Highlights of the
August Sky. . .

- - - 1st - - -
Dawn: Venus dominates morning sky all month.

- - - 5th - - -
Neptune at opposition

- - - 7th - - -
Last Quarter Moon

- - - 9th - - -
Pleiades above, Hyades below crescent Moon

- - - 11th - - -
Dawn: Venus below crescent Moon

- - - 12th - - -
Perseid Meteor Shower
Dawn: Venus right of Moon

- - - 13th - - -
Dawn: Saturn lower right, Pollux left of crescent Moon.

- - - 15th - - -
New Moon

- - - 17th - - -
AM: Venus at greatest elongation; visible high in east.
Dusk: Jupiter left of Moon

- - - 18th - - -
Dusk: Jupiter lower right of crescent Moon.

- - - 20th - - -
PM: Spica lower right of crescent Moon.

- - - 23rd - - -
PM: Antares lower left of Moon.

First Quarter Moon

- - - 26th - - -
AM: Venus within 5° of Saturn for next 10 mornings.

- - - 29th - - -
Full Moon

- - - 31st - - -
AM: Saturn 2° upper left

Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ **August 2004** ☆ ☆ ☆

This Months KAS Events

Observing Session: Saturday, August 7 @ 8:30 pm
Kalamazoo Nature Center

Perseid Potluck Picnic: Saturday, August 14 @ 6:00 pm
Kalamazoo Nature Center -- See Page 3 for Details

Observing Session: Saturday, August 21 @ 8:00 pm
Kalamazoo Nature Center

Astrophoto Workshop: Sunday, August 22 @ 8:00 pm
Kalamazoo Nature Center

Inside the Newsletter. . .

July Meeting Minutes

The July General Meeting of the Kalamazoo Astronomical Society was called to order by President Richard Bell on Friday, July 9, 2004 at 7:11 pm EDT. Approximately 28 members and guests were in attendance at the Kalamazoo Area Math & Science Center.

Richard commented on how fortunate we were to have power in the building. Electrical work was being performed at Old Central that day and the power wasn't turned back on until *exactly* 7:00 pm. A close call to be sure! The KAS would also like to thank KAMSC secretary Barbara Hunt for getting us in the building. Mike Sinclair was still working in Sunspot, New Mexico for the summer.

Our featured speaker of the evening was long-time on again and off again KAS member and Planetarium Coordinator of the Kalamazoo Valley Museum Eric Schreur. Eric's presentation was entitled "Cassini-Huygens Missions to Saturn and its Moon." Eric started off by giving a brief history of exploring Saturn with robotic spacecraft. The first craft to flyby Saturn was *Pioneer 11* in 1979. This was followed a year later by *Voyager I* and then a year after that by *Voyager II*.

Eric then went into the long and all to familiar series of design challenges, funding cut backs, and general NASA red tape that seem to haunt every project. Eric then listed the mission objectives of the *Cassini* orbiter and *Huygens* lander. We were then treated to only a handful of the latest images of Saturn, Phoebe, and Titan.

After the break Richard gave a brief president's report and took a quick survey of those that witnessed the Transit of Venus. At least 90% of those in attendance were lucky enough to witness the rare event. Richard encouraged everyone to give a report at the Perseid Picnic (see page 3).

Several members reported observing the Russian booster that reentered the atmosphere on June 28th. Mark Miller reported the completion of the A.L. asteroid program. Congratulations Mark! Beverly Byle encouraged everyone to attend the Enchanted Skies Star Party held in New Mexico at the beginning of October. If enough members attend then we can get a group discount. We also talked about the close call the Large Binocular Telescope on Mount Graham (near Safford) had with the recent outburst of forest fires in Arizona.

Vice President Jack Price played the News 3 coverage of our Transit of Venus observing session at the top of the Borgess parking ramp (see page 4 for a report). The meeting concluded at 9:06 pm.

KAS Board Meeting Minutes

The officers of the KAS assembled for a board meeting on Sunday, July 11, 2004 at Sunnyside Church. President Richard Bell brought the meeting to order at 4:15 pm. Other officers in attendance include Jack Price, Frank Severance, and Carol & Bill Van Dien.

First on the agenda was comments on our participation at the Kindleberger Festival held in Parchment on July 10th. Bill quickly commented that it was "hot"! It was pretty humid that day and we had many clouds in the morning. It did clear up in the afternoon, so we were able to get in some solar observing. Richard and Jack commented on the spectacular prominence they observed. It developed, grew, broke away, and dissipated all in a 5 minute time span!

Jack thought attendance was as good as last year, but both Richard and Carol thought we had more people pass by our location the year before. Jack said he would try to ask for a better location next year.

Richard ended the discussion by mentioning how badly we need a large banner. He promised to shop around for the best price when he had the chance. Any suggestions from the membership would be greatly appreciated.

Richard discussed his disappointment on the low attendance we had at the July 10th public observing session. The weather certainly wasn't ideal that night, but he wondered what we could do to increase attendance.

We decided it would be best to find some volunteers to form a publicity committee. Right now, Richard sends press releases on our general meeting and observing sessions while Carol covers the Young Astronomers. It's not easy keeping up with publicity when they're both busy with other duties. Richard decided to make an effort to find at least a family couple that would be willing to take on this *very* important task.

Preparations for the tenth annual Perseid Potluck Picnic were then discussed. Jack will make sure protection against the elements will be setup if needed. Bill volunteered to purchase the hamburgers, hot dogs, and veggie burgers along with the appropriate condiments. Frank will bring coolers with ice and Jack will bring a grill.

We then briefly discussed an event the Kalamazoo Valley Museum will be holding on October 2. We've been invited to at least setup a table and pass out KAS literature. Carol will keep in contact with the museum about helping out with hands-on activities. More to come as the details become available. The meeting concluded at 5:20 pm.

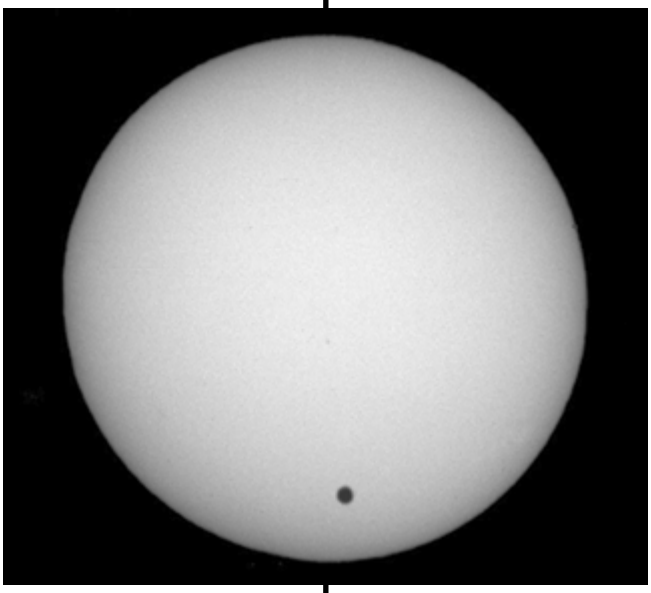
Observations (of the Transit of Venus)

By Richard S. Bell

After all the waiting, all the reading, and all the planning it's hard to believe that June 8th has come and gone. I'm just glad all the effort wasn't for nothing. I successfully observed the Transit of Venus! My Venus Transit adventure began on Saturday, June 5th when Rich Mather came to pick me up in his Honda *Odyssey* mini-van.

We reached our destination (Portland, Maine) on Sunday, June 6th at 2:45 pm EDT. We picked an odd time to arrive in Portland. The "Old Port Festival" was being held that day, so many of the city's interior streets were blocked off and filled with thousands of people.

Our task on Monday was to scout out observing locations. The weather was still looking gloomy, so Rich tried calling Bill Nigg several times throughout the day without success. My weather radio said that "tenacious clouds" were hanging over our area, but that northern New Hampshire was enjoying sunshine. It also started reporting early morning fog, so we knew we'd better start looking for higher elevations We decided to head to Portsmouth, NH where they were indeed in the sun.



Time was running out, so Rich decided to call Bill again from the Portsmouth Library. Finally, he answered his phone and he found a good, high spot near Cape Neddick, Maine. So, Rich and I headed back to Maine and met Bill and his wife Mary on the top of Mount Agamenticus (Latitude: 43° 13' 30" N, Longitude: 70° 41' 30" W).

After getting a quick bite to eat in York Beach, we headed back up to Mount A and I set up my equipment. The fog started rolling in off the Atlantic Ocean just as I finished. I was hoping to polar align and collimate my scope, but the fog became too thick. So, everyone tried to get some sleep. Bill and Mary were comfy in their camper and Rich lied down in the back of his van. I just crashed in the front passengers seat knowing that I wouldn't get a wink of sleep.

Around 4:00 am I heard Bill knocking at the window telling us to wake up. I told him I wasn't asleep, but he didn't believe me! I glanced out the window and actually saw a few stars in the sky! When I got out of the van I spotted the Waning Gibbous Moon with a nice moon-dog around it. The air was still pretty foggy, but it was slowly improving. Sunrise for our location was at 5:04:57 am EDT.

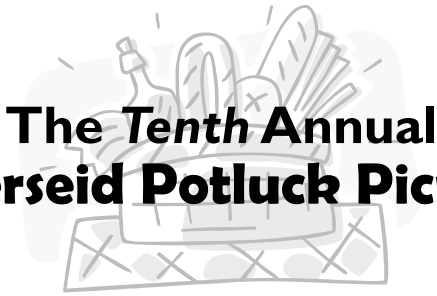
So, we decided to have breakfast while we waited for the sun to rise. The fog from the Atlantic finally cleared out around 30 minutes before sunrise, but then more fog rolled in from the north! It never managed to get very dense though because a warm breeze came in from the opposite direction and cleared everything away. Amazing!

I observed the transit with a Baader solar filter on my 10" Schmidt-Cassegrain and a Coronado SolarMax 40 Hydrogen Alpha filter on my Tele Vue Pronto 70mm f/6.8 refractor. I can consider myself to be one of the first (of thousands) to see the Venus Transit in H-alpha. I didn't see any major prominences that day, but Venus appeared blacker in H-alpha than it did in the white light filter.

After everyone got a peak at the transit in H-alpha I attached my Philips ToUcam to the Pronto and my 35mm SLR camera to the SCT. I used my Lumicon Giant Easy Guider (with built in focal reducer) to photograph the Sun at f/6.3. The light meter in the camera helped me with the proper exposure, but I made sure to bracket just in case.

Its unfortunate Venus transits are so rare, because it was so much fun to observe. After taking all my pictures I wanted to put the eyepieces back on and watch the final minutes of the transit firsthand. Contact III occurred precisely at 7:05:41 am EDT and Contact occurred at 7:25:38 am EDT; although I was able to observe the transit for another 3 minutes or so in H-alpha.

The Transit of Venus was now over – not to return until June 6, 2012. I'm already making plans! I slowly packed up all my gear and then took a quick tour of Mount A and then Rich and I began the long trip home. We watched the sunset while crossing through Ontario, Canada , which I found both ironic (since we watched the sun rise) and fitting, since it was a perfect end to a historic day.



The *Tenth* Annual Perseid Potluck Picnic

Kalamazoo Nature Center
Saturday, August 14th
Arrive at 6:00 pm EDT
Dinner begins at 7:00 pm EDT
Observing after sunset (weather permitting)

Mark your calendar. Pray for good weather. It's time for the big social event of the year for the KAS. So get ready to party! Here are the details:

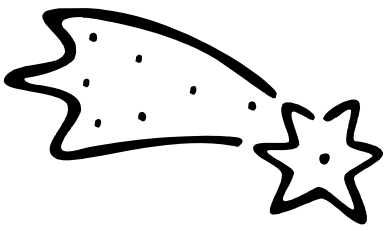
The KAS will provide the hot dogs, hamburgers, and veggie burgers. You will be required to bring your own beverages, table service, lawn chairs, bug spray, and a dish to pass. Condiments will be provided by the KAS.

While dinner is cooking we will have solar observing available through the 12" Schmidt-Cassegrain in Owl Observatory and other KAS member telescopes. Feel free to bring any type of outdoor games or toys to pass the time while we wait for dinner.

We'll also have a special "What I Did on My Summer Vacation" slide show in the Amphitheater; with a special emphasis on *Transit of Venus* reports. Members are encouraged to tell their tale of observing the historic June 8th event, but we'd like to hear any other astronomically themed vacations you've taken this summer as well. Both a slide and LCD projector will be setup, so bring your slides (digital or otherwise). We'll also try and have a VCR and DVD player setup so bring your home movies!

Stargazers should be prepared to observe the deep sky delights of the summer Milky Way and maybe even a few left over Perseid meteors.

This gathering will take place rain or shine, so be prepared for whatever Mother Nature throws our way!



Space Place

By Diane K. Fisher

The evening of June 30, 2004, was nail-biting time at Cassini Mission Control. After a seven-year journey that included gravity assist flybys of Venus, Earth, and Jupiter, Cassini had finally arrived at Saturn. A 96-minute burn of its main engine would slow it down enough to be captured into orbit by Saturn's powerful gravitational field. Too short a burn and Cassini would keep going toward the outer reaches of the solar system. Too long a burn and the orbit would be too close and fuel reserves exhausted.

According to Dave Doody, a Cassini Mission Controller at the Jet Propulsion Laboratory (JPL) in Pasadena, California, there was a good chance the Earth-bound Cassini crew would have to wait hours to learn whether or not the burn was successful. Of the three spacecraft-tracking Deep Space Network (DSN) complexes around the globe, the complex in Canberra, Australia, was in line to receive Cassini's signal shortly after the beginning of the burn. However, winds of up to 90 kilometers per hour had been forecast. In such winds, the DSN's huge dish antennas must be locked into position pointed straight up and cannot be used to track a tiny spacecraft a billion miles away as Earth turns on its axis. "The winds never came," notes Doody.

The DSN complex at Goldstone, California, was tracking the carrier signal from Cassini's low-gain antenna (LGA) when the telltale Doppler shift in the LGA signal was seen, indicating the sudden deceleration of the spacecraft from the successful ignition of the main engine. Soon thereafter, however, Goldstone rotated out of range and Canberra took the watch.

After completion of the burn, Cassini was programmed to make a 20-second "call home" using its high-gain antenna (HGA). Although this HGA signal would contain detailed data on the health of the spacecraft, mission controllers would consider it a bonus if any of that data were actually captured. Mostly, they just wanted to see the increase in signal strength to show the HGA was pointed toward Earth and be able to determine the spacecraft's speed from the Doppler data. If possible, they also wanted to try to lock onto the signal with DSN's closed-loop receiver, a necessary step for extracting engineering data.

Normally it takes around one minute to establish a lock on the HGA signal once a DSN station rotates into range. Having only 20 second's worth of signal to work with, the DSN not only established a lock within just a few seconds, but extracted a considerable amount of telemetry during the remaining seconds. "The DSN people bent over backwards to get a lock on that telemetry signal. And they weren't just depending on the technology. They really know how to get flawless performance out of it. They were awesome," remarks Doody.

KAS Members Observe The Transit of Venus

The Borgess Parking Deck Gathering

By **Molly Williams**

The gathering on the top level of the Borgess Hospital parking structure was arranged by Jack Price, who had found this location in Kalamazoo with the necessary features -- high elevation and a good eastern horizon -- and had gotten permission from Borgess security personnel to use this location to view the transit.

Jack had gone there early on Saturday morning (three days prior to the transit) to identify and mark the locations on the ramp that would provide a view of the sun unobstructed by a chimney and the taller hospital buildings. Security, seeing him on their security cameras, came up to ask what he was doing there at sunrise on Saturday. They had not yet been told of the impending transit three days later.

Photo courtesy of Becky & Kalman Csia

Tuesday, the day of the transit, the group began gathering about 5 am, including several KAS members: Jack Price, Bob Havira, Frank Severance, John Miller, Molly Williams, Carol Morin, Norm Terry and others. [There were several more, but I don't know everyone's name.]

At sunrise (6:05 am), a low eastern haze resulted in very red and subdued sun. However, after a few minutes, as the sun climbed out of haze, Venus became visible – a little black dot at about 5 o'clock on the sun's disk. For the next hour the sky was gloriously clear, highly unusual for Michigan, and it was possible to follow Venus as it moved slowly toward the lower right edge of the sun. John Miller found two small sunspots. However, solar activity was low on this occasion.

A bank of clouds passed over during the time of third contact (around 7 am) and remained intermittent through the conclusion of the event (around 7:30 am). However, we got a clear view of fourth contact and the departure of planet Venus as it continued to separate from the sun.

Both WKZO and WWMT were present to talk with the observers. There were several minutes of coverage on the local news throughout the day on channel 3 (CBS).

Viewers brought a variety of instruments – telescopes, binoculars, and eclipse glasses, all with appropriate solar filters, of course. Many had designed their filter holders from PVC plumbing parts or other hardware items to hold the solar film provided at a recent KAS solar filter workshop held to prepare for the transit.

Maximum attendance was about 30, including Michigan State Senator Dr. Tom George and his family, and numerous Borgess hospital personnel. Thanks to Jack for making the plans for this viewing site.

☼☼☼

Expedition to Lake Huron

By **Greg Sirna**

June 8, 2004 held an unprecedented event in our lifetime, the Transit of Venus, last seen on December 6, 1882. Many great men and women have traveled to distant parts of the world to view the transit of their time. Although our group did not travel thousands of miles over land and sea, the journey was never the less exciting. Just knowing that we were about to see a celestial event that had not been seen by any living being was shear bliss.

Our group consisted of Beverly Byle, Mark & Ninah Miller, Mike Sinclair, Bill Van Dien, Roger Williams and I. We set out from Kalamazoo the day before so we could set up our instruments in time for the great event. We headed to the one of the darkest (at night) and easterly points of Michigan, the home of Ken and Lucy Wayco on the shore of Lake Huron, about 8 miles north of Port Sanilac (Located at W 82° 32' 24.0", N43° 25' 48.0 to be exact). The Wayco's are my college roommate's parents, whom I have kept in contact with ever since and were more than happy to allow our group to use their home. After a hearty welcome from the Wayco's, we set up our equipment on their front lawn bluff overlooking Lake Huron.

I brought both my Burgess Optical refractors. A 127mm f/8 and a 102mm f/6 to set up on my CG-5 mount. Roger had his Coronado MaxScope 60 and his exquisite folded reflector. Mark and Mike brought their 8" SCTs, Beverly had her binoculars and Bill brought his Nexstar 114GT. To view the Transit, we had a variety of solar filters. [A few weeks before the KAS held a workshop to make solar filters for our instruments out of Baader Solar Film for those who did not have a solar viewing device.] Mike also had his Nikon digital camera and Roger had his web cam along with his laptop.

Mike Sinclair (front) among others on the shore of Lake Huron observing the transit.

Then it was off to a nearby eatery for some local cuisine. When we returned to the Wayco's observing station, the sky was getting quite dark. The weather was perfect, warm, not too humid and only a few clouds in the sky. Those clouds quickly evaporated after the 9:11 pm sunset. Jupiter was setting and the Milky Way was beginning to shine. Living in Centreville, with all its light pollution, I had forgotten what the Milky Way looked like. It was stretched out across the eastern sky over the lake. Mike and Roger pointed out some of its highlights for me. I set up my 127 mm on Roger's GEM and he hunted down the comets out that night. Roger is a keen astronomer, fun and informative to observe with. As it getting late and an early sunrise loomed, it was time to get some rest. Some members slept next to their telescope, some in tents or in the hospitality of the Wayco's spare beds.

The sun rose at 5:50 am, but it would be a little over an hour before we would be able to see our shining star. The Wayco's were able to roust some of the local area science teachers and their students so we had more observers to view the transit. We were blessed with a clear sky and no dew. The dew point was 62°, yet the low for night was only 66°, so all our equipment was dry. The winds were light out of the southwest at 5 mph. The visibility was 7 miles.

I had my 102mm f/6 with my Baader Solar filter ready. I was using my Seibert 19mm WA to find the Sun and then my UO 9mm orthoscopic to view the Transit. At about 6:45 am the sun was beginning to rise out of the muck. As the sun came into view, the atmospheric turbulence was very much evident. When the Sun rose to 11.4° at about 7:05 am, a cheer was heard as the Transit of Venus came into view out of the turbulent atmosphere for the Egress Interior Contact. According to the U.S. Naval Observatory the Solar Semi-diameter was 15' 45.4" and the Semi-diameter of Venus was 0' 28.9". The beginning of the transit, the Ingress Interior Contact and the Least Angular Distance phenomenon, all occurred below the horizon. There were also a few sunspots to view while the transit occurred. Through the Baader Solar filter, Venus appeared as a black disk against the white Sun. I could see the planet Venus floating in space crossing our Sun and see how small she was in comparison.

The Transit ended at 7:25 am with the Sun rising to 14.8°. I unfortunately, did not observe the black drop effect as Venus drifted away from the solar disk. Maybe I did not have enough magnification. However, being able to see a celestial phenomenon that was viewed or predicted by the great scientists of the past was exhilarating and truly an event of a lifetime.

☼☼☼

Cadillac View of the Venus Transit

By **Becky Csia**

Bar Harbor, Maine – Monday night we set our alarm for 4:15 to awaken well before Tuesday's 4:50 a.m. EDT sunrise. At my brother's suggestion, Kalman and I had traveled to Mount Desert Island, just off the coast of Maine and home to rocky, mountainous Acadia National Park. The mountains of Acadia NP aren't high when compared to the Rockies or even to the Appalachians. But the highest of them, Cadillac Mountain, at 1530 feet, is the highest point along the Atlantic coast north of Rio de Janeiro. And, as my brother had told us, sunrise is first visible on the continental US from the top of Cadillac Mountain. If all went well, we would have about two and a half hours to view the transit of Venus, Tuesday morning, June 8.

We arrived in Bar Harbor Saturday evening and spent the next two days exploring Acadia and planning our tactics for Tuesday morning. Saturday and Sunday were beautiful, sunny, cool days. In contrast, Monday opened with fog, which lifted to low overcast that shrouded the mountaintops. Although the sun broke through briefly late Monday afternoon, clouds soon filled the sky again as evening darkened into night. Yet the weather forecast for Tuesday called for partly sunny weather. We were hopeful. But we didn't sleep well as fog settled over Frenchman Bay. Our room faced east overlooking the bay. I was up several times to look out the window. The islands in the bay and the lights on the channel markers disappeared in the fog sometime after midnight.

We were awake before the alarm went off. Dense fog completely obscured our view of the bay and the sky. According to the Weather Channel, every reporting station in Maine (about a dozen places) described its weather as foggy or cloudy. We decided to stay put. We felt that driving elsewhere was not likely to improve our chances for clear skies. And we really didn't want to venture out on narrow winding roads in thick fog. It was now about 5:15. We went back to bed, setting the alarm for 6:15 – when we'd reassess our options.

Just as I was dozing off shortly after 5:30, I noticed the room brighten. (We had left our drapes open.) I leaped out of bed, ran to the window and there it was – the sun burning through the fog. I grabbed my solar-filtered, image-stabilized binoculars and Kalman grabbed his camera, equipped with a solar-filtered 400 mm (effectively 600 mm) vibration-reduction lens. Yes, a small, crisp, black dot was crossing the face of the sun. It was about 75% of the way across. Kalman snapped a few photos. Broken fog still filled the bay, allowing only intermittent views of sun. A look out the window to the west suggested clear skies above the fog. We decided to drive up Cadillac Mountain. As soon as we got to the edge of town, we could see the mountaintop – it was clear. Ten minutes later we were on the top.

To our surprise only about two dozen people had chosen Cadillac Mountain to view the transit. Most were from Maine, plus a group of Japanese tourists, a couple from Tennessee and two fellows from Baltimore (including a NASA astronomer who observes with the Hubble Space Telescope).

High above the fog that still blanketed the bay; we enjoyed perfect views of the sun and of the rugged beauty of Mount Desert Island. White-throated sparrows sang their familiar "Old Sam Peabody, Peabody, Peabody" melody as we watched Venus slowly approach the edge of the sun. The ink-drop effect was easy to see in the crystal clear conditions. Then Venus's "Pac-man" bite at the Sun's edge became smaller and smaller until it disappeared just after 7:25. We lingered awhile on the mountain, reluctant to leave such a beautiful, quiet place on such a glorious morning. By the time we returned to our inn for breakfast, the islands in Frenchman Bay had reappeared.

A few of Kalman's photos of our Venus transit experience can be viewed at:

http://KC-Csia.smugmug.com/gallery/162702/1/6071000

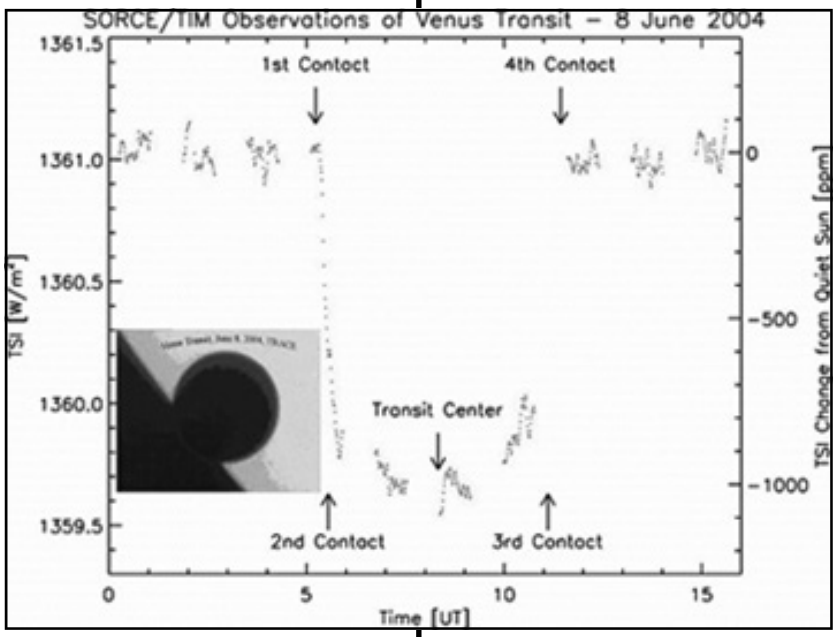
Becky Csia gets above the fog on Cadillac Mountain and checks out the Transit of Venus.

NASA Goes to the "SORCE" of Earth Sun-Blockers

Scientists using measurements from NASA's Solar Radiation and Climate Experiment (SORCE) satellite have discovered that Venus and sunspots have something in common: they both block some of the sun's energy going to Earth.

Using data from NASA's SORCE satellite, scientists noticed that, when Venus came between the Earth and the sun on June 8, the other planet reduced the amount of sunlight reaching Earth by 0.1 percent. This Venus transit occurs when, from an earthly perspective, Venus crosses in front of the sun. When it happens, once every 122 years, there are two transits eight years apart. The next crossing happens in 2012 and will be visible to people on the U.S. West Coast.

"Because of its distance from Earth, Venus appeared to be about the size of a sunspot," said Gary Rottman, SORCE Principal Investigator and a scientist at the Laboratory for Atmospheric and Space Physics (LASP), at the University of Colorado at Boulder. The SORCE team had seen similar reductions in the sun's energy coming Earthward during the October 2003 sunspot activity.



In October 2003 the Earth-bound sunlight dimmed 0.3 percent for about four days, due to three very large sunspot groups moving across the face of the sun.

"This is an unprecedented large decrease in the amount of sunlight, and it is comparable to the decrease that scientists estimate occurred in the seventeenth century," Rottman said. That decrease lasted almost 50 years, and was likely associated with the exceptionally cold temperatures throughout Europe at that time, a period from the 1400s to the 1700s known as the "little ice age."

Solar conditions during the little ice age were quite different, as there were essentially no sunspots. Astronomers of the time, like Galileo, kept a good record of sunspot activity before and during the period, encountering only about 50 sunspots in 30 years.

Rottman said, "Something very different was happening during the seventeenth century, and it produced a much more permanent change in the sun's energy output at that time." Today, the large sunspots are surrounded by bright areas called "faculae." Faculae more than compensate for the decrease in sunlight from sunspots, and provide a net increase in sunlight when averaged over a few weeks.

The large number of sunspots occurring in October/November 2003 indicated a very active sun, and indeed many very large solar flares occurred at that time. SORCE observed the massive record-setting solar flares in x-rays. The flares were accompanied by large sunspots, which produced a 0.3 percent decrease in the sun's energy output. SORCE simultaneously collected the energy from all wavelengths, something that had never been done before.

"The SORCE satellite instruments provide measurements of unprecedented accuracy, so the sun's energy output is known with great precision, and precise knowledge of variations in the sun's energy input to Earth is a necessary prerequisite to understanding Earth's changing climate," said Robert F. Cahalan, SORCE Project Scientist and Head of the Climate and Radiation Branch at NASA's Goddard Space Flight Center, Greenbelt, Md.

The SORCE measurements provide today's atmospheric and climate scientists with essential information on the sun's energy input to the Earth. These measurements also will be valuable to future scientists, who will be relating their view of the world back to conditions existing today. Likewise Galileo's findings about the sun almost 400 years ago have increased in value as understanding of the sun and its importance for Earth has advanced.

☆☆☆

Planets at dusk: Jupiter, of mag. –1.7, is the brightest evening "star" and still noticeable early in month, low in W in twilight. From lat. 40° N, it follows the Sun over the horizon by 1¾ hours on Aug. 1, to just 40 minutes at month's end. **Mercury,** fading from mag. +0.8 on Aug. 1, can be spotted during first week, 13° to 12° lower right of Jupiter. Binoculars are recommended to help pick it out in twilight; it's higher and easier to see from southern states.

Dawn: Venus, at mag. –4.3, rises spectacularly in a dark sky over three hours before sunrise and is well up in east as twilight brightens. In August, Venus shifts eastward about 1° per day against the background stars of Taurus (passing 2° S of Zeta on Aug. 1) and Gemini (passing S of Pollux and Saturn at month's end). On Aug. 17, Venus attains greatest elongation, 46° upper right of the rising Sun, and displays a disk 0.4 arcminute across, about half illuminated. **Saturn,** of mag. +0.2 in Gemini, begins August low in ENE, 25° lower left of Venus. By month's end Saturn climbs well up in east and appears only 2° north of Venus.

Will there be an enriched Perseid meteor shower this year? According to meteor shower expert Esko Lyytinen, the Perseid meteors may produce a strong but brief shower centered on August 11 near 20:54 UT, as Earth passes 180,000 km from the center of a trail of dust released by Comet Swift-Tuttle in 1862. If the outburst materializes, it will be best seen in Europe (except far west, where it's evening twilight) and Asia (except far east). Unfortunately it's daytime in N America, but the broader main Perseid meteor shower may also be stronger than usual this year and is best seen from North America in late evening of August 11 through predawn darkness hours of August 12. (Lyytinen expects a real Perseid storm for most of the U.S. on the morning of Aug. 12, 2028, from comet dust released in 1479.) For more information, visit http://www.sci.fi/~fmbb/astro/perseids.htm and http://www.imo.net

Planetarium business office:
(517) 355-4676
Skywatcher's Diary on World Wide Web:
http://www.pa.msu.edu/abrams/diary.html

SKY CALENDAR AUGUST 2004

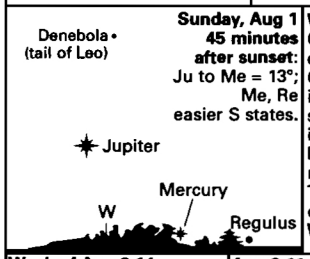
An aid to enjoying the changing sky

Use this scale to measure angular distances between objects on diagrams below.

0° 10° 20°

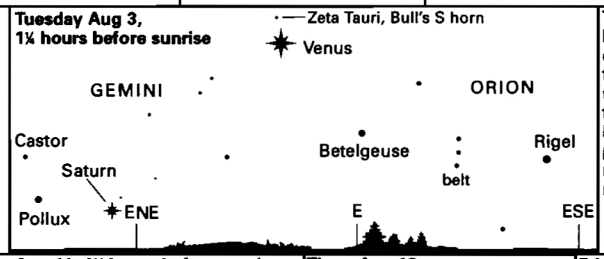
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

Sunday, Aug 1
45 minutes after sunset: Ju to Me = 13°; Me, Re easier S states.



Week of August 1-7
Catch a reddened rising Moon each evening this week. On Sunday Aug. 1 it rises in ESE within 1-1/4 hours after sunset. Each night this week, it rises farther N along horizon, by less than half an hour nightly from N states. On Tues it rises 5°-6° S of E, and on Wed it rises 3° N of E.
What causes the red color?

Tuesday Aug 3,
1¼ hours before sunrise



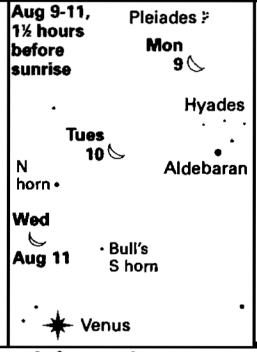
Tuesday August 3
From S states early in evening twilight Aug. 3-8, use binoculars to follow fading Mercury until last possible date as it remains 12° lower right of Jupiter.

Thursday Aug 5
Neptune (mag 7.8) at opposition, 0.5° N of 4.1-mag Theta Capricorni, is easy to locate with telescope and is visible in a dark sky, with good binoculars.

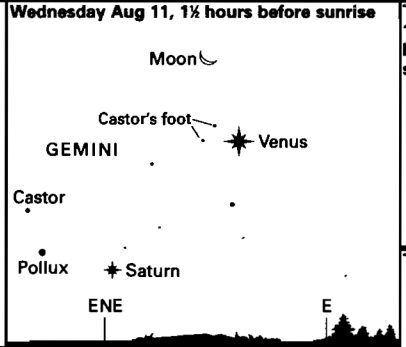
Saturday Aug 7
Moon at Last Quarter 6:01 p.m. EDT. Moon appears slightly more than half on Saturday morning, slightly less than half on Sunday morning. Mars at aphelion, 1.666 a.u. (249 million km or 155 million mi) from Sun.

Week of Aug 8-14
Follow waning Moon in morning sky this week as it passes two planets and two first-mag stars. Look before first light of dawn for Perseid meteors. Shower is expected to be best in predawn on Thurs Aug 12 for North American observers. For more, see left margin.

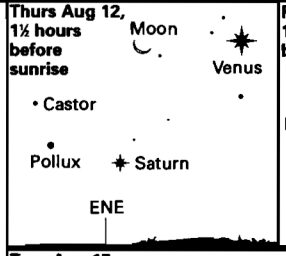
Aug 9-11, 1½ hours before sunrise



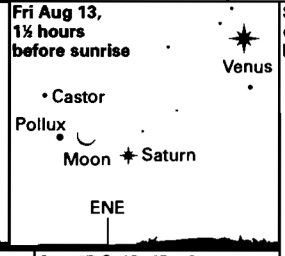
Wednesday Aug 11, 1½ hours before sunrise



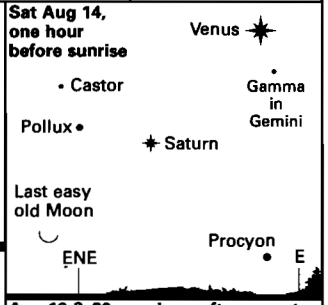
Thurs Aug 12, 1½ hours before sunrise



Fri Aug 13, 1½ hours before sunrise



Sat Aug 14, one hour before sunrise

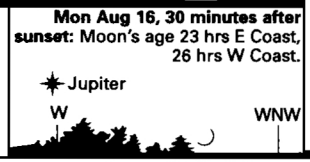


Sunday, August 15, 1½ hours before sunrise:
Saturn 15° lower left of Venus. Watch Venus close in on Saturn for rest of month; they'll be within 10° apart at end of this week.

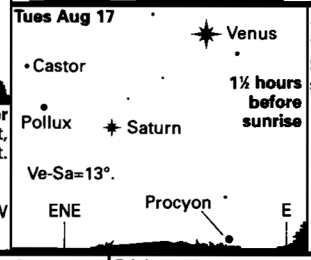
30 minutes before sunrise in New England: Binoculars may show very thin old Moon, 16 hours before New, rising in ENE.

New Moon 9:29 p.m. EDT.

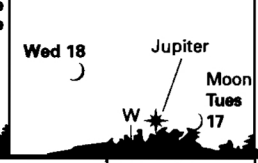
Mon Aug 16, 30 minutes after sunset: Moon's age 23 hrs E Coast, 26 hrs W Coast.



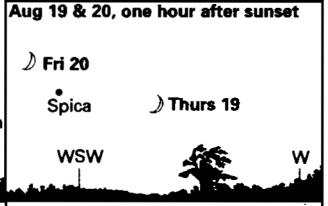
Tues Aug 17



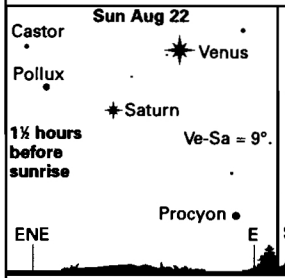
Aug 17 & 18, 45 min after sunset
Spica 32° UL of Jupiter; see next box.



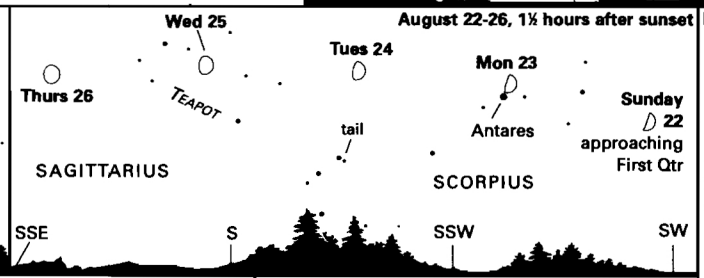
Aug 19 & 20, one hour after sunset



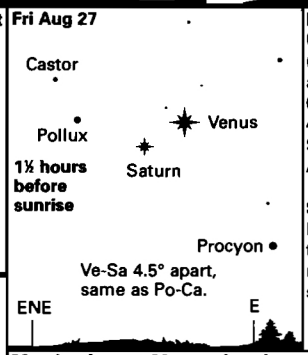
Sun Aug 22



August 22-26, 1½ hours after sunset



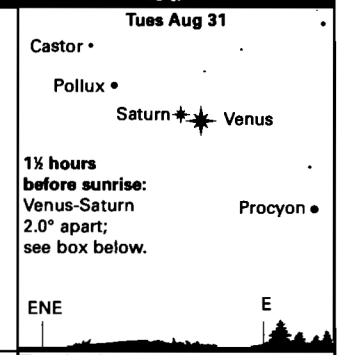
Fri Aug 27



Fri Aug 27:
Uranus (mag. 5.6) at opposition, 0.8° W of 4.8-mag. Sigma in Aquarius.

Sat Aug 28:
Last chance to see Moon rising before sunset.

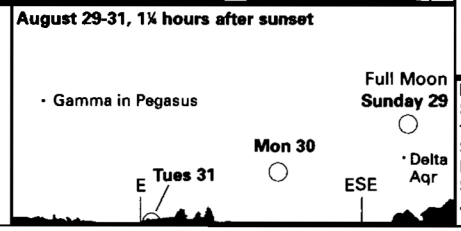
Tues Aug 31



Sunday, August 29
Watch Moon rise 15°-20° S of E about 10-20 minutes after sunset tonight for most of U.S.

Full Moon occurs at 10:22 p.m. EDT.
Moon rises less than 30 minutes later each night this week from northern U.S. Again, as in first week, note the reddened color of the Moon at moonrise.

August 29-31, 1¼ hours after sunset



Monday August 30, morning sky:
Saturn is 7° S of Pollux this morning. This is the first of three occasions within nine months when Saturn passes that star (next times in January and May 2005): A ***triple conjunction.*** Then, the next Saturn-Pollux conjunction will be single, in July 2034.

Tuesday Aug 31, morning:
Venus passes 2.0° S of Saturn, while Saturn is still 7° S of Pollux; three bodies in conjunction (but this is *not* a triple conjunction).

Robert C. Victor, Patti Toivonen
ISSN 0733-6314

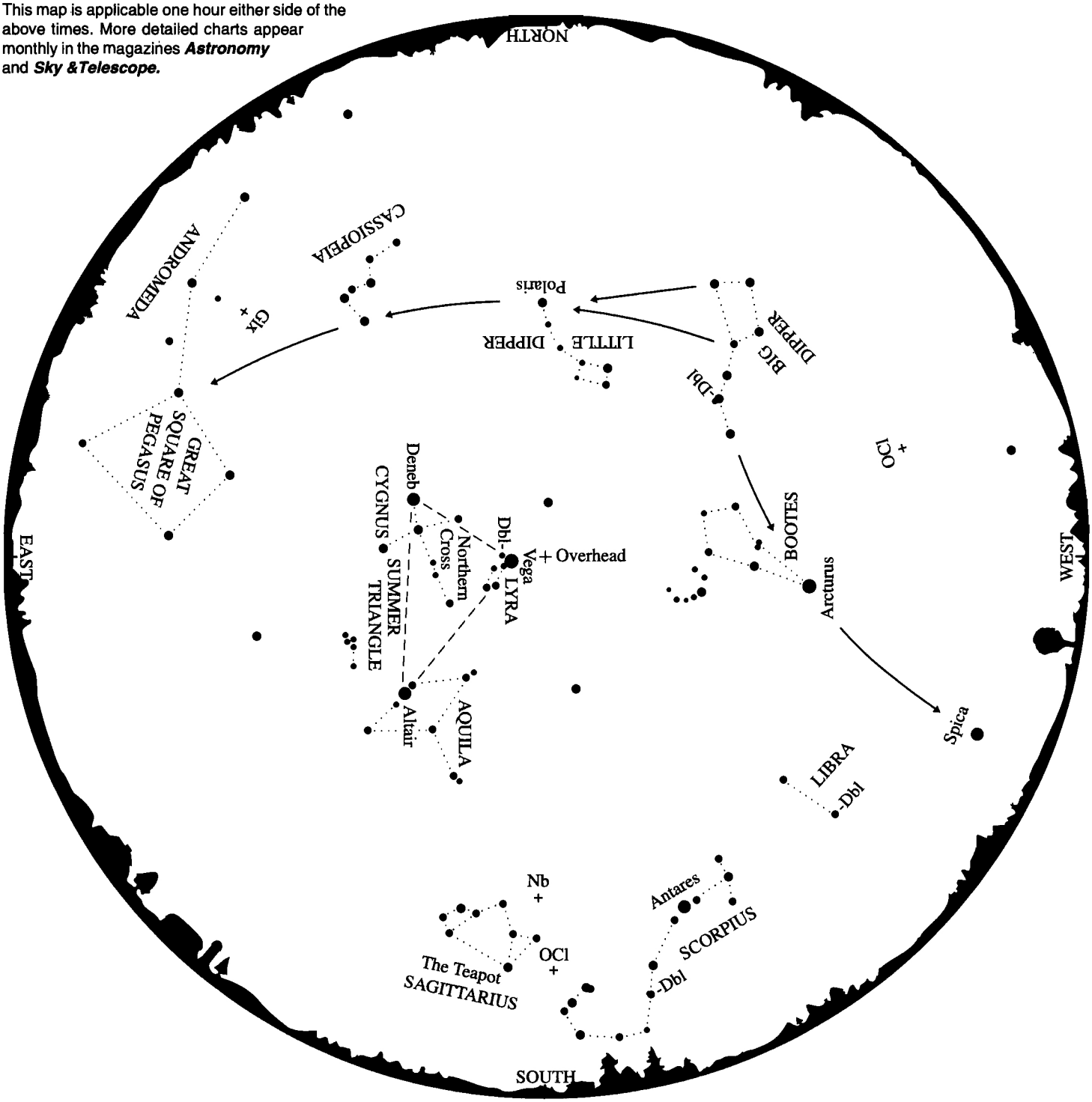
August Evening Skies

This chart is drawn for latitude 40° north, but should be useful to stargazers throughout the continental United States. It represents the sky at the following local daylight times:

Late July	11 p.m.
Early August	10 p.m.
Late August	9 p.m.

This map is applicable one hour either side of the above times. More detailed charts appear monthly in the magazines ***Astronomy*** and ***Sky &Telescope.***

Subscription: $10.00 per year, from ***Sky Calendar***, Abrams Planetarium, Michigan State University, East Lansing, MI 48824-1324.



No planets are above the horizon at map time. Six objects of first magnitude or brighter are visible. In order of brightness they are: Arcturus, Vega, Altair, Antares, Spica, and Deneb. In addition to stars, other objects that should be visible to the unaided eye are labeled on the map. The double star (Dbl) at the bend of the handle of the Big Dipper is easily detected. The double star in Scorpius is somewhat harder. Much more difficult is the double star near Vega in Lyra. The open or galactic star cluster (OCl) known as Coma Berenices, "The Hair of Berenice," is located between the horizon and Bootes. A more compact open cluster is located between Sagittarius and the "tail" of Scorpius. Nearby, marked (Nb) above the "spout" of the "teapot," is the Lagoon Nebula, a cloud of gas and dust out of which stars are forming. The position of an external star system, called the Andromeda Galaxy, is also indicated (Glx). Try to observe these objects with unaided eye and binoculars.

—D. David Batch

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Wanted: Publicity Volunteer(s)

The KAS is searching for one or more volunteers to handle publicity for our programming. Responsibilities would include writing and sending out monthly press releases to local media outlets. Creating and distributing posters and fliers may also be required. Those interested in the position should have access to a computer with a modem connection or a fax machine. Fax software for your computer can be provided by the KAS. For more information please contact KAS President Richard Bell.

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August Observing Schedule

Kalamazoo Nature Center
7000 N. Westnedge Ave.

Saturday, August 7 @ 8:30 pm
The Summer Triangle

Saturday, August 21 @ 8:30 pm
Globular Clusters of Summer

with the **Kalamazoo Astronomical Society**

For Sale

Having the right tools for observing is important and planispheres are essential. The Miller Planisphere is made with heavy duty plastic (cardboard versions will be ruined after a few dewy Michigan nights). Just dial the date and time and you'll see what's in the sky for that moment.

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