



# The Night Sky

A Publication of The Astronomy Club of Akron  
Akron, OH USA

ACA Homepage: <http://www.acao.org>

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2004 ACA Calendar	Summary
9/11/04 Sat 5:30 p.m.	Dedication of the New Club Telescope; The planets Uranus & Neptune— ACA Observatory
9/18/04	Black River OTAA convention
9/24/04 Fri 8:00 p.m.	ACA General Membership Meeting— Kiwanis Club
10/16/04 Sat 7:30 p.m.	ACA Observatory Open House— ACA Observatory
10/22/04 Fri 8:00 p.m.	ACA General Membership Meeting—Kiwanis Club
11/6/04 Sat 7:30 p.m.	ACA Observatory Open House—ACA Observatory
12/11/04 Sat 7:30 p.m.	ACA Observatory Open House—ACA Observatory

**2004 ACA Calendar-Detail**

**Saturday, September 11**

**Dedication of the New Club Telescope beginning at 6:00 pm. ACA program** featuring the planets **Uranus and Neptune beginning at 7:30 p.m.** View the gas giants as they appear as tiny blue green disks in the southern night sky. Please bring your telescopes for the public star party which follows the program.

**Friday, September 24**

General membership meeting beginning promptly at 8 pm at the Portage Lakes Kiwanis Club. The speaker is Alex Panzer. The title of his program is

“An Update on Solar Activity”, and will include a slide show.

**Saturday, October 16**

Open House and Star Party begins at 7:30 pm with emphasis on Perseus, Auriga, Taurus and the Pleiades as they rise in the east. Bring your telescopes for the event.

**Friday, October 22**

General membership meeting beginning promptly at 8 pm at the Portage Lakes Kiwanis Club. Speaker to be announced.

**Saturday, November 6**

Open House and Star Party begins at 7:30 pm with random observing two days after the Southern Taurid meteor shower. Please bring your telescopes for the event.

**Friday, November 26**

General membership meeting beginning promptly at 8 pm at the Portage Lakes Kiwanis Club. Speaker to be announced. Last meeting of the year.

**Saturday, December 11**

Open House and Star Party beginning at 7:30 pm. Bring your telescopes and mittens!!

**Sky Events for September 2004**

<b>Sept 6</b>	<b>Last Quarter Moon</b> at 15:11 UT.
<b>Sept 14</b>	<b>New Moon</b> at 14:29 UT
<b>Sept 21</b>	<b>First Quarter Moon</b> at 15:54 UT.

<b>Sept 22</b>	<b>September equinox</b> at 16:30 UT. The time when the Sun reaches the point along the ecliptic where it crosses into the southern celestial hemisphere marking the start of autumn in the Northern Hemisphere and spring in the Southern Hemisphere.
<b>Sept 28</b>	<b>Full Moon</b> at 13:09 UT. The full Moon of September is called the "Fruit Moon" and, because this year it is the nearest to the September equinox, also the "Harvest Moon".

**All times Universal Time (UT). (USA Eastern Daylight Time = UT - 4 hours)**

**September Sky Events: Detail**

If you are in a clear, dark country location before dawn over the next few weeks, you might see an elusive phenomenon called the zodiacal light. Look toward the eastern horizon before twilight begins for a ghostly pyramid of light. The elusive zodiacal light is a faint shimmering of sunlight reflected off dust particles in the solar system. It is easiest to observe when the zodiac band of constellations stands most upright just before dawn or after dusk. This time of year the zodiacal light appears best in predawn skies during the dark of the Moon, which begins September 13. Look for a dim triangular glow rising out of the east and tilted slightly to the right. Use the planets Mercury, Venus, and Saturn as a guide,

since they appear in the zodiac in the pre-dawn sky.

On September 10, the planet Venus lines up near the crescent Moon. It is the brilliant "morning star" to the upper right of the Moon before sunrise. On September 11, the Moon and the planet Mercury snuggle up to Leo, the lion, at daybreak. They are quite low in the east at first light. Regulus, the star that marks Leo's heart, stands a little to the lower right of the Moon, with Mercury a little farther below the Moon.

No other Moon is as well known, it seems, as the Harvest Moon which rises on September 28. To most people the term suggests a large, orange orb, but size and color have nothing to do with the name. Around the Autumnal Equinox (in the northern hemisphere), the Moon's orbital path lies relatively flat along the eastern horizon. As the Moon travels along the orbit, each night the Moon is only slightly farther below the horizon than the previous night at the same time. Therefore it rises not much later than the previous night. The effect produces bright moonlight during darkening twilight for several nights in a row -- quite a boon for farmers running late gathering in the harvest.

### Upcoming Astronomy Events

#### September 18

Black River Astronomical Society's OTAA convention, Birmingham Methodist Church Hall, Birmingham, Ohio, 4:30 pm

<http://junior.apk.net/%7earstar50/otaaconvention.htm>

#### September 25

Scope Out 2004  
Cincinnati, Ohio

[www.cincinnatiobservatory.org](http://www.cincinnatiobservatory.org)

### Frontiers of Astronomy Lecture Series

The Frontiers of Astronomy Lecture series is a free lecture series featuring the latest astronomy research. The lectures are sponsored by the Cleveland Natural History Museum, Case Western Reserve University and The Cleveland Astronomical Society. On clear evenings, the Museum's observatory is open after the program. Selected Thursdays, 8 pm. No tickets or reservations

required. For more information, call (216) 231-4600, ext. 3362 or 3253.

On **October 14:** **Matt Bershady** from



the **University of Wisconsin** will speak on "**New Dreams in the Southern Skies: Large Telescopes and the Formation of Galaxies.**" He will describe an in-

ternational effort to work with a new nation to create the world's largest optical telescope. The telescope costs one fifth that of previous megascopes, and represents a new paradigm for creating "large glass." This Southern African Large Telescope, or SALT, will be used to peer deep into the southern skies, and to dissect the diffuse light from faint galaxies. He will show why SALT will help us understand how and when galaxies form, and where dark matter clusters in the Universe.

Other scheduled speakers and dates are: November 18, Karl Gebhardt, the University of Texas; March 24, Bob Zinn, Yale; April 14, Jacqueline von Gorkum, Columbia University. Topics yet to be announced.

### Treasurer's Report: 8/1/04—8/31/04

<b>Total Beginning Assets</b>	<b>\$5,765.06</b>
<i>Income</i>	
Donations	\$ 655.75
Dues	\$ 145.00
Interest Paid 7/31	\$ 1.89
Interest Paid 8/31	\$2.72
Merchandise Sales	\$ 40.00
Food Sales at Solar/Lunar Event	\$171.50
<i>Expenses</i>	
ACA Newsletter	\$ (74.89)
Food for Solar/Lunar Event	\$ (86.43)
Insurance	\$ (70.00)
<b>Total Ending Assets</b>	<b>\$6,550.60</b>

Submitted 9-04-2004 Gary Smith

### From the VEEP

I hope we'll see everyone at the observatory Saturday, September 11. The evening will begin at 6:00 with the dedication and public unveiling of our new observatory telescope, a 14" Meade LX200GPS donated to the Club by a consortium of local amateur astronomers. We anticipate some local press coverage and visitors from other local Clubs, so please help us put our best foot forward with this opportunity to show off our Club and our facilities. There'll be some brief (I promise!) words from some of our movers and shakers and then an informal gab session.

This will be followed at 7:30 by Night Sky editor Lynn Laux's presentation on the planets Uranus and Neptune. Weather permitting, there will then be an opportunity to observe these objects in our new telescope, as well as general observing in as many telescopes as Club members choose to bring and set up nearby.

Please try to attend, and to bring a telescope if possible. This has the potential to be a great night, both for the Club and for the membership.

—John Crilly

### Ramblings from the President

What a wonderful time we all had at the annual Solar/Lunar/Hot-Dog Culinary Extravaganza! I can't remember a nicer day (well, it WAS a bit chilly for August) or a larger nicer group of folks - both members with telescopes and general public. I believe this event was responsible for us getting several new members, too...always a nice consequence. Thanks to each and every one of our members that contributed their time, equipment and expertise to this event - especially to Gregg Crenshaw for his Hydrogen-alpha setup, to Ray Paul who acquired the food, to Pete Flohr who took care of the cooking of those delicious dogs, and to Cathy Cook who kept us all honest with the collection of the funds. To top it off, there was a beautiful sky as well! Wonderful views of the Sun and Moon were had and the Milky Way was even visible (an unfortunate rarity these days). Many of the magnificent Mess-

ier objects in Sagittarius were seen from the observatory.

If you haven't taken a look through the new 14" club scope, do yourself a favor and mark September 11<sup>th</sup> on your calendars! It's the long-awaited public dedication of our new observatory instrument and it will be another event-to-attend this year. VP John Crilly has arranged for media coverage so a large turnout is expected.

Remember that this month marks the start of our monthly meetings for this season: **Friday, Sept 24<sup>th</sup> at 8:00PM at the Portage Lakes Kiwanis Civic Center, 725 Portage Lakes Dr., Akron, OH 44319.** The first hour or so is given to a guest speaker who lectures on an astronomical topic, followed by coffee, followed by our business meeting. We make every attempt to adjourn by 10:00PM. Please try to attend - your opinions and votes are welcome and necessary for the proper functioning of the Club.

Very sad news came to us this past month...our fellow member and friend, Bill Karas, passed away on August 7<sup>th</sup> following a short illness. Bill was a nineteen-year veteran of the club and will be very sorely missed. Bill always kept us on our toes...woe be to any member or officer who suggested anything at odds with the ACA Bylaws, which Bill always had at the ready. Several of us attended the calling hours at the funeral home and met his niece, Robin, who told us that Bill talked about the club all the time. As a matter of fact, Bill instructed her to include the following statement in his obituary, "Memorials may be made to the Astronomy Club of Akron, the US Power Squadron, or the Cancer Treatment Center at Akron General Medical Center in his name". I truly believe higher commendations have never been extended to our club. I recently spoke with Bill's daughter, Darlene, who told me of an event common to many of us. She was visiting her mother and Bill was out with his telescope calling for Darlene to come take a look. She resisted as long as she thought prudent then joined Bill "for a quick look". She reluctantly looked into the eyepiece, was surprised by the wonderful view, exclaimed "Oh, my!" and stayed out with Bill for over an hour!

Thank you, Bill...for all you did for our organization. You were missed at the Solar/Lunar program but

I know you're enjoying the heavens from a different perspective. May you rest in peace.

—Dave Jessie

### Observatory Director's Report

The Aug. 21<sup>st</sup> Solar Lunar program was a resounding success once more thanks to everyone who participated. By many estimates we had between 80 and 100 visitors on an evening with exceptionally clear skies. I believe we sold something on the order of \$200 plus in hot dogs and received a couple of new membership applications. The sun remains unusually active for this time in its cycle and many sunspots were observed.

We are still fiddling with the balance of the new scope and are getting closer. I recently added about 12 lbs to the counterweight which is attached to the visual back and mounted the 4" refractor piggybacked. This may be a bit too much weight and I plan on doing some more tweaking this week.

We have one more formal program at the observatory this coming Saturday Sep.11 and it is an important one. Not indicated on the schedule, is our formal dedication of the new scope prior to the program at about 6:00 p.m. PLEASE plan on attending. John Crilly has arranged for refreshments and several short speakers followed by a presentation by Lynn Laux on Uranus and Neptune. If you haven't seen one of her PowerPoint presentations yet, they are a real treat.

Hope to see everyone this Saturday evening..

—Ray Paul

### Enviro Outreach Program

The Enviro Outreach Organization and Portage Lakes Advisory Council is sponsoring the **2nd annual Northeast Ohio Enviro Expo on Saturday, September 25, 2004 from 10:00 AM - 5:00 PM at Coventry High School North Campus, 3089 Manchester Road, Akron, Ohio.** It will be an environmental awareness fair consisting of everything from Astronomy to the Zoo.

There will be alternative energy products and exhibits, environmental

education exhibits, nature and environmental group contacts, recycling information, speakers giving talks on various environmental issues, live radio remote broadcasts and food vendors.

### Free parking and admission.

The ACA will be having an exhibit at this event. We will be able to sell merchandise. This will be a great opportunity to spread the word about the problem of light pollution! **Mark Kochheiser** is the ACA contact and he is **requesting assistance in manning a booth for the event.** He especially needs people to bring telescopes with solar filters in order to observe the Sun. If you can help, please give him a call at **330-882-3713.**

### MVAS and ACA Events

Both M.V.A.S. and A.C.A. events were successful and enjoyable. We had about 12 A.C.A. members at M.V.A.S. and as the fog slowly increased we watched a tape of the British TV series "Red Dwarf".

Also, Fri, 8-27, I went to the Wilmot club meeting. Even though it was a bad night for viewing we had an interesting talk on meteorites. I also talked about our new telescope and they were very interested.

—Lou Poda

### NASA Space Place

#### Resisting Retirement: Earth Observing 1 by Patrick L. Barry



*These images, made from EO-1 data, are of La Plata, Maryland, before and after a tornado swept through May 1, 2002.*

The Hubble Space Telescope isn't the only satellite that scientists have fought to keep alive beyond its scheduled retirement. Scientists also went to bat for a satellite called EO-1, short for Earth Observing 1, back in 2001 when the end of its one-year mission was looming.

The motivation in both cases was similar: like Hubble, EO-1 represents a



"quantum leap" over its predecessors. Losing EO-1 would have been a great loss for the scientific community. EO-1, which gazes back at Earth's surface instead of out at the stars, provides about 20 times more detail about the spectrum of light reflecting from the landscape below than other Earth-watching satellites, such as Landsat 7.

That spectral information is important, because as sunlight reflects off forests and crops and waterways, the caldron of chemicals within these objects leave their "fingerprints" in the light's spectrum of colors. Analyzing that spectrum is a powerful way for scientists to study the environment and assess its health, whether it's measuring nitrate fertilizers polluting a lake or a calcium deficiency stressing acres of wheat fields.

Landsat 7 measures only 8 points along the spectrum; in contrast, EO-1 measures 220 points (with wavelengths between 0.4 to 2.5  $\mu\text{m}$ ) thanks to the prototype Hyperion "hyperspectral" sensor onboard. That means that EO-1 can detect much more subtle fingerprints than Landsat and reveal a more complete picture of the chemicals that comprise the environment.

As a NASA New Millennium Program mission, the original purpose for EO-1 was just to "test drive" this next-generation Hyperion sensor and other cutting-edge satellite technologies, so that future satellites could use the technologies without the risk of flying them for the first time. It was never meant to be a science data-gathering mission.

But it has become one. "We were the only hyperspectral sensor flying in space, so it was advantageous to keep us up there," says Dr. Thomas Brakke, EO-1 Mission Deputy Scientist at NASA's Goddard Space Flight Center.

Now, almost three years after it was scheduled to be de-orbited, EO-1 is still collecting valuable data about our planet's natural ecosystems. Scientists have begun more than a dozen environmental studies to take advantage of EO-1's extended mission. Topics range from mapping harmful invasive plant species to documenting the impacts of cattle grazing in Argentina to monitoring bush fires in Australia.

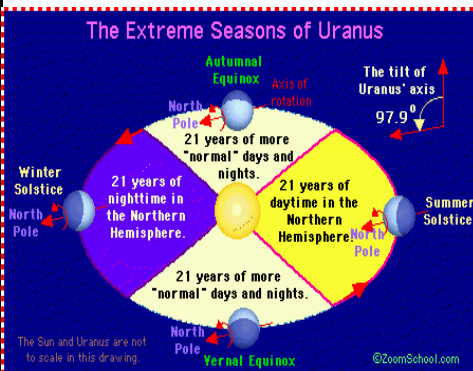
Not bad for a satellite in retirement.

Read about EO1 at [eo1.gsfc.nasa.gov](http://eo1.gsfc.nasa.gov). See sample EO-1 images at <http://eo1.usgs.gov/samples.php>. Budding young astronomers can learn more at

[spaceplace.nasa.gov/eo1\\_1.htm](http://spaceplace.nasa.gov/eo1_1.htm).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

### Did You Know?



Uranus is the seventh planet from the sun in our solar system. This huge, icy planet is covered with clouds and is encircled by a belt of 11 rings and 22 known moons. Uranus' blue color is caused by the methane ( $\text{CH}_4$ ) in its atmosphere; this molecule absorbs red light. Uranus is about 31,690 miles (51,118 km) in diameter

Uranus' rotational axis is strongly tilted on its side ( $97.9^\circ$ ). Instead of rotating with its axis roughly perpendicular to the plane of its orbit (like all the other planets in our Solar System), Uranus rotates on its side (along its orbital path). This tipped rotational axis gives rise to extreme seasons on Uranus. Because of its almost-perpendicular axis orientation, there is a debate over which of Uranus' poles is its north pole. This debate leads to yet another: Is Uranus spinning in a retrograde orbit (like Venus) or not (like the other planets)?

The planet is shrouded in an icy cloud layer (made up of frozen methane, ethane, and acetylene) circling this planet at 185 mph (300 kph). Uranus' icy atmosphere consists of 83% hydrogen, 15% helium, and 2% methane. The outer layers of the atmosphere are the coldest; temperature and pressure rise under the cloud layer. Beneath the atmosphere, there is a liquid layer of hydrogen and helium. As depth increases, this layer becomes more viscous, and then partly solid. This layer may be composed of compressed water with ammonia and methane. Uranus has a molten rocky core about 10,500 miles (17,000 km) in diameter and about  $12,500^\circ\text{F}$  ( $6927^\circ\text{C}$ ). This core may have a mass five times

greater than the mass of the Earth. This gas giant is the third-largest planet in our Solar System (after Jupiter and Saturn).

Uranus has a belt of 11 faint, narrow rings composed of rock and dust. They circle Uranus in very elliptical orbits. These rings are only a fraction of the size of Saturn's rings, and were only discovered in 1977.

Uranus has 5 large moons (2 were discovered by Wm. Herschel in 1781, 2 were discovered by Wm. Lassell in 1851 and one by G. Kuiper in 1948) and many small moons (which were discovered much later).

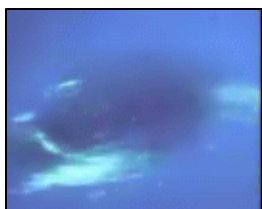
Neptune is the eighth planet from the sun in our solar system. This giant, frigid planet has a hazy atmosphere and strong winds. This gas giant is orbited by eight moons and narrow, faint rings arranged in clumps. Neptune's blue color is caused by the methane ( $\text{CH}_4$ ) in its atmosphere; this molecule absorbs red light. Neptune cannot be seen using the eyes alone. Neptune was the first planet whose existence was predicted mathematically (the planet Uranus's orbit was perturbed by an unknown object which turned out to be another gas giant, Neptune). Neptune is about 30,775 miles (49,528 km) in diameter. This is 3.88 times the diameter of the Earth. If Neptune were hollow, it could hold almost 60 Earths. Neptune is the fourth largest planet in our Solar System (after Jupiter, Saturn, and Uranus).

Neptune is circled by a system of very thin, dark rings located in clumps. These rings are composed of small rocks and dust. The rings are circular (unlike Uranus' elliptical ring system). There are three distinct rings, named Adams, Le Verrier and Galle (after the discoverers of Neptune) plus a wide plateau of dust adjacent to the Le Verrier ring (this wide sheet of orbiting dust is co-orbital with the moon Galatea). These rings have been very difficult to detect because they are not uniform in thickness and density. The thicker parts of the rings are called ring arcs; these are the parts of the rings that are more easily detected. The Adams ring has three prominent arcs (named Liberty, Equality and Fraternity). The gravitational pull of Neptune's moons may cause the unevenness of the rings. Some of Neptune's smaller moons may 'shepherd' the inner rings with their gravitational forces.

Neptune has three main moons, Nereid, Proteus, and Triton, plus five smaller moons. Triton and Proteus orbit close to Neptune; Nereid is in a distant

orbit. Triton is the only moon in our Solar System with a retrograde orbit (orbiting in the opposite direction than its primary, Neptune, is rotating). The moon Triton is the coldest measured object in our Solar System, and Nereid is the Solar System object with the most eccentric orbit.

Neptune's thick atmosphere consists of 74% hydrogen, 25% helium and about 1% methane. The atmosphere merges into the planet's mantle. Neptune's atmosphere has icy clouds and enormous storms. These features change rapidly because of tremendous winds that whip around the planet. Neptune has the fastest winds in our Solar System. Icy particles of methane in the outer parts of its atmosphere give



Neptune its deep blue color; methane absorbs red light. Neptune's Great Dark Spot is an

Earth-sized hurricane in the thick methane atmosphere of Neptune. The size, shape, and location of the spot vary greatly over time; it even disappears and reappears occasionally. The storm spins counterclockwise. Horrendous winds near the spot were measured by Voyager 2 to be about 1,500 miles per hour (2,400 kph). These are the strongest recorded winds in our solar system.

—Lynn Laux

### Opinions on Some used Wide field Eyepieces By John Crilly

I am a big fan of what Al Nagler referred to as the "spacewalk" experience. I like wide field eyepieces and huge eye lenses. Although the latest Nagler line (Type 6) provides nice wide fields and great performance in a smaller, lighter package, they just aren't the same to me. I'm also an Astromart ([www.astromart.com](http://www.astromart.com)) fan - I love trying different pieces of gear and then changing to something else. I don't think either of these preferences are very unusual - and they certainly aren't mutually exclusive. There are a great many other eyepieces out there and some of them represent great value for their price.

Buying used premium eyepieces isn't risk-free, but I can report that amateur astronomers generally take

very good care of their expensive eyepieces. Most of the used ones I've acquired (and all of them that I have sold) were disposed of not because they were worn out or damaged, but because they had been replaced with more modern units. I like the modern ones also, especially the Type 4 Naglers, but the classic eyepieces can be great performers at a more reasonable price. I won't go into lengthy performance evaluations on these, but rest assured I have owned and used the ones I'll discuss and have been pleased with them. I should comment that I use mostly slower optics; I'm an SCT fan. All the eyepieces mentioned here do very well indeed at F/10. The Naglers and Meade UWA's generally get very good reviews in faster optics, while the SWA's and Wide fields aren't considered very good for fast telescopes.

Classic wide field eyepieces generally belong to one of three categories. The oldest ones were produced in Japan and have smooth sides (no knurling) and no eyecup grooves. Later Japanese production units do have the knurling and eyecups, and thus a more modern appearance. The next generation were produced in Taiwan. The later Japanese units tend to command the highest prices, although some folks regard the smooth sided versions as the real classics. I wouldn't be too concerned about the Taiwan-sourced units; after all, the current Type 4 and Type 5 Naglers, among others, are sourced from there.

The longest focal length classic wide field Tele Vues are called the Wide Field series. They had an apparent FOV of about 65 degrees. They were replaced by the Panoptic line by Tele Vue, but Meade's current SWA series is very comparable. The big bombers in this line are the 32mm and the 40mm jobs, both in 2" format. For comparison, the current Taiwanese Meade offerings are about \$240 and \$300 respectively. You'll see 32mm SWA's for around \$175 and 40mm SWA's for around \$225. Original Japanese Tele Vue Wide fields go for a little more. The jump-on-it price for any of these is \$150 for the 32mm and \$200 for the 40mm, especially if they are from Japan. I sold my 40mm SWA when I got the 35mm Panoptic - and ended up buying it back (though I still have the 35mm Pan). There were smaller Tele Vue wide fields but I

haven't used those. I have used the 13.8mm and 18mm Meade SWA's and they are nice eyepieces but not in the size/weight class being discussed here. For higher magnifications and really wide views we can look at the original (sometimes called Type 1) Naglers and the similar Meade UWA's. These guys go over 80 degrees in apparent FOV. T1 Naglers were made in 4.8mm, 7mm, 9mm, 11mm, and 13mm focal lengths. Comparable Meade UWA's are available in 4.7mm, 6.7mm, 8.8mm, and 14mm. The interesting ones are the 9mm and larger. The 11mm and 13mm Naglers are a little bit collectable, and we don't want to pay a premium for that so we'll concentrate on the 9mm Nagler and the Meade 8.8 and 14mm UWA's, all of which are 1.25" eyepieces with 2" barrels. For reference, the 8.8mm UWA is about \$240 today and the 14mm UWA is around \$300. These are truly excellent eyepieces - at market price they are great values. I'd jump on a nice 8.8UWA for \$150 or a 14UWA for \$200. The 9mm Nagler would be a deal at \$175. I sold my UWA's when I went to T4 Naglers and wound up getting another pair just because I like them.

The next generation of Naglers are the Type 2 units. These were made in 12mm, 16mm, and 20mm. The 20mm Nagler Type 2 was called the Holy Hand Grenade and is a heavy bugger. It's heavier than the immense 31mm Type 5! The 20mm has some collector value so bargains are hard to find. A great deal would be \$250 but if you can find a nice 20mm T2 for under \$300 it's worth considering; I sold mine when I got the 22mm T4 but I'll replace it someday. The 12mm or 16mm would be a good deal at around \$200.

I think any eyepiece case would be enhanced with the 8.8mm and 14mm UWA's - I can't recommend them highly enough for the price. The Type 2 Naglers would be nice, as would the 32mm and 40mm SWA's but I apparently don't find them quite as essential. Other wide field eyepieces to watch for are the current model Proxima 31mm (\$150 from Hands On Optics), which shows up for under \$100 used from time to time, and the Tele Vue 55mm Plossl (\$225 new) or Meade's 56mm Plossl (\$200 new). The latter two aren't too good in faster telescopes but give a very wide true FOV for under \$150 on the used market.

Disclaimer: I have no commercial relationship with any of the vendors or manufacturers mentioned in this article. I do have an Astromart account and occasionally pay for a short-term sponsorship there because I find it so extremely useful.

### A Solar Filter As Big As All Outdoors

By  
Glenn R. Cameron

On July 19<sup>th</sup> of this year I read about a very large “naked eye” sunspot that was visible just then. Of course, “naked eye” really means no magnification is required. One still requires an appropriate solar filter to look directly at the sun.

That evening my kids and I were leaving one of a huge chain of retail stores, which rhymes with Mal-Wart, and I heard a nearby girl say to her friend, “Wow, look at the sun!” I was impressed that she actually noticed. I confess that I was herding munchkins and hadn’t seen the sunset myself until I heard the girl’s exclamation.

The sun was setting in the west-northwest. The time was about 8:30 PM. It was low on the horizon and a dark orange-red. The atmosphere was hazy and there were a couple of thin clouds moving across its face. In other words, I could look directly at the sun without discomfort. The clouds appeared as dark bars or fingers, moving across the surface but I noticed that one of the “clouds” was smaller, darker, and roughly circular. It was evident that this “cloud” wasn’t moving. “Wow!” indeed. I was seeing the large sunspot mentioned in the article I had read earlier. I was seeing it without a commercial solar filter. I was seeing it with a solar filter as big as all outdoors, our planetary atmosphere.

This was a first for me. I was thrilled and I told the kids. They weren’t as thrilled as I was.

With a little online research at <http://www.spaceweather.com/>, I determined that the sunspot was identified as number 652. Sunspot 652 was roughly as large as Jupiter! Another online resource with great data and current pictures of the sun is the official NASA web site for the Solar & Heliospheric Observatory (SOHO), <http://soho.nascom.nasa.gov/>. SOHO is located about 1.5 million kilometers

sunward of Earth at the L1 Lagrangian point.

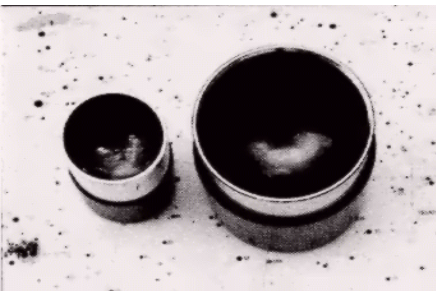
As of the writing of this article, August 19<sup>th</sup>, sunspot 652 is still visible although not as large as it was previously. With luck we’ll be able to see it this Saturday evening at the ACA annual Solar and Lunar star party.

I’ll definitely keep this experience in mind the next time I hear or read about a large “naked eye” sunspot. A favorable sunset or sunrise might allow me once again to use that solar filter as big as all outdoors.

### Eyepiece Definitions

By  
Lynn M. Laux

Astronomical telescopes have standard eyepiece tubes, with which one can use eyepieces bought separately from the telescope. Most astronomical telescopes use eyepieces with a 1 1/4" barrel diameter; although many amateur observers with larger telescopes designed for viewing dim galaxies at relatively low magnification now use eyepieces with a 2" barrel diameter. Some inexpensive telescopes sold on the mass market use interchangeable eyepieces whose barrel diameter is approximately .965".



It may seem only a small increase to go from a 1 1/4 - inch to a 2-inch eyepiece barrel, but the latter has an opening 70 percent larger in diameter and almost three times the area of the former. This sets a limit on the true field (the amount of sky) visible with a telescope

Telescopes are usually described in terms of *aperture* and *focal ratio*. Thus, you might see a telescope mentioned as being a 4-inch f/12 telescope. A 4-inch telescope is (often) one with a 100 mm aperture: as with the lengths of slide rules, an "inch" is often only 25 mm instead of 25.4 mm. With telescopes, as with cameras, "f/12" means that the aperture is 1/12 of the focal length. Thus, the focal length of such a telescope would be equal to 100 mm times 12, or 1200 mm. A telescope's

ability to collect light is directly related to the diameter of the lens or mirror -- the aperture -- that is used to gather light. Generally, the larger the aperture, the more light the telescope collects and brings to focus, and the brighter the final image.

The *magnification* of a telescope is determined by dividing the focal length of the telescope by the focal length of the eyepiece. Thus, if a telescope has a focal length of 1200 mm, an eyepiece with a focal length of 40 mm will provide a magnification of 30x; that is, objects viewed with the telescope will look 30 times larger in each direction. Since any magnification can be achieved by almost any telescope by using different eyepieces, aperture is a more important feature than magnification.

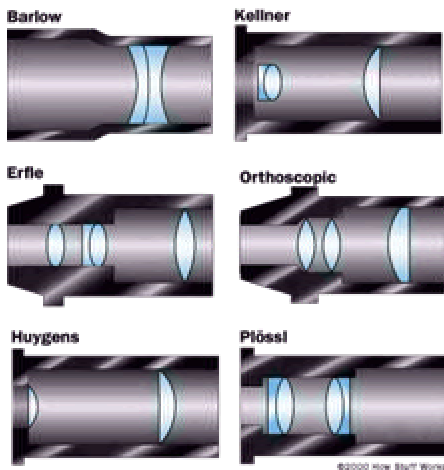
When you look at a printed page with a magnifying glass, it will normally look just as bright as it did before; perhaps a little dimmer because of the loss of light in the glass, but that is not usually noticeable (or brighter if the light illuminating the page happens to also be concentrated by the lens, but this isn't applicable to astronomy, since you don't see even the Moon by the light of a lamp situated behind your telescope).

Stars, however, do look brighter through a telescope. This is because they are so tiny, that they appear as just points of light whatever magnification you use. When a star is made brighter, in effect it is really being enlarged but it retains the same brightness over the now larger surface area, making for a larger total amount of light. But since the "larger area" is still just a point, that point is brighter. There is, however, an upper limit to this process.

By day, a typical value for the size of the pupil of the human eye is 3mm. At night, a fully dark-adapted eye can have the pupil dilated to about 7mm. The aperture divided by the magnification yields the size of the *exit pupil* of the telescope. When the size of the exit pupil matches that of the dark-adapted eye, lowering the magnification of the telescope further won't yield brighter stars, because not all the light from the telescope for each star can enter the eye. Thus, the exit pupil indicates the size of the circular area that can receive all the light collected by the telescope; but that circular area must be situated a particular distance from the telescope



to receive that light, and that distance is known as the *eye relief* of the eyepiece.



Eyepieces come in many designs: Huygens, Ramsden, Orthoscopic, Kellner, Koenig, Erfle, Plossl, Nagler, and Barlow (used in combination with another eyepiece to increase magnification 2 to 3 times), plus a few more not named here. The designs vary in the number and types of lenses, or *elements* they use. When choosing an eyepiece, the following characteristics should be evaluated: optical quality, field size, brightness, sharpness, lack of aberrations (chromatic aberrations, ghost images), eye relief (distance from focal point, your eye, to the lens -- especially important for eyeglass wearers), barrel size - 0.965 inches, 1.25 inches, 2 inches, and price.

<b>Magnification =</b>	$\text{Objective focal length} / \text{Eyepiece focal length}$	$= \text{Objective diameter} / \text{Exit pupil}$
<b>f/# =</b>	$\text{Objective focal length} / \text{objective diameter}$	
<b>Field Size (in degrees) =</b>	$(\text{eyepiece field stop diameter} / \text{telescope focal length}) \times 57.3^\circ$	
<b>Exit Pupil =</b>	$\text{Objective diameter} / \text{Magnification}$	$= \text{Eyepiece focal length} / (\text{Objective } f/\#)$
<b>Dawes Limit =</b>	$4.56 \text{ arc seconds} / \text{Objective diameter in inches}$	
<b>Aperture Gain =</b>	$(\text{Objective diameter} / \text{Eye pupil diameter})^2$	

**In Memoriam:  
William J. (Bill) Karas**



William (Bill) J. Karas passed away August 7, 2004 following a short illness.

He was born August 20, 1921, in Akron, and had been a resident of Cuyahoga Falls since 1954. Bill retired from B.F. Goodrich in

1985 with over 40 years service, and was a proud Navy veteran of World War II.

Bill was an avid tinkerer with a special love of photography and astronomy. He was a life member of the VFW Post 3458 and an active member of the Astronomy Club of Akron and the Akron branch of the U.S. Power Squadron, where he was a test proctor. Bill was a member of the Four Stack APD Veterans having proudly served on the USS Clemson, and enjoyed traveling to their reunions.

Memorials may be made to the Astronomy Club of Akron, the US Power Squadron, or the Cancer Treatment Center at Akron General Medical Center in his name.

—Published in the Akron Beacon Journal on 8/10/2004.

**Welcome!**

Welcome, new ACA Members!

The ACA wishes to extend a warm welcome to new members...

- Mary Kay Estep**
- Robert Hershberger** - owner of 'Time and Optics' in Millersburg
- Mark & Diane North**
- Joanne Rilling**
- Merle Tomlinson**
- Pat Worden**

We look forward to seeing you at all club events!



**For Sale**

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**Article Submission**

Please note the change in the deadline for article submission. All articles are due **12 days after the last meeting**. In the summer months, when there is no meeting, the deadline is **12 days after the fourth Friday of the month**. This has been revised in order to get the newsletter into the mail **2 weeks after the last meeting or 4th Friday of the previous month**. All word processing files should be saved in any version of **Word** to minimize import problems. If you don't have access to a computer, don't hesitate to write something out long hand.

Send in your articles, items for sale, and comments to:

**Lynn M. Laux**  
14274 Bridle Trail  
Strongsville, OH 44136

Or email:  
[gemmalady@msn.com](mailto:gemmalady@msn.com)



If you have any pictures of club events, astronomical images, rig pictures and the like, please submit them to:

<http://groups.yahoo.com/group/astronomyclubofakron>

