

NASS Conference Retrospective: Burlington Vermont, August 2010

Roger Bailey

Reception: Thursday August 12, 2010. The Registration and reception was 4:30-6:00 on Thursday. We greeted our old friends and welcomed newcomers. The door prizes were a significant attraction. Tickets were used to allow choices to maximize the chance of reward. You could plunk all your tickets on one prize or you could spread your tickets to increase your chances of winning something. Here are the prizes and winners.

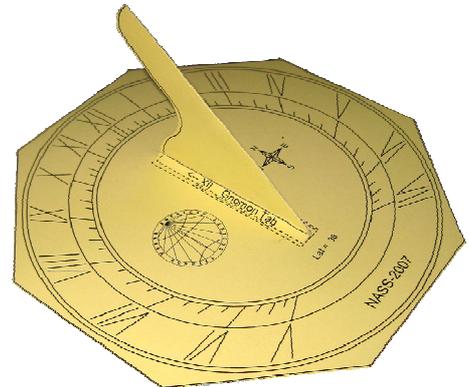
Roger Bailey won the BSS Monograph No. 8, "Time Reckoning in the Medieval World" by David Scott and Mike Cowham. Tony Moss won the BSS Monograph No. 5 "The Double Horizontal Dial" by John Davis and Michael Lowne. Madeleine Lelievre won "Sundials: An Illustrated History of Portable Dials" by Hester Higton. David Scott won a silver "Nocturnal" lapel pin. Bert Holland won a copy of Mrs. Gatty's classic "Book of Sundials". Warren Thom won a silver "Navicula or the little ship of Venice" lapel pin. Fred Stetson won the Digital Sundial. John Mulholland won the drug store "Sun Catcher". Glenn Simmons won three booklets on cutout sundials, including Jenkins & Bear's "Sundials & Timedials". Susan Schilke won "Sundials: history, art, people, science" by Mark Lennox-Boyd. Bill Gottesman won the yellow tee shirt with a functioning sundial that he wore proudly all weekend. Charles Olin won "Sundials Old and New" by A.P. Herbert. Don Petrie won Martin Brennan's "The Stones of Time", a book on the stone chambers and sundials of Ireland. Jackie Petrie won an antique print of Dante Gabriel Rossetti's Beata Beatrix.

Presentations: Saturday August 14, 2009

The presentations started at 8:30 am with welcome from Fred Sawyer.

Paper Sundials at the Science and Engineering Festival:

Bob Kellogg reported that NASS will be represented at the Science and Engineering Festival on the Mall in Washington DC in October, 2010. Bob took up the suggestion of Robert Adzema to organize a project, get sponsors and volunteers, define suitable sundial projects, submit the applications and design a booth with appropriate banner, logos, posters and projects. The interactive projects involve sundial cutouts inspired by Robert Adzema's 1978 classic "The Great Sundial Cutout Book". Bob showed several examples of the cutout kits including prototypes dials, horizontal, vertical, polar and point. The pictured prototype lacks the large SAEF. His presentation contains a macro to design the sundials within PowerPoint. NASS and the Analemma Society are sponsors and a number of NASS members in the Washington area have volunteered to help.



Update on the NASS Registry: Larry McDavid then gave a report on the Sundial Registry noting that there are now 689 dials registered, 32 new this year and 21 updated. Frequent contributors were Mark Montgomery (14) and Roger Bailey (9). He is working to improve the quality of the submissions both data and pictures. Larry requests original digital pictures that can be edited. He showed how he has improved some of the pictures with Photoshop. He also gave several examples of non dials, some sun sculptures, others errors like the Columbus Learning Center horizontal gnomon shown below. As well, he reviewed some of the more interesting dials registered over the last year like the Burnsville Quilt Block Sundial shown below. The dial shows solar standard and daylight sayings hour and incorporates the equation of time correction in representation of the hills along the bottom of the block.



Antique Hour Lines: Fred Sawyer gave another excellent example of his reviews of the history of complex mathematical concepts for sundials. In the case of Antique Hour Lines, the question was “Are they straight lines?” For millennia they were assumed to be, but the assumption was questioned by many mathematicians. Proofs were offered by Ibrahim Ibn Sinan in the 10th century, Christopher Clavius in the 16th, Hellingweth in the 18th and many including Montucla, Delambre and Cadell in the 19th, offering proofs that the lines were in fact curved. The various proofs tended to be empirical based on plotting the results of individual calculation. Biot offered an analysis in 1841 and Davies in 1843, but the problem was not fully solved until 1914 when Hugo Michnik studied the curves for the equatorial sundial, providing a method to come up with non-parametric equations for the curve for each hour. Fred then presented the graphs of various hour lines at different latitudes and inclinations. The curves were amazingly complex looking but the specific area of interest, where a shadow would be projected was very close to the straight lines of the traditional method.

Gnomonics Up North: Le Gnomoniste” (1993-2010): After the break, André Bouchard of the Quebec sundial society (Commission de Cadran Solaires de Quebec) reviewed the history and philosophy of his Francophone sundial society in Quebec, a sister society of NASS. His presentation went well beyond the recitation of facts on the society, their journal “Le Gnomoniste” and the sundial registry. André discussed the philosophical attraction of sundials, their symbolic and cognitive appeal. “Why should we be interested in a sundial, an object that no longer has a use, but to ennoble the mind?” He is challenging his collaborators to go beyond the scientific presentations and popular explanations to cultural analysis. Many of the entries in the registry now include references to philosophical authors.

He also reported that “Le Gnomoniste” has been published for 17 years and the last 13 years are accessible free on line at http://cadrans_solaires.scg.ulaval.ca. This includes 715 articles by 45 authors and 225 collaborators. The registry lists 362 sundials in Quebec.

Solstice Point on Analemmatic Sundials: Roger Bailey gave a short presentation on a new concept for analemmatic sundials. Through the choice of the correct gnomon height for a dial of a given location and size, the shadow point on the sundial meridian I can be the same for both the winter and summer solstices. This remarkable coincident point of the long shadow in the winter and the short shadow in the summer is due to the fact that the

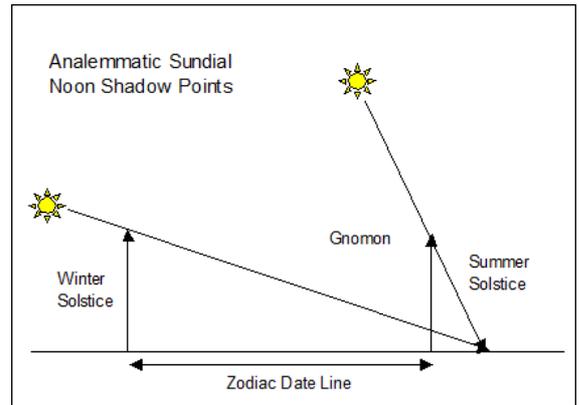
gnomon moves along the Zodiac Date line with the seasons. The length of the date line is related to the sundial size and latitude.

Fred Sawyer suggested the gnomon height to sundial size ratio could be solved directly using a single equation. The spreadsheet included with the proceedings includes both solutions solved for a Burlington VT example.



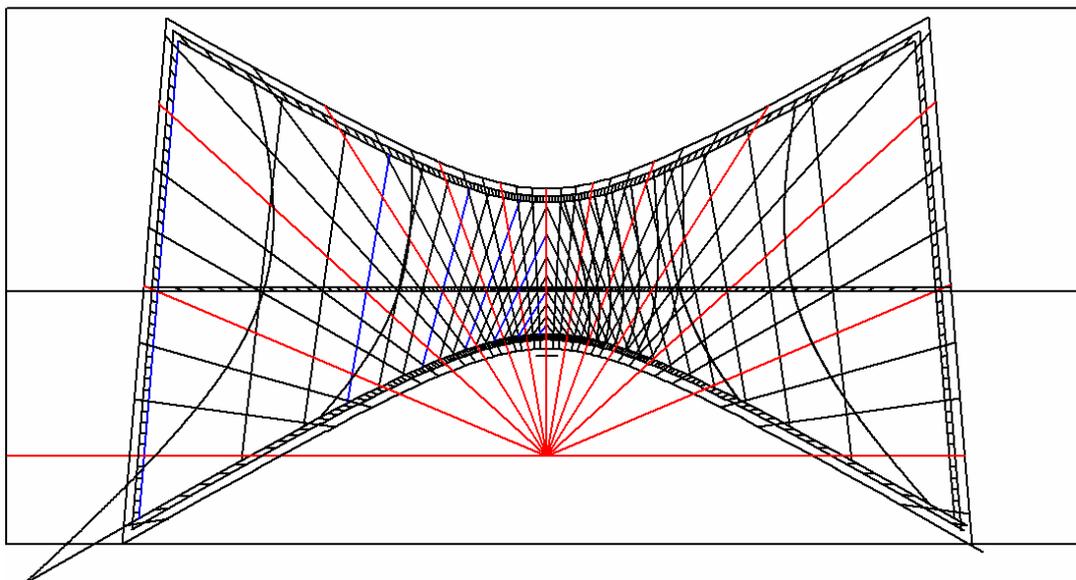
Last Scratchings of an Old Bird:

Again we welcomed Tony Moss, the sole attendee from the UK, to give his “last presentation”. We were entertained by his project to give all his five grandchildren a sundial as a memento of their grandfather. The five are now quite young and could end up anywhere in the world including the southern hemisphere so the design had to be universal. One of the finished dials is shown on the left. The underside is also engraved for use when the sun is low. Flip the disc for the southern hemisphere.



Ibn Al-Shatir Sundial: Roger Bailey’s key talk was on his latest project with the Analemma Society, to replicate in Virginia the historical sundial designed and crafted by Ibn Al-Shatir in Damascus in 1371. This dial is the oldest sundial with a polar gnomon known to exist. The sundial was the forerunner of sundials with polar gnomons in Western Europe as well as the Ottoman and other sundials in the Islamic world. Roger discussed the original design and outlined

the steps to produce the design for Latitude 39°. The drawing for shows hours based on noon using the polar gnomon in red. The tips of the gnomons show the following time systems: Babylonian hours based on sunrise in the morning, Italian hours based on sunset and Moslem prayer times. Reference lines are used to indicate the time of all the Moslem prayer times, even those when the sun is well below the horizon.



James Hartness and Russell Porter- Sundials and Sunlocks:

Bert Willard, the Springfield Telescope Makers Historian and Curator reminded us of the heritage at Springfield and Stellafane, the mecca for amateur telescope makers in Vermont. Springfield is the home of many of the instruments, sundials and telescopes, designed by and James Hartness and Russell Porter. Hartness made his fortune from his turret telescope. He also produced a unique patented sundial design as shown in the picture. This includes a date wheel for an EQT correction. Russell Porter is known for his telescope and sundial designs including the “Garden Sundial”, an accurate heliochronometer. There are many versions of this design incorporating dolphins, nymphs, etc. Porter is also known for his leadership in the Amateur Telescope Makers Society, the Stellafane Star Party and Scientific American articles.

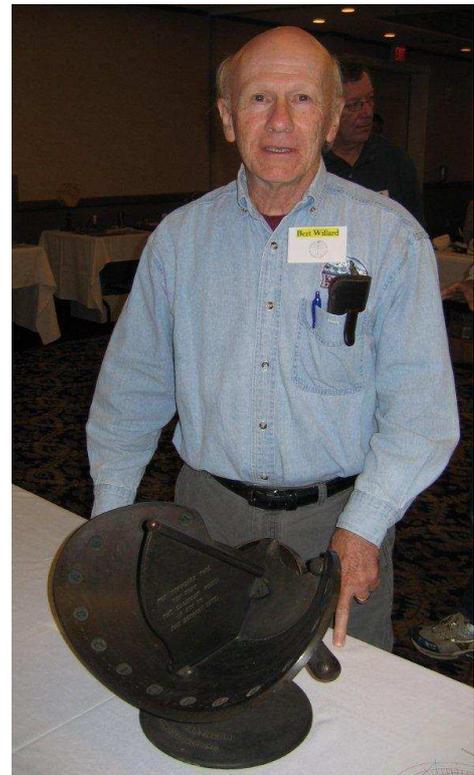
The Analemma: Invented or Discovered? Like many of us, Jack Aubert wondered about the analemma. He asked “when was the EQT discovered and what is the origin of the analemma curve to display the EQT? He found, as other researchers have, that Hipparchus and Ptolemy recognized the sun’s anomaly from mean time. Modern calculations based on Ptolemy’s publication “Almagest” show close agreement, within half a minute for modern times. Jack referred to a figure in Kevin Karney’s article in *The Compendium*, Dec 2009.

The analemma (figure 8) curve originated as a mean time meridian first used by Grandjean de Fouchy at the Palace de Petit Luxembourg in Paris before 1741. Many mean time meridians were made in France to provide a mean time reference to reset mechanical clocks. The answers to Jack’s questions were:

- The difference between mean and solar time was known to ancient astronomers.
- The Mean time Meridian (analemma) was a fairly recent invention.
- It was invented in a particular time and place by Grandjean de Fouchy.
- It was inspired by the mechanical clock, without which it would have no practical use.
- It was calculated gnomonically, rather than traced out empirically.

A Simple Platform Heliodon: Mac Oglesby introduced us to the concept of a heliodon, a device to simulate sunlight on a model. A heliodon is a test platform for sundials and consists of an adjustable platform, a rotating base and a light source to simulate the sun. Mac used four pieces of scrap wood for the platform, a lazy susan to rotate the platform and an old slide projector as his light source. Heliodons are generally used by architects. By placing a model building on the heliodon’s platform and making adjustments to the light/surface angle, you can see how the building or sundial would look in sunlight at various dates and times of day. Mac demonstrated in his presentation how useful they are for sundial designers. A heliodon can test sundial design for a remote location to see how it interacts with the sun. Mac gave several examples demonstrating the utility of a heliodon. No longer do you have to hold a model in your hand and rotate it in sunlight to see how it works. A simple heliodon is the ideal test platform.

NASS Flash: Fred Sawyer again provided everyone with copies of all the presentations on a 4 GB flash drive. This is an excellent means to provide all participants with their own reference copies of the presentations. As he did in previous years, Fred added to the storage area a number of sundial design programs and very useful utilities. These are especially useful as all the programs are self contained, running from the flash drive, great for traveling.



Geotagging Zarbula's Sundials: After the break Roger Bailey followed up on his presentation last year on "Geotagging Sundials" with a concrete example, tracking the sundials in the Alps painted by Giovanni Francisco Zarbula between 1830 and 1876. These sundials are favourites of his as Zarbula used a simple construction technique to set the gnomon and hour lines correctly on the vertical declining sundials. Zarbula's sundials are classic folk art paintings using fresco techniques and inorganic pigments. They have withstood the test of time with over half still remaining after over 150 years. Roger reviewed his database of pictures, information and GPS locations. This he has made available on the 52 surviving Zarbula sundials as waymarks, Google Maps and Google Earth files. To see the Google Map use this link.

www.tinyurl.com/ZarbulaSundials

The presentation had several purposes, to show Zarbula's sundials, to assist others to enjoy searching for sundials and to demonstrate how to produce their own waymarks and specific maps of their own travels. Above is a typical placemark of an original Zarbula sundial. This Google earth placemark includes the GPS location, descriptive text, picture and links.

Zarbula 1843, Val des Prés, Pra Premier

A classic Zarbula from 1843 still in excellent original condition. The construction lines now show through as the surface weathers. The actual location is at Pra Premier, past Val des Prés, the sawmill and Le Serre. SFA 05 178 04

[Waymark for more information](#)

Directions: [To here](#) - [From here](#)

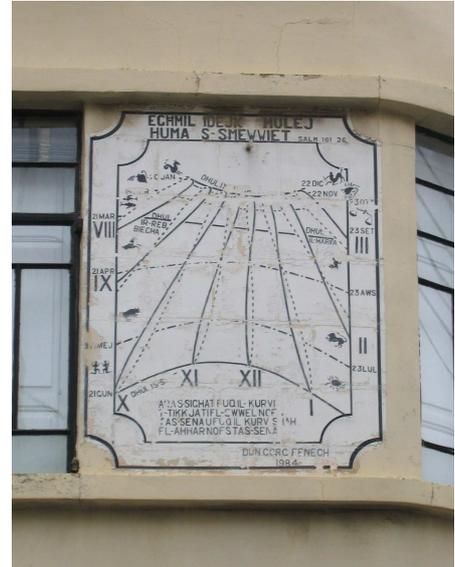
Sawyer Dialing Prize Presentation to Bill Gottesman: All those at the conference understand why Bill Gottesman won the Sawyer Dialing Prize this year. We saw so many examples of his innovative work designing and crafting sundials and consulting with others. As in previous years the award was money to fund a sundial project and a custom made Spectra Sundial by Jim Tallman, Artisan Industrials Corp.



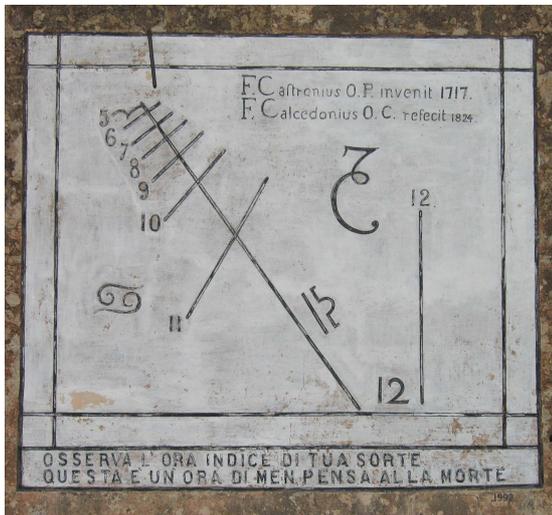
Ideas For Dials I Have Not Yet Made: Bill Gottesman then presented his talk outlining some ideas and challenges for sundial designs. His ideas included a wind powered sundial, a dipleidoscope or Wheatstone polarized sundial, a bracelet dial showing civil time, a fixed gnomon Foster Lambert sundial, an Ozanam Map sundial and a holograph sundial. There are many new ideas in the ancient art of dialing.

Presentations: Sunday August 23, 2009 8:00 AM

Sundials in Malta: Roger Bailey was back again, this time to introduce us to the Sundials in Malta. This small group of islands in the middle of the Mediterranean Sea has a rich history and interesting culture. A local architect and sundial enthusiast Alexi Pace volunteered to give them a sundial tour. In return Roger was invited to give a talk on sundials to the Malta Astronomical Society. Alexi also provided background information including an article by Chris Daniel and a book on Maltese sundials by Paul Micallef in 1994. The sundials on Malta are an interesting blend of modern and historical dials. George Fenech created many of the modern ones. Fenech was an engineer, astronomer, mathematician, gnomonist and also a priest. Most of his sundials featured an analemma noon mark or hour lines.

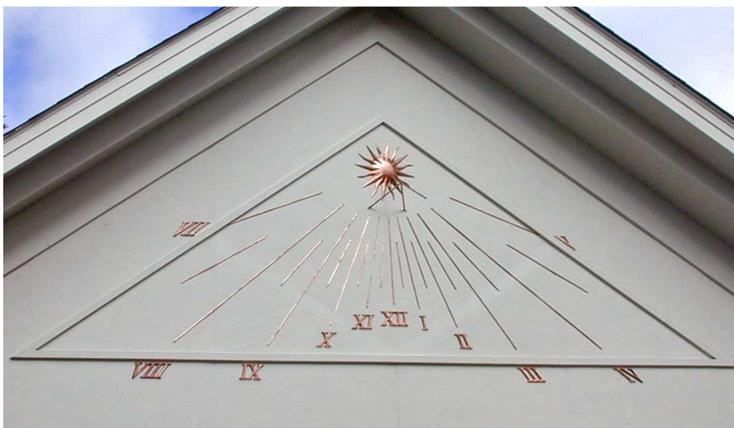


The older sundials were designed by priests and carved on religious buildings. One of the five dials at the Dominican Priory is shown on the right below. As before Roger provided waymarks, and Google maps like this one at www.tinyurl.com/MaltaSundials



Wendell Library Sundial: Dave Scott is a skilled sundial designer and craftsman. One of his projects was a vertical sundial for the library in Wendell MA. The key features are the hammer formed copper sunburst and the hour numerals. He showed in this presentation the complex pattern making and hammer forming techniques used to craft the sundial components.

Dave was also the designer of the CD Sundial that Fred provided to all those registered at the conference. This refraction sundial discovered by M. Catamo and C. Lucarini in 1999 has no gnomon. Details of this remarkable CD sundial are available on Dave's website www.scottdesignsundials.com



Potpourri of Sundial Matters from Japan: Barry Duell covered a number of topics on sundials in Japan. The first was the status of the Japanese Sundial Society. He offered a copy of their journal and reflected that this might be the last edition. The members are getting older and the president is retiring, closing his sundial museum, and limiting activities with the Sundial Society. This is a reflection of the demographic profile of Japan, an aging society with fewer people left to take on activities like the Sundial Society.

His second topic was the creation of a new sundial at the Tokyo International University where he teaches. The retiring president of the university sponsored this sundial and Barry was quite involved in the choice of location and alignment to make best use of the limited space available.

Barry also reviewed the exercise with students to determine north using the Hindu or Indian Circles method. The class did accurately determine the meridian but the major problem was maintaining their interest waiting for the sun to cross the meridian to mark both morning and afternoon shadows.

Dialing with Dollars: Fred Sawyer came up with another gem, a party trick to fold a dollar bill to create a technically correct sundial. All you need is a dollar bill, and a couple of numbers based on a table of lengths for your latitude and origami skills.

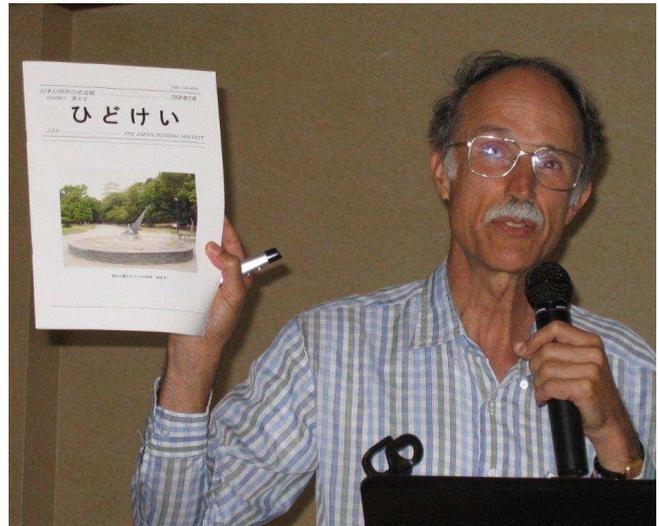
Short Informal Presentations: Following the Annual General Meeting, John Schilke gave a short presentation on the subject of labyrinths. First he reported that the maze that the members saw last year in Portland was still in good condition. John is a member of the "Labyrinth Society", an international group with a large number of like-minded people. He talked about some of the history of labyrinths and their large geographic distribution. John discussed the labyrinth with its reflective mirrors that we saw at All Saints Church on Friday's bus tour. He also explained the difference between a maze which is designed to confuse the participant and a labyrinth which is a path to be followed to its centre while meditating and praying. He likened this to a minor pilgrimage. We can find out more at the website "labyrinths.org".

NASS Conference 2011: The next NASS conference will be in Seattle WA and Woody Sullivan will be the local host. We look forward to seeing you there.

Burlington Sundial Tour

Bill Gottesman was the appropriate tour guide for the Burlington Sundial Tour, not only because he was the local co-host but he created, consulted or owned most of the sundials shown on the tour, many in collaboration with our co-host Kate Pond.

Kate Pond's Workshop: Kate Pond shares with another metal working sculptor a large industrial building as workshop. This is located just north of the Burlington Airport at 9 Ethan Allen Drive. For the NASS Sundial tour Kate Pond and Fred Stetson set up displays of notebooks and maquettes of Kate's Sawyer Award winning sundial projects. These included *Come Light Visit Me*, *SUNFIX* and her *World Sculpture Project* of five sun-aligned sculptures including *ZigZag* in Stanstead, Quebec, *Solekko* in Oslo,



Norway, *Himeguri* in Sendai, Japan, *All One* in Hawaii and *Telling Stones* in Nelson, New Zealand. See <http://www.vermontsculpture.com/>

Gateway Park Equatorial Sundial: In Burlington's Gateway Park is an equatorial sundial built in July 2007 by Kirk Williams. The dial features a stainless steel equatorial arc marked for standard and daylight saving times. No longitude correction is included as noon is centered on the equatorial ring. The gnomon is a strong stainless steel rod. The structural support is steel plate powder coated with red plastic. The dial sits on two large granite slabs. Terry Krinsky was the Landscape Architect and Carol Weston the project coordinator for the City of Burlington. All three were on hand to meet the NASS group on the 2010 sundial tour.



Champlain College Sundial: A main event on the sundial tour was the dedication of Kate Pond's new "Come Light, Visit Me" sundial. This large cylindrical polar sundial was conceived and crafted by Kate Pond. Bill Gottesman was the gnomonic designer. The two ends of the helical section of corten steel serve as gnomons casting shadows for standard and daylight saving on the inner surface of the dial. Time is indicated by the dominant shadow, top in the summer and bottom in the winter. A plaque provides the longitude and Equation of Time correction.

Attending the dedication were Kate Pond and Bill Gottesman, Michel George, the architect and project manager, and David Provost representing Champlain College. The NASS group joined a large local group at the dedication ceremony.

The sundial utilizes the properties of an equatorial ring. Shadows cast from the meridian gnomon at 15° intervals indicate the hour lines on the inside of the ring. These hour marks are at 30° segments around the ring. Any of the hour mark positions have similar geometric properties so the



daylight saving gnomon at the one hour from the meridian will correctly show local daylight savings time. The helical curved edges allow for the position of the sun at different solar declinations. A quote in the Champlain College newspaper said, "This new sundial is beautiful in two ways. It is artistic and it is correct. The mystery of the universe, time, and the sense of the relationship between the sun and the earth is all captured in the essence of this sundial."

Circles of Peace Sundial: A prominent circle of standing stones is located along the lakefront walkway off Harrison Ave. and Proctor St. In the center is an analemmatic sundial. Some of the stones mark the cardinal directions and the sunset locations for the solstices, equinoxes and mid quarters. Others are placed where they seemed right for Native Americans or Druids. The sunset directions were calculated by Bill Gottesman to show the last flash of sunset behind the mountains across the lake.



Bill also designed the analemmatic sundial. The Zodiac or date table is carved on a circular granite slab that also shows the directions indicated by the significant marker stones. The hour markers are anchored to concrete posts below the frost line.

Shelburne Farms: For lunch we proceeded south and west to Shelburne Farms, the former model agricultural estate in 1886 by William Seward and Lila Vanderbilt Webb on the shores of Lake Champlain in Shelburne, Vermont. Since 1972 Shelburne Farms has been a membership-supported, non-profit environmental education center, a 1400-acre working farm, and National Historic Landmark. This provided an impressive setting for lunch but offered no sundials. See www.shelburnefarms.org .

All Saints Church Labyrinth Solstice/Equatorial Markers: Behind All Saints Church is a labyrinth. This is located near the corner of Spear Rd. and Swift St. in South Burlington. Here Kate Pond and Bill Gottesman collaborated on a "sundial" using mirrors on poles 35 ft. from the center of the labyrinth to reflect beams of light. These were precisely located and focused to form a cross onto the center of the labyrinth at noon on the winter solstice and equinoxes. The effect was most apparent if you stood to cast a shadow to increase the contrast for the reflected light. Bill was pleased when his calculations and accurate location of the mirrors was confirmed by



the cross in the center of the labyrinth in a demonstration on the first winter solstice. See www.precisionsundials.com/consult.htm.

University of Vermont Sundial: On the Old Mill Building at the University of Vermont Campus is an oval shaped vertical sundial installed in 1970. It is easy to overlook but it is directly above a large bronze bell. The dial includes a longitude and Equation of Time correction. The information plaque has the following information.

“This sundial, a gift of Professor and Mrs. Willard B. Pope was planned by Professor Betty Bandel, designed by Herman Egger, Zurich, Switzerland and executed by W.M. Schenk in 1970. "The Sun of Science is Rising Towards its Meridian Splendor." To determine Eastern Standard Time, read the hour line against the appropriate band for the current month.

Physics Department Heliostat, University of Vermont: The tour continued at the nearby Physics Building where on the top floor was a museum of 19th century instruments. Although there were no sundials, the display was quite interesting. These included an 8” refracting telescope by Alvan Clark, a Wimshurst electrostatic generator, various Crookes and X-ray tubes, a repeating horizontal transit and many other intriguing devices from physics before the discovery of radioactive elements, atomic physics, quantum mechanics, etc. In an adjacent room, a heliostat was set up for display. This combination of mirrors and lenses projected a bright solar image onto the screen at the front of the darkened classroom. This was used for many solar studies including sunspots. None were evident on the afternoon of our visit.

Bill Gottesman’s Sundials: The final stop on the NASS Sundial Tour was Bill Gottesman’s home and Precision Sundials workshop. Bill had on display the seven sundials in his large garden overlooking Lake Champlain and many more in his home. See the Precision Sundial website for details. <http://www.precisionsundials.com/>



Renaissance Sundial: The first sundial on display was Bill’s Renaissance design, a spiral sundial that used curved mirrors to show two bright bands on the inside of the spiral. The center dark line can show the solar time to within seconds. The Renaissance dial is one of Bill’s custom Precision Sundial designs.

Schmoyer Sunquest Sundial: Next, just across the driveway was a Schmoyer sundial. This was designed by Richard Schmoyer and featured in Scientific American in Oct 1959. Bill has recovered the Schmoyer patterns and offers the sundial as castings or fully machined timepieces. The key feature of this equatorial sundial is the complex curved gnomon that corrects for the Equation of Time. The gnomon casts a line of light onto the equatorial ring. The dial can be easily adjusted for both latitude and longitude.

Picture Rock Analemmatic Sundial: By the pool was an analemmatic sundial that John Carmichael crafted on a 31" x 23" elliptical slab of Picture Rock sandstone. This beautiful tabletop sized dial was one of the first analemmatic sundials to include Seasonal Markers. These markers can be used with the date line to show where and when the sun rises and sets throughout the year.

Equatorial Band Sundial: Close by was a maquette of a polar equatorial band sundial. Hour numerals are cut out of the band to indicate time by the bright numbers on the meridian mark on the base. Kate and Bill have created larger versions of this sundial design.

Equatorial Pipe Sundial: Just to the west was one of Kate Pond's cylindrical 'Come Light, Visit Me sundials.' This 4 ft. diameter version was smaller than the Champlain College sundial and the pipe cylinder is continued down to the base plate. A small 12" diameter maquette of this design was also on display.

Sawyer Equant Sundial: Next was a Sawyer Equant sundial. Fred Sawyer conceived this design for a sundial that will show both solar and clock time. To show both solar and clock time, you move a small handle to turn the granite base with equal angle time marks with respect to the bronze cardioid or heart shaped base, normal horizontal sundial with a typical gnomon and local hour lines. Fred demonstrated how turning the small handle adjusted for longitude, the equation of time and even daylight saving. A latitude adjustment mechanism is built into the base. Bill custom crafts these Precision Sundials for sale.

Bill's Sundial Collection: Debra Gottesman provided refreshments inside their home for us to enjoy while perusing Bill's extensive sundial collection. On display were numerous small dials, all fine instruments including: a compendium, a bifilar, a Wenger globe, various equatorials, several horizontals, universal dials and heliochronometers. Beside a sundial noon cannon was the sundial alarm clock like that demonstrated by Paul Nibley at the Banff conference in 2003. Even Bill's car was set up as a sundial using the radio antenna as a gnomon for hour lines on the back window and trunk. Bill's extensive slide rule collection was also on display. He even demonstrated early digital music reproduction with his player piano! I was so intrigued by all the displays I missed the workshop tour. So many sundials, so little time!

Dartmouth "Heath & Wing" 1773 Sundial: The final sundial on our tour was also on display in Bill's home. Richard Kremer of the Physics Department of Dartmouth College brought to display a historical "Heath & Wing" Sundial. This finely crafted bronze horizontal sundial, about 20" in diameter, engraved in 1773 had been installed at Wheelock House at Dartmouth College, Hanover NH. This sundial is one of only 17 sundials crafted by Thomas Heath and Tycho Wing, 18th century instrument makers in London, known to exist worldwide.



