NAWCC NEW ENGLAND CHAPTER 8
ASTRONOMICAL TIMEKEEPING SYMPOSIUM

SATURDAY, SEPTEMBER 22, 2012

BROWN UNIVERSITY PHYSICS DEPT, LADD OBSERVATORY, PROVIDENCE, RI

Excellent Presentations, 3 Speakers,
Beautiful Campus Setting and Ladd Observatory Tours

Continental Breakfast - Coffee Breaks - Buffet Luncheon
Registration fee $60 ($50 with student ID)

Schedule

8:30 - 9:00 AM. **Registration: Continental Breakfast**

9:00 - 9:15 AM. **Welcome & Introduction**
Joe Seremeth, President, and **Cynthia Dias**, Program Chairperson, Chapter 8

9:30 - 10:30 AM. **Mark Frank, "*John Harrison Meets Rube Goldberg – The Making of an Astronomical Time Machine*"**

John Harrison Meets Rube Goldberg – The Making of an Astronomical Time Machine

Most clocks, even some of the most complex in the world, are largely static devices. Aside from their pendulum, escapement and strike mechanisms, in the case of striking clocks, not much is moving on a continual basis. This talk will describe an extraordinarily complex astronomical skeleton clock, which began construction in 2006 with completion scheduled for 2014. The purpose of this clock is not just to impart time and astronomically related information through a variety of horological complications but, also, to mesmerize the viewer through a variety of complicated mechanical motions. These occur every 15 seconds, sometimes in shorter intervals, and not always in a predictable fashion.

The mechanism will contain over 350 wheels. Yet, through judicious use of jeweled bearings combined with the latest in high-tech bearing technology it will be, with few exceptions, entirely a "dry runner." This is unprecedented in a horological movement of this size and complexity. This feature, as well as a radically different frame design, is part of the plan focusing on future maintenance and sustainability of the clock. This project is being created by one man. And while he is using contemporary machine tools and, in spite of the new designs we incorporate into this project, all of the flat material, including the spoking out all of all 350 wheels, are by hand on a jeweler's saw. There is no employment of computer-aided design or manufacture (CAD-CAM). All drawings, calculations and their execution are by hand and without the aid of a computer.

10:30 – 11:00 AM. **Coffee Break / Refreshments**

11:00 – Noon. ***Dr. David Livingston, "Science and Industry Join Forces to Produce a Single-leg Gravity Escapement Sidereal Clock"***

Science was combined with industry in the pursuit of American precision horology in 1877. Charles A. Young (astronomer / scientist) joined forces with Edward Howard (industrialist) to produce a single leg gravity escapement siderial clock with a detached, barometric and temperature compensated pendulum. This may be the only American single leg gravity escapement ever made, and may be the only American made clock with a pendulum that is compensated for atmosphere and temperature. It was used for many years, and is heavily documented in the archives of the astronomy dept. at Princeton.

The presentation will be focused on the so called precision "one leg gravity escapement clock" made by Howard, and designed by Young, an astronomer at Princeton. To my knowledge this is the only surviving example made by Howard, and the only clock to have an extensive history of time keeping at the Princeton Observatory where Young was the chief astronomer for many, many years. In astronomy circles Young was world famous as well as an author of many astronomy text books.
The intent of the presentation is to bring the history of Howard and the career of Young together in an attempt to understand how the scientist, Young, designed the clock, and the industrialist, Howard, went about constructing it. I will try to bring life and history in the 1870's together, and then show the result.

Noon - 1:00 PM. **Buffet Luncheon**

1:00 – 2:00 PM. ***Michael Umbricht, "From Star to Clock…Timekeeping at Ladd Observatory"***

The historical need for precision timekeeping to meet a range of astronomical requirements led to the development and usage of an array of clocks. The Ladd Observatory has a diverse collection of clocks, which will be discussed and displayed. The following regulators and timepieces are in the collection: Hezekiah Conant / Tiffany (1885), Wallace Goodwin (c. 1860), E. Howard, No. 74 astronomical regulator (1891), E. Howard, No. 89 regulator (1895), Robert Molyneux (mid 19th century), and Clemens Riefler, astronomical regulator (1902).

Also, the following boxed chronometers are in the collection: Wilhelm Bröcking, Edward John Dent, Charles Frodsham w/ telegraph break circuit by William Bond, Morris Tobias, H. Vuillemin, W. Wilkes, and a telescope clock drive by George Saegmuller (1891), which is currently undergoing restoration.

2:00 – 4:00 PM. Closing comments by Joe Seremeth followed by guided tours of the Ladd Observatory. Shuttle service will be available from 2:15 to 4:15 PM. The observatory is about ½-mile north of the Barus & Holley Building (Physics Dept.), at the corner of Hope St. and Doyle Ave. Parking near the observatory is very limited. See directions, below, to the Barus & Holley Building.

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NOTES ABOUT THE SPEAKERS

Mark Frank has been a collector of clocks for the past 20 years. His focus is on the theme of those clocks where one can readily view the mechanism. Skeleton clocks achieve this goal. Tower clocks do the same on a much larger scale. Also, he restores and repairs clocks and tower clocks for his collection, and engages in public speaking and writing on clocks. In 2003, Mark teamed up with Buchanan of Australia to create a complex fantasy clock mechanism, which is due for completion in 2014 and will be one of the more complex clocks ever created. You can see some of his collection, follow the construction of the fantasy clock and contact the author through his website at: www.my-time-machines.net.

Dr. David Livingston D.D.S. MScD was, in a prior life, an orthodontist practicing in the Lakes Region of N.H. Graduated from Temple University Dental School in 1972, he later served as a clinical instructor at Harvard University in the post Doctoral Orthodontic Department. David started collecting clocks in 1976 when he bought four clocks in Venice, CA while there on a vacation. Around that time he also bought his first Howard clock, a No. 5 banjo, and decided to limit his focus on Howard clocks thereafter. Since then he has seen a multitude of Howard pieces and, in the process, has limited his focus on the precision timepieces made by Howard.

Michael Umbricht is currently the Curator of the Ladd Observatory and a Visiting Scholar at Brown University. He has been researching the history of the Observatory since 2004. He has worked on major projects such as the 2010 transit telescope observing room restoration. Ongoing projects include the restoration of historic scientific instruments and the original timekeeping system. Also, he is involved in public education, outreach in local schools and citizen science projects. Michael was formerly at the Museum of Natural History & Cormack Planetarium for nearly 15 years. During that time, he was involved in the 1995 renovation of the planetarium.

Next regular meeting Saturday, November 3rd, Auburn Elks Lodge, Auburn, MA

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DIRECTIONS: Brown University Physics Department, 182 Hope Street, Barus & Holley Building. There is free off-street parking here for this event.

From I-95 (North or South) and I-195 East. From I-195 east, take the Wickenden St. exit (Exit #2). At the end of the exit ramp, at the traffic light, take a left onto Wickenden St. After going through two more traffic lights there will be a stop sign. This should be Hope St. Take a left onto Hope St. and proceed to 182 Hope Street, Barus & Holley Building. Ladd Observatory will be on the right at about the 5th traffic light at the corner of Hope St. and Doyle Ave.

From I-195 West: Take the Gano St. Exit in Providence. At the end of the exit ramp, at the traffic light, take a left and then the next right. Proceed up this street about three blocks until you come to the second stop sign. After the second stop sign there will be a small traffic island with a Fox Point stone marker on it—proceed straight around the traffic island Fox Point marker to the next stop sign at Hope St. Take a right onto Hope St. and proceed to 182 Hope Street, the Barus & Holley Building. Ladd Observatory will be on the right at about the 5th traffic light at the corner of Hope St. and Doyle Ave.

LODGING (discounted group rate). Attendees are advised to call the MARRIOTT Providence Downtown (4 star), One Orms Street, reservations department at 1-866-807-2171. To take advantage of the discounted group room rate, all reservations must be made by August 31, 2012 or sooner (reservation requests will be honored on a space and rate available basis). Callers should identify the group as the "Astronomical Time Keeping Symposium of the NAWCC." All reservations must be canceled within 72 hours prior to arrival in order to avoid a no-show charge of one night's room and tax. The room rate for this event is $129.00 for single or double occupancy, plus applicable state and local taxes which are currently 13%. Attendees save about $20 per night with this rate.

For visitors' information: http://www.visitrhodeisland.com/make-plans/regions/providence/

SEE THE WEBSITE FOR THE REGISTRATION FORM