Summer 2011
Issue 94

Battle Point Astronomical Association BPAA

Quarterly

www.bpastro.org Bainbridge Island, WA

Events Calendar

(unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

JUNE

June 1 ●
7 p.m. BPAA Board Meeting

June 2–5
Mt. Bachelor Star Party at Brothers *www.mbsp.org*

June 8 ◐

June 15 ○

June 18
8:30 p.m. Planetarium Show and Star Party

June 21
Summer Solstice 10:16 a.m. PDT

June 23 ◑

JULY

July 1 ●

July 4
Grand Old Fourth in Winslow

July 6
7 p.m. BPAA Board Meeting

July 8 ◐

July 15 ○

July 23
8:00 p.m. Planetarium Show and Star Party

July 23: ◑

July 28–30
Table Mountain Star Party
www.tmspa.com

July 30 ●

AUGUST

August 3
7 p.m. BPAA Board Meeting

August 6 ◐

August 10
Deadline for fall issue of *BPAA Newsletter*

August 12
Perseids Meteor Shower Peak

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Maria Mitchell's telescope in the American History Museum, Washington, D.C. (Photo courtesy Mr. T in D.C.)

What do you do when you have not seen the night sky in months?

During spring break, we made our way to the little Washington on the right coast. This was meant to be a civics lesson for the kids, but I also compensated for the lack of observing with a slight historic/astronomic

Road Trip con't page 8

So You Want to Make a Mirror?

What are you thinking?

Nels Johansen grinding telescope mirror.

Making your own telescope mirror is a labor of love. If you are doing it to save money forget it; go deliver pizzas and buy one! Making my own mirror (not finished yet) has been fascinating. There are a great many things to learn and many steps to go through.

The first decision to make is what should the diameter be and what should the focal length be? The smaller the diameter and the longer the focal length(FL) the easier it is to figure the mirror—(that is shape the mirror to a parabolic curve). I

Mirror con't page 5

August 13 ○

August 18-21
North American Sundial Society Meeting in Seattle *http://sundials.org/*

August 21 ◑

August 24
5th Anniversary Pluto (now Dwarf Planet 134340) Demoted as Planet

August 24–27:
Mt. Bachelor Star Party at Sun River *www.mbsp.org*

August 27
8:00 p.m. Planetarium Show and Star Party

August 28 ●

August 31–September 4
Oregon Star Party
www.oregonstarparty.org

Any member who is planning to observe can invite others to join in by sending an email to *bpaa@yahoogroups.com*. To join our email group, send an email with your name to *bpaa-owner@yahoogroups.com* and we can enroll you. If you want to have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on *http://groups.yahoo.com/*. Request to join at *http://groups.yahoo.com/group/bpaa/*. The system will send us a message, and we'll approve your request after we verify your membership.

Oregon Star Party Photo by Steven Nehl/The Oregonian 2008

CALENDAR NOTES: IT'S ABOUT TIME. I've said that and heard that hundreds of times this so-called spring, whenever there was a brief moment of sunshine or a momentary respite from rain. It's been worse than usual for observers seeking clear skies in our whereabouts this season. Some say the delayed spring may mean a better summer. No scientific basis for that of course but nothing wrong with a little optimism.

As least we can hope for clear skies at the regional star party venues. This year, there are two Mt. Bachelor star parties, neither of which is at Mt. Bachelor. The first is near Brothers, Oregon, which is about 40 miles east of Bend. It's a new-found dark site at 4,600 ft. elevation. The dates are June 2–5. The second is at Sunriver Nature Center in Sunriver, Oregon, August 24–27. Check them both out at *www.mbsp.org*. The Table Mountain Star Party is July 28–30. Registration opened May 1. You need to register early as attendance is limited due to the size of the site. More information at *www.tmspa.com.* The Oregon Star Party, the biggest and the best in the region, is August 31 to September 4. At over 5,000 ft. elevation, OSP has the darkest skies of any major star party in the U.S. In addition to those dark skies, there is a variety of youth and adult activities along with an always excellent roster of speakers. The necessary info is at *www.oregonstarparty.org.*

Whatever the weather here at home, the monthly planetarium shows will continue through the summer. If the weather cooperates, the shows will be paired with star parties. Note the times for the shows: 8:30 p.m. in June and 8:00 p.m. in July and August.

Finally, a bit of a rant from a bit of a Luddite. A major telescope manufacturer now advertises a telescope that apparently allows the observer to be totally devoid of any knowledge of the night sky. The advertisement says: "Knows the sky so you don't have to." When we started observing, we were advised to first start with a good pair of binoculars and to learn to recognize the main constellations, planets, bright stars

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Crowd waiting outside monthly BPAA planetarium show, photo by Nels Johansen

Con't from page 2

and star clusters, and even a galaxy and a nebula. We were then advised to buy an entry-level telescope to find out what features we liked and disliked. It was great advice. Like most amateur astronomers we moved onward and upward with a series of telescopes, but we still retained the "big picture."

Maybe there's no need today for that picture and maybe technology is wonderful, but it seems to me there's something lacking if the telescope knows the sky and you don't. To the extent that the go-to technology encourages young observers, that's certainly desirable, and maybe I'm just jealous that they won't have to serve an apprenticeship of self-taught sky knowledge. Maybe I should just shut up and get back to my spinning wheel.

—Diane Colvin, BPAA Events Manager

The Spindle Galaxy (also called NGC 5866 or Messier 102) a bright lenticular or spiral galaxy in the constellation Draco. It was probably discovered by Pierre Méchain or Charles Messier in 1781, and independently found by William Herschel in 1788. Credit: HST/NASA/ESA.

Edward M. "Mac" Gardiner

1918-2011

Mac Gardiner, Paul Below and telescope, photo courtesy Anna Edmonds

Edward "Mac" Gardiner passed away on Friday, May 20, aged 92. A graduate of Roosevelt High School in Seattle, he returned to the city after college to work as a Boeing aerospace engineer for 43 years, retiring in 1988.

Mac was the last of the three founding members of the Battle Point Astronomical Association. Ed Ritchie had died in 1997, John Rudolph in 2003. In the late fall of 1993 the three friends met for breakfast to brainstorm a question Mac put to them: "What do we together have that we can give to the people of Bainbridge that is unique?" He knew that Ed had built his own observatory and that the architect John knew of available properties, including some in Bainbridge's parks. Combining their skills and ideas with his own creativity, by January 1994 Mac had seen the Battle Point Astronomical Association chartered as a non-profit organization by the Washington Secretary of State and established in an agreement with the Bainbridge Island Park and Recreation District to occupy the Helix House.

One of Mac's tasks as BPAA's first president was to find the money to ensure the continuance of the Association and pay for the costs of restoring the former Navy generator building so it could become a meeting place, a workshop, and, on the roof, an observatory. John worked tirelessly in planning and collecting volunteers to help in that major reconstruction. Mac mounted several financial campaigns, and also obtained the gift of two "zerodur" mirrors that Boeing no longer wanted. One of these was ground, polished, and figured by Ed to become the 27.5-inch primary mirror for BPAA's Ritchie telescope.

Mac's dream was that BPAA would become an educational and research facility with a world-class telescope system that would encourage mentors and students alike to "discover, hypothesize, interpret, analyze, receive peer review, and publish exciting work."

The basic concept of BPAA was Mac's; it became a reality because of his stability (there were some early board meetings…), his unflagging attention, his practicality, his energy, his creative vision and humor, his ability to raise the initial funds, his dedication to keep it an amateur organization (against a lot of very persuasive arguments that it couldn't be done), and his ability to attract others who had so many untapped talents that could be put to use with this idea. He approached the problems, first, with the question of "What do we really want?" and then, "What do we need to get this?" When there was a snag he was skilled in suggesting, "Suppose we look at it a different way." He wanted BPAA to engage the people of the neighborhood in science on many levels—to be something that could go far beyond what anyone had imagined.—*Anna Edmonds*

President's Message

La Niña

I do not know about you but this La Niña thing can go away at any time. Please.

It has put a serious crimp into my observing in the last quarter. Clouds, clouds, and more clouds. More than once, I have set up and got as far as getting my polar alignment down and orienting my mount and then the clouds roll in. I have been working on some modifications to my mount, (more about that later) and I will get a little data and then have to start all over on the next partially clear night. In the past quarter, I have imaged one night.

So what do you do? Astronomical Road Trip. Instead of looking at the sky from a backyard on Bainbridge, we looked at historic astronomical items in the other Washington. (See article beginning on page 1.)

New Vice President

I would like to welcome Charles Higgins to the board as our new Vice President. Charles brings experience as a serial entrepreneur and a developing interest in astronomy. He currently is working with Parks on our sundial project.

Mike Browning's business required him to be out of town so much that he felt he could no longer perform the duties required of the Vice President. I would like to thank Mike for all his efforts with the BPAA and congratulate him on the success of his business. He will still be around as the club's archivist.

Introduction to Amateur Astronomy Class

Dave Fong teaching the Amateur Astronomy Class. Photo by Vicki Saunders

In the last newsletter, we mentioned that Dave Fong and I were going to teach an "Introduction to Amateur Astronomy" class on Thursdays starting April 28th. After 2 classes, I am pleased to report that everything is going swimmingly. We have a full class of 20 enthusiastic students and I think every one is enjoying it. While we have objectives and subjects that we are teaching, the subjects are not set in stone so if a tangent is relevant and interesting to the class, we can follow it for a while. Unlike a formal school class, there are no final and specific criteria to meet. It is a lot of fun for both sides.

It did not start out that way. We had set a minimum of five and a maximum of twenty students for the class. On the Friday before the class, two students had signed up and we were close to cancelling the class. By Saturday, we had six. The class would take place but given that not everyone shows up for a class, it would be almost one-on-one instruction. By Wednesday, we had eleven and on the last day nine more people signed up.

As a group, we have learned a little more about publicity and these classes. Given how people signed up and where they found out about the class, we should be able to direct our efforts more efficiently. And big thanks to Vicki our publicity czar, because without her, the class would not have happened.

Working on My Mount

Periodic error is the bane of many astro-imagers. As the gears of your right ascension drive turn, systematic cyclic errors occur as they turn over and over. People spend lots of time to try and eliminate them. Most people measure the error and then try to train their mounts to speed up and down based upon what the gear is doing. This is called "periodic error correction."

I am trying to take a different tack by measuring the right ascension on the axis and adjusting the speed of the motor based upon where the telescope is actually pointing. It is a subtle difference but I think it should work better. If/when I get some results, I will publish the details here.

But first I need some clear skies.

—*Stephen Ruhl*

Con't from page 1

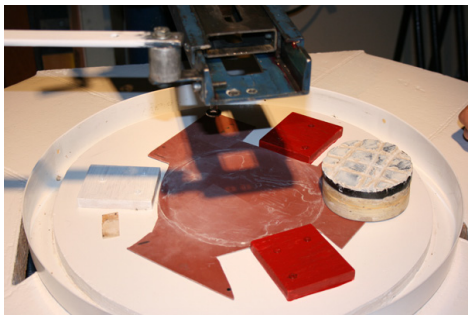
wanted to make my mirror an 8" f/5, which means the focal length is 40", so that it would fit in my car easily. The center of curvature is twice the FL or 80" which means I needed to grind out .123 inches from the center. If one grinds out too much (which I did) too bad! You can't fix that without a lot of work.

Mirror grinding machine made by Ed Ritchie, one of BPAA's founders.

Once the mirror is ground properly it is time for polishing the glass. Glass is polished by rubbing cerium oxide on the glass with pitch. That's right, tree tar! Learning to make a pitch lap (*ed. note*: the name of the polishing tool, basically a disc of pitch) has a steep learning curve. It's so simple and so very frustrating. Watching it done and doing it are not related. If the pitch is too cold it won't flow, and too hot it runs all over; it is always very sticky and messy and smelly and dirty. And once the pitch lap is made, you are just beginning the hard work.

Close up of grinder controls.

Mix the polishing compound to be about the consistency of milk. Keep your work area as clean as possible: free even from old dry polishing powder. Then pour about fourteen teaspoons of the polish on the mirror and gently place the pichlap on the mirror and start rubbing back and forth. Ten minutes at a time is about all anyone can take until physical exhaustion occurs. The polishing process may take months or hours in my case—neither one.



Pitchlap to right on grinding machine.

Once the mirror is fully polished it is time for testing. Testing involves the physical properties of light. I will not be able to explain what happens but could show anyone the tests if they like. The Foucault test enables you to see the variations of the surface of the glass to greater than 1/1,000,000 of an inch. It is really fantastic. You will

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Basic Mirror Making Notes

Focal ratio: shown as f/

This is the same as the 'f stop' or aperture setting in a camera. It is defined as the ratio of the focal length to the diameter of the mirror or lens.

Focal length: shown as F or FL

This is the distance from the mirror surface (or lens center) to the point at which light will come to a focus.

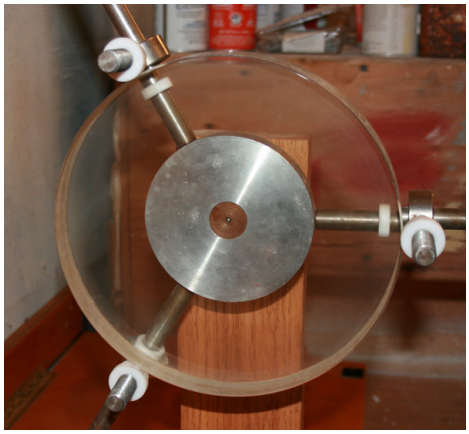
Center of curvature: Twice the focal length.

In making a telescope mirror it is usual to begin by grinding and polishing the mirror blank to a spherical shape. A machine can be used to do this part. However a sphere will not focus the light properly. To get a good focus you have to modify the spherical shape to a paraboloidal shape. This is called 'figuring the mirror' and is normally done by hand. For a long focal length mirror (high f/ ratio, for example f/9) this is a small change and easy to make. For a short focal length mirror (for example f/5) this is a substantial change and can be quite difficult to make. There are lots of trade-offs in choosing between a long focal length and short focal length mirror.

—Malcolm Saunders, Chief Astronomer

Performing Foucalt test with device made by Ed Ritchie.

Nels regards unfinished mirror.



Close up of unfinished mrror on clamps.

Con't from page 5

find the surface is not smooth. It may look like dog biscuits or a donut or maybe like a broken hub cap. All these different looks are the results of too much pressure, or not enough polish, or too much polish, or a bad pitch lap, or a dirty work area, or not rotating the mirror and lap enough, and of course, all of the above at the same time!

To change a spherical mirror to a paraboloidal mirror the center has to be deepened and the outside area flattened. The amount of glass removed is tiny. In my mirror it is about a .3 mm difference in depth. This is tough to measure. But the Foucault test can reveal small changes by showing where light comes to a focus.

To make the change from spherical to paraboloidal different amounts of glass must be removed from different zones of the mirror. This is the stage my mirror is at now. After the mirror is paraboloidal and smooth it is time to get it silvered.

There are lots of ways to do all of these steps wrong (believe me I know) and only one way to do it right. There are plenty of Web sites and YouTube videos and books to read about this subject for more information to help you in building your mirror. But there is no substitute for a real person to ask questions and show you how it's done. So don't be discouraged: it can be a lot of fun; it just takes time and patience and maybe two wives!

Now it is time to build your telescope to put your new mirror in! But I will have to save that for another time. I can't wait to get my mirror finished; hopefully first light will be next spring!—*Nels Johansen*

Photos by Malcolm Saunders.

NASS Meeting August 18-21

Full and partial registration is now open for the North American Sundial Society Meeting in Seattle, hosted by Woody Sullivan, Professor of Astronomy, University of Washington.

The conference starts Thursday evening Aug 18th with reception from 4:30-6:00. Conference presentations will be at the University of Washington.Talks will be on Friday the 19th and Sunday morning the 21st, with the traditional bus tour of local dials on Saturday the 20th. See Woody's progress in making Seattle the sundial capital of the country!

The schedule includes a variety of talks, a workshop on the use of DeltaCAD to design sundials (bring your computer), an artists' panel, and a special planetarium show.

The largest horizontal dial in Washington State, in a Renton office park. Courtesy NASS.

On Second Thought

Seeing Stars: Astronomy 0.001

Bronze Age petroglyphs from Häljesta, Västmanland in Sweden.

The more I've pondered my recent article ("Terraquagation" *BPAA Newsletter* Spring 2011) about where and why astronomy began the more I think that second thoughts may be better.

Recently I was browsing through Rocky Kolb's *Blind Watchers of the Sky* and came upon this paragraph (pp 7–8):

> To my mind, the most remarkable aspect of astronomy is found not in the sky but on Earth, where a species has developed the curiosity to look into the sky and wonder. Perhaps the origin of sky watching was driven by practical considerations, like predicting the seasons to know when to sow and when to reap, or when a nearby river would rise. Other possibilities have been postulated for the genesis of astronomy. But it really doesn't matter whether astronomy began for the Darwinian reason that it led to the increased probability of food production and hence the greater chance for survival, or for the Marxist explanation that knowledge of astronomy gave shamans special power that could be used to subjugate the masses, or the capitalist rationale that astronomy developed the crass commercial purposes of improving navigation. For whatever purpose it began, astronomy today has clearly progressed far beyond any reason other than to fulfill a deep longing in us to understand our universe. The longing is strongest in those who devote their lives to astronomy, cosmology, or physics, but some vestige of the longing must reside deep within us all as part of human nature.

I stand by my suggestion of "terraquagation" (*ed. note*: defined last issue as "to move across the land and the sea") as an early reason for astronomy because the stability and predictability of the sky would have been obvious to our ancestors in Africa as they traveled the unpredictable and hazardous Earth. But I also stand corrected in failing to see some other motivations. Ones that might even have come earlier. I doubt that those people 90,000 years back were moving so far or so fast that the stars were the obvious choice for "landmarks" then.

In support of Kolb's points, yes, there's the Darwinian reason of relevance of astronomy to agriculture to help identify the seasons. Perhaps those observations were by individuals who thereby gained a reputation for luck with their crops and whose ideas were sought after by others. There's also the tradition that in ancient Egypt the heliacal rising of Sirius was taken as the promise of the rising of the Nile. However, would looking for Sirius to rise at the same time as the Sun be your first question of the sky?

As for other pragmatic reasons, maybe it wasn't so much Marxism or capitalism way back as it was superstition that led people to ascribe special powers to the sky and to the ones who could read it. A really careful study over a lot of years—with some luck—could be used to forecast the next solar eclipse. That would have ensured anyone's reputation for life. If a successful coup d'état in the neighboring state happened just when Jupiter shone brightly in the constellation Leo, you might take courage from seeing a bright Mars in Leo to try to overthrow your own government.

I also suspect that there's the motive of pride in being able to create relationships so we can control what is happening to us. If we can predict the future we think we can control it. (We want to think we can.)

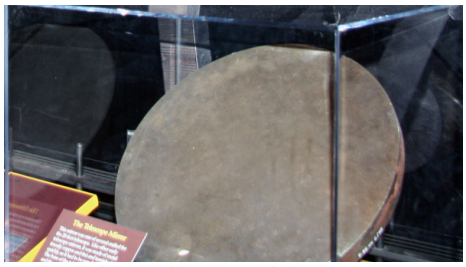
Once the idea was accepted that observation paid results—whether it was commercialism, agriculture, superstition, politics, or combinations of these—the desire to know more spurred people to develop more powerful instruments. But each time we've looked further into the sky we've found new and more puzzling questions: How can our Earth not be the center of the universe? What holds us all together? What's a black hole? But none of these reasons is the beginning; they're all built over many years of observing the sky.

So I go back to Kolb's first assessment that what is essential in our human make-up is simple, enduring curiosity. Or, on second thought, maybe it was the combination of that and that when and because we started to walk upright we were able to look up and wonder.—*Anna Edmonds*

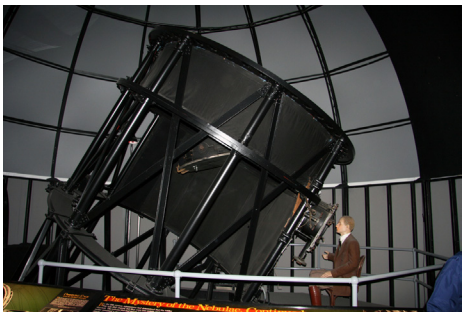
Chaco Canyon petroglyphs

Con't from page 2

William Herschel's telescope.



A mirror from William Herschel's telescope.



Newtonian focus cage for the Hooker telescope.

Long view of Solar Walk.

diversion among the Smithsonian's great astronomical artifacts.

This is by no means a complete tour. We did not make it to the Einstein memorial at the National Science Foundation or to the Naval Observatory.

We start at the "Explore the Universe" exhibit at the Air and Space Museum on the mall. Our first artifact is William Herschel's 20-foot telescope. Herschel used this telescope to make the first systematic search for nebulas. He would observe and dictate what he saw to his sister Caroline. The telescope was set up so that it only viewed on the meridian (the arc connecting the North Pole to the South Pole that runs through the observer's location—the observer's line of longitude). Thus when he viewed an object, the time he viewed it and the angle of the scope were all he needed to record the location in the sky. (20 foot refers to the focal length, not the mirror size.) He began observing with the telescope in 1783, and though he went on to build even larger ones the 20-foot remained his favorite. In 1820 Herschel and his son John rebuilt the telescope, salvaging what they could from the original. The telescope on exhibit is a product of that reconstruction. Herschel initially published his results in his "Catalogue of Nebula" in 1786. His son, John, supplemented it with the "General Catalogue of Nebulae and Clusters" in 1864 and John Dreyer supplemented once again with the "New General Catalogue" (NGC) in 1888.

Also on display is one of the mirrors used in the 20 foot. The mirror is about 18 inches in diameter and, unlike today's mirrors, it is made of polished metal. Since the mirror was made of metal, it corroded. Hershel needed to polish them continually: the polishing would change the shape which would cause him to refigure the mirror. He observed with one mirror while several were being worked on.

This structure is the Newtonian focus cage of Mount Wilson's 100-inch Hooker telescope. The telescope had several interchangeable cages for different purposes. The Hooker saw first light in 1918 and was the largest telescope in the world until Mount Palomar went on line in 1948. This cage was used for deep field photography and spectroscopy. Edwin Hubble used this focus to prove that the Andromeda Galaxy was external to the Milky Way and that galaxies are moving away from each other with a velocity that increases with their distance. The Hooker telescope is still in active use today in Southern California, but the Newtonian focus cage has not been used in many years. As a result, this historic instrument was donated to the Smithsonian.

As I left the Air & Space museum, I was greeted with something that the club would like to do at Battle Point Park, a Solar Walk. On the left side of the picture, "Long view of Solar Walk," is the solar walk monument for Earth. On the right of the picture in quick succession you see the monuments for Venus, Mercury and the Sun. The golden orb on the last monument is a scaled representation of the Sun.

Close up of the Sun monument from the Solar Walk.

Close up courtesy V. Hasler, www.waymarking.com

Inside the American History museum, I was delighted to find the telescope pictured on page 1, made by Henry Fitz of New York. He was the dominant telescope maker in America prior to the Civil War.

This particular instrument was used by Maria Mitchell. She gained international recognition when she became the second woman to discover a comet (C/1847 T1)—the first was Caroline Herschel. She became the first woman member of the American Academy of Arts and Sciences in 1848 and of the American Association for the Advancement of Science in 1850. She later worked at the U.S. Nautical Almanac Office, calculating tables of positions of Venus.

She became professor of astronomy at Vassar College in 1865. She was also named as Director of the Vassar College Observatory, and was a strong and vocal advocate for woman's rights.

Toward the end of our stay in Washington, we made our way to the Udvar-Hazy Center out by Dulles. On that day, NASA was making its

first inspection of the test shuttle "Enterprise" since the Smithsonian had taken possession of it in 1985. Our visit was several weeks prior to NASA's announcement of shuttle distribution. NASA wanted to make sure that Enterprise was able to ride on the back of a 747. So Enterprise was opened up and in the air on "jack-stands" when we visited. This vehicle was used in 1977 in a series of test flights to characterize how the shuttles would behave as they approached for landing.

And then there is this in the "Looking at Earth" section of the Air and Space Museum. Ikonos is the first commercial Earth imaging system. The concept is you take a telescope, put it in orbit, point it at the Earth, and take pictures. Lockheed Missiles & Space Company (LMSC) in Sunnyvale, CA started this concept back with the Corona project in the late 50's and early 60's, and developed it further in various "black" projects. In converting this technology from swords to plowshares, LMSC built the Hubble and extended the technology into a commercial venture that became Space Imaging, Inc. At one time, all of the images the Kitsap County Assessor's office published for property taxes had a Space Imaging copyright.

I spent 12 years at LMSC (I met my wife there) and worked two years on this project. It's a weird feeling when something you worked on makes its way into the Smithsonian.— *Stephen Ruhl*

All photos by Stephen Ruhl unless otherwise noted.

Observatory Wish List

Stuff We Wish We Had
(donations welcome)

1) A flat screen video monitor, with a 'video' input jack—something in the 17 to 22 inch size, for use with the Stella Cam telescope camera.

2) 1 1/4 inch eyepieces to loan out along with the loaner telescopes—Meade 4000 series or similar.

10–Summer 2011

In this Issue

BPAA Quarterly is a publication of the Battle Point Astronomical Association.
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