



The Interval Clock

by Mostyn Gale

A customer friend of mine is into antique military equip, mostly telephones, but recently he introduced me to an Interval Clock. What is an Interval Clock? I had never seen or heard of one before and I suspect you may be in the same boat. Of all the articles I have read in trade magazines over the last almost decade, I have never read of this before.

Back in 1911, an officer of the US Army, named Isaac Newton Lewis, invented the first air-cooled machine gun that was used heavily by the Allies during World War I. Another of his inventions was the interval clock and accompanying system of bells and signals to assist the targeting of various military guns. The clocks were made by various companies at the time and fitted for the specific system in which they were to be employed. For more about these interesting systems

http://en.wikipedia.org/wiki/Coast_Artillery_fire_control_system.

Most of these clocks are now separated from their components – pictured at right is an early photo of Ser. No. 164 in its original box with a relay switch in the bottom of the box. Note the springs that the clock is hanging from used to isolate the clock from the vibrations of big guns as they are fired. Also note the knobs, one on the side and one on the top of the box.

The one I received from my customer was just the clock and had been placed in a rather nice but incorrect wooden case with many missing parts. My customer is



Figure 1 Ser No 164 Original Configuration



Figure 2 As received

reconstructing the box and its fittings. My task was to restore the clock and build the connecting pieces and knobs. The knob on the side is used to start and stop the clock as needed. The knob on the top is used to turn on/off the bell signal system to ring with a prescribed timing.

Restoration of the clock itself was quite straight forward – it is a very nice quality clock made by Chelsea. The Certificate from Chelsea says that it was delivered to the US Army Chief Signal Officer on 23 October, 1905. It uses a Swiss lever escapement with jeweled pallets and balance wheel – it was missing a jeweled balance wheel pin. With the pin replaced and a minor cleaning it easily sprung back to life. I also gave the dial a nice clean but the harder part was to restore and fabricate the missing pieces. Some very grainy blown-up pictures were available as models for the missing pieces but the lack of clarity left lots of room for inventiveness.

The picture shows two levers used to operate the clock. The vertical lever is used to control which pawl rides on the cam which controls the bell timing. The horizontal lever controls the stop mechanism which allows the clock to be stopped and then started at a precise time thus synchronizing with all the other clocks in the system.



Figure 3 The two control levers

The stop mechanism is a three-thousandths thick strip of spring steel that is moved to touch and stop the balance wheel.

Also, a difficult but important part of this restoration was ensuring that the center cam wheels were running concentric with their axis. Good operation of the system relies on the contacts closing as the pawls ride on top of the cam wheels. If the wheels are not concentric, the contact will close on one half of the wheel but not the other. I used a dial indicator and rotated the wheel in my lathe in order to make sure that they were running concentric within a few thousandths of an inch. I used a Volt-

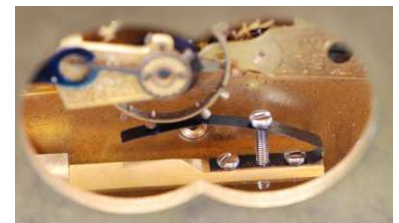


Figure 4 The stop mechanism
Continued on page 3

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PRESIDENTS MESSAGE

By George Gaglini

When I attended the NAWCC Field Suitcase Workshop (FSW) 101 course, Ray Marsolek was the instructor. The class, presented by Chapter 75, was held many years ago in Northridge, CA. After collecting and tinkering with clocks for years, I decided to stop tinkering and attend the workshop, and learn how to fix them correctly. Up to that time, it seemed to me that all clocks had black movements with gears loaded with WD-40 and kerosene, and seemed to be lubricated with a mysterious black mud. I had seen movements that were dunked, sprayed, battered, soldered, punched, and bent.



At the class, Ray set up an ultrasonic cleaner with rinsing tubs. Students took turns using them to clean their movement parts. When my turn came and I saw the clean, glimmering brass plates, parts and gears that emerged from the process, I knew right there I was hooked. I got serious about clock repair. The plain old kitchen clock movement in my hands looked to me like something from Ali Baba's cave. With a little help, I got it to tick and strike. The rest is history.

Today Chapter 190 conducts Field Suitcase Workshops like the one I attended so long ago. We have added a two-day Public Workshop as an introduction to clock repair, and prior to every chapter meeting, mini workshops are held where members can follow up on their learning and get questions answered by the professionals. This solid educational program provides, among other things, what past president Mike Schmidt terms a "Bridge to membership" for Chapter 190 and the NAWCC itself.

On July 26 – 27 we are presenting "Introduction to Antique Clock and Watch Collecting, Repair and Maintenance." Lex Rooker will be the instructor and it is being held at the Historic Dudley House museum in Ventura (near the college). This two-day course introduces students to the history, collecting and care and repair of antique clocks. Attendees actually disassemble and re-assemble time-only clock movements and get them to run. This course will be repeated September 6 – 7, 2014 in Santa Barbara at the historic County Courthouse. On September 26 – 29, 2014 Chapter 190 will present FSW 201, "Fundamental Skills for Lathe and Clock Repair" at the Odd Fellows Hall in Santa Paula. For more information on these and other Chapter 190 educational offerings, please visit our website www.nawcc-ch190.com.

See you at the next meeting on July 20, 2014.

George Gaglini

Happy Birthday

July

Barb Barnes, Ron Palladino, Mike Schmidt,
Kathi Sheffrey, and Kim St Dennis

August

John Berney, Alan Bloore, Phil Caulfield, Jim Chamberlain,
Pat Fitzgerald, Bill Frank, Royce Hulsey, Ken McWilliams,
Merl Meach, Ralph Napolitano, and David Potts



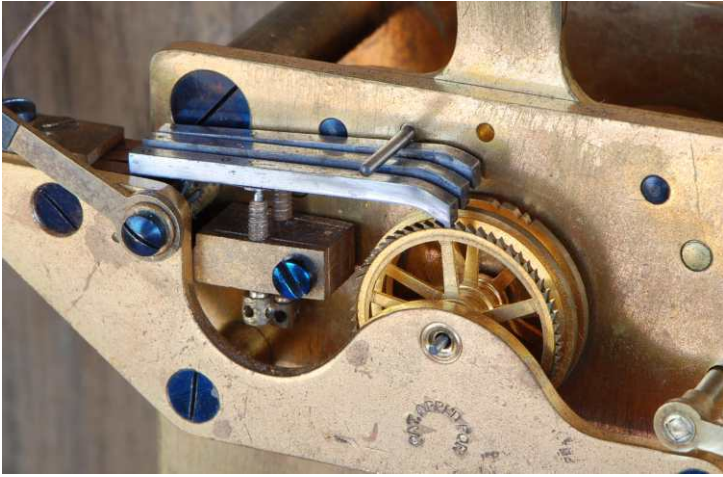


Figure 5 The timing cams

Ohm meter set in the “beeping” mode to hear when there was a good contact being made around the entire wheel rotation.

These wheels and associated cams are the heart of the targeting system and were customized depending on the particular application. This particular set of wheels was used with the large 12” artillery guns used along the US coastal waters. It took roughly 60 secs to “re-lay” (reload) these big guns. If you look closely at the back most wheel you can see three cams – they’re used to indicate, “ready, aim, and fire” – the first two cams are spaced at one sec and the last at two secs. It is hard to see in the pictures but the dial has indications for 15 and 20 seconds – this was the standard for smaller guns. Small guns take less time to re-lay and therefore less time was needed between the cams. For more on these interesting guns see; http://en.wikipedia.org/wiki/12-inch_Gun_M1895.

The picture shows my finished restoration in a test box.

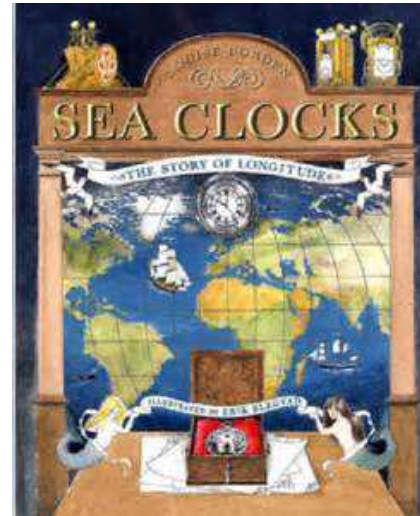
Have fun! ■



Figure 6 The finished restoration in its test box



by Mike Schmidt



For hundreds of years ships had been sailing far and near without really knowing where they were!

All of us connected with horology know about the great story of John Harrison and the “The Story of Longitude.” Many of us have read the book by Dava Sobel and viewed the wonderful movie “Longitude.” I recently made a delightful discovery of a wonderful children's book “*Sea Clocks*” – “*The Story of Longitude*” written by Louise Borden and illustrated by Erik Blegvad.

“*Sea Clocks*” tells, in a pleasing way, one of the greatest stories in horology. This book is written for ages 7-10. It is a great gift to a child you love and not a bad for gift for yourself either.

Louise Borden, a well know writer of children's books, does a great job of explaining the problems of longitude and its surprising solution. She takes you through the story of John Harrison's life, He was an Englishman without any scientific training who worked tirelessly for forty years to create a perfect sea clock. The development and explanation of each clock H-1 thru H-5 is explained very well, as are the disappointments and obstacles John Harrison overcame to finally receive his place in history.

The book is beautifully illustrated by Erik Blegvad. The detailed pictures, originally rendered with pen, ink and watercolor, delightfully add to the story. Erik, born in Denmark, studied at the School of Applied Arts in Copenhagen. He has illustrated more than a hundred children's books and has drawn for numerous magazines.

The author in writing the story has made acknowledgments to Dava Sobel, Will Andrewes, Jonathan Betts, and Andrew King for their encouragement and expertise in reading drafts of the book.

“*Sea Clocks*” is 48 pages, and was published in 2004 by Margaret K. McElderry Books, Simon & Schuster Children's Publishing Division. New and used copies can be readily obtained. ■

Horology Trivia

by Giorgio Perissinotto



More on Calendars

Since my first installment on calendars I have been contacted by benevolent fellow horologists with comments and requests for more information. I am far from being an expert on calendars, or anything else for that matter, but I am fairly adept at basic research. So here is a bit more on this topic for those who want more punishment.

THE GREGORIAN CALENDAR is strictly a solar calendar based on a 365-day common year divided into 12 months of irregular lengths. Each month consists of either 30 or 31 days with 1 month consisting of 28 days during the common year. A Leap Year usually occurs every 4 years, which adds an extra day to make the second month of February 29 days long rather than 28 days. The Gregorian calendar reformed the Julian Calendar because the Julian calendar introduced an error of 1 day every 128 years. The introduction of the Gregorian calendar allowed for the realignment with the equinox, however a number of days had to be dropped when the change was made.

The Gregorian calendar was first adopted in Italy, Poland, Portugal, and Spain in 1582. The Gregorian calendar would not be adopted until much later in Great Britain and America. Japan replaced its lunisolar calendar with the Gregorian calendar in January 1873, but decided to use the numbered months it had originally used rather than the European names. The Republic of China originally adopted the Gregorian calendar in January 1912, but it wasn't used in China due to warlords using different calendars. However, the Nationalist Government formally decreed the adoption of the Gregorian calendar in China in January 1929. Although the Gregorian calendar is named after Pope Gregory XIII, it is an adaptation of a calendar designed by Italian doctor, astronomer and philosopher Luigi Lilio (also known as Aloysius Lilius).

THE ISLAMIC CALENDAR works on the principle that each month starts when the lunar crescent is first seen (by a human observer's eye) after a new moon. Although new moons may be calculated quite precisely, the actual visibility of the crescent is much more difficult to predict. It depends on factors such as weather, the optical properties of the atmosphere, and the location of the observer. It is therefore very difficult to give accurate information in advance about when a new month will start. Furthermore, some Muslims depend on a local sighting of the moon, whereas others

depend on a sighting by authorities somewhere in the Muslim world. Both are valid Islamic practices, but they may lead to differences from location to location. The names of the 12 months that comprise the Islamic year are: (1) Muharram (2) Safar (3) Rabi' al-awwal (Rabi' I) (4) Rabi' al-thani (Rabi' II) (5) Jumada al-awwal (Jumada I) (6) Jumada al-thani (Jumada II) (7) Rajab (8) Sha'ban (9) Ramadan (10) Shawwal (11) Dhu al-Qi'dah (12) Dhu al-Hijjah.

THE JEWISH CALENDAR, closely related to the Islamic, is based on three astronomical phenomena: the rotation of the Earth about its axis (a day); the revolution of the moon about the Earth (a month); and the revolution of the Earth about the sun (a year). These three phenomena are independent of each other, so there is no direct correlation between them. On average, the moon revolves around the Earth in about 29½ days. The Earth revolves around the sun

in about 365¼ days, that is, about 12.4 lunar months. The civil calendar used by most of the world has abandoned any correlation between the moon cycles and the month, arbitrarily setting the length of months to 28, 30 or 31 days.

The lunar month on the Jewish calendar begins when the first sliver of moon becomes visible after the dark of the moon. In ancient times, the new months used to be determined by observation. When people observed the new moon, they would notify the Sanhedrin. When the Sanhedrin heard testimony from two independent, reliable eyewitnesses that the new moon occurred on a certain date, they would declare the Rosh Chodesh (first of the month) and send out messengers to tell people when the month began.

The problem with strictly lunar calendars is that there are approximately 12.4 lunar months in every solar year, so a 12-month lunar calendar is about 11 days shorter than a solar year and a 13-month lunar is about 19 longer than a solar year. The months drift around the seasons on such a calendar: on a 12-month lunar calendar, the month of Nissan, which is supposed to occur in the Spring, would occur 11 days earlier in the season each year, eventually occurring in the Winter, the Fall, the Summer, and then the Spring again. On a 13-month lunar calendar, the same thing would happen in the other direction, and faster.

To compensate for this drift, the Jewish calendar uses a 12-month lunar calendar with an extra month occasionally added. The month of Nissan occurs 11 days earlier each year for two or three years, and then jumps forward 30 days, balancing out the drift. In ancient times, this month was added by observation: the Sanhedrin observed the conditions of the weather, the crops and the livestock, and if these were not sufficiently advanced to be considered "spring," then the Sanhedrin inserted an additional month



Prague Astronomical Clock, with gold clocks & calendars

Chapter 190 People

by Ernie Jenson

Bill Hogan



Bill is one of our more active members and has been in the club for about three years. He arrives at every club meeting with a table full of clocks for the mart. He says that he is addicted to the hobby of collecting and repairing clocks. Of course he is not alone with that problem in our club.

Bill met his wife, Carolyn, when she was a coed at Arizona State University. Bill was attending pilot training at Williams AFB. After getting his wings, they were married and have been married for 51 years. They have two children, Monica and Christopher.

Bill was born in St. Helens, Oregon and went to the University of Oregon where he received a BS in Education and a minor in math. He was in the ROTC and received a commission of 2nd. Lieutenant. Upon graduation he is off to do his military duty and after training on a number of aircraft, he becomes a pilot of a SAC KC-135, a multi-engine jet aircraft. After six years of military duty he is hired as a pilot by TWA, where he works for 28 years, leaving with a medical retirement in 1995.

Here is his story on how he developed his hobby addiction to clocks. He started in a really big way!

In 1967 the airlines were expanding and were looking for multi-engine jet pilots to fill their ranks. In June of 1967, I hired on with TWA. After training with TWA in Kansas City, KA., We moved to the LA area and flew out of LAX. In 1979 we moved to a farm in Oregon where I played farmer for 25 years along with commuting to LAX, SFO and JFK for flights both domestic and international.

After moving to the farm, Carolyn's father gave her a single-weight Becker wall clock and later we bought a very nice 3 weight Grand Sonnerie wall clock. I did not know anything about clocks at that time.

In the summer of 1985 my wife and the kids went to Athens and took a surface tour to London. I was left home alone on the farm to make hay. On a day off, (rain day), I bought 31 Vienna regulators; 1, 2, and 3 weight clocks from a shop getting out of the clock business. (I am still not sure why.)

Not knowing anything about clocks I signed up for a local Community College clock repair class. I told the instructor I would miss two-thirds of his classes due to my flying schedule. He said, "That's OK. I teach two others in the Portland area. Just show up at any of them."

The instructor and I palled around together and I would bring clocks from Europe for "show and tell" for the other students. We ended up buying a few clocks together for resale at the Portland regional.

In 2009, after moving to Bradenton, FL., a friend and I opened a clock repair shop in a mall for 2 years prior to relocating in Moorpark, CA.

To this day I am still buying, selling, and playing with clocks.....The addiction continues." ■

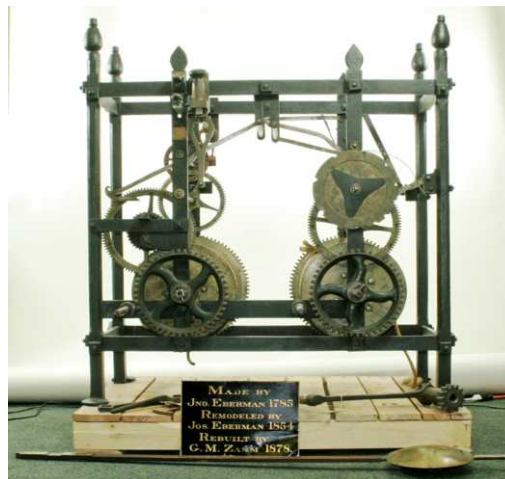
A L O O K I N S I D E T H E



National Watch & Clock

MUSEUM

By Noel B. Poirier, Museum Director



The Museum recently acquired this 18th century tower clock movement from the County of Lancaster, Pennsylvania. This clock was used in the County Courthouse until the latter quarter of the 19th century when it was replaced. The clock was, for years, on loan to the Lancaster Heritage Center until they closed in 2012. The Museum, donated funds, is having a period appropriate stand built for the clock so that it may be displayed in the Museum rotunda.

Horology Trivia, continued from page 4

into the calendar to make sure that Pesach (Passover) would occur in the spring.

In the fourth century, Hillel II established a fixed calendar based on mathematical and astronomical calculations. This calendar, still in use, standardized the length of months and the addition of months over the course of a 19 year cycle, so that the lunar calendar realigns with the solar years. Adar I is added in the 3rd, 6th, 8th, 11th, 14th, 17th and 19th years of the cycle. The current cycle began in Jewish year 5758 (the year that began October 2, 1997). If you are musically inclined, you may find it helpful to remember this pattern of leap years by reference to the major scale: for each whole step there are two regular years and a leap year; for each half-step there is one regular year and a leap year.

In addition, Yom Kippur should not fall adjacent to Shabbat, because this would cause difficulties in coordinating the fast with Shabbat, and Hashanah Rabbah should not fall on Saturday because it would interfere with the holiday's observances. A day is added to the month of Cheshvan or subtracted from the month of Kislev of the previous year to prevent these things from happening. This process is sometimes referred to as "fixing" Rosh Hashanah. ■

EDUCATIONAL OPPORTUNITIES

The following workshops are scheduled for 2014:

Chapter 190 will continue to offer the “**Introduction to Antique Clock Collecting & Repair & Maintenance**” workshop. This 2 day workshop is open to members, friends and the public. The only prerequisite for this workshop is “Interest & Curiosity” in mechanical clocks. All tools, movements, and knowledge are supplied.

The date for this 5th workshop is *July 26th & 27*. This 2 Day workshop will be in Ventura at the Historic Dudley House Museum.

The next workshop will be *September 6th & 7th* and will be in Santa Barbara at the Historic Santa Barbara County Courthouse.

For information or to sign up for either workshop, contact Mike Schmidt, phone 805 988-1764 or e-mail: eaglecreekclocks@msn.com

A **FSW 101 Basic time & strike clock repair** workshop is scheduled for Oct 4 & 5 and Oct 11 & 12. This 4 day workshop will be spread over two consecutive weekends. The instructor is Lex Rooker. The coordinator for this workshop is Walter Pickett. For further information or to enroll, please contact Walter at email pickittlakewood@aok.com

This Month's Mini-Workshop **At 11:00AM**

The workshop will be led by George Antinarelli. This is a round table discussion where everyone gets to join in and contribute. Bring the clock that is giving you problems. Don't let a clock baffle you, let our experts confuse you instead.



Dave Coatsworth has acquired two estate sales of watchmakers tools. One was a master watchmaker for Tiffany.

Lots of neat tools will be for sale at the July meeting.



George Antinarelli, leading the free, pre-meeting workshop. Always a popular event.



Neil Kuns presenting his program on Lawson clocks.

The July Chapter 190 Meeting
is July 20, 2014

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The Meeting starts at 1:15

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By Dave Coatsworth.

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This page is dedicated to advertising for Chapter 190 members. It is, of course, free to members.

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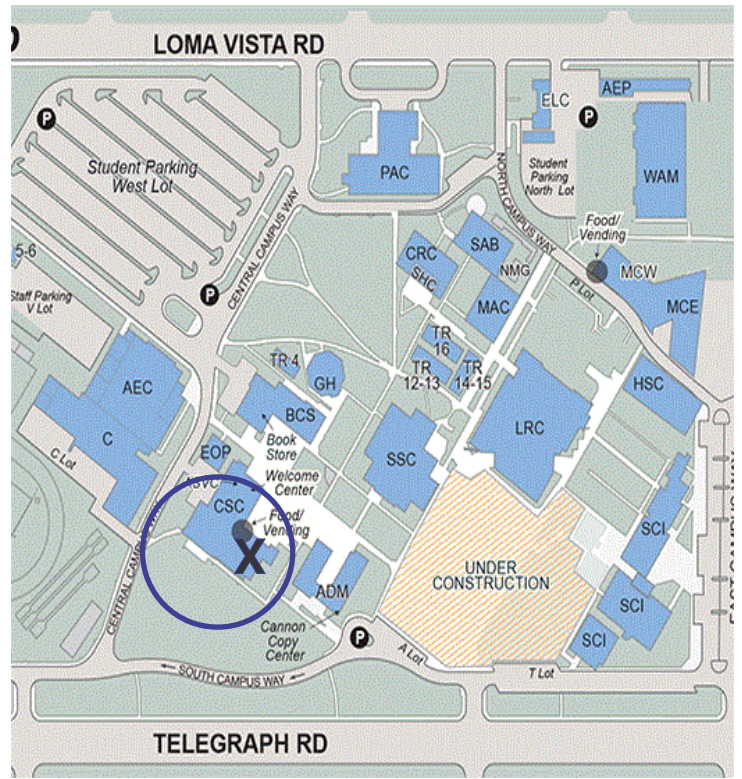
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- Chronometer -

Hamilton 21 Marine Chronometer in running condition, with
inner box and gimbals; outer box not essential.

Please contact: Giorgio Perissinotto
E-mail: giorgio@spanport.ucsb.edu

The Chapter 190 meetings are held the third Sunday of each month. (No meeting in December)
 We will meet in the Campus Student Center (CSC) on the Ventura College campus. The CSC is located in building "B", east of the gym and



July - August, 2014 Issue

NEXT MEETINGS

JULY 20

AUGUST 17



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Chrono Times

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