

## NASS Conference Retrospective: St Louis 2008 – Roger Bailey

St Louis was an excellent choice as a conference venue offering many of us a good reason to visit this part of the US. St Louis is an interesting city with a long history from the early explorations by the French, to the Louisiana Purchase and the westward expansion of the U.S. St. Louis, at the confluence of the Illinois, Missouri and Mississippi rivers was the natural transportation hub and gateway to the west for explorers, settlers and the railroads. Dan Snyder was the local host who chose the venue and organized the sundial tour, finding or developing a number of significant sundials. Here he worked closely with Michael Olsen, VP Finance, for the Missouri Botanical Garden to have five sundials in the garden available for the NASS conference.

A total of 30 full registrants attending the presentations and 13 partial registrants joined for the tour and dinner. International attendance was down this year. Mike & Mary Isaacs attended from England. Barry Duell from Saitama, Japan attended the conference as he and his daughter Emi toured through the U.S. The weather was not typical for St. Louis at this time of year. The heat stress warnings and thunderstorms earlier in the week had passed and we enjoyed pleasant temperatures and humidity. We were impressed by the parts of St. Louis we saw on the tour and the conference location in Clayton. Here we could enjoy strolling through the parks, gardens, residential areas and have our choice of dining from sidewalk cafes, fine Italian or Japanese restaurants or cowboy bars.

As usual, the conference began with registration and light refreshments late Thursday afternoon. A voting and lottery system awarded the excellent door prizes, books and sundials. Each registrant was given 10 tickets to distribute among the prizes offered. For each prize one winning ticket was chosen. The following people won prizes: Barry Duell “The Ivory Sundials of Nuremberg 1500-1700 by P. Gouk; John Schilke “The Nocturnal Geocoin”; Emi Duell “Stieff Pewter Sundial”; Susan Schilke “Greek and Roman Sundials by S. Gibbs”; Roger Bailey “Sundials – The Art and Science of Gnomonics” by F. Cousins; Ina Carpenter “Reproduction 18th Century Brass Sundial”; George Wilson “The Art of Sundial Construction” by P. Drinkwater; Mark Montgomery “Sundials and Timedials” by Jenkins and Bear; Mike Isaacs “Anno’s Sundial” by M. Anno; Ron Reinhart “The Horizontal Instrument” by C. Wilkins; Arsene Fauquet “Diptych Sundial”; Jack Aubert “The Book of Sundials” By Gatty and King; Jan Lapp “Pillar Sundial Pendant”. After the welcoming reception, people had their choice among the fine local restaurants.

### **Friday 9 August 8:30 AM: St Louis Sundial Tour**

See Don Snyder’s “Guide for the NASS Tour of St. Louis”. The following are supplementary comments and a few pictures.



Jefferson Barracks

The tour left on time from the hotel following Dan Snyder’s tour guide. Michael Olsen, VP of the Missouri Botanical Gardens, was introduced as the narrator to provide background information on St. Louis. The bus took us downtown to the bank of the Mississippi River to view the famous symbol of St. Louis, the Arch marking the Gateway to the West at the Jefferson Expansion Memorial.

From the Arch we went on to the Arsenal. This historical military site was originally established in 1817 and is now the home of the USAF “National Geospatial Intelligence Agency”.



Angel at St. Louis University Hospital

Memorial” installed in 1986 to replace a malfunctioning memorial clock. The south facing vertical dial is gnomonically correct. The lack of shadow contrast on the stainless steel is a lesson for sundial designers. The horizontal lines parallel to the gnomon base are artistic embellishments. Here we took group pictures of the NASS group with members of the Academy of Science who were joining us for the tour.

The central display of historical sundials as we entered the Missouri History Museum was set up for our visit. The most interesting dial was the one reputed to be designed and engraved by Thomas Jefferson. Historical records show that Jefferson did the correct calculations for a St. Louis sundial but whether he made this specific dial remains unproven. See the article and pictures by Don Snyder and Anne Woodhouse in the September 2008 *Compendium*, “A Forgotten Sundial Designed By Thomas Jefferson”

We enjoyed a lunch break at the museum with an opportunity to view other exhibits like the replica of Charles Lindbergh’s airplane, “The Spirit of St Louis” and a pendulum clock from the 1904 World Fair.

Access was restricted and security was tight. On the grounds of the Arsenal was the sundial. This brass horizontal dial was a proper astronomical instrument custom-made for the site. A steel armor cover that is normally locked in place protects the dial. They were taking no chances on vandalism or theft of this historical instrument from the highly secure site. A professional photographer took pictures of the dial and the group.

Then we drove downstream along the Mississippi past the Busch Stadium and all the old breweries and factories that made St. Louis famous for “booze and shoes”. We were welcomed at the “Jefferson Barracks” by Arthur Schuermann who told us the history of this historical military post. For details see Don Snyder’s article in the September 2008 *Compendium* “The Sundial at Jefferson Barracks in St Louis” The original dial disappeared around 1964. The replacement is custom-made, but it was designed for looks - not function. The gnomon is centered on the dial so the east-west 6 AM/PM line does not touch the tip of the base but crosses near the middle of the gnomon. The errors are large.

St. Louis University Hospital back downtown was the next destination. On the south wall of the chapel was a statue of an angel holding a vertical sundial. This is quite similar to the historical angel dial at Chartres Cathedral. This is a beautiful sculpture but again it was designed for looks not function. The wall and sculpture are aligned with the road axis in the area, perhaps over 10° east of south by quick compass and time checks.

Then we went west to the “Jewel Box” in Forest Park to view two sundials. One was a typical bronze cast horizontal dial, custom designed for the location by a reflecting pool. This dial is dedicated to Mary Harrison Leighton Shields, founder of the Missouri Society of Colonial Dames in 1896 and charter member 34 of the Daughters of the American Revolution. The next dial was an imposing “Korean War



NASS and the St. Louis Academy of Science visit the Korean War Memorial in Forest Park, St. Louis MO

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Class of 1908 Dial at Washington University

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At the Danforth Campus of Washington University we found a vertical declining sundial donated by the Class of 1908. The buildings were classical gothic architecture in the style of British colleges at Cambridge and Oxford so this dial high on the wall was in proper context. It was correctly designed for the location with the wall declining slightly and included a node on the gnomon keyed to the analemma on the face. The addition of a modern horizontal roof pavilion made viewing and taking pictures of the dial difficult.

Our final stop, the Missouri Botanical Garden, was the highlight for me to view three excellent sundials recently installed specifically for the NASS Conference and tour. Our visit started with the dedication ceremony with the Chairman of the Gardens, Dr. Raven, Fred Sawyer and Ron Rinehart who designed, built and donated the dial. This inclined cylinder dial was described in Ron's presentation on Saturday.



Ron Rinehart speaking about his donated dial



Ottoman sundial at the Missouri Botanical Gardens

Around the corner was the Schmoyer Dial by Bill Gottesman donated to the Garden by Dan Snyder.

This replaces a previous dial with backwards markings that looked good but served no function. The Schmoyer dial is a correct modern design adjustable for latitude, longitude and equation of time.

Around another corner was the Ottoman Garden with its centerpiece, the Ottoman Sundial designed by Roger Bailey and carved by Abraham Mohler, a St Louis sculptor. This custom designed dial, patterned after the sundial built in 1485 at Topkapi Palace, Istanbul, has two gnomons and shows four time systems: equal hours based on noon, Babylonian hours base on sunrise, Italian hours based on sunset, and Moslem prayer times Zuhr and Asr. The Topkapi dial, one of the first dials with a polar gnomon is patterned after the dial made by Ibn Al-Shatir in 1371 at the Great Mosque in Damascus.



Child in a garden of thyme

The final dial viewed was at the other end of the Garden; two special trams took us to an herb garden with the Child Sundial appropriately in a bed of thyme, and then provided a tour of many other gardens.

We arrived back at the hotel on time and thanked Dan and Michael for a great tour. The NASS diner that evening was at the Café Napoli, an excellent Italian restaurant around the corner from the hotel.

#### **Saturday, 9 August Presentations**

When we started at 8:00 am Fred Sawyer noted the coverage in the local newspaper, the St. Louis Dispatch and thanked Don Snyder for making the media contacts.

#### **Christ Church Sundial:**

Don Petrie led off with a slide show on the dial he designed for his parish church, Christ Church in Stouffville, Ontario. Like many of us viewing a blank wall, Don saw the opportunity to place a sundial on the south facing wall of his local church. His slide show documented his process. First he had to convince the church council that sundials are traditional on church walls, get permission and support to proceed, then determine the location and declination, figure the lines, design the dial, fabricate and install the dial.

The dial is constructed of "SIGN-FOAM" a high-density polyurethane board, by a local sign maker, Shane Durnford Design, according to Don's design and specifications. The bold colorful dial is 46" wide x 52" high at N43°58' 79° 15' W declining east at 9.7°. A longitude correction of 17' is included in the layout of the hour lines. Declination curves for the solstices and equinoxes track the shadow of a disc



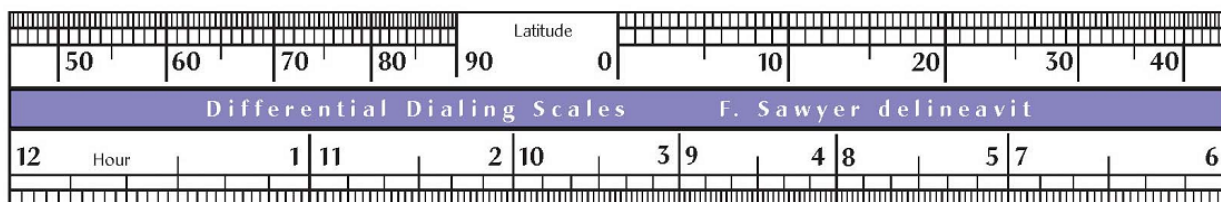
Christ Church sundial by Don Petrie

node on the 10 mm stainless steel gnomon. The motto “SOLI DEO OMNIS GLORIA” translates as “To God alone be all the Glory”. The project was funded by Don with a supporting grant from NASS. The Dedication and first shadow ceremony was held as planned on 23 Sept 2007, coincident with the fall equinox.

**The Cahokia Woodhenge:** Michael Friedlander, professor of physics and astronomy at Washington University was the next speaker. He outlined the remarkable artefacts uncovered just across the river from St Louis. His abstract says “Excavations by Warren Wittry and others at the Cahokia Mounds State Historic Site in Illinois have revealed traces of posts that have been set out around five large circles. The most complete of these circles had a radius of 205 ft. and contained posts that were aligned in the direction of the equinox and solstice sunrises.” His

presentation provided graphic evidence that these alignments are astronomical and not by chance.

**Differential Dialing Scales:** Fred Sawyer returned to one of his favorite topics: dialing scales. He started by demonstrating the usefulness of a dialing scale to lay out dials on horizontal or vertical planes. George Serle first published the scales on a ruler in 1657. These scales provided a mathematically correct method for a craftsman to lay out a sundial accurately. One problem with such scales is the compression of the scale at higher latitudes. The distance on the scale for the 15° from 45° to 60° is the same as the 5° from 15° to 20°. Fred then led us through his elegant solution to this problem using a differential technique to expand the higher latitude areas. This is similar to the differential trig scale used on some Thornton slide rules. The mathematical background and use of this revised ruler will be outlined in an article in *The Compendium*. The result is shown below.



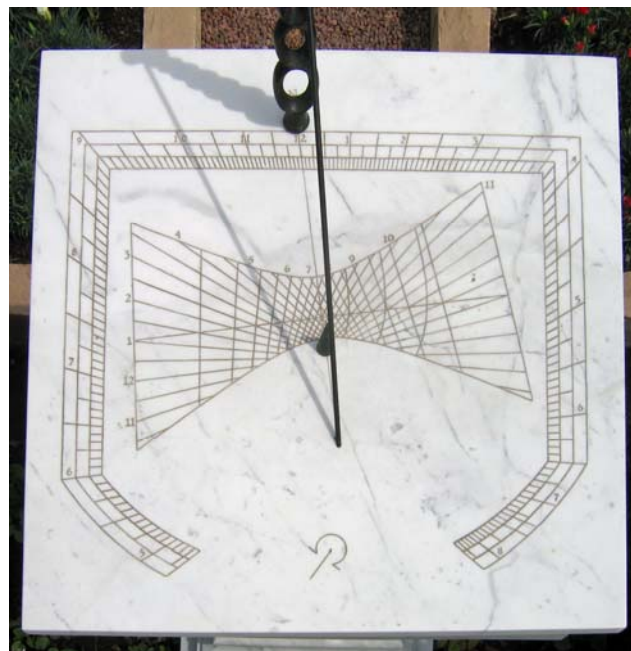
**Ottoman Sundials:** Roger Bailey’s presentation provided background information and details of the design for the Ottoman Sundial viewed at the Missouri Botanical Garden. He started with a historical overview on the Ottoman Empire when the original dial was built at Topkapi Palace, Istanbul around 1480. The Topkapi Palace Sundial has two gnomons and hourlines for four time systems: As in Europe, equal hours based on noon, Babylonian hours based on sunrise, Italian hours based on sunset, and Moslem prayer times Zuhr and Asr. The dial is based on Ibn Al-Shatir’s dial carved at the Great Mosque in Damascus in 1371, probably the oldest extant sundial with a polar gnomon showing equal hours throughout the seasons.

The Missouri Botanical Garden had developed a special “Ottoman Garden” based on the gardens in Istanbul and other Moslem areas like Alhambra in Andalusia, Spain. During the planning discussion for the NASS conference, Michael Olsen and Don Snyder came up with the idea of making an Ottoman Sundial patterned after the sundial at Topkapi Place. Roger Bailey provided the gnomonic design. Fazil Sutcu was the architect for the dial and the Ottoman Garden. Abraham Mohler, a local sculptor, carved



Abraham & Roger with their creation

the marble and installed the dial. The dial, conceived in January was carved in April and unveiled in May as the Turkish tulips bloomed at the Garden.



Face of the Ottoman sundial designed by Roger Bailey

Roger outlined the design techniques to create the drawing for sundials with different gnomons on the same base. He used Fer de Vries' "Zon2000" program, DeltaCad and DeskPDF to produce accurate full scale drawings that could be printed in most local copy shops. The original dial was an excellent balanced symmetrical design translating the concepts of the original to the St. Louis location. Unfortunately the owner reoriented the dial to "look better" aligned with the garden, 9° off the polar axis. As we could not convince the owner to turn it back, a new design was drawn and new dial plate carved for the off-axis position. The compromise was installed and aligned just hours before the NASS tour. The photo above shows the final off-axis dial plate. The dial is likely unique in North America, the only large public sundial with such time lines.

#### **My Sundials: A Short Journey Through Time:**

Ron Rinehart outlined the design and construction of his polar cylindrical sundials. These are custom designed and fabricated to show standard time for specific locations. These dials have been sold around the world. The one Ron donated to the Missouri Botanical Garden was dedicated on the NASS tour. Ron's talk was a movie clip showing in high speed the steps in constructing a typical sundial. See Scientific Sundials [www.scisundials.com](http://www.scisundials.com)

#### **A Helical Polar Sundial: Tampering With the Equation of Time:**

Fred Sawyer explored with us the development of a new concept in sundial design, a Helical Polar Sundial that is self-orienting and can include corrections for the equation of time. This polar sundial with linear time scales along the North South line is self-orienting like an analemmatic sundial but with less ambiguity and more distinction between the readings. With the linear time scale, such a dial can also show Babylonian, Italian, or



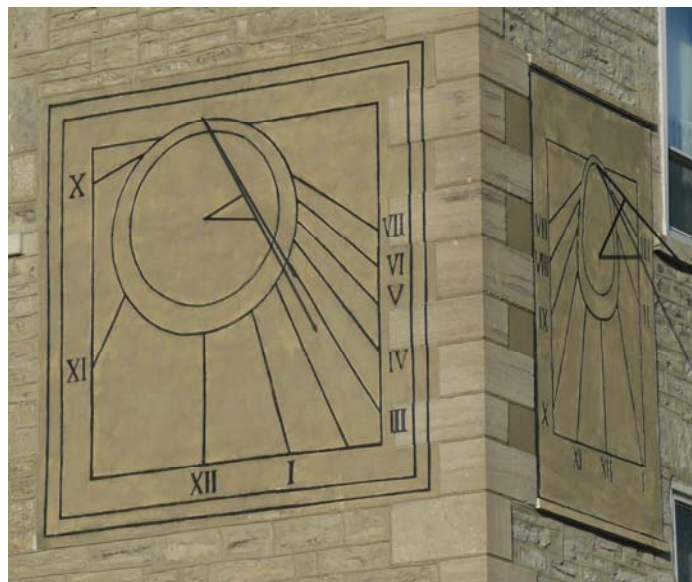
Sundial donated by Ron Rinehart

Sidereal hours. The Equation of Time can easily be incorporated. Fred then extended the concept by redefining the equation of time to develop a sundial with two annual adjustments that offers a 41% improvement when compared to the standard Equation of Time error. ( $\sigma = 5.61$  min).

**Design of a Digital Wall Dial:** Bob Kellogg, an inventor of digital sundials explored how the concept could be applied to create a digital wall image. The concept is based on defining a shadow cell with walls of different heights. The shadows of the cell walls would provide shadow patterns depending on the height of the walls and the orientation of the sun. He demonstrated the concept with an example portrait on the wall that would morph from George Washington in the morning to Ben Franklin in the afternoon. The concept could be applied to create a digital wall image. The concept is based on defining a shadow cell with walls of different heights. The shadows of the cell walls would provide shadow patterns depending on the height of the walls and the orientation of the sun. He demonstrated the concept with an example portrait on the wall that would morph from George Washington in the morning to Ben Franklin in the afternoon.

### **Sisters of Charity of Ottawa Sundials:**

Roger Bailey took us on a slide show tour to Ottawa, the capital of Canada, focusing on the sundials on the Motherhouse of the Sisters of Charity of Ottawa. This religious order is a branch of the Grey Nuns who were very influential in civilizing the pioneering frontier of Canada. Sister Louis Seguin, Curator for the historic site is the co-author for the presentation and provided much of the historical information. The Sisters arrived in the bush camp called Bytown in 1843 and within a year had a convent, school and hospital operating. They survived the typhus epidemic of 1846 and by 1849 constructed the Motherhouse that stands today. Fr Jean-François Allard, their spiritual advisor and teacher designed and constructed a pair of vertical declining corner dials in 1851. The dials, very much in the French tradition, are the oldest dials of this type in North America. Bytown became Ottawa and the capital of Canada in 1857. Roger Bailey checked the Fr. Allard's design by overlaying modern design lines on photos of the dials. He concludes that the dials are well designed for the location. They are aesthetically pleasing and mathematically correct.



Sisters of Charity of Ottawa dials

### **Connections: From Skeletons to Differentials:**

In this presentation Fred Sawyer used the “connections” technique of James Burke. In his articles, book and TV series Burke would connect one idea in a discussion to another concept and continue through these connections to return to the original topic. Fred started with the concept of skeleton watches with the inner gears and wheels visible. The skeleton or inner workings of a sundial could be the construction lines for graphic design and he provided some examples of this design style. Weathering of the exposed final coating has exposed the construction lines of many dials. Fred reviewed how exposed lines could be used to discover the techniques used by the designer. One example is the decoding of Zarbula's method by Paul Gagnaire. Another was the unusual technique uncovered on the sundial at S. Genesio church in Dairago near Milan. Fr. Alberto Cintio analysed the exposed construction lines to resolve this technique using an alternative layout line to the equinoctial line. Alessandro Gunella published a generalized proof for the technique. This concept led to ways to show the hourlines for more than seven hours on a vertical

declining sundial and then on to dialing scales, the differential trig slide rule scale and differential dialing scales. This random walk through interesting but connected ideas brought us back to his morning talk.

### **Sawyer Dialing Prize Presentation to Kate Pond:**

After the break Kate Pond was awarded the Sawyer Dialing Prize for 2008 “for the success of her World Sculpture Project. This project has brought dialing, an appreciation of light and shadow and new connections between traditional art and science to children and adults to countries and cultures around the world.” The prize consisted of a certificate, a cash award, and a specially commissioned trophy Spectra sundial by Jim Tallman. See <http://www.artisanindustrials.com/spectra.html>



Fred Sawyer presents the Sawyer Dialing Prize to Kate Pond

### **Sculpture With an Eye to the Skies:**

Kate Pond’s presentation summarized her award winning world project. She says “My sculpture invites participation: with people, and with the sun, shadows and alignments at different seasons of the year. The position of the sun, moon and stars creates a structure for me, like a painter might use a rectangle as a frame of reference.” The first sculpture of her project “Zig Zag”, is a simple elegant pipe structure that tracks the time from 10 am to 2 pm on the equinox at latitude 45°, the border between Canada and the US at the dials location, Stanstead Quebec. The next sculpture was SOLEKKO at the Norwegian Museum of Science and Technology, Oslo, Norway. Here the sculpture is a triangular cone that cast no shadow at noon on the equinox. All the projects involved children actively playing and learning and included time capsules with art and their messages for the future. The next in the series was a bold sundial sculpture’ HIMEGURI, at the Mitsubishi Sports Garden, Sendai Japan. Here a large triangular Corten steel plate gnomon and stones mark the north south axis. Field stones also mark the hours and trace the shadow on the summer solstice. At Honolulu, Hawaii Kapiolani Community College, Kate’s sculpture “All One” faces east in November to mark the rise of the Makalis (Pleiades) as the sun sets. Stones on the grass mark the two times in May and July when the sun is directly overhead. The final sculpture “Telling Stones” was recently completed in Mapua, Nelson, New Zealand. Alignments of the stones include the rising and setting of summer and winter solstices, equinox and the rising of the Pleiades in June (the Matariki marking the Maori new year) and the rising of Antares (the Maori, Rehua), at the beginning of summer in December.



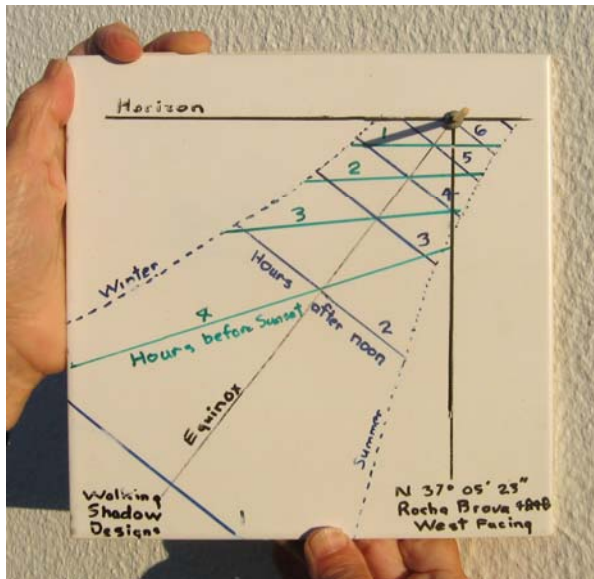
Telling Stones in Mapua, New Zealand



## Sunday August 10, 2008:

Again we started on time at 8 AM and Fred started by providing links to some of the local press coverage.

**NASS Flash Drive:** Fred then demonstrated the NASS Flash Drive that was provided to all full registrants. This handy little flash drive has a capacity of 2 GB, much more than required to just provide us with copies of the conference presentations. Fred loaded it with programs useful for NASS members. His philosophy here was to provide standalone programs that we could easily carry with us and plug into most computers to give us independent access to a web browser, webmail, pdf files, a universal viewer and many of our favorite sundial design programs. Personally I have found it very handy. For example it included an FTP client FireFTP as a tool in the FireFox browser. This was just what I was looking for to update my personal website. The flash drive is loaded with many gems like that and still has about 1 GB of space available for personal files.



Sunset

design drawings to order a suitable sundial in Portuguese tiles (azulejos) from one of the local tile shops. Having developed the math from first principles Roger was then well prepared to take on the design of the Ottoman sundial described earlier.

## Clark's Technique for Standard Time Using a Transit: Barry Duell

Barry Duell from Tokyo International University outlined his use of a transit to accurately determine standard time as developed by an English Engineer, Latimer Clark in 1882. Clark developed a simple transit device that a person could use in areas isolated from railroads and telegraphs to derive the exact time by observing the transit of the sun or specific stars for resetting mechanical clocks. This was routinely done at Greenwich and Naval Observatories around the world and Clark hoped his transit would make the technique available to more people. Barry acquired a theodolite and set out to test Clark's technique in Tokyo. He replaced Clark's Manual with data from online sources like Naval Observatories or commercial astronomical software. This remains a work in progress.

**Worldwide Sundials:** Mike Isaacs, representing the British contingent at the conference, kicked off the short talks session with a slide presentation on Worldwide Sundials with photos and words by his son David Isaacs. It was great to see three generations of Isaacs on the NASS tour. Like many of us, Mike and David look for sundials when they travel. This slide show portrayed many unique sundials around the world- specifically the southern hemisphere, Australia and New Zealand. These examples provided a new perspective, as did the dials he showed from Singapore with flat gnomons at 1° N latitude.

## Designing a Sunset Sundial from Scratch:

Roger Bailey was up next with his presentation that could have a subtitle of "What I did on my vacation". This time Roger and Christine were enjoying a sunny south and west facing deck of their rental condo, watching the sun set into the Atlantic from the Algarve coast of Portugal in November. The blank west facing wall of the balcony needed a proper sundial, ideally one showing reversed Italian hours, the hours until sunset. Again Roger on vacation lacked the tools for sundial design and had to develop them from basic principles and what he could remember about geometry and spherical trigonometry. The presentation goes through the math that led to calculating the points defining the timelines for time from noon and time to sunset. On the final evening he produced a small prototype to leave as a gift for the house. Since then the owner has received proper

**Working on the Website:** Bob Kellogg quickly reviewed the concepts he is working on to renew the NASS website. First was the task of integrating the website with the Sundial Registry database. Most people don't realize that the current web register is a subset of the actual Registry. Expect significant changes in this area. He is looking at a more interactive website software like Python's Plone or the php based Drupal that would allow more member involvement in content management. Expect a section listing dialing artisans like John Carmichael, Bill Gottesman, Jim Tallman, *etc.* This is a work in progress.

Completing the conference was the Annual General meeting reported elsewhere.

My assessment is that this was an excellent NASS conference. We all benefited from the interaction with our colleagues that share our interest in sundials. See you in Portland next year.



The Korean War Memorial



Examining the Schmoyer Sunquest dial



The Spectra Sundial awarded to Kate Pond

The 15<sup>th</sup> Annual NASS Conference will be held next year from August 20 through August 23, 2009 in Portland, Oregon. John Shilke will be our local host.

Please plan to attend!

If you have an idea for a talk you would like to give, it's not too soon to contact Fred Sawyer: [fwsawyer@aya.yale.edu](mailto:fwsawyer@aya.yale.edu)