# NAWCC
## Chapter 190
## September 2019

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VENTURA & SANTA BARBARA COUNTY
Chrono Times
Newsletter for Chapter 190 of The National Association of Watch & Clock Collectors

# Collecting and Displaying Tower Clocks

**By Alan Bloore and Ernie Jenson 12-16-2018**

The study of Horology involves a wide variety of devices that provide the professional as well as the hobbyist with a mighty challenge.

The challenge could be related to something as large and complex as the Santa Barbara tower clock or as small as a simple watch.

One can enjoy using his skill and creativity for restoring and displaying these items. This article is about the challenge of restoring and then displaying two rare, technologically interesting and surprisingly small tower clocks made by the Self Winding Clock Company of New York.

In this instance Alan provided the clocks and knowledge of how clocks made by the Self Winding Clock Company (SWCC) operate. Ernie was the mechanical wizard that answered the challenge of replacing a missing motor on the largest of these two tower clocks. And then fabricating a drive mechanism so that either of the two tower clocks could be to used drive a set of hands.(Figure 1)

Tower clocks, as the name suggests, are usually installed in a tower. Well at least the big ones are, especially if they are to be used as designed with multiple dials up high to be visible to the public. The tower also provides room for a long swinging pendulum and distance for the weights to descend before being rewound.

### Electro-mechanical Tower Clocks don't need a tower

At Alan's house there is no tower. Therefore if Alan is to operate tower clocks they better not have long pendulums or weights that descend.

Fortunately these two SWCC tower clocks fit perfectly into his collection of electro-mechanical clocks. These tower clocks are not driven by pendulums but are powered by an electric pulse from an electro-mechanical master clock. They are essentially slave clocks.

Electro-mechanical clocks differ from purely electric clocks because electro-mechanical clocks consist of a conventional mechanical clock mechanism that is wound or propelled with electric power. Electric clocks simply drive the hands directly.

First a little background on electro-mechanical clocks. By the 1880's horologists were experimenting with electricity to wind main springs. This led to the development of self winding clocks. About the same time a system was invented to advance clock

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hands one minute at a time via an electrical pulse traveling along electrical wires. This led to the development of slave clocks.

The Self Winding Clock Company was started in 1886 by Chester Ponds and Charles Pratt. They used a small electric motor powered by a battery to wind a conventional spring driven clock. The electric motor was incorporated below the clock mechanism and after the clock had run one hour the main spring would automatically be rewound. The clock was therefore, self winding. The batteries would rewind the clock for at least one year. This was revolutionary. A modification of their original self winding movement was used in all SWCC master clocks and all clocks used in the ubiquitous Western Union Time Service. To insure absolute accuracy all Western Union clocks and most SWCC master clocks were equipped a special synchronizer attachment. Every day the US Naval Observatory would send a time signal at noon over telegraph lines. Any connected clock that is not precisely correct will be re-set to exactly noon.

The master clock and these two tower clocks were made by the SWCC. The master clock has this synchronizing feature so a connected tower clock would be absolutely accurate. It is the time keeper and the tower clock movements are simply slave mechanism that advance the hands one half minute at a time. The master clock sends an electric pulse via connected electrical wires to the tower movement every 30 seconds. The pulse turns on the tower motor on long enough to move the hands one half minute. The motor then turns off and waits for the next electric pulse.

### One clock can turn into a collection

For years Alan had an original small SWCC tower clock movement complete with it's timer but no cluster to drive hands. He recently had the opportunity to acquire another small SWCC tower clock . This one had all the original works to drive the hands but the original drive motor was missing. It had been electrified with a 110 volt motor to continuously drive the hands. Taking parts from both he now has a fully functioning SWCC tower clock with an original motor drive able to receive the pulse from a master clock and cluster of gears to drive up to 4 sets of hands.(Figure 2)

If you have one, why not have a collection? So Alan recently purchased an even larger SWCC tower clock (actually less than 2 feet square & about 18 inches high) complete with the cluster to drive up to 4 sets of hands and the coils used to receive the on/off signal from a master clock.(Figure 3) However the motor and timing mechanism were missing. This was going to be a much more challenging project. A search of the internet and questions to many tower clock experts did not reveal any information pertaining to the motor or timer. After studying the mechanism and counting the teeth Ernie arrived at the conclusion that we need a 12 volt DC motor that will turn the shaft with the worm gear 24 clockwise revolutions in less than 30 seconds. This will move the hands one half minute. The master clock will turn the motor on each 30 seconds. After the shaft has turned 24 revolutions it turns off and waits for the next start pulse from the master clock. With Ernie's expertise a was motor selected and timing gear fabricated. Now there are two operating SWCC tower clocks.

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## Displaying and operating SWCC tower clocks

Alan tries to keep all his clocks running. The problem: how does one display a running tower clock without a tower and no more wall space? The creative solution was to mount the two new additions on platforms in front of his office window which is between the shop and his office. Then build a custom motion works, cut a hole in the glass and mount the clock dial on the glass in his office. The two tower clocks are hooked in tandem and either can be used to drive the hands. This tandem hookup was devised and fabricated by Ernie. Now Alan can sit at his desk and watch either tower clock operate the hands. (Figure 4) The master clock was designed and built by the SWCC specifically to impulse tower clocks and slave clocks. (Figure 5) It is mounted next to the tower clocks and wired directly to them. This master clock was configured to both control a tower clock and advance slave clocks each 30 seconds. Fortunately the clock came with the original wiring diagram. (Figure 6)

The master clock now generates the half minute pulse and a switch can be turned to deliver the pulse directly to either of the tower clocks. (Figure7)

This was a labor of love and an horological challenge met.

**Figure 1**. Two Self Winding Clock Company tower clocks mounted next to the controlling Self Winding Clock Company master clock. Notice the dial in the window is to be read from the other side.

**Figure 2.**The smallest Self Winding Clock Company tower clock. Hooked in tandem with the other tower clock.

**Figure 3.** The largest of the two Self Winding Clock Company tower clocks.The cluster gear is driving the clock hands mounted in the window between the office and shop.


## September

**Thomas Beard, Thomas Ferkel, Ron Hirsty, Chris Manzione, David Ohlinger, Daniel Ohlinger, Alexander Rose, David Rubright, David Spong, Chip Stevens, Norma Zuber**

## October

**Jess Ashby, Rod Christel, Marco Perez, Barbara Pickett, Jeff Ryder**

## November

**Dave Coatsworth, Ferdinand Geitner, Jim Gilmore, Ernie Jenson, Tyler Kalb, Keith Lord, Bryan Mumford, Peter Racette, Norma Ray, George Sessions, Peter Wedel**

**Figure 4.** View of the dial, hands and tower clocks from inside the office. The motion works and hands are mounted through a hole in the window. The dial numerals and five minute marks are decals.

**Figure 5.** The Self Winding Clock Company master clock with the dial removed showing a myriad of electrical components.

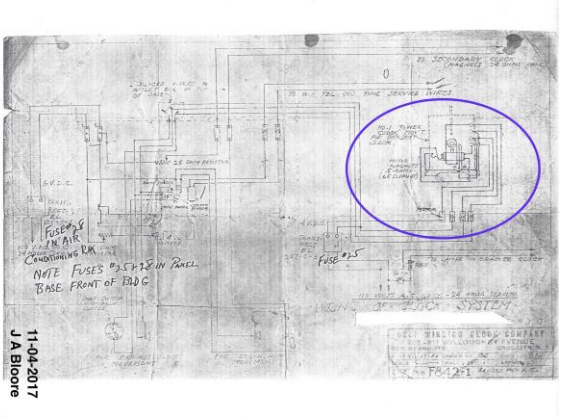



**Figure 6.** Original Wiring Diagram for the master clock and the wiring connections to power the small tower clock circled in blue.

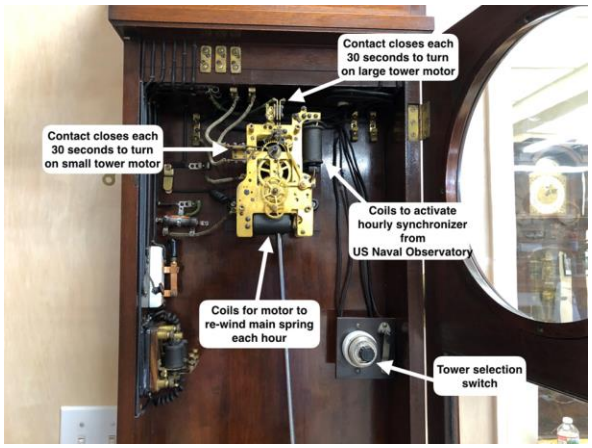



**Figure 7.** Master Clock movement with component labeled.

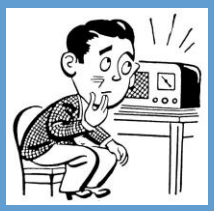
workshops

**Mini-workshop**

**Every Regular Meeting**

**At 11:00AM**

**There will be 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!**



***News Flash!!***

**Many of our Members will have lots of neat and useful tools, clocks, books and other items for sale at the September 15 Meeting.**

## PRESIDENT'S MESSAGE

Dear Members and Friends of NAWCC Chapter 190:

If you are reading these words, you have undoubtedly realized that Chapter 190's Chrono Times is being published once again.

We owe a great deal of thanks to our new editor, Barbara Pickett, for making this happen. A considerable amount of work goes into publishing the Chrono Times and Barbara has taken it upon herself to work with other Chapter members to bring the newsletter together. Our intent going forward is to publish the Chrono Times quarterly.

Of course, we will need material for these newsletters so, if you have an idea for an article, please write it up and submit it to Barbara. We would love to hear about your latest find or project.

I've just returned from the East Coast where I attended the National Convention in Springfield, Massachusetts and the opening of the "Timeless Testaments" Civil War watch exhibit at the NAWCC headquarters in Columbia, Pennsylvania. Both events were very successful and a great deal of fun.

One piece of exciting news that was announced at the National Convention is that an anonymous donor has pledged up to $250,000 in matching funds for donations to the For All Time Endowment and Capital Campaign during the next year. ***Hope within the NAWCC is that the $250,000 can be raised within six months.***

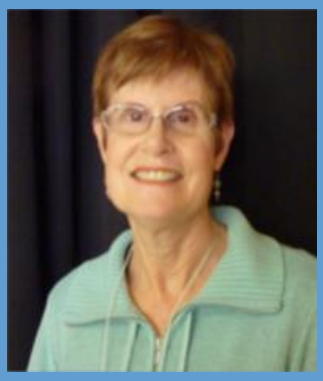
So, if you have been thinking about making a donation to the NAWCC, now is definitely the time! Go to nawcc.org for more information and to make a donation.

As you read this, Lex Rooker is packing up the tools and movements for the Introductory Clock Workshop and preparing to drive them to Columbia where he will teach the class at NAWCC headquarters.This is in preparation to 'clone' the class and package it so that it can be taught by any Chapter wishing to do so. This innovative program would not have happened without Lex's dedication and speaks to Chapter 190's commitment to education.

Please enjoy the great articles in this edition of the Chrono Times and I hope to see all of you at the meeting!

Best Regards,

Dave Coatsworth



**Sue Gary**

**Photo #1**

**Astronomical Clock known as The "Wilhelmsuhr"**

**by Baldewein, Bucher and Diepel**

## Featured Article:

***"Eberhard Baldewein, 1525 – 1593, The Story of the Dresden Planetenlaufuhr (Planet-running Clock) and its Creator."***

***by Sue Gary***

The groundwork for this presentation is based on information gleaned during the 2014 AHS USA Section Central Germany Horological Study tour led by Fortunat Mueller-Maerki.

I will begin with background on Baldewein, as well as on his earlier works. Then I will move into an overview of the Planetenlaufuhr, before sharing a look at work being done on the Planetenlaufuhr in the Zwenger's Conservation Lab at the time of my visit to Dresden.

Wilhelm IV was the son of the local ruler, known as a Landgraf, of the Hesse region of Germany, in the mid 1500's, He was also an ardent astronomer. Wilhelm's father, Phillip, employed Eberhard Baldewein.

It is important to see the geography of central Germany to appreciate this work. Kassel is located in the Hesse region. Dresden is in the Saxony region. The city of Kassel had its origins in 900 A.D. The city of Dresden became formalized in the 1100's. During the 1500's, these regions were without a strong, centralized monarchy. The local political rulers held tremendous power. Other important cities include Ingoldstadt and Augsburg which are in the southern area of Bavaria. I found it interesting that there was such a vibrant information flow around these areas when transportation was so basic. The cities of Marburg and Giessen are in the Hesse region, south of Kassel. It is also important to understand that Bohemia is the area we now call the Czech Republic, abutting Saxony.

Peter Apian created a large volume, titled, *Astronomicum Caesarium,* in 1540. He created this reference in Ingolstadt, Germany, not far from Augsburg, in Bavaria. The volume was made up of paper discs which allowed the positions of the planets to be calculated at any time.

Wilhelm, one of the most serious astronomers of his era, decided a clock should be made to give the same information and tasked Baldewein with the job.

The Orangerie in Kassel is where we first viewed the original, smaller, Astronomical clock known as the "Wilhelmsuhr", (***photo#1***) created for Wilhelm, between 1560 and 1562. The calculations for the movements were based on observations made by Wilhelm's personal astronomer, Andreas Schoener, as well as on the new astronomical tables of Peter Apian's *Astronomicum Caesarium.* This clock has always been essentially at this site, in Kassel. Eberhard Baldewein is credited with designing and directing the construction, basically serving as the "general contractor." The clock maker, Hans Bucher, of Augsburg, is

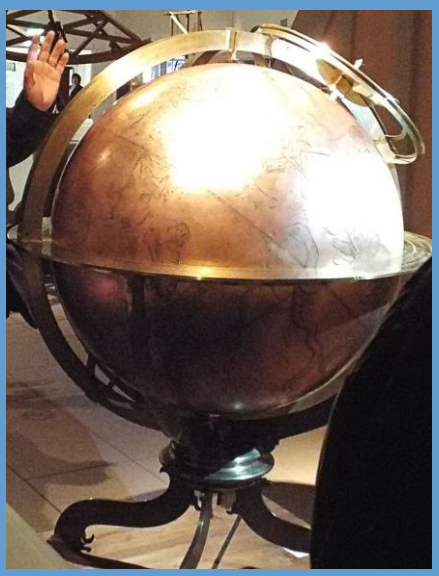


**Photo #2**

**The Celestial Globe**

**By Jost Burgi and Eberhard Baldewein**

credited with the mechanism work, and the Master Goldsmith Hermann Diepel of Giessen created all of the gold work. Baldewein is credited with the creative gearing such as cutting the wheels with unevenly spaced teeth.

The clock shows the motion of the five known planets (Mars, Venus, Mercury, Jupiter and Saturn), plus the sun and the moon, sidereal time, mean time, and the lengths of the day and night
.
One dial shows the Primum Mobile. A dictionary definition I found states the Primum Mobile is the outermost empty sphere in the Ptolemaic system that was thought to revolve around the earth from East to West in 24 hours, carrying with it the inner spheres of the planets, sun, moon and fixed stars.

A celestial globe sits at the top, showing the sun traveling from east to west in a sidereal day. Finally, there is a mean time dial at the North Pole.

The planetary dials show the planet's path through the astrological images of the constellations.

Baldewein was born in approximately 1525, and died in 1593. Originally he was a tailor, but by 1560 he was employed by Landgraf Phillip the Magnanimous, who was Wilhelm's father. Baldewein was a light chamberlain, meaning he was in charge of heating and lighting for both the estates in Kassel and Marbourg. At this same time it is documented that he was making clocks and other instruments for Wilhelm IV. Besides these responsibilities, he also worked as an architect to Wilhelm's brother, Ludwig.

Correspondence exists revealing Baldewein's collaboration with clockmaker Hans Bucher. He also collaborated with Jost Burgi on the creation of several celestial globes with clockwork. Baldewein is also credited with creating Armillary spheres and an Azimuth Quadrant, as well as other mechanical celestial globes.(***photo#2***)

The first clockwork-driven mechanical model of the motion of the planets, based on the Ptolemic - earthcentric view of the universe, was most likely the "Astrarium" built in the 1350's by Giovanni de Dondi, of Padua, Italy The actual clock has been lost to posterity but accurate construction notes by de Dondi survived allowing replicas to be built in the mid 1900's. One of these models is on display in the musee international d'horlogerie in La Chaux du Fonds, Switzerland.

The clockmakers of the 1500's were the first to create the breakthrough of the epicyclical motion gearing based on **real time**. Five of these clocks, using epicyclical motion gearing to compensate for the non-Copernican understanding of the movement of the planets, in real time, have survived. Two of the five were created by Eberhard Baldewein.

Baldewein's Dresden Planetary clock is considered the pinnacle of planetary clocks based on Ptolemy's theory. Copernicus's book, presenting the heliocentric view of our solar system, was

**Photo #3**

**The Planetenlaufuhr**

**by Baldewein, Bucher and Diepel**

published in 1530, approximately 30 years before Baldewein's works showing planetary motion. However, Copernicus's views were not widely accepted for another 100 years. (***photo#3***)

The large Planetenlaufuhr is located in the Mathematisch-Physikalischer Salon in the Zwenger Museum Complex, Dresden. Dresden is in the Saxony region of Germany, and in the mid 1500's, it was ruled by Augustus, for whom the clock was built
.
References agree both clocks were made in Kassel. However, there are differing accounts as to whether the larger, second clock was given as a gift to Wilhem the IV's cousin, Augustus of Saxony, or if the second clock was commissioned by Augustus of Saxony, who was Wilhelm's brother-in-law. I understand that in that era it is not unlikely that Augustus was both a cousin and a brother-in-law.

Each of the four sides of the clock has two large dials (approx. 12 inches in diameter). This becomes 8 dials for what were then thought to be the seven planets: the moon, Mercury, Venus, the Sun, Mars Jupiter, and Saturn.

Six of the planets have their own large dials. The seventh dial is the calendar and the eighth dial is an astrolabe which was an instrument used to observe and calculate the position of celestial bodies before the invention of the sextant.

The firmament of the stars is the ninth display and is shown on the celestial globe at the top. The sun is considered the 7$^{th}$ Ptolemaic planet, and its position is shown three times: first on the moon dial, next on the astrolabe dial and finally on the celestial globe. The calendar over the moon dial predicts lunar and solar eclipses. The small time dial showing the days of the week along with the minute hand sits between the Mars dial and the Astrolabe dial.

This clock was constructed between 1563 and 1568. As with the smaller, earlier clock, the clockmaker attribution is Hans Bucher of Augsburg. Again, Baldewein is credited with the hand-cut creative gearing used to accurately display the epicycles of the planetary movements. As with the earlier clock, the Goldsmith attribution is Hermann Diepel of Giessen. Fortunat Mueller-Maerki has written, "At the time of its construction, the clock was arguably the most complex geared apparatus ever built." The clock is just under 4 feet tall, and each side is slightly more than 2 feet wide. It weighs 551 lbs.

On the Planetenlaufuhr, the faces of the planetary dials show images of the mythological deities associated with that planet, while the chapter ring has the constellations marked. As noted earlier, the Wilhelmsuhr clock dial shows the movement of the planets through the constellations on the dial face. The decoration around the dial of the Dresden clock is much more elaborate, besides the clock being larger and more complex.

Again, on the Planetenlaufuhr the corners are decorated with pairs of pillars. The bottom, center, and top friezes are richly

**Photo #4**

**The Planetenlaufuhr with Calendar Dial missing as it was undergoing conservation, 2014**

**Photo #5**

**Detail on the Planetenlaufuhr**

ornamented in silver or gilt brass. Every square centimeter of (***photo#5***) each dial and spandrel are decorated. The subjects shown all relate to the theme of the dial or to Augustus of Saxony.

Each dial is hinged so it can be individually swung out of the case, including the respective display train. Swinging out the dial disengages the train from the connecting drive shaft that reaches up to the train from the central power distribution mechanism located in the bottom of the case.

The clock has two main power trains. It has a spring-driven, Gothic style four corner pillar movement. There is a 12 turn fusee. It Runs 55 hours. It was originally created with a verge escapement with either a folliot or a ring balance, but it was converted to a short pendulum anchor escapement in 1828, and further adjusted in 1901.

The Time train directly drives the small time dial which is the day disc and the minute hand. The time train also drives the astrolabe dial. All other functions are driven indirectly from the 24 hour wheel behind the astrolabe dial. The top of that wheel also drives a pinion that goes up to the celestial globe and the bottom of the wheel drives the 'power plant' in the bottom of the clock, which in turn powers the other seven major dial systems.

The planetary dials are governed by epicyclical gears to show real time planetary motion.

Because the apparent retrograde movement of the planets based on Ptolemy's geocentric theory is difficult to show mechanically, epicycle gearing was created. Baldewein is credited with creating the gearing for the two planetary clocks.

The Calendar dial is one of the few dials without the epicyclical gears. It has a centered hour hand on the 2 twelve hour displays. The silvered shutters in the dial's center show the daylight hours, while dark blue shutters show the nighttime hours. The shutter edges show the time for sunrise and sunset. The shutters are not tied to any specific latitude, but can be adjusted for latitudes from 0 degrees to 64 degrees. Attached to this sunset mechanism is a special drive system that uses a "step-wheel' with a mechanical crank for the dial ring, to indicate Bohemian hours, which are hours counted since nightfall, meaning seasonally equal hours counted from a variable starting point. The change in night fall over the seasons is a nonlinear function that exceeded the limits of unevenly spaced teeth, and this forced Baldewein to invent even another custom solution. The outer rings show the calendar data, with the most exterior hand indicating the day of the year as well as related information such as 57 holidays with fixed dates.

(***photo #4***)The clock was completely dismantled for conservation and documentation beginning in 2007. The work was ongoing when we visited in the fall of 2014. The work is now finished. Part of the conservation process included comparing the Dresden clock to the smaller Baldewein clock in Kassel. During conservation, each part was given a part number as it was

**Photo #6**

**The Calendar Dial Movement**

***Photos by***

***Sue & Robert Gary***

removed. The part was then photographed and given an inventory number. Each of these images became a full printed page. As of the fall of 2014, these pages filled four huge volumes of binders, and there were over 100 Gigabytes of photos. These binders are used as back-up for the digital files. (***photo#6***)

The spring is 18 feet, 4 inches long and is confirmed to be the largest of any known such spring anywhere in the world in its day. The spring is one width, not stacked. The length was created by riveting 3 springs together. The grease in the spring barrel was analyzed and found to be original to the time the clock was built. The studies showed the spring to be cracked.

By taking a minute sample from the end of the rope around the fusee, the conservators learned the rope is gut, and by doing DNA tests, it was confirmed to be older than the clock, thus original. The rope was left in place as it was in good condition. The conservators have now added a part to the clock to prevent anyone from accidentally winding it as they are worried the spring could break.

The original marks are still visible on the hand cut wheels, screws and many other parts. There is always a mark to show how every wheel and dial fits together properly. Connical cannon pinions were used. There were no standard measurement units in this era. Five sets of dies were used to make screws but all are numbered. The wheels were cut from 4 joined sheets of brass.

The spring barrels are now closed with rivets so they cannot be opened as it would be unsafe to run the clock.

Learning about these marvels of Renaissance engineering was a tremendous experience.

# Chapter 190 People

*by Walter Pickett*

***Irving Camhi***

**Education:**

**MS Engineering, UCLA**

**Employment:**

**Self Employed 40 Years**
**IT Consulting**

**Enjoys Collecting:**

**Vintage Pens,**

**Cameras, Clocks**

***Spotlight on Irving Camhi***

**If you are married, do you have any children?**
Married 4 adult children 8 grandchildren

**Where were you born and where did you reside before landing here?** Born in New York City Came to CA at age 12

**Did you go to college**? Yes UCLA, Masters Degree engineering

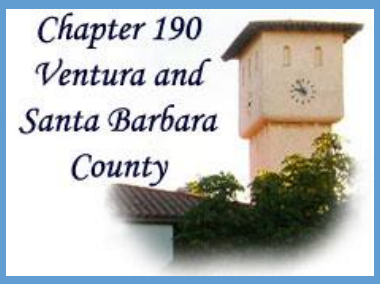
**Are you presently employed?** Retired from my own IT consulting firm (40 years)

**Do you have any hobbies?** Yes Collecting Vintage Pens, cameras, clocks, enjoy photography and writing

**Tell us about your interest in horology.** All aspects of horology, history of all manor of clocks, restoration of clocks, art associated with their enclosures and faces

**Have you participated in any NAWCC activities?** No

My wife had a clock in her garage for 25 years she bought it at a second hand store in Colorado. It was in total disrepair and she was going to discard it. I took a look at it. It was a New Haven Clock Co. advertising wall clock usually given to general store owners. It was built in 1896 and is a single train movement. When I opened it in addition to naturally being interested in old stuff, I was intrigued by the mechanism, the case, the ad, and I restored the clock mechanism, case, dial everything. Immediately I got hooked on clocks, collecting, repair, history, and I find it a great hobby.




**The September**

**Chapter 190 Meeting will be**

**September 15, 2019**

**Sellers may start setting up at 10:30AM**

**Selling is open from 11:00AM til 1:15PM**

**The Meeting starts at 1:15PM**

# CLASSIFIED PAGE

*This page is dedicated to advertising for Chapter 190 Members.*

*It is, of course, free to members!*

## SERVICES OFFERED



## FOR SALE

**Send us Your For Sale Ads!**

## WANTED

**Send us Your Wanted Ads!**


**REMEMBER!**

**We have the *BEST* $5 SUNDAY LUNCH In Town!**


**The September Mart was CANCELLED!! Regular Chapter Meeting will be held.**

**Next Meetings:**

**September 15, 2019**

**October 20, 2019**

**November 17, 2019**

**No December Meeting**

The Chapter 190 meetings are held the Third Sunday of each Month. No Meetings are held in the months of June or December.

We will meet in the Campus Student Center (CSC) on the Ventura College Campus. The CSC is located in buildings “B” east of the gym.

**The address for Ventura College is:**
**4667 Telegraph Rd., Ventura, CA 93003**


**The CSC is off Central Campus Way Near Parking West Lot**