



THE AGE OF THE QUARTZ WRISTWATCH (PART II)

by Henri Bonnet

In a quartz analog wristwatch, the electrical impulses are typically sent, once every second, to a tiny stepping motor, or alternatively, to a liquid crystal display for digital readout.

In an analog display, the stepping motor moves the hands via an appropriate gear train. The quartz crystal is temperature sensitive, and is optimized to remain accurate in its frequency, at close to human body temperature. Any significant temperature deviation, up or down, reduces its frequency, resulting in an eventual time loss of the wristwatch. High quality quartz movements, of course, include temperature compensation. The quartz movement is entirely machine made by extremely sophisticated automated equipment. Nowadays, they are produced to the tune of hundreds of millions of pieces a year, with a minimum of human intervention, hence their relatively low cost.

Quartz movements aren't normally repairable. When they fail, they simply are replaced, or the entire timepiece is disposed of, in favor of a new one. Quartz movements can be very complex in their functions, and can drive, not only time displays, but also calendars, chronograph,s and alarms, among others.

Quartz movements come in multiple levels of quality, depending on the brand of the wristwatch, and of course, affecting the price accordingly. There is no question that even so, in mass production, the quartz movement may costs less to manufacture than the case, or even the bracelet of a quality timepiece.

What are the main advantages and weaknesses of a typical quartz wristwatch? Their popularity resides primarily in their low relative cost, as well as in their high accuracy. Typically, the higher the beat frequency of any movement in a timepiece, the more accurate it is. It must be remembered, that the highest available beat frequency in a mechanical wristwatch is 5 hertz. The frequency of the Bulova Accutron tuning fork timepiece is 300 hertz. The frequency of even the lowest priced quartz wristwatch is 32,768 hertz. Nevertheless, in spite of their high accuracy, their major shortcoming is that they suffer from the same problems that ail most electronic devices, in addition to issues of a purely mechanical nature. The quartz oscillator is adversely affected by the mere process of aging, and as a result, may lose some of its properties that were crucial to its use as a resonator in an electronic

circuit. In addition to simple aging, printed circuits and microchips in general, are subject to rapid deterioration when exposed to hostile conditions.

Typical, among these are toxic vapors and chemical contamination, resulting from battery leakage, as well as heat, humidity, and air pollution, among others. Soldered connections are especially vulnerable, as they might oxidize and crystallize, and otherwise deteriorate beyond good conductivity. Over time, the epoxy encapsulation of the microchip itself might develop microscopic cracks, and together with the above mentioned factors, combine to cause the demise of the electronic movement. On top of all that, dust, perspiration, and congealed lubricant, may gum up the works of the stepping motor and its gear train.

Liquid crystal displays have been known to fail due to shocks, heat, and contamination. Unfortunately, there is no real remedy to failure, save for replacement or disposal. In the exceptional instances when a quartz timepiece can economically be repaired, it most likely involves the gear train, or the time setting mechanism in an analog wristwatch. Occasionally, in some older models, the stepping motor coil can be replaced as well.

Except for the very highest quality levels, and prices of quartz timepieces, they are unlikely to survive on the wrist, beyond a period of ten to fifteen years. This, of course, is in stark contrast to the longevity of a good mechanical timepiece, whose life span is, for all practical purposes, virtually unlimited. It is entirely reasonable to assume, that with future technological progress and innovation, some if not all, of the quartz timepiece deficiencies, may find their proper solutions. Until that time comes however, quartz wristwatches could still only be considered nothing more than disposable timepieces.

Different models of early quartz wristwatches.



1. The inside view. The coil (A) belongs to the stepping motor. The quartz crystal (B) in its small cylinder.

2. Casio liquid crystal display watch. Note the stain as a result of deterioration of the display.

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PRESIDENTS MESSAGE

By Mike Schmidt

The "BisnoShall Gallery" Santa Barbara Courthouse Tower Clock project is progressing. The four motion works and clock hands have been restored and installed back into the clock tower. Repairs are being made to the time train and are detailed in accompanying articles. The floor in the clock room has been removed in preparation for new electrical installation and then a tile floor. Work has begun on the design and setting up of the bell hammers. This fascinating detailed project and all the people involved can be followed and observed on the website dedicated to this historical project. Be sure to look at all the photos and follow Santa Barbara County Architect Robert Ooleys blogs. www.BisnoShallgallery.com



Educational Opportunities Report:

Congratulations to all of the students who have recently completed the August FSW102 "Time & Strike Spring Barrel Clock with Rack/Snail Strike". Instructor Ray Marsolek and assistant Lex Rooker guided students, Laurie Conti-Class Coordinator, Frank Huttlinger, Dan Kerker, Tom Lorr, Alan Martin, Bedros Ozuzun, Steven Schechter, Marie Sidun, David Clarkin and Bob Parsons, through the four day course.

The year 2011 is only a short distance away. I am presently working with Field Suitcase Workshop instructors Ferdinand Geitner and Ray Marsolek to give members an opportunity to increase their watch and clock repairing skills. We will be offering seven to eight progressive workshops from beginning level skills to advanced level skills. The demand and response for workshops and classes by our chapter members and the western NAWCC members has encouraged me to continue the work of setting up classes. Announcements for classes and dates will be in October.

The monthly meeting workshops are available to all members and guests and are scheduled from 10:30 AM to 12:00 AM on the regular Sunday meeting day. This is an open 1 ½ hour workshop where you can bring in your repair questions for help. This is also a supplement for those who have taken repair classes. Come and stump the experts, all who attend get the opportunity to learn something new. This month's open workshop will begin with George Antinarelli and Ernie Jenson. They will talk about the tower clock repairs. We will have the coffee on early.

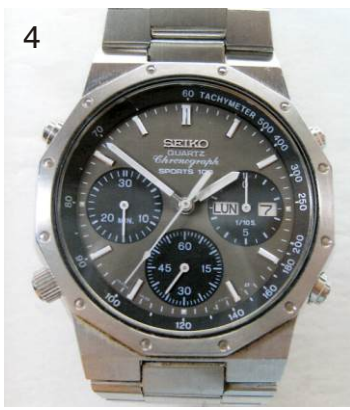
To keep track of all your important dates and to start your planning for 2011, you will need one of the beautiful and terrific NAWCC DESK CALENDARS. It is a well thought out calendar that is the right size and easy to read and use. It is produced and donated by our contributing member Daniel Weiss, using clock photos from NAWCC members. Daniel has made these Calendars for several years and they are becoming collector items. The cost is \$10, and with the entire proceeds going to help current and future NAWCC projects. Calendars are available at the meetings or can be ordered from me at EagleCreekClocks@msn.com with free Mailing.

See you at the Meeting *Mike*



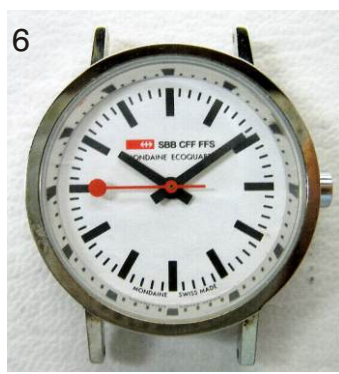
Happy Birthday

**Ed Armstrong, Thomas Beard, Thomas Ferkel,
Paul Highfill, David Rubright, Chip Stevens
Norma Zuber**



3. Breitling chronograph all in titanium. Note the combination of analog and digital display.

4. Seiko chronograph in stainless steel. Multi-function complicated movement.



5. Multi-function inexpensive Chinese made wristwatch with a calculator; in a plastic case.

6. Mondaine Swiss ladies wristwatch. The dial is a replica of the Swiss railways clock face.

CHAPTER 190 PEOPLE

by Robert Gary

Crawford & Rowena Sachs



Crawford and Rowena Sachs have collected clocks for over thirty-seven years. Each brought clocks to their marriage, mostly grandfather clocks and cuckoo clocks. Their primary love is cuckoo clocks. Rowena has a cuckoo on which the pendulum is a pair of children on swings swinging from front to back rather than the traditional single pendulum swinging left to right or bouncing up and down.

Crawford's great-great grandfather was the first physician in history to use ether during an operation. This surgery took place outside, beneath a tree in Jefferson, GA, by Crawford W. Long, M.D., on March 30, 1842. Crawford has Dr. Long's wall clock in his possession.

Although their primary interest is in collecting timepieces, Crawford took the 101 suitcase clock repair class at Chapter 190. The clock movements actually are of more interest to him than the complete clocks. Crawford's interest is in the design and theory behind clock movements and he writes computer math programs involving clock movement design.

The Sachs' joined the NAWCC and Chapter 190 after attending the Chapter 190 Mart held at the Camarillo airport in 2008.

**The next Meeting & Mart for Chapter 190
is September 19, 2010**

Sellers may start setting up at 11:30

The Mart is open from 12:00 til 1:15

The Meeting starts at 1:15

PROGRAM

**"A History of Electric Clocks
for the American Automobile"**

Presented by Ray Brown

**This is a very interesting program and
one that you aren't likely to see anywhere else.**

SHOW & TELL

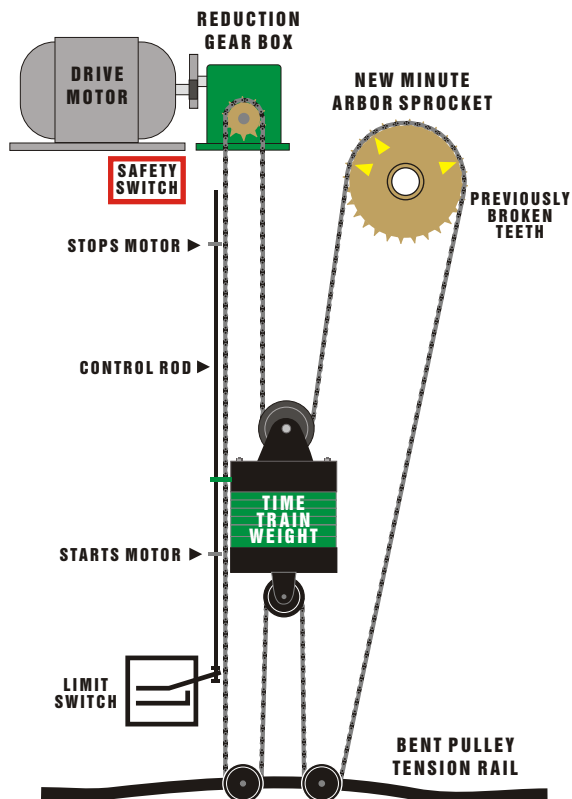
"Car clocks or any others items you want to share"

Welcome, Crawford and Rowena! ■

SANTA BARBARA COURTHOUSE TOWER CLOCK TIME TRAIN RESTORATION UPDATE

by: *George Antinarelli & Ernie Jenson*

During the restoration of this Model 18 Seth Thomas Tower Clock there have been several areas where repairs have been required. These repairs are necessary to keep the clock trouble free for the next decade. We found serious problems in the motion works and the time train. The motion works has been repaired and is back in place and the scaffolds are down. Over the more than eighty years of operation, damage has occurred to the time train which we believe is mostly due to a failure in the winding mechanism. The following illustration shows the winding mechanism.



The tower clock is a conventionally designed clock of the early 1900's but had the additional Seth Thomas feature of an electrical, auto winding mechanism. This was delivered as part of the clock when it was new in 1929.

The principal of operation is that an electrical gear-head motor starts when the clock weight activates a limit switch at the bottom of its travel. The weight moves up approximately three feet until it encounters a collet on a rod connected to the switch and stops the motor. The excess chain would hang down in a pile on the floor, if it weren't for the clever design for accumulation of the chain. The chain is routed around two pulleys on a bar at the base of the clock and around another pulley attached to the bottom of the weight.

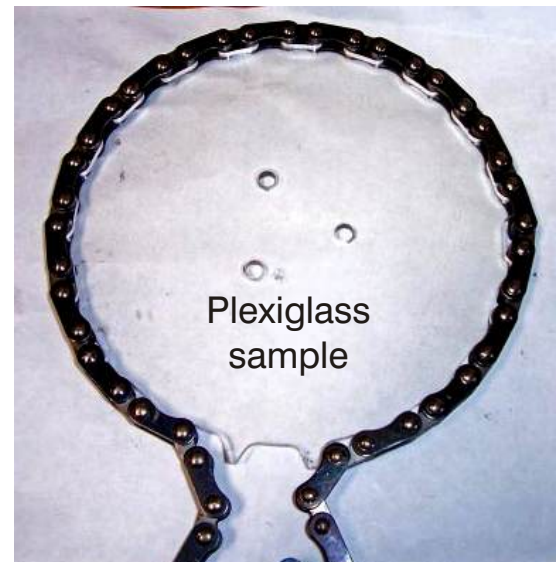
We found that the sprocket that delivers power to the drive train had three broken teeth and the remaining teeth were badly worn. The bar used for tensioning the chain was bent and the pulley cocked off to one side.

A safety switch will be added, in addition to the limit switch, to prevent the motor from damaging the assembly in the event of a failure in the future of the limit switch. This improved design is under way at this time by Mostyn Gale.

First, the bar was straightened and the pulley made right. Then, the task was underway to repair or replace the sprocket with the broken and worn teeth.

Replacement of this sprocket was going to be very costly as this was a very unusual sprocket design and it had originally been cast as one large piece. The sprocket is of an obsolete leaf chain design, and nobody makes that product any longer. George has a good friend, Kenny Helderlein, who owns and operates a company (H.E.C. Helderlein Engineering and Consulting Inc.) for machining precision parts, primarily for the aircraft industry. The design work is done on a computer and sent wirelessly to the machining center. Kenny's computer scanner was used to get the exact tooth profile.

A sample of the sprocket was made using Plexiglas to verify that the tooth profile exactly matched the chain.

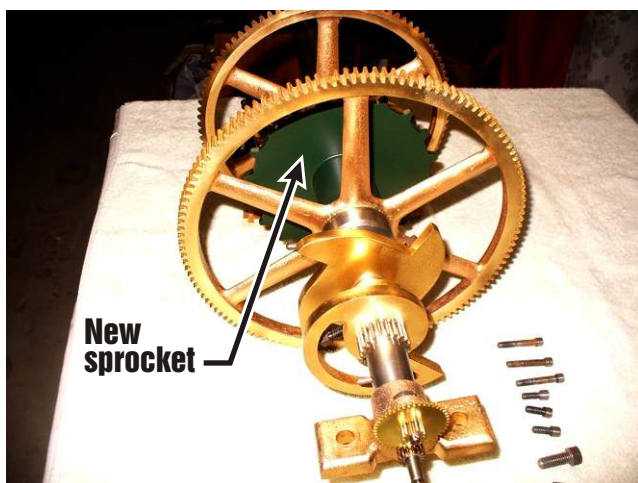


When the Plexiglas profile was approved, the final sprocket design was machined from a solid piece of steel including the large hub.

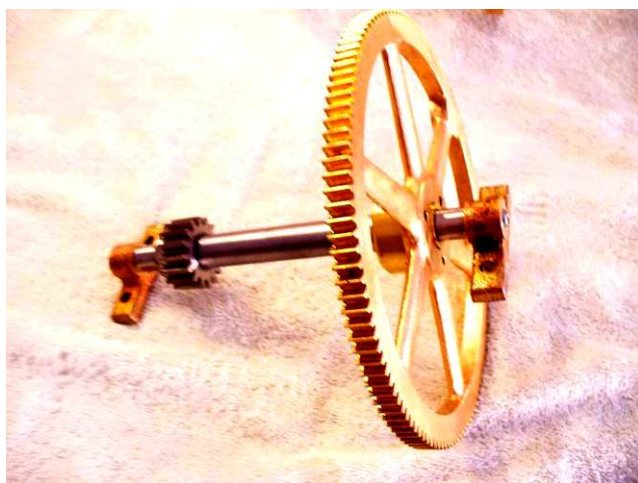


Continued from page 4

The center arbor assembly is now completed and back together again in like new condition.



Other gears that showed a small amount of wear were reversed so that the gears are now meshing on new surfaces.



The next arbor with pinion and spur gear in the time train had severe wear in the journals. The original centers of the journals were established and bored out and new bushings were inserted



Our thanks go to the many people that gave us advice and helped us with this part of the clock restoration.

Editors note: (Due to space limitations, the articles on the Santa Barbara tower clock restoration have been condensed. The complete articles, with much more detail, will be posted on our website in the near future. I'll let you know when they are available.)



Southern California Chapter 4

Annual Merrimart September 19th
Bellflower Masonic Lodge
info: Roland (310) 548-4827

Santa Anita Chapter 116

Supermart October 23
Arcadia Community Center
Info: Albert (626) 824-8825

EDUCATIONAL OPPORTUNITIES

The following are future courses that may be offered to those who are interested and have the required prerequisite for the year 2011.

- FSW 101 Introduction to Basic Time & Strike
- FSW- 102 Time & Strike Clocks with Spring Barrels
- FSW- 103 Introduction to Chime Clocks
- FSW- 104 Introduction to weight and Fusee Driven Clocks
- FSW- 302 Fundamentals of Wrist Watch Repair
- FSW- 200 Fundamental Skills for Lathe & Clock Repair
Course Part I
- FSW- 201 Fundamental Skills for Lathe & Clock Repair
Course Part II
- FSW- 202 Lathe II Clock Repair Course

This month's Mini-Workshop

will be an open workshop.

***Any subject is open for discussion,
any clock, watch, or tool may be brought.***

***Ernie Jenson & George Antinarelli
will open this month's workshop with***

"The Santa Barbara clock restoration"

The workshop begins at 10:30 AM. Free to members

BOOK REVIEWS

by Ken McWilliams

I have two new clock repair oriented books to review. The first is on a clock that many repairman despise and others just refuse to work on them. This is the 400 day or anniversary clock. Why are they so disliked? As one repairman said when asked this question, "It is the only clock that, after you do everything 100% right, it still won't run."

Another problem is; the majority of the existing 1950's and newer clocks are not very valuable. In fact, in most cases, the repair cost far exceeds the clocks value. So, unless the clock has sentimental value, it isn't worth the bother to repair it.

Joe Rabushka has attempted to demystify and ease the pain of repairing these clocks in his book, "**Repair and Restore your 400 Day Clock**" Joe, a retired concert violinist, has been repairing 400-day clocks exclusively for over 30 years. Acknowledged as one of the world's foremost experts in 400-day clock repair, he has repaired and restored clocks for collectors worldwide.

Joe is a member of the NAWCC and of the International 400-day clock chapter 168. He has been a frequent author in their newsletter, "The Torsion Times."

Mr. Rabushka also possesses an outstanding collection of rare 400-day clocks.

This is a very comprehensive repair manual that describes, in fully-illustrated detail, every aspect of 400-day clock repair for the novice as well as the professional. He often offers more than one way to accomplish a task. For instance, he has one chapter dedicated to lubricating the clock. Then, after going through all of the do's and don'ts, he confesses that he never lubricates his clocks. He claims that a properly cleaned and polished clock will run better and longer without oil.

I have repaired many of these clocks and I have to say that Joe's book has given me some new ways to look at problems and has enhanced my understanding of these clocks.

If you are going to repair 400-day clocks, there are two books that are a must for your library, Charles Terwilliger's "400-Day Clock Repair Guide" and this book. Armed with these books, your chances of successfully repairing a 400-day clock are almost 100%

Hard cover: 11 x 8.4

Pages: 98

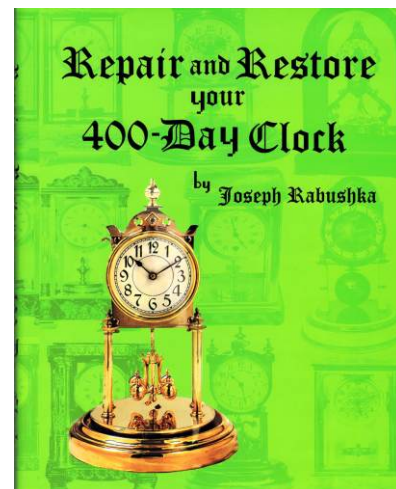
ISBN: 1935097784

Two Harbors press

March 29, 2010

Available from

Amazon \$14.96



My second book, "**Finding and Restoring Longcase Clocks**" by Anthony Ells, is not new in the true sense; it was originally published as a hard cover book in 2009. The paperback version was released this year. Used hardcover editions can be found for \$70.00 and up. This edition is \$26.56 new, from Amazon.

This book is essential reading for anyone interested in buying and restoring a long case clock. Experienced readers will be able to undertake most of the restoration work themselves, but for the novice the basic principles are explained and advice on seeking professional help is given.

His comprehensive guide to finding and buying longcase clocks tells you everything you will need to know about what to look for, what to avoid, and their restoration costs, before going on to cover the practical aspects of restoration. Contents include: a detailed section on the workings of the clock; covering the time and strike trains; introduction to the restoration project; step-by-step instruction to assessing and restoring the clock case, dial, hands, clock movement, and finally, advice on setting up the clock and keeping in good working order. Illustrations and photos can be found on virtually every page. For the beginner, a glossary is included for defining clock terms that are used.

Mr. Ells is a member of The British Horological Institute.

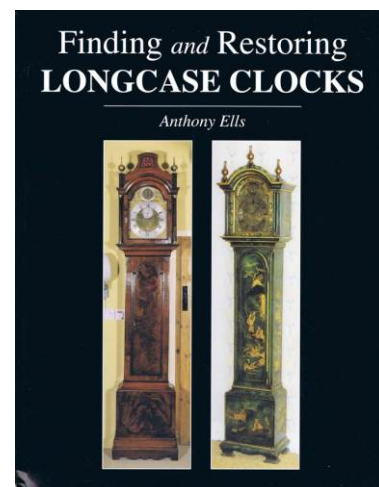
Paperback: 144 pages

9.3 x 7.3 inches

(February 1, 2010)

ISBN: 1847971350

Amazon - \$26.56



CLASSIFIED PAGE

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

SERVICES OFFERED

The Montecito Clock Gallery

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I will have a huge selection of watch repair
tools and other items from my latest estate
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WANTED

URGENTLY NEEDED, VISIBLE ESCAPEMENT MOVEMENT

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Winding hole spacing of 38.9 mm, (1.53")
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Antique English 2 or 3 gear-train skeleton clock.

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Tel. 805-650-8800

- 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

- Watch Repair Tools -

I'm just starting out and need just about everything.
I would prefer to purchase an entire collection of old
watchmaker's tools.

Please contact:
David Clarkin Tel: 805-988-4384

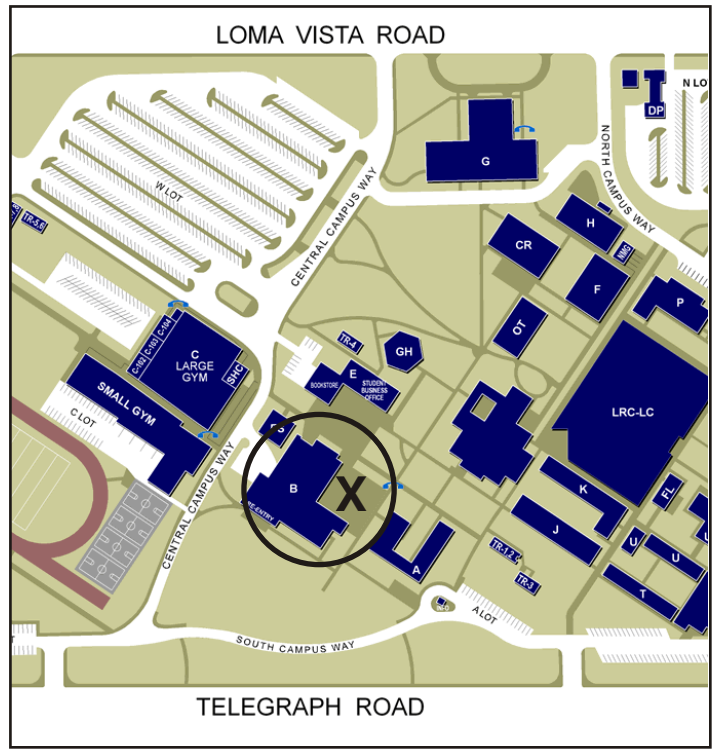
I need a few watch item,

- (1) 18 size Howard staff for Series III...(Coles Escapement)
- (2) I have the collet for an Adams & Perry watch...needs
hairspring and stub to fit in balance cock, or someone to replace
what is missing and give the timepiece a good cleaning so that
it runs correctly, without breaking the bank!

NEW

Dan Weiss (Pennsylvania 190 member)
Contact: (215) 725-5463 • dweiss17@verizon.net

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



Hope to see you there!

September 2010 Issue

NEXT MEETING
SEPT 19



If Undeliverable return To:
 17738 Superior St. Unit 21
 Northridge, CA 91325

Chrono Times