The Skyscraper

Vol. 36 No. 8 August 2009

Amateur Astronomical Society Of Rhode Island · 47 Peeptoad Road North Scituate, RI 02857 · www.theSkyscrapers.org

THE UNIVERSE YOURS TO DISCOVER
INTERNATIONAL YEAR OF ASTRONOMY 2009

Seagrave Memorial Observatory is open to the public

weather permitting

Saturdays 8:30pm - 10:30pm
See **www.theSkyscrapers.org** for updates.

Register Today for

AstroAssembly 2009

Friday, October 2
& Saturday, October 3
Seagrave Memorial Observatory

Speakers: Ronald Florence, Thomas Levenson, Mike Mattei, William Sheehan

Friday Night Informal Talks
Solar Observing • Swap Tables • On-Site Vendor • Raffle & Door Prizes
Evening Reception • Buffet Dinner
Observing at Seagrave Observatory

August 2009

●	5	Full Moon
	12-13	Perseid Meteor Shower peaks
◑	13	Last Quarter Moon
	14	Jupiter at opposition
	17	Neptune at opposition
●	20	New Moon
	24	Mercury at greatest eastern elongation (27°)
◑	27	First Quarter Moon

August Meeting & Members' Short Talks

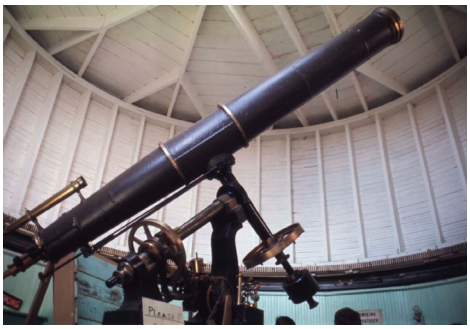
Friday, August 7 at Seagrave Memorial Observatory

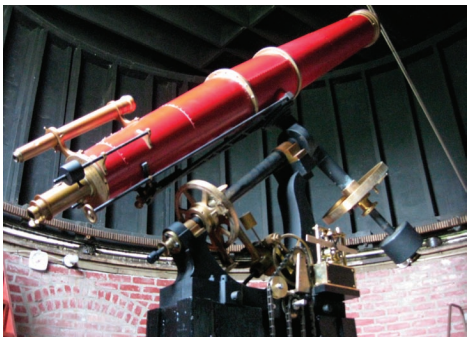
The August monthly meeting will feature informal talks by Skyscrapers' members. Several members have requested that monthly speakers include more practical "amateur" astronomy level talks that they can directly relate to and learn from. We have three talks of about 20 minutes each:

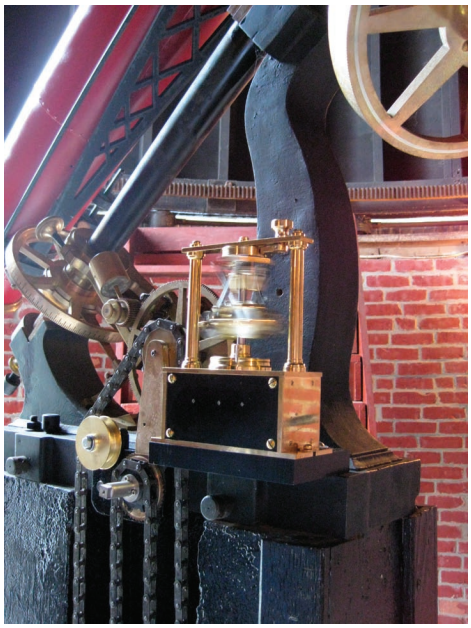
Dick Parker–Chiefland Astronomy Village Observing Site In Florida
Craig Cortis–The Summer Milky Way Points of Interest
Bob Forgiel–Astro-Imaging Equipment and Procedures

Then & Now...

Al Hall used some archive photos from the 1960's of the Alvan Clark weight drive to design the parts for the replacement, which is now operational. **Page 4...**












Skyscrapers Cookout, Saturday, July 11, 2009. Left, top to bottom: Al Hall and Dick Parker test the rebuilt flyball governor, in operation for the first time. Bob Horton presents Al and Dick with a certificate of appreciation for their work on the Clark telescope drive. Bob Horton presents Glenn Jackson with a framed print of his White Mountain Milky Way photo from the executive committee as a symbol of appreciation for his service as president. Right, top to bottom: Solar observing. Steve Siok at the grill. Skyscrapers gather for presidential announcements after the cookout.

Dark Sky News Briefs

The Town of North Smithfield has begun a rural skies initiative by shutting off unneeded streetlights to help preserve dark skies and reduce energy costs:
http://www.valleybreeze.com/Free/MAIN-6-25-NOS-Rural-skies-initiative-clone

New Hampshire has enacted a dark skies bill that encourages the use of efficient, night-sky friendly lighting:
http://www.unionleader.com/article.aspx?headline=AP%3A+Bill+establishes+NH+dark+skies+policy&articleId=c0361f26-58ee-4114-a57e-e99bffc616a2

Cherry Springs Dark Sky Park in Pennsylvania is being threatened by the drilling of gas wells on lands near the park. The company drilling the wells is working with Cherry Springs to minimize the effect of the drilling, which includes the burn-off of gas at the top of the wells:
http://www.csspdarkskyfund.org/home/announcements_and_notices

The American Medical Association recognizes the adverse effects of light pollution on human health and has adopted a policy statement calling for its reduction:
http://docs.darksky.org/Docs/AMA%20Light%20pollution.pdf

The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are usually held on the first Friday of the month. Public observing is usually held every Saturday night at Seagrave Memorial Observatory, weather permitting.

Directions
Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions
Submissions to *The Skyscraper* are always welcome. Please submit items for the newsletter **no later than August 21** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or email to jim@distantgalaxy.com.

Email subscriptions
To receive *The Skyscraper* by email, send email with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal

The Perseid Meteor Shower of August

Dave Huestis

As I write this column in mid-July, it appears we may have finally moved into a more favorable weather pattern that will allow us stargazers to view the starry heavens once again. Though I am reluctant to even mention the word "shower," the upcoming shower of meteors in August is the annual Perseids.

Each year centered on August 12, the Earth passes through a couple of streams of particles stripped off Comet 109P/Swift-Tuttle and deposited in orbit about the Sun. At this point in time and space the density of the stream is a little thin, but the resulting display of shooting stars is still worth watching as the meteors plunge into our atmosphere at many miles per second and disintegrate.

Though perhaps the night of August 12-13 will hold the best prospects for observing as many shooting stars as possible, I would also suggest you observe on the previous night as well. Why? The peak of activity is predicted to occur during daylight hours on the 12th. In either case, the Perseids perform best from midnight until dawn's early light. However, the almost last quarter Moon will rise before midnight, so its bright presence will somewhat diminish the number of meteors that can be seen.

Maximize your chances of observing as many meteors as possible by selecting a location well away from light pollution and get comfortable on a lounge chair or in sleeping bag. Try to block out the Moon with a nearby building so its light will not shine directly in your eyes. And this year, exercise special caution and keep the mosquitoes at bay.

The Perseids appear to radiate from an area of sky, called the radiant point, in the constellation Perseus. Perseus is well up in the northeast sky after midnight. Face this general direction when you first begin your observing session and gradually follow the radiant across the sky. As Perseus rises higher into the sky, the number of meteors will increase as the morning progresses.

The Perseids are usually green, red or orange in color and blaze across the heavens at 134,222 miles per hour. And some members of this shower are bright and often produce exploding fireballs. Taking into consideration all the observing conditions for the Perseids this year, potentially one may expect to see 30 to 40 meteors per hour. But like the weather, anything is possible.

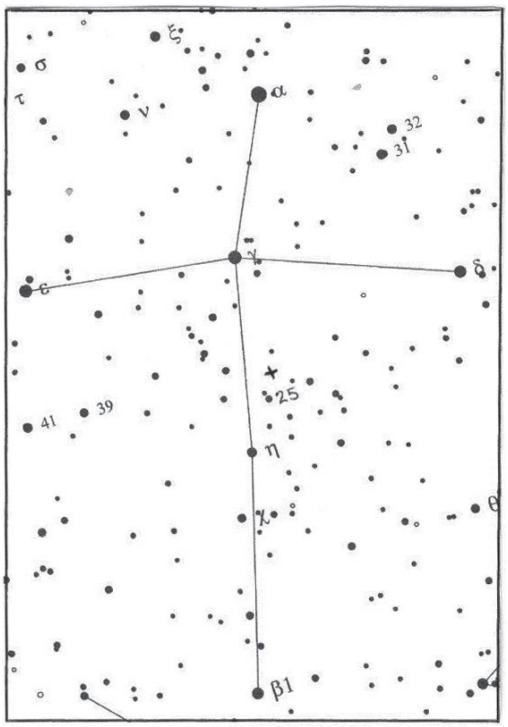
So if the weather does cooperate, spend a few hours outdoors on the mornings of August 11-12 and 12-13 to watch a beautiful display of shooting stars light up the sky. You never know when the "other" type of shower will prevent further astronomical adventures.

When it is clear on a Saturday night, don't forget to visit Seagrave Memorial Observatory (http:/www.theskyscrapers.org) on Peeptoad Road in North Scituate for a tour of the heavens through our many telescopes. Or, on every clear Tuesday night please visit Ladd Observatory (http://www.brown.edu/Departments/Physics/Ladd/) in Providence. Check out their websites for the public night schedules.

Sky Object of the Month - August 2009

"Chaple's Arc"

Glenn Chaple



Finder chart for the fairy Ring (Chaple's Arc)
(from Cartes du Ciel)

Forgive me for the apparent ego trip, but this month I'm going to introduce you to an amazing little asterism called "Chaple's Arc." I stumbled upon the Arc in the mid-1970s while looking for the double star h1470. Instead of one double, I found four arranged in an arc 1/2o across. So smitten was I by its extraordinary appearance that I eventually wrote about it in the September 1980 issue of Deep Sky Monthly. New York amateur astronomer John Pazmino viewed the group and dubbed it "Chaple's Arc."

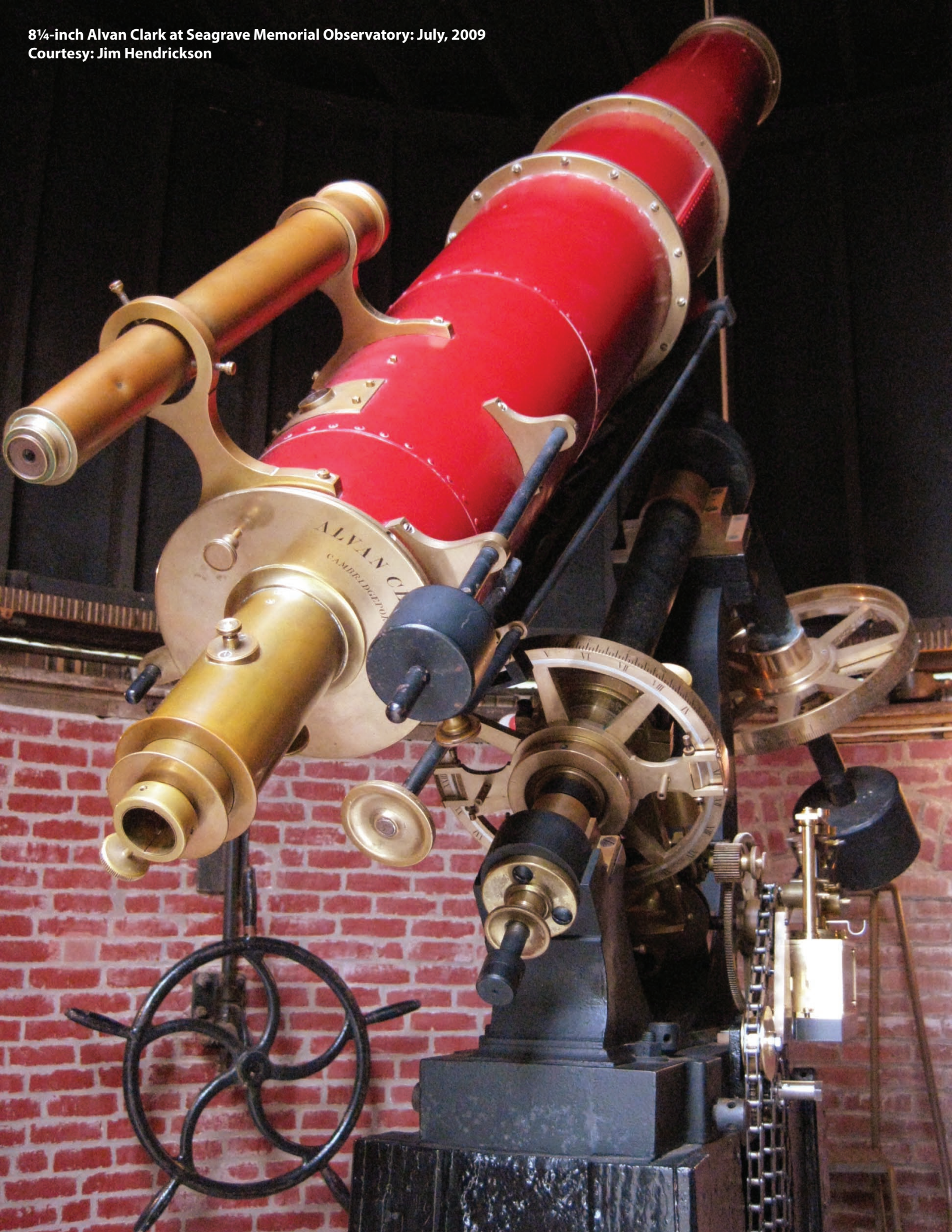
A quarter century later, I decided to introduce the Arc to a much larger audience by featuring it in my "Observing Basics" column in Astronomy. To my amazement, I saw the same group described in the British magazine Sky at Night. The writer called it the "Fairy Ring." Uh-oh! Had I missed something?

After a little detective work and an assist from Sky and Telescope's Sue French, I learned that the Arc had been seen by Utah amateur astronomer Kim Hyatt in the early 1990s. Like me, he found it during a search for h1470. Because he was using a larger telescope than I had, he was able to view some faint pairs that, along with my four, formed a ring of double stars. Not knowing about Chaple's Arc, he and a friend christened it the Fairy Ring.

This summer you can view a famous Ring (M57) for the gazillionth time, or you can be one of the few to glimpse a much lesser-known Ring (the Fairy). Here's how to find it. Using a low-power eyepiece, trace a line from eta Cygni to 25 Cygni and extend it a half degree beyond to the Arc.

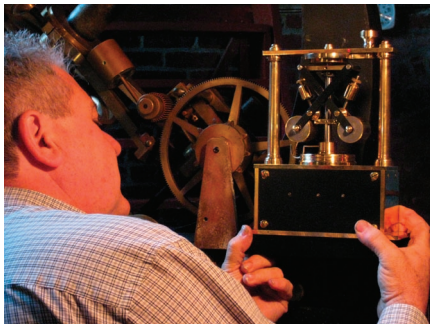
For an interesting discussion on Chaple's Arc/the Fairy ring, Google "Chaple's Arc" and look for the Cloudynights thread in the subject. Whether you call it Chaple's Arc or the Fairy Ring, this is one asterism that will astound and delight you.

Your comments on this column are welcome. E-mail me at gchaple@hotmail.com.



8¼-inch Alvan Clark at Seagrave Memorial Observatory: July, 2009
Courtesy: Jim Hendrickson

Rebuilding the Weight Drive for the 8¼-inch Alvan Clark at Seagrave Memorial Observatory



Allen T. Hall

It has truly been an honor spending some time over the last few years working on the Clark Weight Drive Project for Seagrave Memorial Observatory.

My first logbook entry mentioning the reconstruction of the Drive was back in 2003, over six years ago. During this time I have learned a great deal about the genius of the Clarks, in particular George Basset Clark, whom I believe is responsible for the design of our 8¼-inch telescope's mount and drive systems. This grand old scope was built in 1878 and I had been thinking about restoring it for some time. So, when the opportunity finally presented itself, I was very anxious to get started.

Initially, there was a big problem to overcome. We did not have the original flyball governor, the heart and soul of the weight drive system. It had been destroyed back in the early seventies. For those of you who are unfamiliar with the story, I will reiterate some of it here, as I believe it to be an important part of the telescope's history.

Back in the early 1970's, the flyball governor, right ascension circle and sector drive were removed in an attempt to "improve" the telescope's tracking ability. The governor and weights were replaced by an electric motor and a "new" Mathis gear was installed on the polar axis. During this time the flyball governor and most of the drive components were brought into the meeting hall and stored in a cabinet. Well, one day vandals broke into the meeting hall and stole the 6-inch Crawford refractor, along with the flyball governor.

The governor was subsequently found a few weeks later. It had been smashed on a stone wall. It is truly hard to comprehend how anyone could be so ignorant. Now, I never saw the flyball governor, or any of the supposed pieces after it had been stolen, and I don't remember who found it out on the stone wall. Anyway, the governor was gone and we had no indication of what it looked like or how it operated other than my feeble recollection of having seen it run the telescope when I was a young lad of 14.

Once I decided to try and replicate this important missing component, it became immediately apparent that much research would be required to track down whatever vital information I could find.

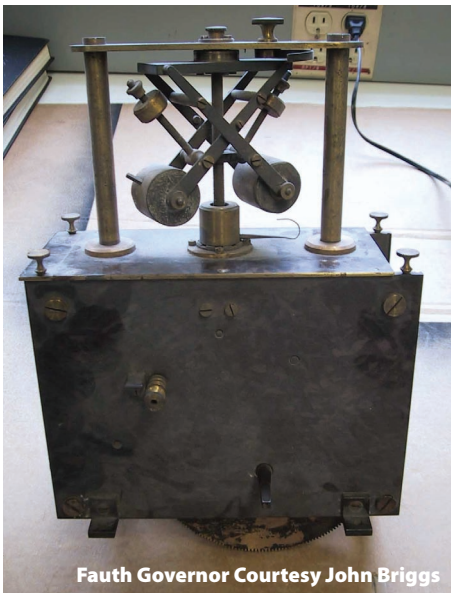
My first step was to simply close my eyes and try to remember what I saw when I was a young boy. I do remember seeing the governor spinning, and with my eyes closed I made an initial guesstimate that it was spinning around 120 RPM, 2 times per second. Well, at least I had somewhere to start.

I asked Ed Turco and Bill Penhallow, both long-time Skyscrapers members, to recall what they could about the old drive. Of course I also asked if they had any old pictures. Unfortunately neither had pictures, but Bill recalled that my guesstimate about the speed was probably pretty close, and Ed Turco remembered that there was a hook on the unit that would produce a clicking sound every few seconds; two more vital clues.

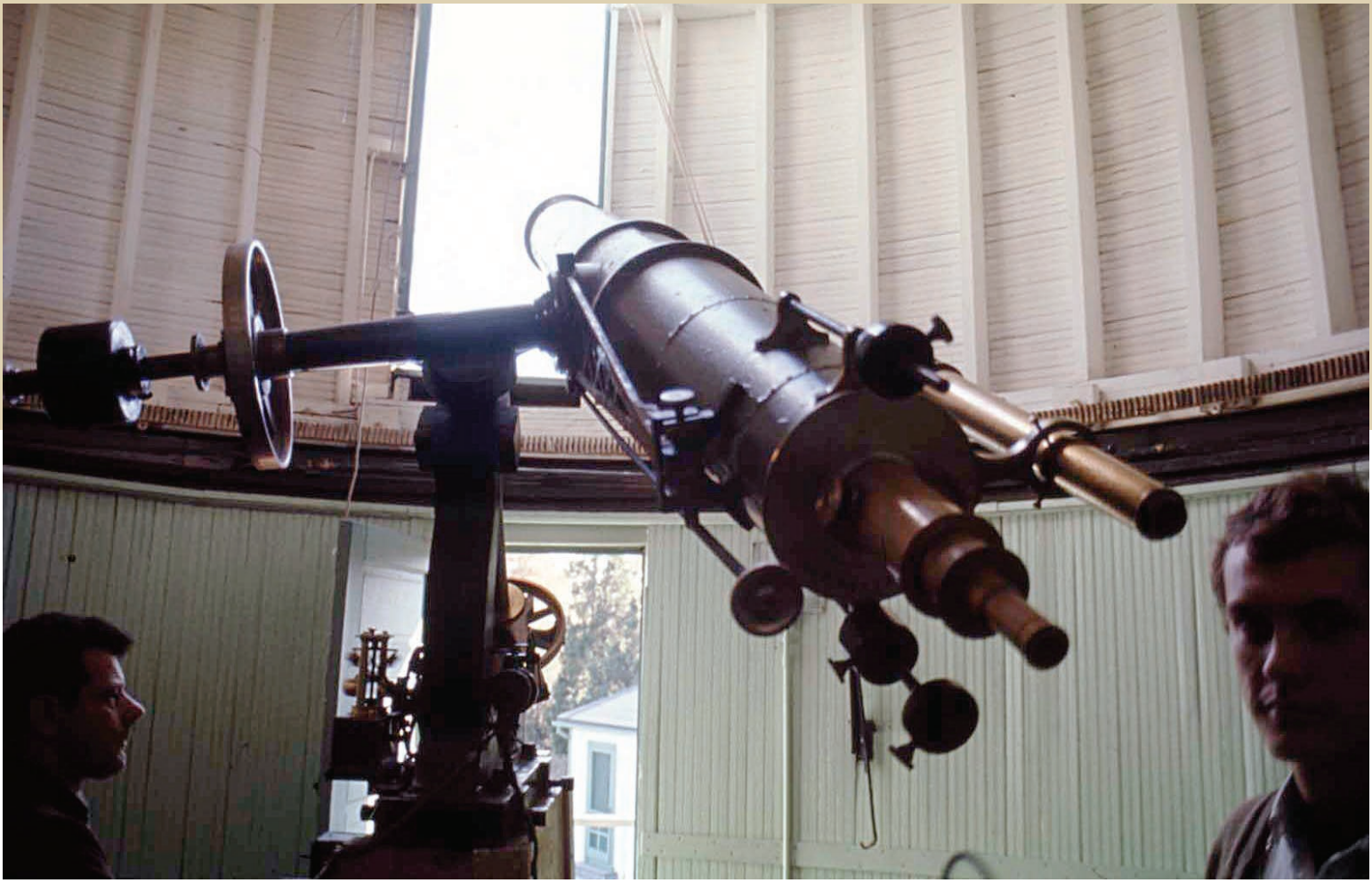
Next, I contacted John Briggs, renowned Alvan Clark Expert. He had some pictures of an old Fauth governor, which he believed George Clark had based his design upon. This photograph was an important first step in the reproduction effort because we now had a rough idea of the scale of the unit and some insight into its operation. This unit was thought to precede the Clark governor by some short period of time. You can see a copy of this picture below. Notice the little hook that Ed Turco had referred to.

It became apparent after examining this photo that the hook was there to engage a small pin that extended from one of the weights. In this photo the pin is rotated out of position. Look at the left weight to see the pin; it should be facing downward, so that while rotating it could hit the hook after flying out a certain distance. This hook's function was also immediately apparent as it was there to add friction. When the system of weights flies out too far, the pin engages the hook and this slows the rotation; then as the rotation slows, the weights drop back down slightly and disengage the hook. This was the mechanism by which the speed of rotation was regulated. Ah, another vital piece of information.

I started looking into the physics of these systems and found a great



Fauth Governor Courtesy John Briggs

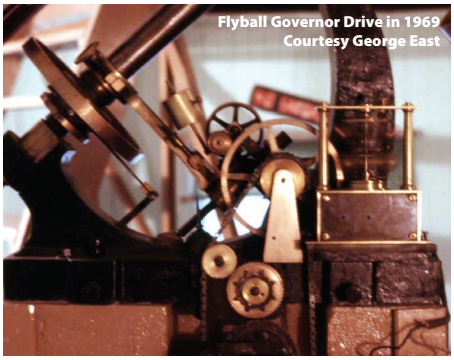


deal of resource material related to the James Watt flyball governor. These governors operate on a principle of centrifugal inertia. As the shaft spins faster and faster, the weights "fly" further out from the axis of rotation. This motion is very well understood and can be described by formulas that were developed for conical pendulums, the details of which I will not bore you with here. Suffice it to say that the angles to which the weight support arms will rise to are directly related to the rotation speed.

Next, I compiled some additional information based on the fact that I had some of the remaining clock drive components that the governor attaches to. In particular, I determined that the idler spur gear which mated to the governor needed to rotate at 1 RPM in order for the telescope to track at the sidereal rate. This figure was arrived at by back tracing the gear train and by counting up the multiple gear ratios.

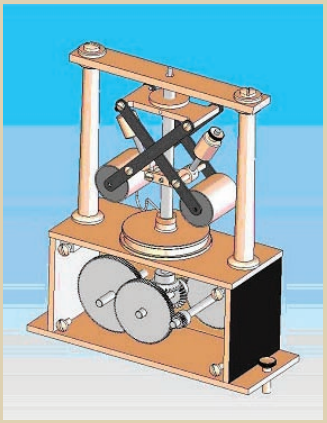
So, I now knew that the governor was spinning about 120 RPM and the output speed of the governor's shaft had to be 1 RPM. This indicated an initial estimate of 120 to 1 for the gear reduction box, and knowing this gear ratio allowed me to identify the internal gears; the ones we cannot see inside the box.

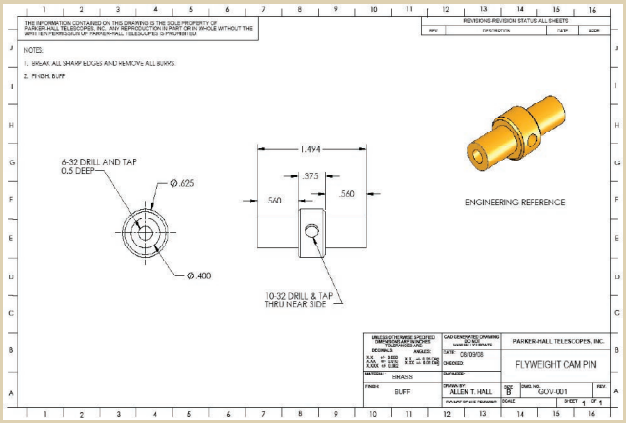
A couple more seasons passed and I was at AstroAssembly 2005 when I noticed that George East was also in attendance. I approached him to see if he might have in his possession any photographs of the old weight drive. As it turns out he did! After several days of looking, he was able to track down several photos from the late 1960's that showed the flyball governor and how it was situated. Jackpot! I was now able to see what the old governor looked like. More importantly, there were pieces of the drive still on the telescope that were also in these photographs. I was able to measure the parts on the telescope and then measure them again in the photos. These measurements gave me the scale for all of the other dimensions in the photos, and I was able to reproduce all of the required dimensions of the missing components, including the flyball governor.



Flyball Governor Drive in 1969
Courtesy George East

Once the dimensions were determined I began to back check against some of my previous assumptions. For example, I now knew the length of the flying weights pivot arms, and also the fact that they appeared to be spinning at a 45 degree angle to the vertical axis. This operating angle makes quite a bit of sense because the tangent of 45 degrees is 1, and the tangent of the angle of operation is the coefficient in several of the conical pendulum equations. This simplifies the math because you are





Left: Allen Hall & Richard Parker begin work on the governor in 2005. **Middle**: CAD Model of the Replica. **Right**: Detail Drawing of one of the governor's Components

now multiplying by 1, a fact that I'm almost certain did not elude George Clark. Now, when I ran the back calculations with the newly acquired length dimensions it turns out that the unit in the 1969 photo was spinning at approximately 150 RPM; not far from my original guesstimate of 120 RPM. So, knowing the RPMs needed to be 150; this set the internal gear ratio to 150 to 1, thereby producing the 1 RPM output speed that I was looking for. It all started to make sense!

Finally, with the internal gear ratio now identified, and the exterior dimensions known, I was able to design a replica of the governor in SolidWorks.

Once the CAD model was completed, it was a simple matter to produce detail drawings of each of the unit's components.

I began fabricating the parts in late fall of 2006. It was at this point that I asked Dick Parker to help me out with some of the machining, as there were many parts to make. Dick has a very fine Moore jig borer, which is the ultimate machine for the job of precision drilling of holes; a definite requirement when placing bearing holes for plate-type clock mechanisms. Dick was more than happy to help, and quite excited as well to be working on such an interesting project.

The governor was virtually completed in the spring of 2007 and Dick and I decided to bring it up to Stellafane that year and enter it into the mechanical competition. We were very fortunate and won a Special Award that year for our work on the governor.

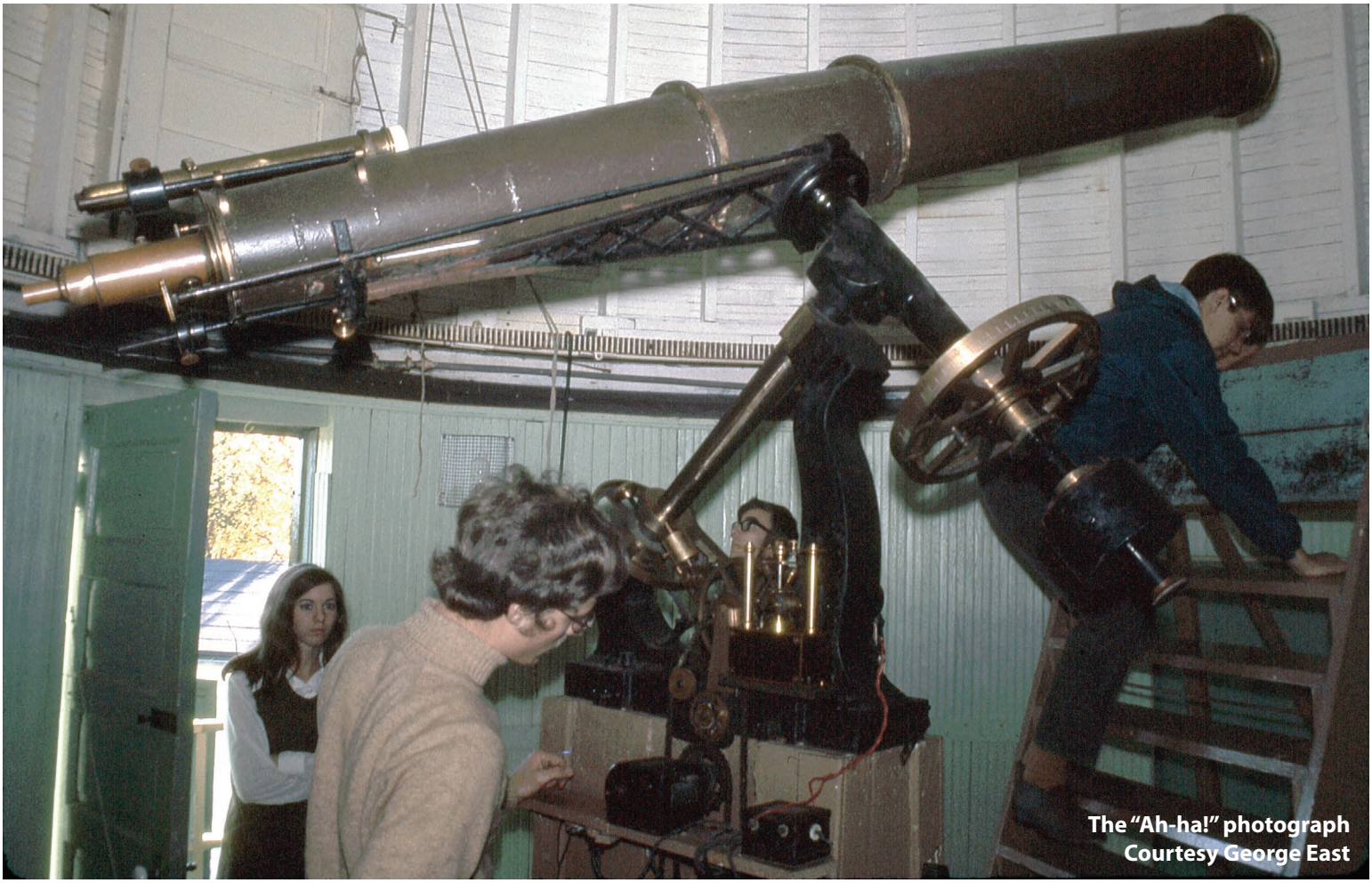
Well, we were almost ready to install the governor back onto the telescope at Seagrave Observatory, but there was still one vital piece of information missing that prevented us from proceeding. I had no idea how the weights and chain system was coupled to the gear train. The photos that George East contributed did not show any details of how the weights were hung. This caused me great mental stress because what I was seeing in these old photos just did not make sense. If you refer to the first photo of the original unit, you will notice that the chain is not wrapped around the ratchet gear in the center of the pier. How did the chain make contact to this component? It was a giant mystery, and if it was not resolved we could not complete the project. I spent several months trying to figure out what was happening with the weight system.

The Completed Governor Displayed at Stellafane 2007

Once again I called on John Briggs to see if he could help me out with the chain mechanism. He did not recall what the old Clark at Seagrave looked like, but he did think that the chain mechanism employed what is known as a Huygens chain, so named after Christiaan Huygens who invented it back in the 1600's.

I began to do a little more research into this chain system. It is also called an endless chain because the whole chain power system forms a continuous loop—really quite ingenious! Anyway, I began to get a feeling for how this chain system worked but was still baffled by what I was seeing in the old photographs. It just did not make any sense that the chain was not connected to the ratchet gear.

Several months passed and I bumped into George East again at a Skyscrapers meeting. I was mentioning to him my problem, and just happened to have



The "Ah-ha!" photograph
Courtesy George East

a copy of the picture that he had sent to me. I remember saying "boy it sure would have been nice to see what was going on down below the bottom of the photograph." I had assumed that Frank Seagrave had made some sort of modification to the original system. Immediately George said; "well I wish I had known that sooner. I have some more photos that show those weights, but you didn't let me know that you were interested in that area." Doh!

So after another couple of days passed I got the "Ah-ha!" e-mail from George. It contained a picture of the weight winding mechanism that was missing from the previous set of photographs. This new information was vital to the faithful reproduction of the original weight drive system. You can see a copy of this photo above.

Utilizing Photoshop I enlarged the area below the mount and also enhanced the contrast. Ah-ha!

It became instantly apparent that Frank Seagrave had replaced the manual winding mechanism with an electric motor, and the chain was simply lowered from the original ratchet sprocket to a new sprocket on the motor shaft. He must have gotten tired of manually winding up the drive. I now knew the last piece of vital information that would allow us to finish the project.

I purchased all of the remaining materials required to complete the project, and began immediately to assemble the last few components. These included the chain and several weights and pulleys. The original ratchet also had to be modified slightly to work with a new, modern chain since the original chain was a late 1800's style bicycle chain that was no longer available.

After more than six years since its inception, the project was finally finished. The weight drive was test-assembled on the telescope in early April, 2009. During that installation it was noted that a couple of modifications were required to achieve proper operational success. So it was immediately removed and the temporary drive was replaced.

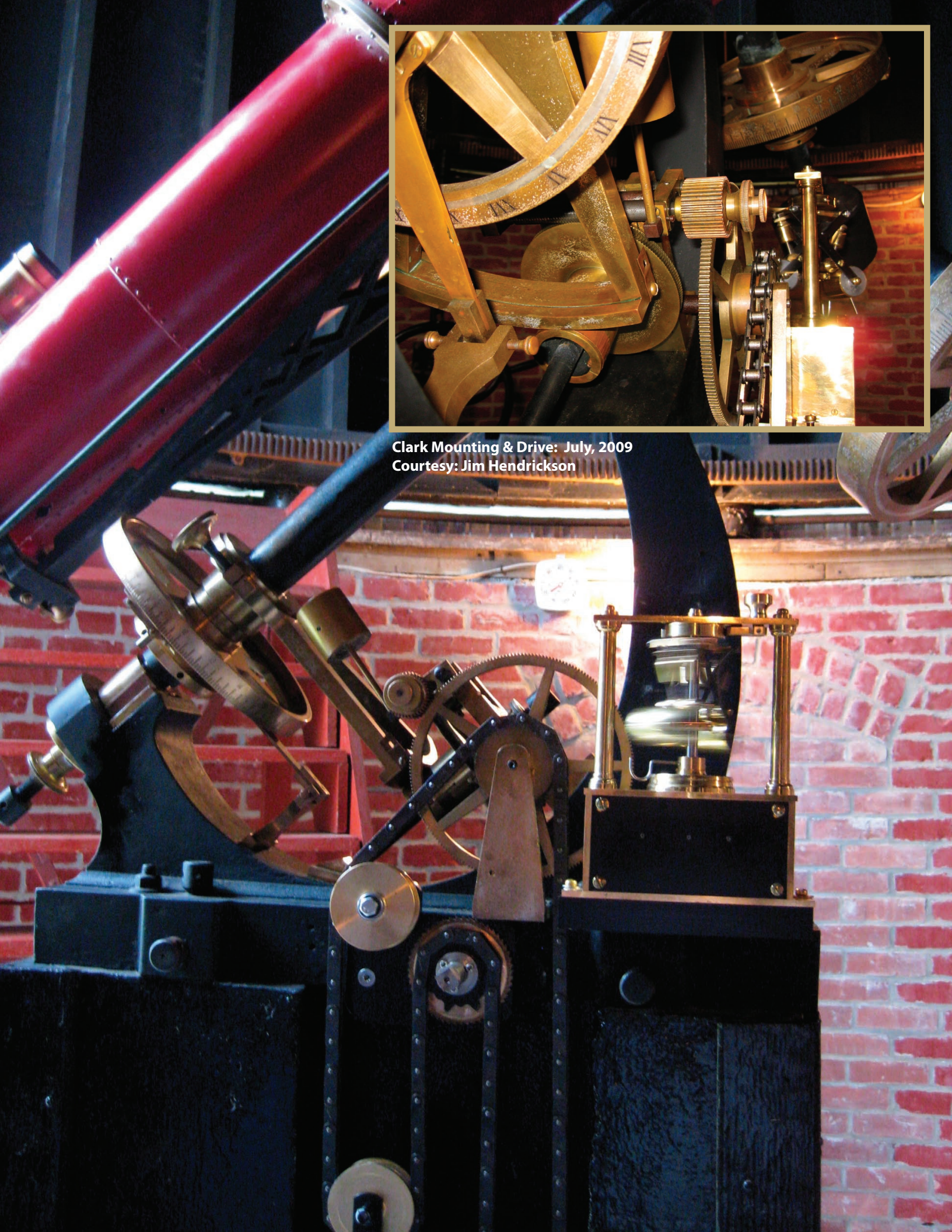
The final installation occurred on July 5th, 2009 and some tweaks were made during the following week. There were a few minor adjustments required on some of the gear mating interfaces and we needed to properly balance the weight loads.

The new "old" drive was re-dedicated and ownership passed to the Skyscrapers Board of Trustees during a ceremony at the annual Skyscrapers Cookout which was held on Saturday, July 11th, 2009. First light with the telescope being driven by its old weight drive occurred on July 13th, 2009 with myself, President Bob Horton and First Vice President Bob Napier in attendance.

The drive worked perfectly. We even managed to adjust out most of the annoying periodic oscillations which had been present as far back as I could remember.

All three of us commented on the apparent spiritual attendance of Frank E. Seagrave, Alvan, Alvan Jr, & George Basset Clark as well.

Regards & Clear Skies All



Clark Mounting & Drive: July, 2009
Courtesy: Jim Hendrickson

The Heart of our Milky Way Galaxy

Craig Cortis

Milky Way photo by Dick Parker during the trip to White Mountain, California in 2004.

Ah, the joys of summer observing—let me itemize a few: 1) Mosquitoes. 2) The occasional tick or other problematic insect. 3) Messing with insect repellent, or not having any when you most need some. 4) Mosquitoes. 5) Thunderstorms, frequent and often nearly unpredictable. 6) Generally hazy, humid, "mucky" air—much more the rule than at other times of the year. 7)) Mosquitoes! (Even worse when it's humid.) 8) Poor transparency of the air, which particularly affects viewing of extended, nebulous deep-sky objects. Dust and other particulates in the atmosphere—enhanced during summer—combine with haze and increased water vapor to reduce contrast and sharpness of certain classes of objects, although not all kinds. (Low altitude objects can be even more adversely affected in this regard; winter is more forgiving when trying to observe things down near the horizon. 9) Humid nights cause optics to dew up with frustrating quickness, sometimes within just minutes after you've set all your stuff up. What, you don't have the right dew-prevention accessories? Break out the hair dryer! (You'll be using one often.) 10) The shortness of observing hours—it gets dark late and light early; around the June solstice or several weeks thereafter you must pay attention to the clock if you're an early riser on a normal schedule. 11) Poorer quality air during summer just enhances skyglow from light pollution—light gets spread out through much larger parts of the sky as opposed to fall and winter, when it's more restricted. The more humid it is, the worse it'll be. Sometimes it

may seem as if you can't really notice anything close to adequate darkness, even in a rural area after midnight. 12) Speaking of light pollution, how about all these outdoor recreation areas (ballfields, golf, etc.) that are usually lit up like the noonday Sun? Such places tend to be in use often and don't close until late in the evening at this time of year; many are seasonal and either are not open the other half of the year, or close down much earlier at night outside of summer. This constitutes an additional, summer-related source of light pollution with which we must contend. 13) Mosquitoes—did I mention them already?

In case you're wondering where I'm going with all these summer observing complaints, let me admit to a few points associated with this time of year that are actually positive and beneficial for amateur astronomers: 1) Comfortable temperatures at night. We don't have to struggle with outrageously cold, freezing conditions, including snow and ice! (Do you ever envy people who enjoy indoor hobbies, like bowling, for example?) 2) The same atmospheric conditions that make for lousy transparency can sometimes—conversely—actually improve seeing, the ability to resolve finer detail when viewing the Moon, tight double stars, the cores of condensed star clusters, or details of the planets, particularly Jupiter and Mars. Why is this so? Well, oftentimes the presence of greater humidity (water vapor) in the air tends to make it steadier and much more amenable for more sustained viewing, with images that retain their sharpness and steadiness longer than you'd see under the drier air conditions of other seasons.

The ever-changing motions of air "cells" along any given sightline through the atmosphere above us tremendously affect the quality of seeing; inconsistencies in speed and direction of the cells' motions relative to one another throughout the entire length of a sightline are enhanced when less water vapor is present. Incoming light rays from celestial objects are refracted to-and-fro and "disturbed" more in drier air, on average, than is the case while observing through air with greater humidity. If you've ever been frustrated with wavering, in-and-out of focus images that don't seem to stay sharp for more than just a few seconds at a time, and you're confident that your scope's optics have equalized to the ambient air temperature (a vitally important factor!), blame it on poor seeing caused by turbulence in the local atmosphere.

Heat rises quickly from buildings or paved areas that can continue radiating their heat to the sky even after nightfall on hot summer days; this can cause a separate mirage condition that will drastically affect image steadiness. Savvy amateurs will try to avoid such problems by not observing directly over houses or pavement, whenever possible.

There are many more globular star clusters to be seen in summer skies than during other seasons of the year, because their orbits around the Galactic center in Sagittarius give the appearance of concentrating them towards that general direction in the sky. Several of the more notable Messier globulars, however, are positioned on the sky well away from the Galactic nucleus. These include M2 in Aquarius, M3 in Canes Venatici, M5 in Serpens Caput (at least as good as M13, in my opinion), M13 and M92 in Hercules, M15 in Pegasus, M30 in Capricornus, and M53 in Coma Berenices. With the exception of the three globulars listed for Serpens Caput and Hercules, most objects I've just mentioned are best seen at other times of the year. Although the fantastic Omega Centauri technically just "breaks" a perfect southern horizon when it culminates (transits the Meridian) at our local latitude of 42° north, you can't really say that it's visible here—it is just too low in the sky. Observers need to be at least several degrees of latitude further south and have the requisite unobstructed horizon and clear sky conditions in order to even begin to appreciate this magnificent object, arguably the finest of the globular clusters known. 47 Tucanae—equal to Omega Centauri in the considered opinions of many amateurs—is at declination -72° 05′ and is therefore over 24 degrees below our local southern horizon limit of -48° declination.

Now (finally!) we come to the very best that summertime observing has to offer us: the areas around the actual center of our home Galaxy, the Milky Way. (It is correct, by the way, to capitalize "Galaxy" when referring to our own, even when the word is used alone. The word is not capitalized when used to describe another galaxy unless it's part of a proper noun name, as in "Andromeda Galaxy.") August is the prime time of year to view this wondrous manifestation of nature's handiwork, a spectacle rivaling—to the astronomically inclined—all the richness and complexity displayed throughout the natural world here on Earth. Those fortunate enough to have access to truly dark observing sites in rural areas on the best of nights—coupled with the absence of a bright Moon—can see luminous, billowy star clouds that simulate steam issuing from the "spout" of the well-known Teapot asterism comprising the main outline of Sagittarius. The brightest of all star clouds along the Milky Way, the Great Sagittarius Star Cloud, has its center located about 2° to the NW of magnitude 3.0 Gamma Sgr, Al Nasl, the star prominently marking the "spout." The combined light of uncountable stars populating the dense, central hub of the Galaxy produces the effect of a cloud; these suns are crowded together much more densely here than in any other parts of the sky and the region is so thick with them that the vast majority cannot be distinguished from one another as separate points of light—thus you see actual "clouds" of stars!

Intricate patches of dark nebulae (usually given "B" numbers indicating their designations in the famous catalog developed by American astronomer E. E. Barnard) are also numerous throughout constellations around this part of the sky, namely Ophiuchus, Scorpius, Sagittarius, and Serpens. These seemingly starless "holes" on the sky are areas having so much fine dust and concentrated gas that they obscure the background light of stars behind them, giving the visual impression of dark splotches lacking any features save for the shapes defined by their borders. Dark nebulae are therefore foreground objects lacking visible light of their own and comprise one of the five classes of nebulae defined by astronomers. Light is either emitted from or reflected by those nebulae making up the other

four general classes: diffuse/emission ("bright") nebulae, planetary nebulae, SN's or supernova remnants, and reflection nebulae.

Somewhat ironically, the Galactic nucleus itself—the very spot from which you'd expect to see the most stars blazing forth—is concealed behind intervening dust that stretches for hundreds of light years outward through the Galactic equatorial (disc) plane from the center. Surprisingly, much of this cosmic dust is thought to be so finely-grained that its average density might approximate that of smoke. Our own position within the Orion Arm lies perhaps 27,000 light years out from the nucleus, so all that dust concentrated along the precise sightline towards the center makes an effective screen of the visual light to which human eyes are attenuated. Fortunately, other wavelengths of energy—comprising a far greater percentage of the electromagnetic spectrum than the very narrow band of visual light we see—do pass through the dust and gas unimpeded. It is due to this fact that we can know exactly the position of the Galaxy's actual nucleus at a spot called Sagittarius A*, which coincides with the zero degree point of Galactic longitude on the Galactic Equator. On a star atlas you'll see that this point lies in western Sagittarius in a corner of the constellation close to the borders with both Ophiuchus and Scorpius. Here, at approximately RA 17h 46m and Dec. -28° 55′, lies what I call the "monster in the middle"—the supermassive black hole at the very heart of our Milky Way Galaxy, having a total mass of about 4.1 million times the mass of our own Sun!

Even though there's nothing you can actually see (in visible light) at this spot, knowledge of the power, energy, and forces at work here can easily impress and fascinate those willing to consider the significance of looking inward in the direction of the Galaxy's true nucleus. Using binoculars or a rich-field telescope, star-hopping to Sagittarius A* is easily done by first noting Gamma Sgr, the Teapot's "spout" star. An arc of several much fainter stars will be seen to rise above and curve NW from a point just W of Gamma, finally "hooking" down to what is by far the brightest star nearest to the Galactic center, magnitude 4.5 X Sgr (also known as 3 Sgr), at RA 17h 47m 34s, Dec. -27° 50′. About one degree due W of X is a magnitude 6.4 star; together, these two stars form the base of an inverted, "arrowhead"-shaped triangle. The third point of this triangle must be imagined, because it is not marked by a visible star—this is Sagittarius A*, about 1.1° due S of the middle of a line joining X Sgr to that magnitude 6.4 star. A sprinkling of faint foreground stars will be seen just above Sgr A*. The Galactic center is just over 4° WNW from Gamma Sgr, barely W of the border of the Great Sagittarius Star Cloud—it is lost within the dark murk of the Milky Way's Great Rift, a continuous band of dark nebulae running basically along the plane of the Galactic Equator that I described in my article on the constellation Scutum in the August 2008 issue of this newsletter.

True enough, you will see a few foreground stars amid the Great Rift but the contrast of this region with the dramatic, intense blaze of concentrated starlight lying just E and NE (the Great Sagittarius Star Cloud) seems to make the Milky Way's center a visually unimpressive spot. Actually, the entire part of the sky I've thus far described—including bright star clouds, but particularly dark nebulae—is impossible to really appreciate from urban areas awash with light pollution spread out through the hazy muck of summer air. Even the best observing sites on good nights in rural locations can't begin to do justice to all the delicate beauty rendered supremely by good photographs or CCD images, so I'd advise trying "armchair astronomy" by enjoying pictures showing detail that your eyes alone cannot. A huge advantage, too, will be freedom from mosquitoes! Many websites and astronomy books have luscious pictures of the summer Milky Way, but club president Bob Horton has taken what may be the classic, definitive astrophoto of this sky region. No doubt many Skyscraper members have seen or purchased Bob's splendid photo, described to me by Al Hall as being the best such picture he'd seen anywhere. (Al is known to many of you for his prowess in engineering, machining, and award-winning telescope-making.)

On a trip to California's White Mountains back in 2002, Bob Horton took advantage of a clear, Moon-free night to capture a long exposure, wide-field image centered about two degrees or so to the NW of Gamma Sgr. He was in a very dark, remote region probably just W of the Nevada border, at a latitude I estimate to be between 37.5° and 38° north. A line of trees cuts across the lower border of Bob's photo, limiting the southern declination of stars seen to around -39° as opposed to the -52° Dec. that would have been pictured over a hypothetical perfect southern horizon. This doesn't detract from the impact of all that the photo reveals, though. My words alone would be inadequate to describe all of what registers on the eye in this great picture; looking at it will immediately show what words cannot begin to do justice to, so please treat yourself, if possible.

The July 2008 issue of this newsletter includes an article I wrote containing a listing of 35 various sky objects of note to be seen in the summer Milky Way region, mainly in Ophiuchus, Scorpius, Serpens, and Sagittarius. If you've saved that issue or can access it on the Skyscrapers website, you might find many of my choices to be worthwhile—maybe all of them. A star-hop in Scutum is in the August 2008 issue. The Milky Way in Sagittarius is richly described in *Burnham's Celestial Handbook*, volume 3, pages 1619-1644, which includes a good finder chart for Sagittarius A*.

One First Edition copy of the Skyscrapers 75th Anniversary Book has just become available for sale. To be fair, anybody who would like to own this copy must send me their name by email or notify me in person by the August monthly meeting. A random drawing will be held that evening with all the received entries.

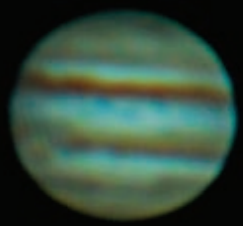
If you enter your name, please be prepared to pay the treasurer $30 after the drawing should you be the lucky winner.

Good luck to everyone.

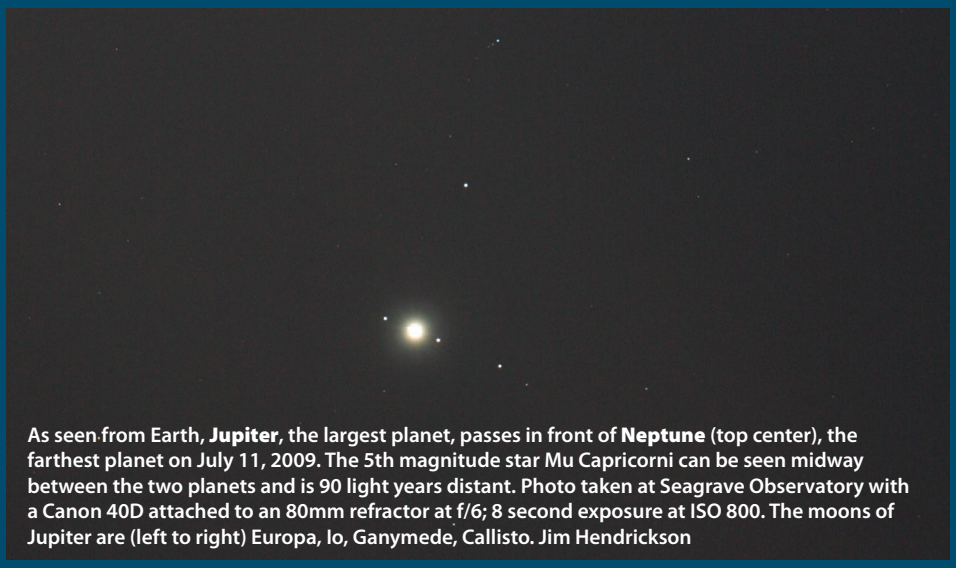
–David A. Huestis, Historian

Astrophoto Gallery

I finally was able to download a version of RegiStax and the attached photo is my 1st attempt with the software. This was a 10 second video of **Jupiter** taken on July 4th at 4:00 AM with an Orion Starshoot Camera through a C11 SCT with a 2x Barlow. The video was 74 frames, then processed through RegiStax, followed by MaxIm DL, and then finally with PhotoShop. Tom Thibault

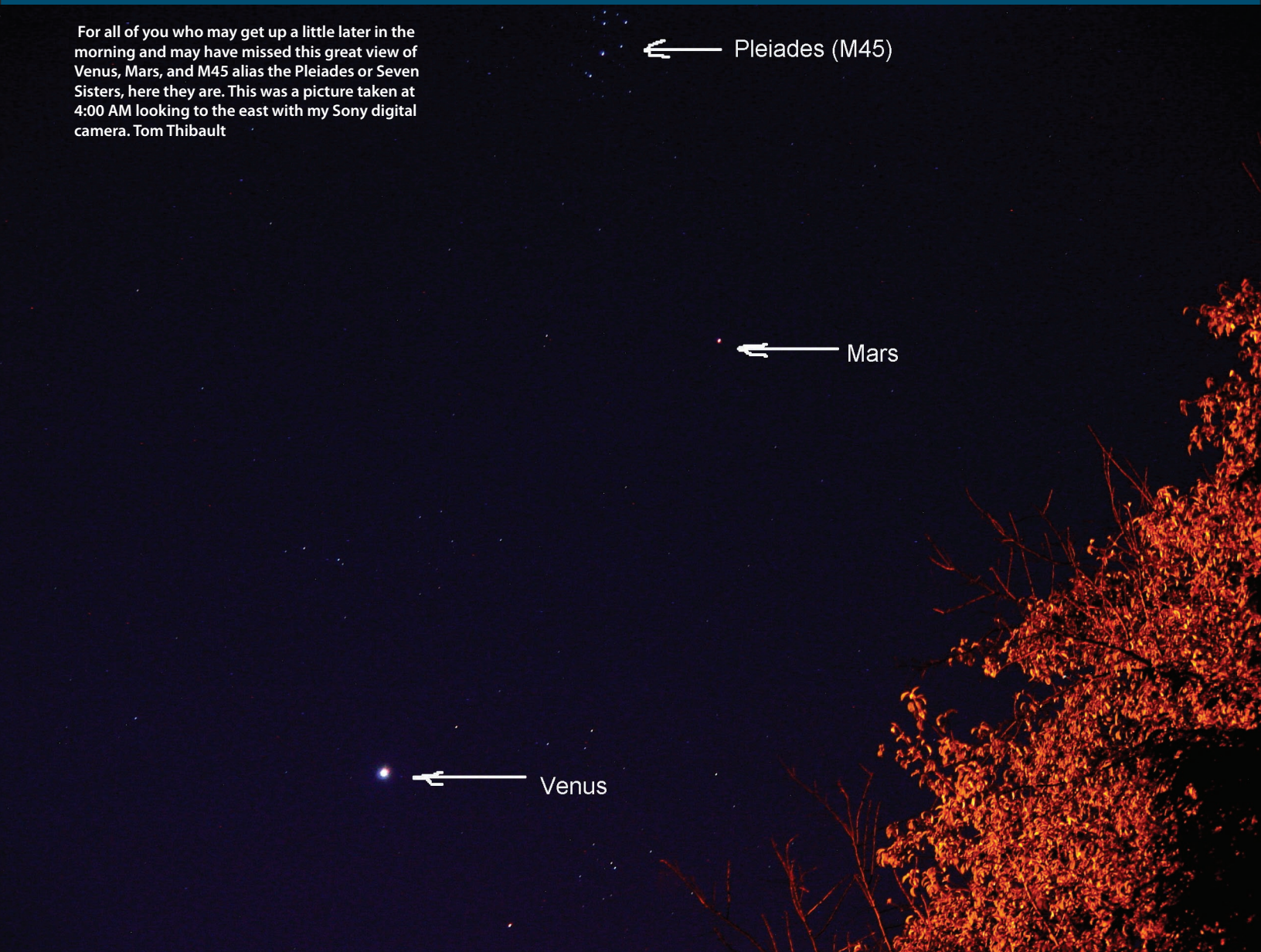


Supernova 2009GA by Bob Napier.



As seen from Earth, **Jupiter**, the largest planet, passes in front of **Neptune** (top center), the farthest planet on July 11, 2009. The 5th magnitude star Mu Capricorni can be seen midway between the two planets and is 90 light years distant. Photo taken at Seagrave Observatory with a Canon 40D attached to an 80mm refractor at f/6; 8 second exposure at ISO 800. The moons of Jupiter are (left to right) Europa, Io, Ganymede, Callisto. Jim Hendrickson

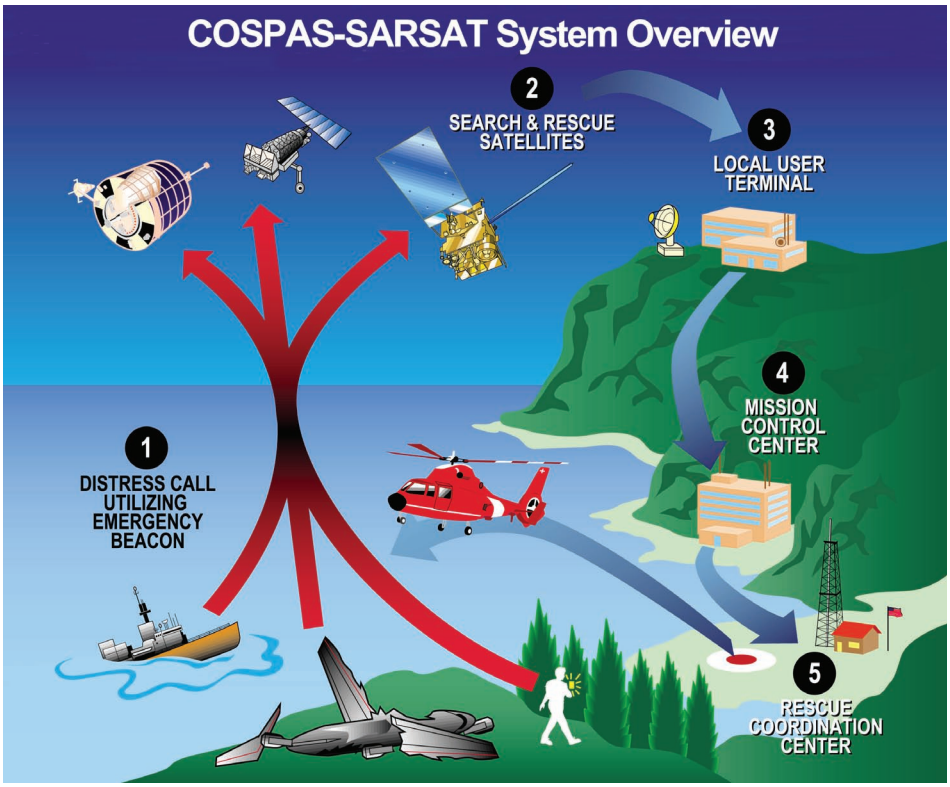
For all of you who may get up a little later in the morning and may have missed this great view of Venus, Mars, and M45 alias the Pleiades or Seven Sisters, here they are. This was a picture taken at 4:00 AM looking to the east with my Sony digital camera. Tom Thibault



SARSAT to the Rescue

If a plane crashes in the woods and nobody hears it, does it make a sound? Never mind contemplating this scenario as a philosophical riddle. This can be a real life or death question. And the answer most of the time is that, even if no people are nearby, something is indeed listening high above. That something is a network of satellites orbiting about 450 miles overhead. The "sound" they hear isn't the crash itself, but a distress signal from a radio beacon carried by many modern ships, aircraft, and even individual people venturing into remote wildernesses. In the last 25 years, more than 25,000 lives have been saved using the satellite response system called Search and Rescue Satellite-aided Tracking (SARSAT). So what are these life-saving superhero satellites? Why they are mild-mannered weather satellites. "These satellites do double duty," says Mickey Fitzmaurice, a National Oceanic and Atmospheric Administration (NOAA) systems engineer for SARSAT. "Their primary purpose is to gather continuous weather data, of course. But while they're up there, they might as well be listening for distress signals too." In February, NASA launched the newest of these Polar-orbiting Operational Environmental Satellites (or POES) into orbit. This new satellite, called N-Prime at launch and now dubbed NOAA-19, prevents a gap in this satellite network as another, aging NOAA satellite reached the end of its operational life. "The launch of N-Prime was a big deal for us," Fitzmaurice says. With N-Prime/NOAA-19 in place, there are now six satellites in this network. Amongst them, they pass over every place on Earth, on average, about once an hour. To pinpoint the location of an injured explorer, a sinking ship, or a downed plane, POES use the same Doppler effect that causes a car horn to sound higher-pitched when the car is moving toward you than it sounds after it passes by.

In a similar way, POES "hear" a higher frequency when they're moving toward the source of the distress signal, and a lower frequency when they've already passed overhead. It takes only three distress-signal bursts — each about 50 seconds apart — to determine the source's location. Complementing the POES are the Geostationary Operational Environmental Satellites (GOES), which, besides providing weather data, continuously monitor the Western Hemisphere for distress signals. Since their geostationary orbit leaves them motionless with respect to Earth below, there is no Doppler effect to pinpoint location. However, they do provide near instantaneous notification of distress signals.



NOAA's polar-orbiting and geostationary satellites, along with Russia's Cospas spacecraft, are part of the sophisticated, international Search and Rescue Satellite-Aided Tracking System.

In the future, the network will be expanded by putting receivers on new Global Positioning System (GPS) satellites, Fitzmaurice says. "We want to be able to locate you after just one burst." With GPS, GOES will also be able to provide the location of the transmitter.

Philosophers beware: SARSAT is making "silent crashes" a thing of the past. Download a two-page summary of NOAA-19 at www.osd.noaa.gov/POES/NOAA-NP_Fact_Sheet.pdf. The Space Place gives kids a chance to rescue stranded skiers using their emergency rescue beacons. The Wild Weather Adventure game awaits them at spaceplace.nasa.gov/en/kids/goes/wwa.

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

From the Archives:
These wooden rectangular enclosures were built by Skyscrapers members in the early 1960's. These meteor observing chairs were closed on all sides with an opening for an observer's head and shoulders. It was like a wooden sleeping bag. They were also inclined from the horizontal like a lawn chair. Nine of these units were built and they resided in the then empty back field (now home to both roll-off roof observatories). During the cold months of meteor observing, long extension cords were used to provide power for hair dyers to keep the observer toasty. These observing chairs became affectionately known as **observing coffins!**

July Meeting Notes

Saturday, July 11, 2009; Seagrave Observatory

Jim Crawford

Monthly Meeting 7:30 p.m.

Bob Horton welcomed all members and thanked everyone for all the help in the organizing, preparation and clean-up for today's annual picnic.

Bob Napier introduced Guest Speaker: **Dr. Kristine Larsen** to present a talk about famed physicist Steven Hawking. Dr. Larson was also our guest speaker in December 2008, presenting a talk about "Woman in Astronomy".

Business Meeting 9: p.m.

Secretary's Report: accepted by the membership.

Financial Report: accepted by the membership.

1st VP Bob Napier: The August monthly meeting will feature informal talks by Skyscrapers' members. Several members have asked that monthly speakers include more practical "amateur" astronomy level talks that they can directly relate to and learn from. Members are asked to give a 10 to 20 minute talk about their astronomy projects and activities. Talks can be about visual observations without telescopes, with telescopes, with CCD imaging, telescope making or other aspects of astronomy of interest to the membership. Those who wish to give a short talk and share your expertise, please contact Bob Napier (bob_napier@hotmail.com or call 934-0980) to be included in the program

2nd VP Steve Hubbard: Is working to get speakers for this year's AstroAssembly. The keynote speaker is Ronald Florence and will speak about how big science got started. Other speakers scheduled are Bill Sheehan's discussion on Mars and Prof. Tom Levinston from MIT, topic still undetermined.

Historian Dave Huestis: Has one unclaimed 75th Anniversary Book from the original printing. Members will be asked at the August meeting to sign up for a drawing. The winner will be offered the chance to purchase the book for $30.

Librarian Bruce Merrill: No report for this meeting.

Star Party Coordinator Bob Forgiel: No report for this meeting.

Trustee Jim Brenek: Completed the installation of a few damaged ceiling tiles in the meeting hall. He also found a tenant living in the attic. Using some hidden talents, Jim safely removed the creature. The squirrel was not injured or harmed during the eviction process and has opened a small nut manufacturing plant in the adjacent field. Jim also replaced the damaged screening to prevent future tenants.

Steve Siok advised members that the Alvan Clark Telescope still needs some minor adjustments and members should refrain from using it until these adjustments are completed. Some retraining will also be held before the Clark is put back into service.

Bob Horton expressed his thanks and appreciation to the Trustees for all their hard work in preparing the property for our annual picnic. A special thanks to former trustee Rich Arnold for using his tractor to cut the main grass areas.

New Business: None

Old Business: New Members voted into Skyscrapers are J.Capen, E. Dettmann, H. Andre, R. Allen, T. Rodriques, M.Masse, M. DeOliveira and Prof. S. Koushiappas. Motion to accept and seconded.

Welcome all new members and hope to see you at future meetings.

Good of the Organization: Bob Horton announced that after a 1 _ month temporary closure, the Ladd Observatory will reopen on July 20th.

Bob also expressed the memberships thanks to a long time member, Allen Shepperton for his donation of an 11 _ F6.8 Maksutov telescope. A thank you letter was sent.

Reminder to all members that many of the guest speakers are currently on DVD in our Library. So if you miss a presentation you really wanted to see, just contact Bruce Merrill to sign out a copy.

Treasurer's Report

4/1/2009 through 7/30/2009

Lloyd Merrill

INFLOWS	
75th Yr T-Shirt Sales	20.00
75th Anniversary Book 2nd Print	35.00
Other Cookoutinc	422.33
Other Donation	179.10
Dues	
Contributing	17.05
Family	750.00
Junior	10.00
Regular	1,480.00
Senior	280.00
TOTAL Dues	**2,537.05**
Interest Inc	65.89
Magincome	
Astronomymaginc	204.00
Skytelmagincome	432.35
TOTAL Magincome	**636.35**
Magsales (Library)	19.00
Starparty	346.00
TOTAL INFLOWS	**4,260.72**
OUTFLOWS	
Collation	-18.00
Cookoutexp	403.02
Corporationfee	22.00
Member Subscriptions	
Astronomymagexp	204.00
Skytelexp	428.35
TOTAL Member Subscriptions	**632.35**
Presidents Fund	25.00
Trusteexp	131.06
Utilities	
Electric	56.13
Propane	37.35
TOTAL Utilities	**93.48**
Website Domain	34.99
TOTAL OUTFLOWS	**1,323.90**
OVERALL TOTAL	**2,936.82**
Citizens Bank Checking	6,178.34
Capital One Money Market	16,229.74
Total Cash	**22,408.08**

Waning Gibbous Moon, July 11, 2009. Two-frame mosaic taken with an 80mm refractor and Tele Vue 4x Powermate, operating at f/30. Canon 40D, 1/500s at ISO 1600. Jim Hendrickson.

Executive Committee Meeting: Saturday, August 8
4:00pm at Seagrave Observatory
All Members Welcome

Skyscrapers Incorporated Presents

AstroAssembly 2009

Friday, October 2 & Saturday, October 3
at Seagrave Memorial Observatory

Ronald Florence

Author of "The Perfect Machine, The Building Of The Palomar Telescope."

Ronald Florence is a historian and novelist. Educated at Berkeley and Harvard, where he received a PhD in French and German history. Before turning to full-time writing, he taught at Harvard, Sarah Lawrence College, and SUNY; was a senior researcher at the Century Foundation; and was executive director of the New York Council for the Humanities.

Thomas Levenson

"The (Criminal) Education of Issac Newton"

Professor Levenson is the winner of the Peabody Award (shared), New York Chapter Emmy, and the AAAS/Westinghouse award and currently the interim head of the Writing and Humanistic Studies department at MIT

William Sheehan

"A Centennial Observed: E.M. Antoniadi and Mars"

William Sheehan is one of the world's leading students of the planet Mars. Sheehan's first book, "Planets & Perception", published in 1988, was a Book-of-the-Year Selection of the Astronomical Society of the Pacific. Other critically acclaimed books include: "Worlds in the Sky" (1992), "The Immortal Fire Within: the life and work of Edward Emerson Barnard" (1995), and "In Search of Planet Vulcan" (1997).

Mike Mattei

""Strange Cloud Formations on the Terminator of Venus.""

Mike Mattei has been an active observer for many decades and a member of ALPO and AAVSO. He worked at Harvard Observatory's Agassiz Station (now Oak Ridge Obs.), and met his future wife (Dr. Janet Akyuz Mattei 1943 -2004) at AAVSO. He became very active in optics and amateur telescope making, and later went professional, specializing in the fabrication of aspherical optics at Space Optics Research Labs, and Optical Systems and Technology Inc (O.S.T.I.). There he worked on optics for space exploration such as an Ultraviolet Telescope for Goddard Space Flight Center. Eventually Mike was asked to join the staff at Lincoln Labs to work on special Government 'Star Wars' projects using Laser Imaging Optical Radar Systems. He also worked at MIT's Wallace Astrophysical Observatory. He taught courses at University of Hawaii and spoke at local club events Mike is possibly best known for his hundreds of nights teaching beginners the art and craft of mirror making at the ATMoB workshop in Westford, Massachusetts. He still works full time at Lincoln Labs, and continues to spend his nights searching for Novae for the AAVSO in his home-built observatory in Littleton, MA.

Friday Evening Informal Talks
Contact Steve Hubbard if you would like to give a talk

A Fabulous Saturday Evening Reception followed by a **Sumptuous Catered Banquet**
You must pre-register for this banquet

Raffle & Door Prizes

Name _____

Address _____

_____

Email _____

_____ Registrations at $17.00 each Total $ _____

_____ Banquet tickets at $17.00 each
Banquet tickets must be pre-ordered. No tickets will be sold the day of the event. Total $ _____

Total $ _____

❑ I would like to give a short 20-minute talk on Friday evening:
Indicate the title of your talk below. AstroAssembly registrar Steve Hubbard will contact you via email to confirm your talk.

_____

Send completed form and check (made payable to **Skyscrapers Inc.**) to:

Steve Hubbard
AstroAssembly Registrar
45 Church Street
Auburn, MA 01501

(508) 832-8746
cstahs@yahoo.com

Directions to Seagrave Memorial Observatory

From the Providence area:

Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:

Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:

Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:

Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:

- Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
- Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:

Take Interstate 295 South (off Interstate 95 in Attleboro.) Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

SKYSCRAPERS INC.

47 Peeptoad Road
North Scituate, RI 02857

THE UNIVERSE YOURS TO DISCOVER
INTERNATIONAL YEAR OF ASTRONOMY 2009