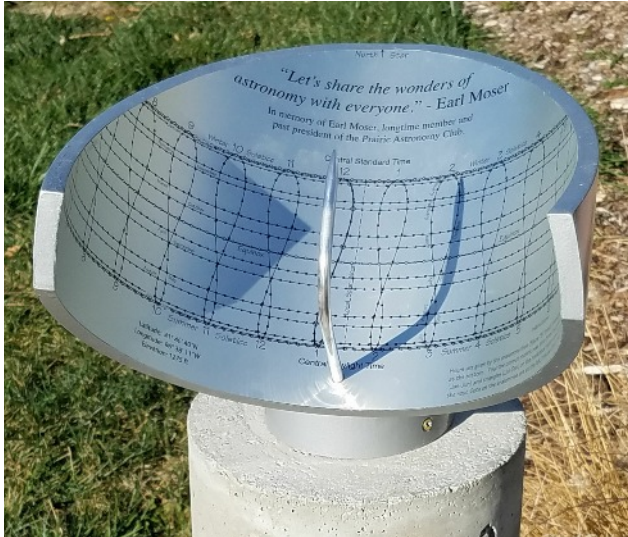
Earl joined PAC in the early 1960s. He became Vice President in 1963 and served as President for 10 years. As President, Earl conducted our meetings, appointed club officers, advised many beginning amateur astronomers, presented programs, settled disputes,

conducted correspondence for the club, and maintained the club observatory.

He hosted countless star parties, entertained and housed visiting amateur astronomers from outside our area, supported the Gateway sky shows (which is how he found PAC), provided refreshments at the meetings and organized yearly picnics. He also helped plan Hyde Observatory and aligned the foundation for the building.

It is largely because of Earl's efforts that we are affiliated with the Astronomical League. He organized the Mid-states Convention that PAC hosted in 1969.

The sundial was custom designed for the Hyde location by Scientific Sundials of St. Joseph, Missouri. It features a highly accurate chart with markings for every ten minutes.



Above left: closeup of the sundial. Above right: Marjorie Moser, unveiling the sundial. Below: panoramic by John Reinert.





This photo was taken with a Ricoh Theta S 360° photo sphere camera. It was then processed with PTGui to create this Stereographic projection called "Tiny Planet."

Photo by Mark Dahmke.

Observatory Update: SH-170

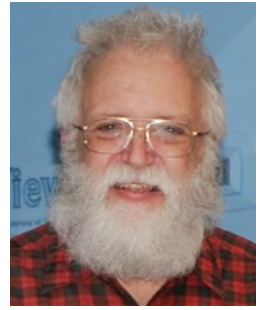
Rick Johnson

Sh-170 is an emission nebula in the northwestern corner of Cassiopeia not far south of Sh-171 on the Cepheus-Cassiopeia border. It is a round emission nebula with the open cluster Stock 18 at its center. Toward the left of the somewhat dark center is BD+63 2093p which is an O8V or O9V star. Galaxy Map says it has a mass 31 times that of the sun. There seems to be

some disagreement. It is considered the illuminating star for the nebula. One distance measurement I found puts it 7500 light-years distant. The visible part of the cloud is thought to have a mass of about 900 suns give or take 10%.

This image was originally taken back in 2009, processed then forgotten. I can't find I ever

posted it anywhere. I didn't have the processing tools in 2009 I do now so I reprocessed it to some extent.





Watching the Wave Maker

*Image credit: NASA/JPL-Caltech/Space
Science Institute*

Watching the Wave Maker

Saturn's moon Daphnis raises waves wherever it goes. In fact, such waves are one way that scientists search for undiscovered moons in the ring gaps. But they can tell researchers a lot of other things, as well.

The waves that Daphnis (5 miles or 8 kilometers across) raises on the edges of the Keeler Gap can also be used to deduce the moon's mass and even some of its orbital behavior. Since the moon moves in and out of the ring-plane, and closer to and farther from the rings' edges as it orbits, the waves it makes change over time. Cassini has been observing these changes during its extended study of the Saturn system to help understand this interaction.

For more about the effects of the vertical motion of Daphnis, see PIA11656.

This view looks toward the sunlit side of the rings from about 35 degrees above the ring plane. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on Oct. 10, 2016.

Daphnis has been brightened by a factor of two in this image to increase its visibility.

The view was obtained at a distance of approximately 810,000 miles (1.3 million kilometers) from Daphnis and at a Sun-Daphnis-spacecraft, or phase, angle of 96 degrees. Image scale is 5 miles (8 kilometers) per pixel.

The Cassini mission is a cooperative project of NASA,

ESA (the European Space Agency) and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colorado.

For more information about the Cassini-Huygens mission visit <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini>. The Cassini imaging team homepage is at <http://ciclops.org>.

January Observing: What to View

Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Venus: Sets about 4 hours after the Sun at a brilliant -4.7 magnitude.

Mars: To the upper left of Venus.

Neptune: On January 1st Neptune is just 0.2° above Mars. On January 12th it passes 0.4° from Venus.

Uranus: High in the WSW after nightfall.

Jupiter: Rises in the middle of the night at magnitude -2.1 with a disk 39" wide.

Saturn: Low in the southeast at dawn.

Mercury: To the lower left of Saturn after January 5th

Messier List

M33: The Pinwheel Galaxy in Triangulum.

M34: Open cluster in Perseus.

M52: Open cluster in Cassiopeia.

M74: Galaxy in Pisces.

M76: The Little Dumbbell Nebula in Perseus.

M77: Galaxy in Cetus.

M103: Open cluster in Cassiopeia.

Last Month: M2, M15, M29, M31, M32, M39, M110

Next Month: M1, M35, M36, M37, M38, M42, M43, M45, M78, M79

NGC and other Deep Sky Objects

Collinder 69: Open cluster in Orion.

NGC 1907: Open cluster south of M38 in Auriga.

NGC 1980: Emission nebula south of the Orion Nebula.

NGC 1981: Open cluster north of the Orion Nebula.

NGC 2169: The 37 Cluster in Orion.

Double Star Program List

Beta Orionis: Rigel, bright white and dim blue pair.

Delta Orionis: Mintaka, bright white and pale blue stars.

Struve 747: Pair of white stars.

Lambda Orionis: Two white stars.

Theta 1 Orionis: The Trapezium.

Iota Orionis: Bright white and blue stars.

Theta 2 Orionis: Three white stars.

Sigma Orionis: White primary with three pale blue stars.

Zeta Orionis: White primary with two white secondary stars.



Challenge Object

B33: The Horsehead Nebula in Orion. Dark skies and a Hydrogen Beta filter are needed to see it.

The Great American Total Eclipse August 21, 2017



Planning your eclipse trip? Take a look at Fred Espenak's presentation on YouTube:

<https://www.youtube.com/watch?v=K4KnxE6yAul>

Focus on Constellations: Orion

Jim Kvasnicka

Orion the Hunter is perhaps second only to the Big Dipper in Ursa Major as the most recognizable star pattern in the sky. It covers 1,231 square degrees. Orion is accompanied by his faithful dogs, Canis Major and Canis Minor. Together they hunt various celestial animals including Lepus the rabbit and Taurus, the Bull. The three bright stars Alnitak, Alnilam, and Mintaka make up Orion's belt. Betelgeuse forms Orion's left shoulder. Hanging down from Orion's belt is his sword. The central star of his sword is not really a star, but the Great Orion Nebula, M42, one of the most famous and observed objects in the sky. Besides M42 Orion has two additional Messier objects in bright nebulae M43 and M78. The constellation Orion is best observed in January.

Showpiece Objects

Open Clusters: NGC 1981, NGC 2169 (The 37 Cluster)

Bright Nebulae: M42 (The Orion Nebula), M43, M78, NGC 1977, NGC 1980

Multiple Stars: Beta Orionis (Rigel), Delta Orionis (Mintaka), Theta 1 Orionis (The Trapezium), Sigma Orionis

Dark Nebulae: B33 (The Horsehead Nebula)

Mythology

Orion, the son of Neptune, boasted that so great was his might and skill as a hunter that he could kill all the animals on Earth. Gaea, Goddess of Earth, was alarmed by such a boastful statement. Gaea was afraid that Orion might try to carry out

his boast. Gaea sent a giant scorpion and ordered the beast to sting Orion. After a brief battle the scorpion stung Orion in the heel (the star Rigel) and he died. Both Orion and the scorpion were given honored places in the sky, but they were placed at opposite ends of the sky dome so they would never engage in battle again.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 0

Open Clusters: 11

Planetary Nebulae: 0

Bright Nebulae: 9

Dark Nebulae: 6



Photo: Till Credner - Own work: AlltheSky.com

Big Science in Small Packages

This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit spaceplace.nasa.gov to explore space and Earth science!

Marcus Woo



About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one,

dubbed MinXSS ("minks") is NASA's first CubeSat with a bona fide science mission.

Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares – eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.



Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat,

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of

waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The \$1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a

second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.

If you'd like to teach kids about where the sun's energy comes from, please visit the NASA Space Place:

<http://spaceplace.nasa.gov/sun-heat/>

WHERE TO GO ON EARTH TO GET THE INTERPLANETARY EXPLORER EXPERIENCE

PLUTO, MOON (NIGHT) — MT. EVEREST AT NIGHT
MERCURY (NIGHT)
MOON (DAY) — MT. EVEREST AT NOON UNDER A TANNING LAMP
MERCURY (DAY) — A LAVA FLOW ON A VOLCANO AT NOON
VENUS — A HEAT-SHRINK WETSUIT IN A BLAST FURNACE
MARS — MT. EVEREST AT SUNSET
TITAN — WAIST-DEEP IN AN OUTGASSING SIBERIAN SWAMP
JUPITER-NEPTUNE — JUMPING FROM A HIGH-ALTITUDE BALLOON OVER AN ANTARCTIC OCEAN WINTER STORM

From the Archives: December, 1990

By Dave Knisely

Ah Christmas! This holiday, more than any other, takes me back to my beginnings as a young amateur astronomer. I got my first "good" telescope on Christmas morning 22 years ago, and for several nights afterwards, I would just sit in a lawn chair in the back yard under a cold December moon with my brand new 2.4 inch refractor, feeling an incredible sense of power. This was MY TELESCOPE, the long awaited instrument that would take me to the stars!

Often, I would wonder eagerly just what views awaited me as I sat in the cold. I had visions of Martian markings and Saturnian rings, of distant nebulae and galaxies, just waiting for me to explore. It was a little

disappointing when I found out just how difficult and dim Deep Sky objects were, but that feeling of power still remained, egging me on to go deeper and fainter. I learned most of the techniques I use today to push my vision to its ultimate limits on that little 2.4.

I have long since gone to using large apertures and fancy filters for much of my viewing, but I still have my little beat-up 2.4, stored in my closet. On its side are the faint marks of the tape I used when I strapped a 2 inch reflector to it, and the dent in its tube tells of when it crashed against the mount of my eight inch after the cradle broke. I still have the crude drawings I made with it and the notes I

took while learning where things were.

My 2.4 inch refractor reminds me of my beginnings, and helps me realize just how incredibly far I have come in this wonderful hobby of mine. At star parties, some people seem amazed at how quickly and easily I find faint and obscure objects without star charts or setting circles. They are sometimes astounded when I correctly identify the number of a faint galaxy after only a single glance. I owe all this ability to one very special Christmas gift given so many years ago, and to the years of wonderful experience which it gave to me. To this day, it is the best gift I ever received.

Editor's note: I ran across Dave's editorial in the December, 1990 PAC newsletter and then realized that I got my first 3" telescope the same year Dave received his scope. Like Dave, I still have my 3" Tasco stored away in the closet. That little scope was one of the best gifts I ever received and saw many hours of use through high school and college. In spite of being a "department store" scope - one of those that we often dismiss - it was a good starter scope.

The best scope is the one that you use. I've always recommended small refractors to beginners. They're light-weight, easy to set up and don't require collimation. For beginners, collimation and polar alignment just get in the way of enjoying their telescope and the night sky. If you're on a budget, I think a small refractor is a great "grab and go" scope.

—Mark Dahmke



CLUB MEMBERSHIP INFO

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: David Pennington
10 inch Meade Dobsonian: Lee Taylor
13 inch Truss Dobsonian: Available

CLUB APPAREL



Order club apparel from cafepress.com:



Shop through Amazon Smile to automatically donate to PAC:



CLUB OFFICERS

President	Jim Kvasnicka (402) 423-7390 jim.kvasnicka@yahoo.com
Vice President	Brett Boller
2nd VP (Program Chair)	Mark Dahmke
Secretary	Lee Thomas
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Mike Kearns mkearns@neb.rr.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular \$30/yr, Family \$35/yr.** Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585.** For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505** or mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.