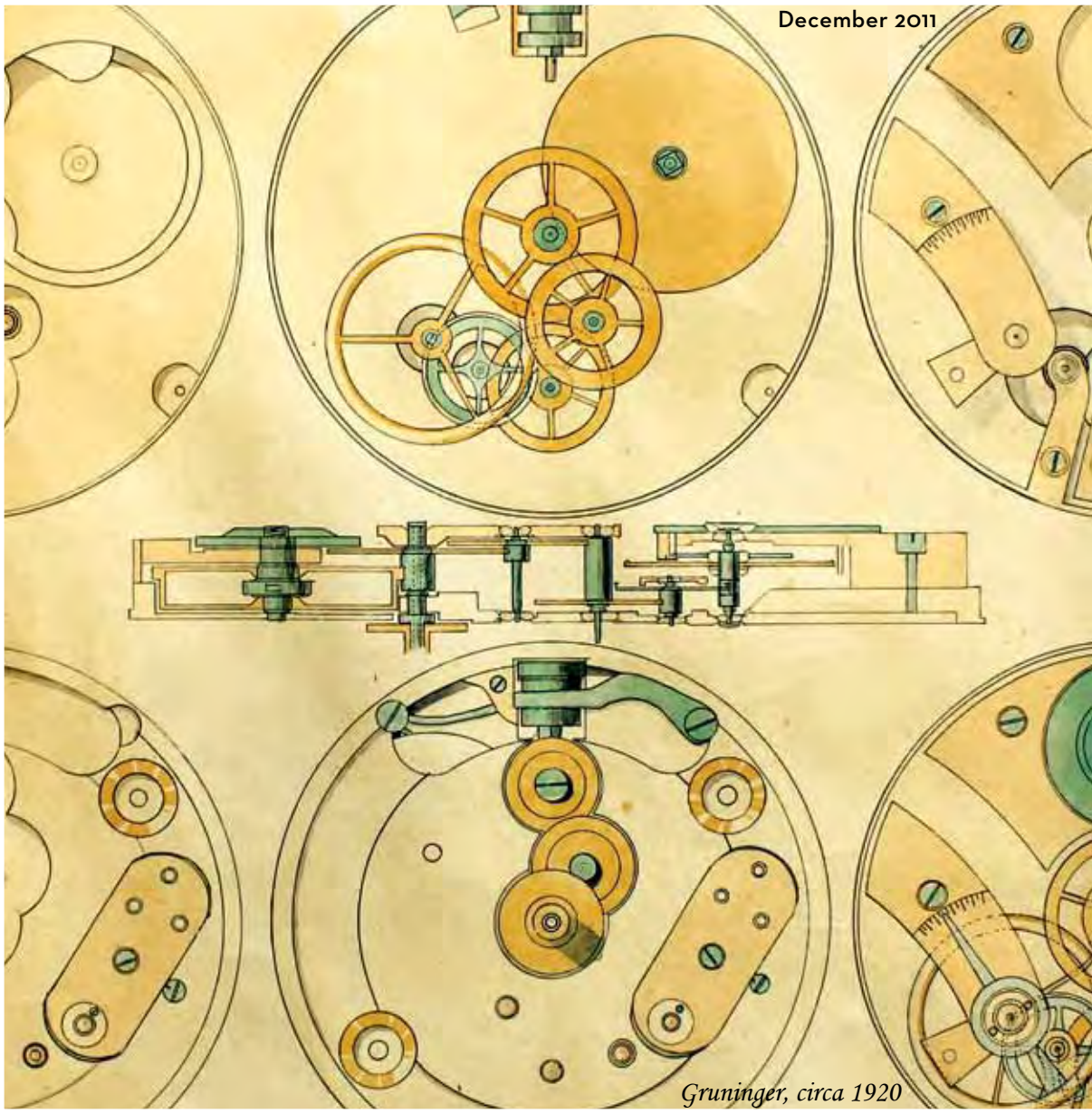
HOROLOGICAL TIMES™

ADVANCING THE ART, SCIENCE & BUSINESS OF HOROLOGY

December 2011



Gruninger, circa 1920

AMERICAN WATCHMAKERS-CLOCKMAKERS INSTITUTE

This Month's Focus: *Technical Insights*

Discover Your New Website

Gruninger: Watchmaking and Technical Drawings

The Shape of Gear Teeth in Clockmaking

Overcoil Hairspring and Timing Results, Part 2

Ratchet Spring Repair

These are a few of our favorite things...

...for year-end capital expenditures and gifts to your business

Borel

Merry Christmas & Happy Holidays

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a message from the president

DOUG THOMPSON, CW21

I hope your holidays are filled with peace and joy.

"If you don't know where you are going, you will wind up somewhere else."

Yogi Berra.

The New Year is upon us and for many it is a time for personal reflection. It can also be a time to examine our professional endeavors over the past year. Many questions may arise in the effort to objectively and subjectively evaluate our businesses, as well as ourselves. To determine the direction for your business and evaluate if it's going where you want, there are essential questions you need to answer. To make sure you're not just "going along for the ride," ask yourself:

? Is there training available that would improve my skills, efficiency and value?

? If I own my own shop, where in my overhead may cost savings be had? If business is good, could it be better? How long before I plan to retire?

? Do I have short and long-term plans for my business?

? Is my HVAC killing me with its lack of efficiency? Would better insulation help my bottom line?

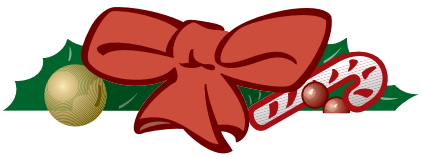
? Have traffic patterns changed in my neighborhood? Should I move my shop?

? Does my space meet my needs? Does the environment in my shop need to change? Do I need improved/efficient lighting, better ventilation/filtering, fresh paint or a new floor?

? How much have my supplies, utilities and rent/taxes gone up over the last year? Do I need to raise prices to meet those challenges?

Sometimes, just a good cleaning and re-organization can also help your bottom line.

Answering and acting on even a few of the these questions could improve your profitability almost immediately. Many of these types of changes would certainly pay for themselves over time. Bring in the New Year with an improved plan, a fresh attitude and let's move forward together.



Best Wishes for a Happy Holiday Season!

The AWCI Industry Advisory Board,
Terry Kurdzionak, Director

AWCI's IAB Members:

Breitling	Butterworth Clocks, Inc.
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AWCI new members

Welcome to these new or reinstated members!

California
Greg Nalbandian, CW21, San Diego

Colorado
Frank Albert, Golden

Florida
David Wendover, Spring Hill
Christopher Wiles, Ft Myers

Nebraska
Todd Martin, CW21-Arlington

New York
Jason Appelbaum, Brooklyn

Ohio
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Oklahoma
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Texas
Phillip Ridley, Arlington
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Ben F. Conner, Houston

Washington
Kit Keung Man, Bellevue
Wilson Garcia Melegrito, Seattle

Canada
Gurdeep Bhalla, Brampton, Ontario

a message from the executive director

BY JAMES E. LUBIC, CMW21

I would like to wish everyone a very Happy Holiday season. Since it's the season for giving, I want to remind you about AWCI's ELM Charitable Trust. The ELM (Education, Library, and Museum) Trust is the charitable arm of AWCI. The Trust is organized under section 501 (c) 3 of the Internal Revenue code for charitable not-for-profit organizations. When you donate cash or an item to the ELM Trust, you will receive a letter acknowledging that gift, which may be useful come tax time. By giving to the ELM Trust you are not only eligible for a possible tax deduction, but you're helping to perpetuate our trade. Your donation will enable the ELM Trust to continue its mission which is stated below.

ELM Charitable Trust Mission Statement

The AWI-ELM Charitable Trust was organized and is operated to aid in the advancement of the art and science of timekeeping (horology) through activities in education. Its purpose is:

1) To lend all practical assistance to schools that engage in the teaching of horology;

2) To educate and encourage students/individuals who are either pursuing or considering studies and/or careers in horology and the horological crafts;

3) To provide those individuals who are interested in horological crafts with practical, technical and current information about horology. We are able to provide these services by maintaining our Henry B. Fried Resource Library on-site; and,

4) To provide and maintain a horological museum on-site where unique timepieces (i.e., watches, clocks, etc.) and tools can be stored or placed on permanent/semi-permanent display for study, research and public viewing. The Orville R. Hagans History of Time Museum provides the public and the professional with a better understanding about the history of watchmaking and clockmaking through the years.

The Trustee's of the ELM Charitable Trust thank you for your continued support.

Utilizing Your Membership - Online

After renewing your AWCI membership this year, remember to visit our website at www.awci.com. Log into the member protected area and make sure that your contact information in our referral directory is turned on. Make sure that all of your contact information is correct, including e-mail and website, if you have these. The information in your record that appears here can be edited by you and only you. Any changes you make to your internet referral directory record should be forwarded to our Membership Coordinator Elizabeth Janszen at ejanszen@awci.com. This member "Referral Directory" is recording more and more hits all the time from the public and is a great way for our members to be found on the World Wide Web.

A new feature is our Enhanced Listings, which will allow you to display photos, your logo and more information. This type of listing will attract more leads from consumers who will be visiting our new website.

When logging on to our website you must know your membership number and password. If you have never logged onto the member protected area before you must know these two pieces of information:

1. Your password is your member number plus the first letter of your last name capitalized.

2. Once you are logged in you can access your contact information used for the member referral directory and you access content that the rest of the world cannot.

If you have any problems please contact AWCI toll free at 866-367-2924, that's 866-FOR-AWCI.

Merry Christmas and Happy New Year.

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American Watchmakers-Clockmakers Institute

Introducing the NEW www.awci.com

•More User Friendly • More Services • More Business Leads

For Consumers

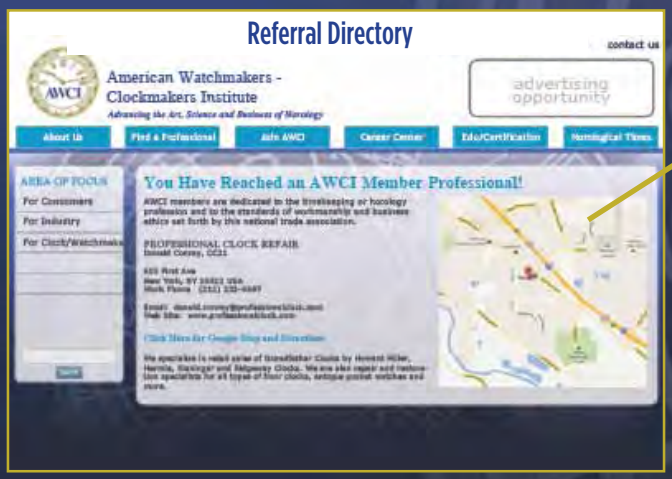
Consumers will visit for information and our Referral Directory. This means more business leads for you!

For Industry

- Information and news for industry and our IAB members.
- Coming in 2012—New "Supplier & Service Center" Directory.

For Watchmakers & Clockmakers

Includes business and technical services, instructional videos, convention info and more.



Member Referral Directory

Easier for consumers to find you with more search options. New Admin section displays number of clicks to your website.

For Watchmakers & Clockmakers
Two sections with information and services for each specialty. Includes business and technical services, searchable HT archives and more.

Promote
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Important Notices:

- **Log-In for New Members:**
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- **Referral Directory:**
  Many new options. See Admin to update your listing.
- **Forum Users:**
  Must sign up again to participate in forums. Prior posts located in "Archives."

HEALTH INSURANCE PROGRAMS FOR AWCI MEMBERS

Association Health Programs is the provider of the NEW and EXCLUSIVE health program including health insurance, long-term care insurance, life insurance, disability income and more. These offerings are available to all members, their families and employees. To inquire about the program, please use the link below or contact us at: 888-450-3040.

Health Insurance

- Individual & Families
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- Annuities & More

It's High Time for Business

It's high time you joined us at the AWCI Annual Convention and Educational Symposium in Denver. It's a great opportunity to network with peers, conduct business, improve your skills...while enjoying the Rocky Mountain scenery.

Highlights include:

- Two-day Vendor Fair - meet with suppliers and see the latest in tools, equipment and materials
- Continuing education courses to update your knowledge (CEU's offered)
- Networking with your peers and giving your input at AWCI governance meetings
- Fun events like the ELM Charitable Trust Dinner and an exciting off-site party
- "Plus-One" activities for your spouse and guests

There's no better place to mix business with pleasure than in the Mile High City with AWCI! Some business expenses can be tax-deductible, so start planning now. Watch for more information coming soon at www.awci.com.

For more information contact:
Bonni Scepkowski, Stellar Meetings & Events, 732-422-8888, Bonni@StellarMeetings.com

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Oct/2011

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SIRIANI

Ewell D. Hartman, CMW,FAWI,AWCI Fellow

"Mr. Enthusiasm" was the nickname for Ewell D. Hartman, CMW, FAWI, who passed away November 22, 2011. He was an AWCI Fellow, a long-time AWCI member and former President. Mr. Hartman was also actively involved in a variety of AWCI committees and served on the AWCI Board of Directors. He held positions in The Chronometer Club and the Horological Association of Virginia (HAV).

AWCI Executive Director, Jim Lubic, said of Ewell, "He will be remembered for his friendship and 'Enthusiasm' for AWCI, and all he did throughout his long career to make all of us better watchmakers."

Current AWCI President, Doug Thompson added, "Ewell was definitely one of those people that you'd never forget...kind, energized, positive, and had a terrific sense of humor. He was a horological deity to many."

Ewell Hartman was affectionately known as "Mr. Enthusiasm" for the spirit he generated whenever he spoke at watchmakers' conventions and functions. During Mr. Hartman's presidency at AWCI, the ELM Trust Fund was established and he served as Chairman. He launched AWCI's home study course in clock repair, he developed the Key Test program, and created the popular AWCI *Battery Number System*, a booklet that aids in the proper selection of replacement batteries for timepieces.

Bowman Technical School in Lancaster, Pennsylvania was where Ewell obtained much of his training. In 1976, Ewell became the first manager of Schwarzschild Jewelers at Regency Square Mall from which he retired in 1997. Ewell co-founded The Chronometer Club in the 1990s and served in different roles from its inception. He had a vision of an affiliate chapter that was different than other affiliate chapters of that time. The Chronometer Club as an AWCI Affiliate Chapter grew to be one of the largest.

Ewell's greatest loves, besides his family and friends, were attending church, meeting new people, watchmaking, attending the associations he was intimately affiliated with, telling corny jokes and traveling.

He was sometimes known to brag about the impressive number of miles he could squeeze from a set of car tires. Ewell lived an honorable life and helped others whenever he could. According to many who knew him, he never met a stranger.

Archie Perkins presents Fellow Award to Ewell Hartman.

BY JENNIFER BILODEAU

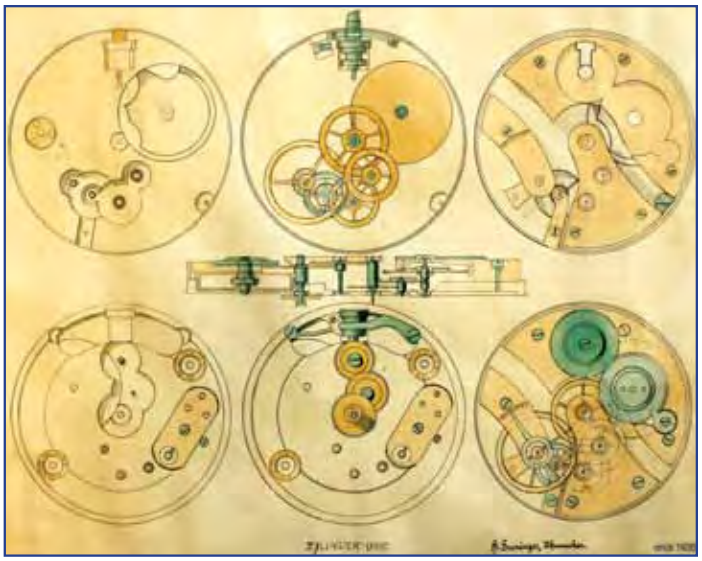
Hermann Gruninger: Passionate Watchmaking and Technical Drawing

Certified Master Watchmaker, HIA, UHAA, and AWCI Member, 1900 – 1988

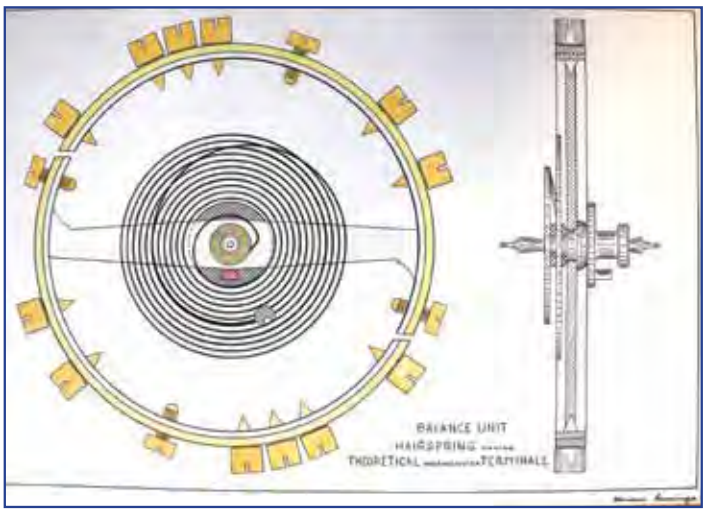
AWCI's ELM Trust Fund received a donation of twenty-two hand-drawn escapement and technical drawings by watchmaker, Hermann Gruninger, this past summer. Arnold Van Tiem, CW21, AWCI Board Member and CW21 exam certification assessor, decided to donate the works of art that his former neighbor, godfather and mentor in the field of watchmaking had bequeathed to him in the 1970s. AWCI's Elm Trust Fund gladly accepted the donations, realizing they'd be a great addition to the classrooms after remodeling was completed at our facility.

Hermann Gruninger

Arnold Van Tiem initially had Hermann's "works of art" displayed at the Career Prep Center in Warren, Michigan. Arnold was a high school watchmaking teacher and had recently retired after twenty-seven years. He was ready to share the treasures of Hermann's work with AWCI.



Circa 1920



Circa 1940

Arnold shared with us that Hermann's son, Ron Gruninger, used to peer through the doors of his dad's workshop in their home in Michigan. He often watched his dad who would stay up late working with fine-tuned precision on his theoretical escapement drawings during the 1930s and 1940s.

After speaking with Hermann's son, Ron Gruninger, we were able to learn much about Hermann and his love for the watchmaking trade. Hermann Gruninger was born in Würtemberg, Germany (outside of Stuttgart). His father, Michael Gruninger, was an uhrmacher (German for "watchmaker"), and so was his grandfather. Hermann grew up around the family trade of watchmaking and was trained by his father in the early 1900s. He apprenticed in a family store

hermann gruninger: passionate watchmaking and technical drawing

BY JENNIFER BILODEAU

then received training in a German watchmaking school to become a certified watchmaker.

In 1925, at the age of twenty-five, Hermann was sponsored to work for the Gruen Watch Company in the U.S., just outside of Cincinnati, Ohio. He worked for Gruen for a few years then he moved to the Detroit area in the late 1920s and worked for a small watch repair company for a short time. Hermann then took a job working as a watchmaker for J.L. Hudson's (Macy's) for many years. Here is where he met his wife-to-be. She was a bead-stringer at J.L. Hudson's, and they grew to know each other during their lunch breaks.

While he worked at J.L. Hudson's, Hermann would also work on repairs from his home, where he had a workbench set up in his office. During the 1930s and 1940s in the U.S., watchmaking was quite a trade. It was regimented and people were required to apprentice, go to school, study and needed to be very good at it. Hermann was all of these things and more. He came from Germany already prepared to be the finest-skilled watchmaker, and he never lost interest in improving his skills.

Hermann was a calm, yet upbeat person who loved the trade. At J.L. Hudson's he enjoyed working on high-grade watches. At home, he tried training his son, Ron, but Ron didn't seem to take to watch repair and he ended up in a different career. Ron never forgot the endless hours his dad worked well into the night on his technical drawings and watch repair projects.

In 1939, Hermann entered into the United Horological Association of America's (UHAA) National Competition in Pittsburgh, Pennsylvania and won First Prize for "Excellent Workmanship" on his theoretical escapement drawings. He entered the same competition again the next year in 1940 in Cleveland, Ohio and won First Prize again. He continued the next year or so to win more awards for his drawings. Hermann never viewed watchmaking—or the skill it took to create the technical drawings—as a job. It was his passion. His escapement drawings are a prime example of his love for horology.

In the 1960s, the Hamilton Watch Company introduced the electric watch. Hermann immediately received professional training in electric watch repair. He wanted to make sure he was staying current on the latest training. Hermann liked the new style of

Hermann Gruninger at J.L. Hudson's

watches, and he continued to work on all the latest products as they came out. He especially enjoyed working on some of the trickier, smaller ladies watches which many others were hesitant to undertake.

In addition to keeping his watchmaking education up-to-date Hermann also viewed membership in professional watchmaking organizations as vital. He became a CMW with the Horological Institute of America (HIA) in 1941. The HIA and UHAA merged and became the American Watchmakers Institute (AWI) in 1960. Hermann continued to be a member of AWCI well into his later years and continued repairing watches until he retired at seventy-two years old.

He was remarkable individual who never viewed watchmaking as a job. Rather, it was his passion; it was his life. ♦

BY JACK KURDZIONAK, CW21

A Missing Package: How Would You Handle This?

How would you resolve this problem? A watch that had been shipped to your shop for repair has already been repaired for $200 and returned to the customer via an insured carrier. The customer declared a value of $1,000 for this watch and that was the amount of insurance placed on the returned package. The $200 repair charge, plus return shipping, was paid in advance by the customer using a major credit card. Everything went smoothly until the package went missing and a claim was filed with the carrier for the missing package. Within a few weeks the $1,000 plus shipping costs claim was paid by the carrier to you. How much money would you forward to the owner of the missing watch who is demanding the entire $1,000 declared value, as well as a refund of the repair charges and the shipping charges? The total amount demanded is $1,225.

Please e-mail your suggested solution to me at: jackkurdz@gmail.com. I will use your answers in a follow-up column to this problem.

Precision Oil Application

Forty-plus years ago, I visited the local watch material dealer, A. Cohen Co., to purchase the items necessary to properly oil a watch. Owner Irving Cohen provided a small kit consisting of a small bottle of Nye Watch oil, a boxwood oil cup, a jar of KT22 grease, and an assortment of three oil applicators (small, medium, and large). I gave Irving a $10 bill to pay for the supplies and received enough change to visit a nearby coffee shop and get a large coffee and a doughnut.

However, the days when a watchmaker used a solitary oil to lubricate an entire watch movement are long gone. A watchmaker now needs numerous specialized oils and greases to properly lubricate a watch movement. This includes train wheel oils, fine pivot oils, high pressure oils, escapement oils, mainspring greases, setting part greases, barrel wall greases, etc. The bill for a set of these oils and greases can easily amount to several hundred dollars with very little change for a cup of coffee.

Although we may have all of these fine lubricants on our bench, many of us are still using the same type applicator Irving Cohen was selling four decades ago: the old-style oiler that is still sold in assorted sizes with color-coded handles. The only perceptible difference between those sold in the past and now is that the old ones had anodized aluminum handles and the ones currently sold are made with molded plastic handles. The new applicators still have the same problem as the old ones. Namely, the quantity of oil these oilers apply is not consistent each time they are used. When these oilers are dipped into the oil cup, the quantity of oil that adheres to the tip varies with every dip.

Figure 1: Old style oiler

Watchmakers have recognized this drawback associated with the old-style dip oilers. Often, we modify oilers by polishing and/or reshaping the oiler's tip in order to have a more consistent amount of oil on the tip each time it is dipped into the oil cup. If the oil drop placed on the jewel is too small, the oil may not adequately lubricate the pivot. If the oil drop is too large, the jewel may become flooded and wick the oil away from the pivot, again causing inadequate lubrication. In either case, a watch movement with improperly oiled jeweled pivots is at risk of premature failure requiring more frequent service intervals.

A few years ago, Bergeon began supplying an assortment of precision oilers to the industry. At first glance, these appear to be very similar to the old-style dip oilers, but rest assured they are not the same. These oilers (Reference 7013N, R, V, B, & J)

BY JACK KURDZIONAK, CW21

Figure 2: Precision oiler

come in tip sizes ranging from 0.18-0.45mm. Please note the shape of the oiler's tip as contrasted with the old-style tip as shown in the accompanying photos (Figures 1 and 2). The tip of the precision oiler is effectively isolated from the stalk of the oiler by the thin waist separating the tip from the stalk.

This is somewhat reminiscent of the oil groove found at the base of balance staff pivots found in many old high-quality watches. The purpose of the oil groove was to confine the oil drop to the balance staff pivot and prevent it from creeping along the axis of the staff. The thin waist on these precision oilers serves the same purpose. The precise size of the oiler's tip controls the amount of oil that can be applied to a jewel and the thin waist prevents the oil from creeping away from the tip.

These precision oilers make the task of consistently applying a precise amount of oil relatively simple when contrasted with the old-style oilers. This is especially important when oiling the very small train wheel jewels in quartz watch movements and those found in the automatic bridges of ETA and Selleta movements. It is all too easy to flood these tiny jewels when they are oiled using old-style oilers. Of course, there is always some downside to almost everything, and that includes these precision oilers.

They are not inexpensive. Their cost is about ten times more than the old-style oilers and they are delicate. They will easily break if handled carelessly. Surprisingly, they can be safely cleaned by pushing them into a piece of soft pithwood. I use them daily and have cleaned the commonly used ones hundreds of times in pithwood without damage. They do need a stand to safely hold them while not in use. In the past year, I have broken one precision oiler due to my own carelessness. The old-style oilers still have a place on a watchmaker's bench. They make excellent grease applicators to use when applying any of the various greases needed in a watch movement.

Another Year in the Books

By mid-December the stresses of the holiday season will be at their peak. Everyone seems to be in a hurry to do whatever they think must be done by December 24th, and that includes a few of our watch repair clientele. For whatever reasons they may have, some people believe they must have a repair ready for "The Holiday" and they do not have any problem communicating their anxiety to the watchmaker with the hope that he or she will work overtime to have that special repair ready for December 24th.

Some years ago we were attending a church service a few days after Christmas when, during his sermon, the pastor took a moment to remind the parishioners that Christmas was going to take place on December 25th of the following year. He suggested that because the congregants were duly notified of the date, they could begin their "Holiday" preparations early and avoid the Christmas rush next year. He went on further to say that if they followed his advice, they would actually be prepared for next Christmas and have the time to truly celebrate the holiday with family and friends.

Any time someone needs that special repair in time for "The Holiday," remember, it can always be ready before December 24th of the following year. We all need to set aside holiday time for ourselves to be spent with family and friends. The unfinished work will always be there after January 2nd. ♦

Best wishes for a joyous holiday season and prosperous New Year.

MAKE YOUR NOMINATIONS NOW

Honor Awards Nominations

The Honor Awards Committee would like your help in finding applicants who fulfill the requirements for the achievement awards given out at the AWCI Convention and Educational Symposium held in August. The three awards are:

AWCI Fellow Award

This is AWCI's most prestigious award. It carries the endorsement of one's peers as an outstanding member of the Horological Community. The person must have these qualities:

- Tangible evidence of leadership abilities
- Active participation chairing or serving on committees
- Publication of articles in horological publications
- Given lectures, workshops and technical demonstrations

Outstanding Achievement Award

Recognized for outstanding personal achievements or accomplishments such as projects, inventions, or innovative or creative ideas that meet a need in the field of horology.

Meritorious Service Award

Awarded to a person who has made a significant contribution to AWCI and its members.

Honor Awards nominations must be received by the Honor Awards Committee Chairperson by April 30, 2012. Please send a letter detailing the nominee's particular achievements to: Honor Awards Committee, c/o Michael Gainey, Master Clock Repair, 3759 Noe Bixby Rd., Columbus, Ohio 43232. Or, e-mail your nominations to: mjongainey@hotmail.com (Subject line: Awards Nomination.)

Honor Awards Committee

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AWCI Board Nominations

If you would like to recommend candidates for the AWCI Board of Directors, please send the name and a description of their background to:

Nominations for Board of Directors, AWCI, 701 Enterprise Drive, Harrison, OH 45030. Or, e-mail your nomination to: thouk@awci.com. (Subject line: Board Nomination.)

The deadline for membership to make a nomination is December 31, 2011 for the 2012 election.

BY LAURIE PENMAN

The Shape of Gear Teeth in Clockmaking

The proportions of the cycloidal gear teeth used in most clockmaking are shown in Figure 1. They are not universal. There are makers of cutters that use different values however, the premise common to all cycloidal gear teeth is that the pitch circles of a pinion and wheel should just touch. If a wheel and pinion are made by cutters using the same manufacturer's proportions, with pitch circles touching, there will be no problems.

Problems can more often be attributed to the pitch circles not touching than to the cutters produced by different manufacturers. This becomes more evident when gears cut with modern cutters are used to replace antique wheels or pinions that have variable forms.

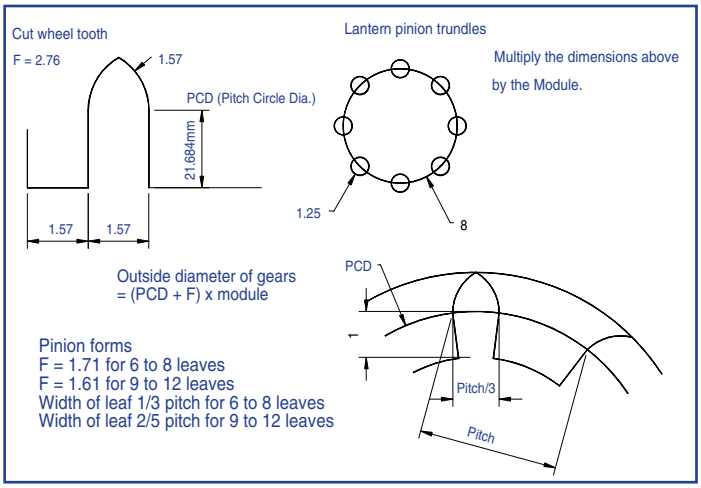


Figure 1

Wheel teeth are different than pinion teeth (also called "leaves") and both are shown in Figure 1, where "F" is the factor used to define the proportions of the form. The proportions of the form are those found in cutters made by Thornton's (the type of cutters I use). Some differences will be found in the Bergeon system.

Meshing of gear teeth that use the cycloidal form produces less friction when the contact between two teeth is not made until their touching surfaces reach a line drawn between the centers of both. An appropriate phrase for this would be, "No contact until the line of centers." This is because the forms of the pinion and the wheel do not roll over each other without sliding or rubbing unless a different geometric curve is used for the addendum of the teeth.

If you want to prove this, simply draw the forms in large scale, "drive" the pinion against the wheel, and measure the distance the mutual contact point moves over each. If the distance is the same there will have been no rubbing. If the distance over the surface of the pinion leaf is different to that over the wheel tooth, movement between the two has taken place. They have not rolled; they have rubbed.

Rubbing between two curved surfaces that are approaching each other produces more friction than two that are moving away from each other. This holds true as long as there is only one contact point, which is the case in clock gearing.

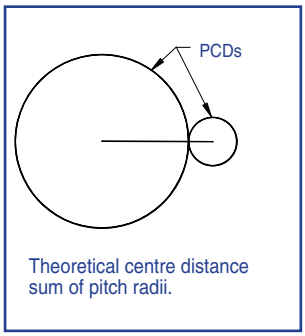


Figure 2

Now, if modern gears are made to a standard form which is designed to produce contact on the line of centers, why do so many clockmakers "depth" their wheels and pinions, (i.e., try the mesh in a machine that allows adjustment of center distance and transfers the best distance to the clock plates)? Why not simply make the center distance equal to half the sum of the two pitch circles? (See Figure 2.)

It should work (and it often does), but it is not foolproof because the correct forms for meshing teeth actually change slightly for every ratio of wheel to pinion. The form we use is a compromise and one that has worked very well for a century or so. If a close-to-perfect meshing is required, depthing is a must. The other option is that center distances need to be made adjustable by means of eccentric bushes or a chariot to carry the pivot hole.

There are several excellent books on the practice of gear design and cutting. The most recent and highly praised is J. Malcolm Wild's *Wheel and Pinion Cut-*

BY LAURIE PENMAN

ting in Horology: A Historical and Practical Guide. There is no need to delve further into the subject of the cycloidal form here. I will deal with the selection of tooth sizes, modules and ratios later.

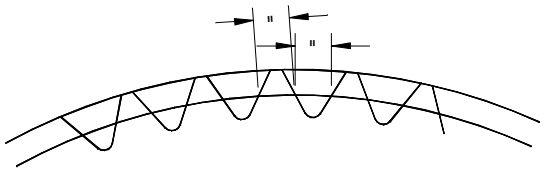
Examining Different Forms of Gear

The lantern pinion is simple to make, more "efficient" than small counts of solid pinions, and clears trapped dirt easily. It is also simple to make (which cannot be understated).

What variations in wheel tooth forms are possible and do they have any advantages? There are two that come to mind: The pyramidal or triangular-toothed wheel, and the pin wheel (a disk with pins set in it).

Pyramidal Teeth

Pyramidal teeth are a very old form going back to classical times, at least as far as Hero of Alexandria (birthdate around 50 BC - 50 AD), but probably even further. They work well, but they need a lantern pinion as the meshing gear for efficient meshing. They will work on a "contrate wheel" to bend the drive through ninety degrees. The Roman road-measuring instrument, the Hodometer, consisted of a pair of road wheels, gear wheels and a "contrate wheel" to



The teeth are cut with a sixty degree included angle cutter and the width of the tooth space is equal to the width of the tooth at the pitch circle.
The outside diameter is (N + 2.5) Module where N is the number of teeth.
Measuring the tooth and space width is difficult to carry out with any great accuracy, but not critical for the operation of the gears as long as errors lead to thinner teeth rather than thicker ones.

Figure 3

BY LAURIE PENMAN

drop a pebble into a box every mile. The Hodometer had this last gear made as a disk with projecting rods. Pyramidal wheels will also work together, but trains in clock movements rarely have meshing wheels.

There is no obvious position for the pitch circle in relation to the other dimensions of the wheel. There is no "shoulder" where a curve meets a straight flank. So when judging the mesh by eye is not an option, depthing is required. However, it is a form that will accept a greater degree of change in center distance than the cycloid will.

In an earlier article, I presented the reasoning for the dimensions of a meshed pair of pyramidal wheels and lantern pinions. So Figure 3 is presented without any justification, other than to say that it works. (Please note that the module for the pinion is 10% smaller than that for the wheel, and that I have not tested wheels smaller than a count of forty teeth and pinions smaller than eight trundles or cylinders).

Cogged Wheels

"Cogs" are gears that consist of a blank disk with inserted teeth. When designing a clock movement, the designer has to first consider what tools and materials are available. I recently made a theoretical examination of a wheel design that used no cutters other than drill-bits and which could be made with a simple bench drill. Figure 4 shows the initial idea which was nice and simple, but limited to light drives. The cogs are shown as lines but would be made of approximately 1mm diameter pivot steel. This wheel is another wheel that is less critical for center distance than the cycloidal form.

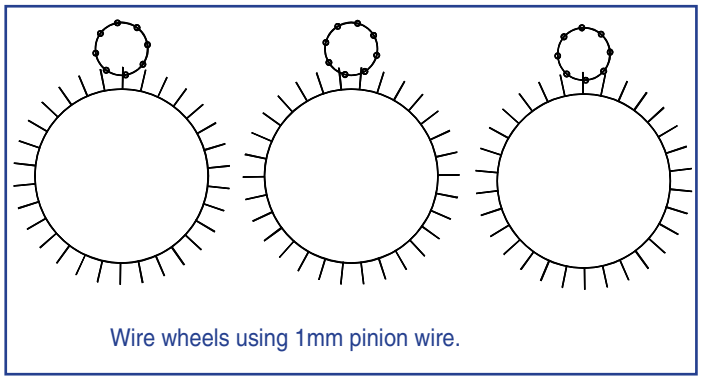


Figure 4

These two variations in wheel tooth forms have different advantages. Both will allow contact on the line of centers, and consequently, the teeth of the wheel and pinion will slide away from each other. Relatively crude tools will obtain a good result. However, the pyramidal tooth produces a loading component along the center line even though it makes contact on the line of centers. This produces a relatively high wearing pressure.

The cogged wheel shown in the illustration does not do this. Initially, the load is tangential to the wheel. When a pivot hole wears, the centers of either of the meshing pair move and the center distance increases. A small amount of wear has little effect on the bearing pressures of the pivots, but as the centers move further apart, the teeth make contact by a greater amount before the line of centers. The result is an increase in the loading that is attempting to push the gears away from each other along their common center line. If gears did not attempt to increase the distance between their centers, pivot holes would not wear egg-shaped.

The greater the amount of wear, the greater the pressure against the pivots and pivot holes, thus their rate of wear accelerates. In practice, a clock may work for twenty years before wearing slightly, but this movement of centers increases the rate of wear so that it may only be another five years for the wear to stop the clock.

I have seen one or two examples of clocks where the pressure was sufficient enough to bend the arbors (this had an advantage: the clock stopped before the pinion tore out of mesh). A gear system that has a lesser tendency to make contact before the line

BY LAURIE PENMAN

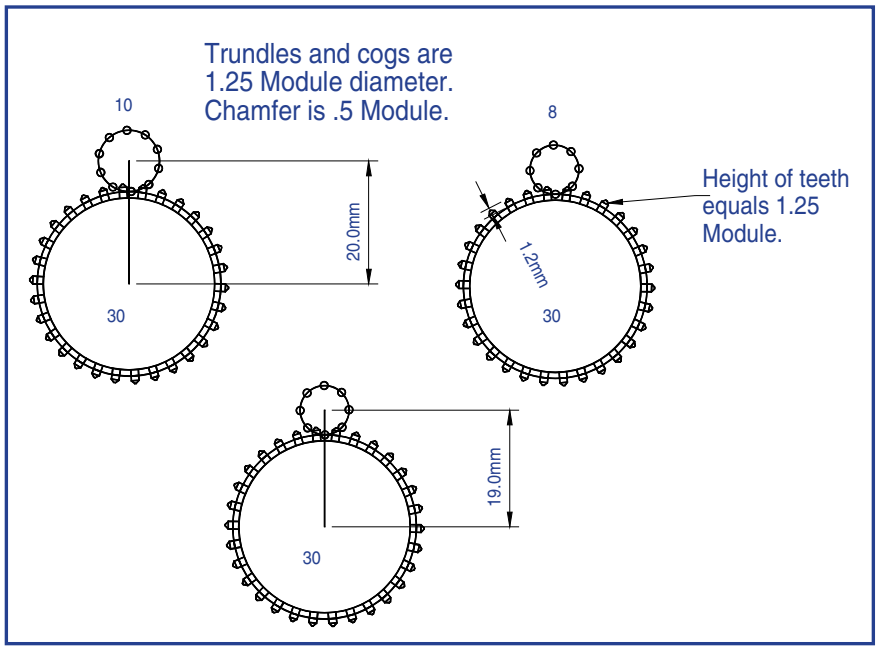


Figure 5

of centers will put a smaller loading on its pivots for a given amount of wear in the holes. All this can be demonstrated by simply drawing the gears out on paper or even more conveniently and swiftly, can be drawn by using a CAD (computer aided drafting) system.

Figure 5 shows the proportions of a wheel and pinion-pair employing cogs that are more sturdy, and more useful than the wires of Figure 4. They possess little difference in their ability to cut teeth. Contact is first made on the cylindrical sides, not the "addendum," (they will only work on lantern pinions). On the ratios that I've tested in a CAD program, the tolerance of wear before straying far from the line of centers (movement of center positions) is about double that of solid wheels and pinions. A variety of materials may be used for the disk, selecting them for reasons of convenience, affordability or ornamentation. Brass, timber, plastic, marble or minerals such as talc can all be used.

The teeth must be metal. They have to be metals that will work well with the trundles or cylinders of the lantern pinion, which are frequently hardened and tempered steel. Metals such as brass, beryllium copper, aluminum bronze and tungsten carbide can be used. (Note: Because they can be removed and replaced easily, it is convenient to use either a softer material than the trundles or a harder one.)

From the viewpoint of utility, teeth of softer material than the pinion make fewer contacts per hour than the trundles of a pinion and have a lesser tendency to wear. From the point of view of ornamentation, aluminum bronze and beryllium copper are more attractive metals and the former resists tarnishing to a great extent. Only a large clock movement can display this, and for the ordinary mantel or wall clock, brass-inserted teeth are probably best.

If the cog disk is made out of wood, laminate it from two or four disks aligned so that their grains cross. Timber will move more in one direction than the other, as temperature and humidity vary and lamination will avoid the wheels becoming oval. (The word "cog" is often used to describe the inserted teeth. But since it's also the name of an early trading vessel, we clockmakers must try not to confuse them!) ♦

BY JAMES P. BORTON, CW21

Building of the Overcoil Hairspring and the Timing Results, Part 2

This second study will compare the performance characteristics of the overcoil hairspring to those of the flat hairspring. In this study the overcoil is assembled and formed as in Study A, which was described in the *Horological Times* November Issue, 2011.

As a brief overview, in Study A, an overcoil hairspring was formed from a stock flat hairspring using factory components for a Rolex cal. 1570. Step-by-step procedures included: pinning and vibrating of the hairspring, forming the rise and leveling bends, and finally, forming the terminal curve of the overcoil. After assembly, the hairspring was installed in the watch and timing results were graphed and analyzed through the whole winding range.

Study B

For Study B, the flat hairspring is built of the same components as the overcoil but will, of course, be pinned on level with the flat coils and breathe unevenly due to the pinning point. To form a reliable comparison, variables surrounding the two hairsprings are reduced as far as possible. Ideally, all the components of the oscillator and movement remain unchanged with the exception of the hairsprings to be compared. Because the regulating unit is necessary only for fine tuning the rate of the oscillator, it (and all the variables that come with it) will be eliminated completely for the study.

Each hairspring can be vibrated to a rate of approximately -30 seconds/day. The daily rates of the hairsprings need not be identical because the study will look only at delta through varying positions and amplitudes. Delta and the performance characteristics can be determined for each hairspring and comparisons made without regard to daily rate. The choice of approximately -30 seconds/day was made to allow for regulation faster by removing mass from the balance rim.

For each hairspring, we will use identical studs, collets and taper pins, and only the complete assembled hairspring unit will be changed in the test watch. The hairsprings will be tested consecutively on an automated timing machine to insure there are identical test conditions.

An ETA 6497 was chosen as the test movement for Study B for several reasons. Of course, availability and cost were factors; the 6497 and its parts are readily available and inexpensive. More importantly however, is the frequency of the oscillator: 18,000 BPH (2.5Hz). The low vibration rate should be ideal to show the contrast between a hairspring with a consistent center of gravity on the axis (overcoil), and one with a changing center of gravity (flat). Also, being a manual-wind watch, the comparison of hairsprings through the whole range of wind will simulate the performance of the watch in actual daily use conditions.

The large size (36.6 mm) of the 6497 will also allow for easier modification of the balance bridge than a smaller movement to accommodate both flat and over-coil hairsprings. The hairsprings used will be Nivarox 3 (Figure 1) which is the factory specification for the 6497 movement.

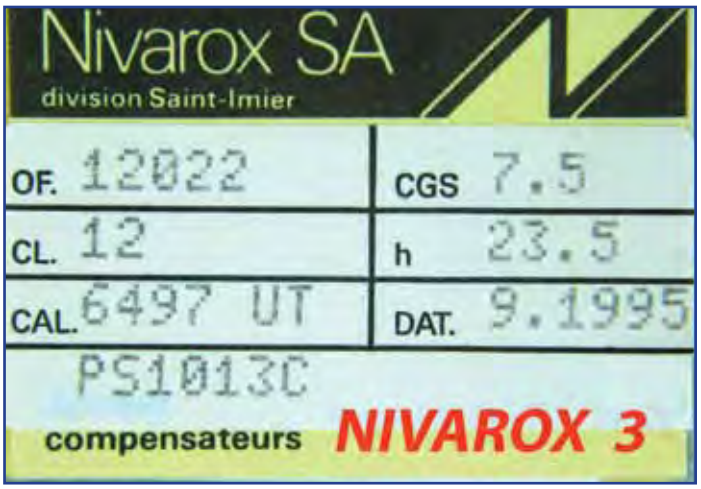


Figure 1: Nivarox 3 hairspring for 6497 movement.

Bridge Modification

In order to accommodate the overcoil hairspring, the stock 6497 balance bridge was heavily modified (Figure 2). A stock bridge is shown (left) and the modified one is shown on the right. The regulating pins were removed from the regulator leaving only the "C" portion to clip onto the setting. Next, the stud holder was filed out on the inside and a second "inner" stud holder was fastened with screws. The inner stud holder uses a longer stud screw oriented 90º from the outer one. The overcoil stud protrudes through the top of the bridge and the stud screw engages the stud on a smooth portion, rather than the factory groove 90º away. This allows for clearance of the higher over-coil terminal curve with a higher stud position. It also allows for precise centering of the hairspring by rotating the stud, as needed.

Figure 2: Modified balance bridge.

Material was removed from the balance bridge and the upper setting. One side of the bridge was filed flat to allow clearance of the inward stud position for the overcoil (Figure 3). A bevel was filed around the setting in the bridge to accommodate the breathing clearance of the terminal curve. Just enough material was left to firmly hold the setting and maintain the clip and stud hanger. Also, the jewel mounting was filed flat on one side as far as possible without disrupting the shock spring. When aligned, the flats on the setting / bridge

Figure 3: Clearance is allowed for inward stud position.

BY JAMES P. BORTON, CW21

and opening on the clip allow for 60º of pivot for beat adjustment.

Hairspring Formation

The flat hairspring was pinned in a collet, centered and flattened as usual and the 2.5 Hz vibrating point was found. An end curve still needed to be formed to allow for clearance of the stud and to reach the outer position of the conventional 6497 stud position. The flat hairspring was pinned to the stud slightly outside the 18,000 bph vibrating point (approx. -30 seconds/day).

The overcoil was assembled identically to the one in Study A and vibrated to 2.5 Hz. A larger post was used in the graduated aperture plate to hold the hairspring centered while finding the specific points for the overcoil bends. The curves were formed as in Study A and pinning to the stud was made at a vibrating point of approximately -30 seconds/day.

Study B Testing

As in Study A, rate measurements were taken at 7 states of wind based on ratchet wheel rotations (W). All 6 positions were measured at each wind state. The measuring began with 6.5W and was repeated at 5.5W, 4.5W and so on, ending with 0.5W. The fully wound state of 6.75W was not used as a starting point to avoid any timing anomalies that can occur with high amplitude at full wind (knocking). The results were graphed in the same manner as Study A through the full range of wind.

The Flat Hairspring

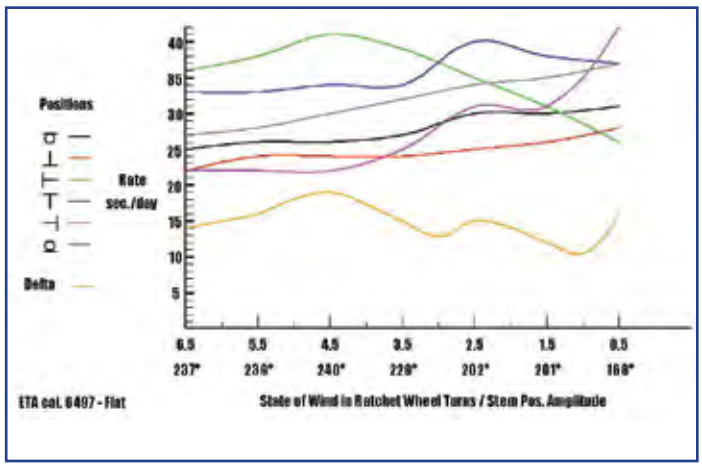


Figure 4: Demonstration of various positions and delta.

The full wind 6.5W delta was found to be 14 seconds with stem position amplitude of 237º. Amplitude increased slightly until 4.5W, where delta reached a maximum 19 seconds. This is attributed to a stem-left position that increased 5 seconds/day through that range and shows the effect of a hairspring poise error that increases with amplitude. Delta then began dropping to 12.84 seconds/day at the 3.0W point. This improvement is expected as the average stem amplitude is approaching 220º where poise errors cancel. The graph shows dial positions that are steady and change slowly through the winding range—unaffected by poise errors. The stem positions show much larger rate changes through the wind range as they are affected by the error. Also, 2 stem position rates are always rising while the other two are falling, and they reverse directions at similar points. This is a clear indicator of a poise error in the balance or hairspring. The balance was poised before the testing so the hairspring poise error is the cause of the changing stem rates. The lowest delta is found in the area of 3.0W where stem amplitude was approximately 220º. This is an expected result as stem position poise errors cancel out at 220º amplitude (Figure 4).

The Overcoil Hairspring

The overcoil graph shows an immediate improvement over the flat with an initial delta of 5 seconds. Delta slowly increases to 7 seconds after two turns of the barrel at 4.5W and to 10 seconds at 2.5W. Delta increases steadily through the winding range and can be attributed to a stem-right position that has steadily dropped. Stem-left and stem-down positions show reversing rate changes that take the form of a poise error. An improperly formed end curve or slightly off-center hairspring could cause such a hairspring poise error shown by the stem-down and stem-left positions. This error has little effect on delta, as it is likely very small. The graph shows that the positions of dial-up and stem-right define the largest delta through most of the wind range (Figure 5).

Comparison

The 6497 overcoil shows a considerably smaller delta through the winding range than the flat until a state of about (1.75W) where the flat and overcoil are nearly equal. The overcoil rates change more slowly through the winding range than those of the flat. Both hairsprings show signs of a poise error but it is extreme in the flat and minor in the overcoil.

BY JAMES P. BORTON, CW21

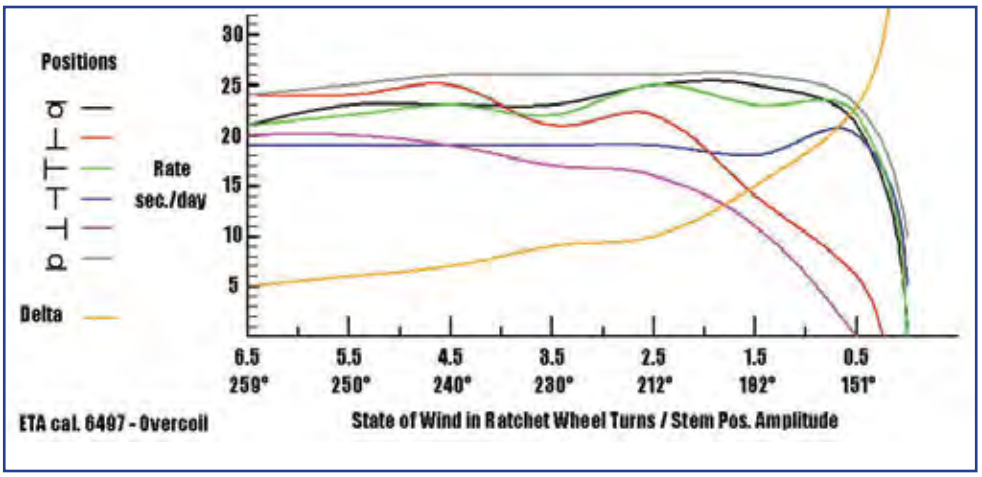


Figure 5: Graph showing positions of dial-up and stem-right.

Rate vs. State of Wind

On the 6497, the ratchet wheel makes approximately 6.75 turns from full to zero wind. Therefore, the barrel also makes 6.75 turns running down. The barrel has 85 teeth and the center wheel has 12 leaves. Given that the center wheel makes 1 rotation/hour, the power reserve is calculated as such:

Center wheel leaves = z1 = 12
Center wheel rotations = n1 = power reserve
Barrel teeth = z2 = 85
Barrel rotations = n2 = 6.75

Formula for Multiplying/ReductionTrains:
z2 / z1 = n1 / n2

So: 85 / 12 = n1 / 6.75 n1 = 47.8125 hrs.

1 rotation of the barrel = 47.8125 / 6.75 = 7.083 hrs.

This places the -24 hour running time very near the 2.5W wind state.

The overcoil shows a smaller delta (10 seconds) than the flat (15 seconds) at 2.5W. The overcoil delta is steady and smaller than the flat through the entire 6.5W – 2.5W range. The flat delta spikes at 4.5W (19 seconds) which is at approximately -14 hours in the winding range. A comparison of the two 6497 delta curves shows that the overcoil oscillates more isochronously than the flat. The flat hairspring shows a rising and falling delta caused by the poise error of the hairspring.

In conclusion, for both Studies A and B it was shown that the overcoil hairspring makes for an isochronous oscillator through the full practical winding range. Delta of the stem rates in both cases was seen to start small and increase slowly and steadily with the drop in amplitude. This is attributed to the greater effect of friction between pivots and jewels, and the disturbance to the oscillator by the escapement as it moves more slowly with dropping amplitude.

The 1570 overcoil clearly outperformed the 6497 overcoil as anticipated. (See Figure 6.) The higher quality 2.75 Hz oscillator is less affected by escapement disturbances and naturally provides a more stable rate than one of 2.5 Hz. Also, higher quality components found throughout the entire movement allow for steady torque delivery with less loss due to friction.

Figure 6: The assembled 6497 oscillator.

We find the excellent rate performance of the overcoil hairspring makes this an ideal choice in a manual or automatic wind movement as it outperforms the flat hairspring. The benefits will be more greatly realized, however, in a manual wind watch where the entire winding range is utilized. ♦

This was a thesis presented to Lititz Watch Technicum by James P. Borton, CW21, while he was attending the school.

BY AL DODSON

Ratchet Spring Repair

What is the most important thing we do when repairing a clock? Is it polishing pivots, rebushing, adjusting the escapement or regulating? Actually, none of these are as important as ensuring the clock winds safely. We can never pay too much attention to the ratchets and their associated parts.

You'll find one common fault on many American clock movements. It is a broken ratchet spring (Figures 1A and B). Several different clock manufacturers used this particular method to attach the ratchet: Sessions, Gilbert, and Ingraham all used this type of spring.

Figure 1A and 1B

As any clockmaker worth his salt knows the proper repair involves using a ¼ lb. of solder and a safety pin. Recently however, when faced with this repair, the only safety pin I could find was the one holding up my pants. (My co-workers insisted I leave that one exactly where it was.) Eventually, however, I found another solution which may be worth sharing.

First, pull the old wire from the slot in the ratchet. Do not pull up. Instead, pull in line with the slot (Figure 2). It is important to remove the wire without destroying the riveting that holds it in place. If there is not enough wire sticking out to grip the ratchet, hold it in a vice and use a small punch to get it started.

Next, measure the wire and find a replacement of the same diameter. The replacement can be one-thousandths of an inch (.001") over or under size, but there is little room for variation here. The material is hard or spring brass wire. Steel wire is much stiffer than the brass and may cause excessive wear on the ratchet. On the other hand, if the original spring was steel, brass wire would be too weak to use as a replacement.

Figure 2

Figure 3

Finally, point up the end of the wire and begin to push it into the slot from the rear of the ratchet (Figure 3). There should be some resistance so you can only push a short section at a time as shown. If you try to push more than about a millimeter, the wire will bend. Again, holding the ratchet in a vice will help. With the wire pushed all the way through the slot, you will find it quite secure. The wire is now bent to shape and the ratchet is ready to be riveted to the great wheel (Figure 4). It is possible to make this repair with the ratchet still on the wheel if there are no other problems. ♦

Figure 4

The Dangers of Battery Ingestion

By Henry Kessler of Sy Kessler Sales, Inc., North American Headquarters for Renata Batteries

Most watchmakers know to be cautious of the dangers related to shorting when handling button and coin-cell batteries. However, all of us should also beware of the increased possibility of accidental ingestion as a direct result of storing button and coin cells for recycling. There have been 16 fatalities reported to date, as well as 85 major medical outcomes resulting from accidental ingestion. Lithium coin-sized cells (specifically the most popular 20 mm sizes) pose the greatest risk, accounting for 92% of the 34 most serious or fatal ingestions, where the diameter of the battery was known, according to data reported between 2000 and 2009, by the National Capitol Poison Center. Be certain to remind your friends and associates of these risks, especially those with young children, while always taking your own steps to limit access and prevent accidental ingestion of button and coin-cell batteries.

A Snapshot in Time: 2010 Statistics on Battery Ingestion

BY P. BILELLO, CHEMIST AND PRESIDENT OF ZENITH SOLUTIONS, INC.

What Do You Use to Clean Hairsprings?

I have asked this question of watchmakers over several years. Listed below are answers I've received with this chemist's commentary:

Take time out to see if your hairspring cleaner contains any of the above solvents. Notice the cleaners range between carcinogenic to highly flammable to dangerous to having obnoxious odors. None are safe or environmentally friendly.

There are products on the market today that are both environmentally friendly and do not harm the watchmaker. The new hairspring cleaners meet with all the requirements watchmakers would want, namely a strong degreaser and one that evaporates fast. They contain the strong degreaser is needed to dissolve entrapped oil between the tightly coiled hairspring wire. Once the oil is dissolved, the part is removed from the cleaner. The droplets of solvent remaining on the hair spring quickly evaporate, leaving a perfectly clean and dry hairspring.

New hairspring cleaning products are non-ammoniated, non-carcinogenic and are rated low for odor. Tell your distributor you're interested in the newer, safer hairspring cleaners. It's time to change to environmentally-friendly and safe cleaners. ♦

Solvents Used to Clean Hair Springs	Chemist's Commentary
Trichloroethane	Carcinogenic
Methylene Chloride	Carcinogenic
Butane - Lighter Fluid	Highly Flammable
Hexane	Highly Flammable
n-propyl Bromide	Obnoxious Odor
Gasoline	Dangerous
Paint Thinner - Vm&P Naphta	Highly Flammable
Acetone - Nail Polish Remover	Highly Flammable
MEK	Highly Flammable
Special Blend of Solvents - A Secret	No Comment

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Energizer® MAX® Zero Mercury claim: Commercially available since 1991.
Energizer® *Ultimate Lithium* 8x claim: vs. *Energizer*® MAX®. Results vary by camera.

questions & answers

BY DAVID CHRISTIANSON, CMW21, FAWI

QUESTION:
We have a customer with a unique timepiece. It seems to be a watch, but has a slide on the side that starts and stops the balance like a stopwatch. The dial is printed: J COMYN
54856
Huddersfield

The movement has the same information. The case has several markings as well. Do you have any information?

Paul M. Hurst
East Earl, Pennsylvania

ANSWER:
Your watch represents a first step in the evolution of the modern chronograph. It is known as a center seconds chronograph. It has a slide on the side of the case that will stop the balance and, therefore, the second hand at the end of the event that you are timing. If not used as a timer (stopwatch), the watch works as a regular timekeeper with a continuously running sweep second hand.

Your watch is exactly like an example shown in Philip Priestley's book, *Watch Case Makers of England: 1720-1920* on page 4, except with a different name on the dial and plates. Several years ago I restored one that was just like yours and the book's but with yet another signature. Both of these were made by C.J. Richardson or his son of Coventry. I would guess that yours was, too. It is likely that you might find his initials (C.J.R.) under the dial or those of his son (A.C.R.). The signatures on each of these watches were probably those of the finishers and/or the sellers of these watches.

Your watch has a fusee-driven movement with a tangential lever escapement. The train is arranged so that the fourth wheel is placed in the center of the watch to carry the seconds hand, and the second wheel is offset with a wheel attached under the dial to drive the minute wheel of the motion works. I've included two photos from the watch I worked on to illustrate this layout. Your watch case carries the hallmark of the Chester assay office, the Chester date letter for the year 1894, and the "lion passant" denoting a sterling silver case.

Author's example 1

Author's example 2

BY DAVID CHRISTIANSON, CMW21, FAWI

QUESTION:
This is additional information provided on a Q & A from July, 2011.

I purchased the pocket watch movement in the attached pictures from a man in Turkey … Could you offer any insight as to who may have made it? The only identifying marks are a serial number on the dial side of the mainplate—27411. The movement has dials on both sides—dual time and seconds on one side, triple date and moon phase cut-out on the other. I know some parts are missing, and in order to restore it, I would like to find out more about the mechanism.

Matthew Schloemer
Lititz, Pennsylvania

ANSWER:
There is no way to know who made your watch or where it was made, other than somewhere in Switzerland. Since it is a complicated mechanism it was probably made in the Vallee de Joux, an area that has and still does specialize in complicated watch movements. Most of these movements were made in any of a large number of small workshops and their makers seldom, if ever, signed their work.

When you asked about this watch earlier, I told you that you'd "have to employ the long and tedious process of rational deduction coupled with a drawing board" (*Horological Times* Q&A column, July 2001, page 33). To get you on the road to thinking empirically, I'll offer some observations that I've made from your photographs. Keep in mind that I'm looking at two-dimensional images without the benefit of the third dimension of depth. I'm also looking at photos that are taken at a slight angle so that distances between pivot points are distorted enough that I cannot get a good idea of concentricity around pivot points (studs and plate holes).

Your photo of the calendar dial indicates it is upside down and on the time side of the movement (the lower plate—the crown wheel stud is showing through the moon phase aperture of the dial). Therefore, you must be showing the time dial on the back side (upper plate) of the movement. I say upside down because the moon phase should be at the bottom of the dial and the leaf design should be at the top of the dial where the winding and setting components are located, just as it is on the time dial.

I would guess that a minute wheel and pinion connects the center wheel pinion to a canon pinion on the long post to the right. The minute wheel pinion connects the minute wheel to the missing hour wheel (which appears to be on the time dial, held to it by the hour hand hub that the photo seems to indicate). From the photo, it looks like a canon pinion is held onto the dial by a minute-hand hub on the Turkish time side.

The Western dial appears to be all in place except for a missing intermediate wheel between the second wheel pinion and the hour wheel. From the photo, you still have the hour wheel held to the dial by its hour hand hub. There doesn't appear to be room for a minute train on that part of the movement, therefore no minute hand on this dial.

The setting wheel (which is missing) is driven by the sliding pinion (clutch wheel). I suspect there is also a rocker arm arrangement that pivots on the setting wheel post with two intermediate setting wheels, one on each end of the rocker arm. The arm is tensioned by the partial spring that you still have and which may also shift the sliding pinion into setting mode. The rocker arm is probably controlled by what appears to be provisions for two setting pins (one on each side of the stem hole) that protrude through the case ring. Pushing the right pin shifts the rocker arm to engage the setting wheel, through its intermediate wheel with the Turkish canon pinion. Pushing the left pin shifts the rocker arm to the Western time train, specifically the large pinion on the mainspring barrel. I suspect that this large pinion has a slip fit that acts as a canon pinion so the hour wheel of the Western time dial can be reset.

The calendar dial is on the back of the movement (the train bridge side). The calendar gearing was probably on a separate plate. It would have been a simple gearing system driven by the center wheel pinion through the toothed finger gear you have.

BY DAVID CHRISTIANSON, CMW21, FAWI

Your best bet is to start studying movements of this period in such books as *Pocket Watches: From the Pendant Watch to the Tourbillon* by Richard Meis and drawings of calendars and double dial movements in *Britten's Watch & Clock Maker's Handbook: Dictionary and Guide* by F.J. Britten and edited by Richard Good (16th edition), to name just two.

I hope these observations might inspire you to start experimenting with pencil and paper and cut-out paper modeling to find a possible design to replace that which is missing. No drawings exist of your mechanism and, with the plethora of double-time dial and/or calendar designs produced during this period, the odds of finding one like yours is remote, at best—but you never know what one of our readers might have in their collection—do you participate in the Technical Discussion and Parts Forum at www.awci.com?

Since you are in Litiz, you are close to Columbia, Pennsylvania and the NAWCC Library and Museum. Show your movement to the curator. He may have some examples you can study that could lead you to a possible design for yours. The library would have more books of period movements that you could study for inspiration and ideas.

Diverscope Built for Extreme Ocean Conditions

The Diverscope JEANRICHARD watch has all the technical qualities necessary to withstand several months of extreme ocean conditions which include impacts, moisture, salt, temperature variations and exposure to UV rays.

Its case, which is water-resistant down to 300 meters, required the use of cutting-edge manufacturing technology. It is made from steel-coated, extra-resistant rubber. Each component was adapted for use in extreme conditions. For example, the screw-down crowns or the sapphire crystal, is two-and-a-half times thicker than that of a standard watch. The luminescent hands and indicators on the dial also ensure optimal readability in murky conditions. It is available with a luminescent lime green or opaline black dial.

The Diverscope JEANRICHARD is watch worn by the famous skipper, Franck Cammas, world champion sailor. It's equipped with the powerful automatic calibre, JR1000, produced by the JEANRICHARD Manufacture.

"Franck Cammas won us over with his commitment and human values. Our professions are demanding; both sailing and Haute Horlogerie are domains that require rigorous tests, experience and accomplishment," remarked Massimo Macaluso, CEO of JEANRICHARD.

TECHNICAL SPECIFICATIONS:

MOVEMENT

- JR1000 manufacture mechanical movement, automatic.
- 27 jewels, frequency 28,800 vib./hour (4 Hz).
- Power reserve of 48 hours.

FUNCTIONS

- Hours, minutes, seconds, date with window at 3 o'clock.

CASE

- Vulcanised rubber-coated steel case and bezel.
- Push buttons, crowns and case-back in black PVD treated titanium.
- Rotating bezel.
- Dimensions 43 x 43 mm, dial opening: 28.5 mm, height: 13.5 mm.
- Sapphire crystal, anti-reflective treatment.
- Water resistant to 300 meters.

LeDIX Véloce, Micromechanical Cell Phone

Building on the successful launch of LeDIX Origine, the first micromechanical cell phone, Celsius X VI II announces the LeDIX Véloce. Whereas the original featured a distinctly watchmaking-oriented design, LeDIX Véloce references the world of motor sports.

The Remontage Papillon (or "butterfly winding") patented system housed in the hinge of the object provides the mechanical watch movement with an additional three hours of power reserve. Making optimal use of the space available, it features the world's most off-centered flying tourbillon (36 mm), an unusual configuration that involves mounting the regulating organ on micro-shock absorbers.

Micromechanics even pervades the operation of the phone itself, including the battery-ejection system, cushioned screen-flap closing and rotational protective system for the main connector. This features no less than 600 mechanical components, many of them endowed with hand-crafted watchmaking finishes. The interface, designed to provide user friendliness, ensures simple and intuitive use of the phone functions.

LeDIX Véloce comes in black PVD-treated titanium with carbon fiber inserts. This all-black version highlights the sleek lines, forming a profile resembling that of a racing car hurtling around a track at full speed.

Thirty-five engineers, watchmakers and other artisans were involved in the development, and it takes six months to produce just one. LeDIX Véloce, which is issued in an 18-piece limited series, will be available as of October, 2011 at a retail price of 250,000 € excluding tax, or $360,600 U.S. dollars.

Technical Specifications:

Watch

- Mechanical movement: 600 mechanical parts including 330 in watch movement.
- Clamshell mobile phone in titanium grade 5 treated with black PVD and carbon fiber inserts.
- Structure entirely milled from a block of grade 5 titanium; Weight ~245g.
- Patented mechanical hinge to harness and store kinetic energy generated by user. (Energy used to activate mechanical system.)
- 100-hour power reserve; Opening/closing of clamshell phone generates additional 3 hours.
- Flying solitaire tourbillon visible on both sides; World's most off-centered tourbillon (36 mm).
- Movement integrated within water-resistant box in aluminum treated with GL titanium coating and ceramics to ensure extreme resistance.

Phone

- Mechanical battery-ejection system, Clous de Paris hobnail pattern.
- 7 main sapphire parts, some featuring two radii of curvature.
- Platform made in France, 2.75G GSM-GPRS-EDGE: Triband 900/1800/1900MHz.
- Screen AM-OLED : 2.2" QVGA 320x240 262k colors.
- Photo/Video: 3.2Mpix camera, autofocus, flash, digital zoom.
- Battery: Li-Ion 770mAh, >3.5 hours talking time, 240 hours power reserve in standby mode.
- Multi-lingual interface, including: French, English, Chinese, Russian, Spanish, Arabic.

AWCI-ELM Trustees
Jack Kurdzionak, CW21, Chair, 2013
Paul Wadsworth, Treasurer, 2012
Dennis Warner, CW21, Secretary, 2013
Charles Cleves, CMW21, 2012

Objectives/Goals
The AWCI Educational Library Museum Charitable Trust was organized to aid in the advancement of the art and science of horology through activities in education. Its purposes are:
1. To lend practical assistance to the schools that engage in the teaching of horology.
2. To establish and maintain a horological library.
3. To establish and maintain a horological museum.
4. To encourage and assist students in their horological studies.

AWCI Board of Examiners
Wes Grau, CMW21, Chief Examiner
Jerry Faier, CMC21, 2016
Tamara Houk, CW21, 2016
Jim LaChapelle, CMC21, 2012
Harold D'Sousa CW21, 2013
Daniela Ott – Staff Contact

Objectives/Goals
Work on watchmaking and clockmaking certification programs and develop new testing items and new performance components for trial in the coming year. Analyze exam results to determine educational needs.

CONSTITUTIONAL COMMITTEES
Constitution and Bylaws Committee
Paul Wadsworth (Chair)
Jim Door
Justin Shiver, CW21
Dennis Warner, CW21
Tom Pack, CPA – Staff Contact

Objective/Goals
To consider and report on all matters referred to the Committee specific to the Constitution, Bylaws and Policy Manual.

Examine the Institute's governing documents and concur that their wording is congruent.

Create an indexing system for the Policy Manual that will ease content searching now and in the future.

Finance Committee
Henry Kessler, Chair
Jack Kurdzionak, CW21
David Douglas, CW21
Mark Butterworth
Ernest Tope, CMW21
Manuel Yazijian, CMW21
Tom Pack, CPA – Staff Contact

Objectives/Goals
To maintain a strong working relationship with the Executive Director, staff and Board of Directors to facilitate its duties as outlined in the Constitution, Bylaws and policy manual.

Nominating Committee
Tamara Houk, CW21 (Chair)
Alice Carpenter, CMW, CMEW, FAWI
Glenn Gardner, CMW
Fred White, CMW21
Jim Lubic – Staff Contact

Duties:
The committee will nominate a minimum of 6 and a maximum of 9 for the annual election to the board of directors per the constitution and bylaws.

Perpetuation Fund
Doug Thompson, CW21 (Chair)
Treasurer, Henry Kessler
Jack Kurdzionak, CW21, 2013
Dennis Warner, CW21, 2012
Mark Butterworth, 2014
Jim Lubic, CMW21
Jim Lubic, CMW21 – Staff Contact

Duties: Constitution
Objectives/Goals
The fund trustees, with the guidance of a professional investment advisor, shall direct the fund strategies per the Bylaws.

STANDING COMMITTEES
Case Mark Committee
Paul Wadsworth (Chair)
Wes Door, CMW21, FAWI
Karel Ebenstreit, CMW, CC21
Jim Lubic, CMW21 – Staff Contact

Objectives/Goals
1. Present a plan to inform Law Enforcement Agencies how this system would aid in identifying recovered, lost and stolen items.
2. Work with the Publicity Committee to let the industry and the general public know of its' existence.

Ethics Committee
Manuel Yazijian, CMW21 (Chair)
Gene Bertram, CC21
David Fahrenholz
Wes Grau, CMW21
David Douglas, CW21
Jim Lubic – Staff Contact

Duties: Policy Manual

Objectives/Goals
To review AWCI Code of Ethics, make recommendations for changes and to establish due process for dealing with accused breaches of the same and potential methods for settling such disputes.

Honors and Awards Committee
Mike Gainey, CC21 (Chair)
Glenn Gardner, CMW
Wes Door, CMW, FAWI
Bob Ockenden, CMC
John Bryant, CC21
Jim Lubic, CMW21 - Staff Contact

Objective/Goals
This committee is responsible for making recommendations for special awards such as, but not limited to AWCI Fellow, Lifetime Achievement, Meritorious Service and Outstanding Achievement Awards.

Horological Times Committee
Jordan Ficklin, CW21 (Chair)
Roland Iverson, CMC
Karel Ebenstreit, CMW, CC21
Bob Porter, CMW
Chip Lim, CMC, CMW, CMEW
Ron Landberg, CW21
David Fahrenholz
Amy Dunn – Staff Contact

Objectives/Goals
1. Continue to work to increase circulation and advertising revenue.
2. Seek out potential authors for magazine articles.
3. Review submitted articles for content and accuracy

Trade Show and Publicity Committee (Marketing)
Henry Kessler (Chair)
Jordan Ficklin, CW21
Justin Shiver, CW21
Gene Bertram, CC21
Jason Ziegenbein, CW21
Jeff Herman
Richard Livesay
Amy Dunn - Staff Contact

Objectives/Goals
Promote the field of watchmaking, the AWCI and its "Certified Watchmaker" and "Certified Clockmaker" programs, and introduce AWCI's new programs. Make AWCI more visible to persons in our industry and to the public.

1. To get AWCI, its activities, its membership, and what it is doing for our industry into the media as much as possible.
2. To prepare publicity materials for use by our member to promote:
a) their attendance at our educational programs and conventions
b) their attainment of AWCI certifications
c) their horological based business (such as press releases on daylight savings time that can be customized for their area). In conjunction with this they shall provide suggestions on how the member can use the above information.
3. Manage the AWCI "21st Century Watchmaker" booth at the JCK Showin Las Vegas, scheduled for June annually.
4. Contact industry associates, including watch companies, retail chains, watch and jewelry repair specialists, tool and equipment manufacturers and distributors to make them aware of the AWCI Trade Fair Booth. They would be encouraged to offer time, materials, equipment and advertising for this project.
5. Review the data from our market research questionnaire.
6. Work together with others such as the Education Committee and Staff members copied, to develop a trade show seminar that will be presented at the next JCK Show in Las Vegas.
7. What can we do to better promote the value of the American Watchmaker / Clockmaker within the retail watch and jewelry industry.

Strategic Action Committee
Ron Landberg (Chair)
David Fahrenholz
Ernest Tope, CMW21
Jordan Ficklin, CW21
Tom Chase, CW21
Tom Jeswald, Advisor
Jim Lubic, CMW21 – Staff Contact

Duties: Policy Manual

Objectives/Goals
Recommend to the Board steps that we can take to insure AWCI's future successas the premiere horological institution in the world.

Convention Committee
Ron Price (Chair)
Mark Butterworth
Terry Kurdzionak (Mistress of Ceremonies)
Tom Nesbit, CW21

Objectives/Goals
1. To implement a welcoming environment at the convention for all attendants
2. To develop a working relationship with the meeting planner and the AWCI office team for running the hospitality suite
3. To facilitate awards banquet participation

Education Committee
Herman Mayer (Chair)
Clock:
Herman Mayer, Interim Section Head
John Bryant, CC21
Wes Cutter, CC21
Bob Ockenden, CMC
Watch:
Manuel Yazijian, CMW21 Section Head
Matt Hritz, CW21
Justin Shiver, CW21
Mackenzie Nesbit, CW21
Clock CMC Volunteers
Jerry Faier, CMC21
Bob Ockenden, CMC
Jim LaChapelle, CMC21
Ron Iverson, CMC

Watch CMW Volunteers
Herman Mayer
Jason Ziegenbein, CW21
Arnie Van Tiem, CW21

Objectives/Goals
The education committee's responsibility is the formulation and implementation of AWCI's educational programs:

1. Finalize the implementation of a Master Level Certification to complement the CW21 certification.
2. Assess the feasibility of, and the demand for, a Master Level Certification as the next higher proficiency level to the CC21 certification.
3. Promote industry recognition for the new Master Watchmaker Certification.
4. Assess the feasibility of, and the demand for, Watch Technician and Clock Technician Certification. Assess the possible risks for the profession and the Institute that come with involvement in semi-skilled activities.
5. Assess the feasibility, benefits and risks of a regulated apprenticeship system as an alternative to fulltime schools to become a certified watchmaking professional.
6. Review and make recommendations for the training offerings currently provided by AWCI, under the criteria of demand and efficiency.

Congratulations to These Professionals Who Have Recently Attained the CW21

Campos, Wilbert	Waco, TX
Chandler, David	Jasper, AL
Cummings, David	Grayson, LA
Hosein, Sandy	Brentwood, TN
Koch, Andrew	Darlen, CT
Marler, Kenneth	Lebanon, TN
Martin, Todd	Arlington, NE
Maslow, Ilya	Vancouver, WA
Matchett, Steve	Highland Park, IL
Nalbandian, Greg	San Diego, CA
Paul, Steven Glen	Carbon, IL
Rolo, Ernesto	Miami, FL
Woycitzky, Susanna	North Olmstead, OH

BY MATT HRITZ, CW21 AND FWCA EDUCATION CHAIRMAN

Florida Watch and Clockmakers Association Convention

The Florida Watch & Clockmakers Association (FWCA) convention was held October 28 - 30th, 2011. Our convention was a great experience for those in attendance. Tom Schomaker, CMW21, taught a Vintage Chronograph class using the Lemania 1873. This class was for the experienced watchmaker. Six of the seven students in the class were CW21 certified (with friendly peer pressure on the seventh student to get certified).

Photo 1 – Left to right - Maurice Lereau, CW21; Fransisco Santos; Fabio Rodirigues, CW21; Matt Hritz, CW21; Richard Lebeau, CW21; Ignacio Perez, CW21; Tom Schomaker, CMW21; Michael, Taylor, CW21.

The FWCA has a great group of enthusiastic members who love the profession. It can be challenging to offer a professional training class away from a regular classroom setting, but we have been successful. We have had three classes a year in the same venue, which has helped our chapter build a good relationship with the hotel in Tampa. This good relationship keeps our affiliate chapter costs predictable and makes it easier to set up an effective training area.

Why should you be interested in an affiliate chapter convention if you don't even know anyone there? Well, a simple answer would be: ***Your Money and Your Livelihood.***

The current FWCA president likes to joke about how I used to politely "kick him out" of my store five or ten years ago when he was trying to interest me in joining. I always felt as if I was too busy, telling him, "Nope. I can't afford the money for the class or time away from the bench. Gotta get back to work. Nice to see you." ***Now I cannot afford not to attend.***

Since joining three years ago, I have learned more and changed more than in the first eight years I was on my own. By networking with others in our chapter I can step back and see that isolation and pressure from customers or trade accounts can result in too much work for too little pay. Do our customers know what knowledge and skills are required to do quality watch repair? Do they pay attention to the rising cost of parts and equipment? Do they understand the requirements to open certain spare parts accounts? Of course not—nobody out in the "real world" has a clue what we do. (Of course, we don't spend time worrying about their line of work either). If a price seems high, we have to convince customers we're worth it. That's the way it works in all industries, and watchmakers are in charge of our own future.

Like in any profession, there are those who are very profitable and successful, and there are those who struggle. ***Getting involved with a local affiliate chapter can mean associating with those who get it right.***

As I mentioned in a recent online post for the Chronometer Club, watchmakers used to keep to themselves because of competition. Today, I find so many fellow watchmakers willing to share their knowledge and wisdom. Human nature "knows" we derive great satisfaction in helping others and I think many watchmakers (who are human, too!) know that if we are to continue and thrive, we need to stick together so the customer (and our livelihood) can be well served.

Photo 2 – Two of Tom's students in the classic chronograph class, repairing the Lemania 1863 (Omega 861).

BY WES GRAU, CMW21, AFFILIATE CHAPTER DIRECTOR

Wes Grau

In an effort to start acquainting myself with each of our AWCI affiliate chapters, I spent some time speaking with Stan Palen, AWCI member, Treasurer and Webmaster of the Horological Association of Virginia (HAV) and member of George McNeill's Potomac Guild (under the HAV chapter). We spoke about the HAV, one of the largest affiliate chapters of AWCI. Stan became a member in 1964 and has been involved in the chapter and the guild over the years. We also discussed many of the changes in our industry and how it has affected horological organizations.

Stan's father purchased a watchmaking correspondence course for Stan in 1955. Stan's passion for horology grew over the years and his involvement as an AWCI member, an HAV Chapter member and a member of the HAV guild has continued to stay strong. HAV was formed in October 1939 and now has three subsidiary guilds: the Southside Guild (Western Virginia), Potomac Guild (Northern Virginia), and the Tri-City Guild (Richmond, Virginia).

The guild that Stan currently belongs to is the George McNeil Potomac Guild. This group of horologists includes professional tradespeople, hobbyists, collectors and enthusiasts who share an interest in time and timepieces—clocks, watches, or both. They meet on a regular basis near the city of Fairfax, Virginia to help one another to better understand the variety of aspects included in the art and science of horology.

Interesting enough, the Potomac Guild has sponsored a clock repair class in Northern Virginia since the 1970s. Hundreds of students have received their start in clock repair through the tremendous resources of the course, which includes instructors, tools, the facility and fellow students.

Stan directed me to the HAV website at www.havhome.org and the Potomac Guild's clock class at www.potomac-guildclockclass.org which contains a lot of valuable chapter and guild information. I must confess, I had never visited another affiliate chapter website other than my own until now, and I was pleasantly surprised at the information and archived newsletters and photos I found online. It is truly amazing what an individual can learn when they reach out to others.

Another affiliate chapter resource that I discovered was a video, "AWI-The Affiliate Chapter Story." This was an interesting overview on the history and purpose of the affiliate chapters. As indicated in my last writing, the national horological institutes were birthed from a desire of the national guilds to meet and share common interests. This thought is conveyed in this video with the following statement, "Affiliate chapters have been a vital part of AWI (now AWCI). They provide the grass roots contact needed between AWI and the members. Many of the policies and services of AWI are a result of proposals by the affiliate chapters."

I believe that each affiliate chapter can provide valuable resources to the horological community. They contribute to continuing education, networking, mentoring and just "plain old socializing." If you are part of an affiliate chapter and would like to feature it, or would like to share some positive ideas regarding affiliate chapters or guilds, please contact me at wgrau@awci.com.

BY JOSEPH SCHRADER, CMW21

Electrical Test Values for Quartz Watches

Author: Jordan Ficklin, CW21

Introduction

In my 35 years at the watchmaker's bench, quartz watches have undergone several changes in degrees of relevance. In the 1970s they were cutting edge, state-of-the-art timekeeping. They were at the top-of-the-heap in terms of cost and prestige. It was a technology that actually came back to bite itself (and us), when technology cheapened the cost for accurate timekeeping. In the 1980s, an innovator in Switzerland began marketing "throwaway" analog quartz watches, and life as a watchmaker became VERY difficult. The culture of watchmakers, as we knew it, looked doomed. Meanwhile, prestigious labels were dropping like flies, and being bought out by the very same entity that had changed the face of the business. That entity had another plan. They could use that inexpensive internal mechanism in a high-fashion, designer case, using a highly-respected name on the dial, and market it to that conspicuous consumer of the 80s, the Yuppie. They succeeded.

Fast forward to today, and we now have diamond-encrusted solid gold cases with quartz movements ranging in cost anywhere from a few dollars to several hundred dollars, but they are still essentially simple quartz movements. Our clients want their watch to continue functioning, but it seems as though there is not always an available replacement movement to just swap in. Some are old and obsolete. Some parts are restricted while some are simply too costly to just discard and swap in another movement.

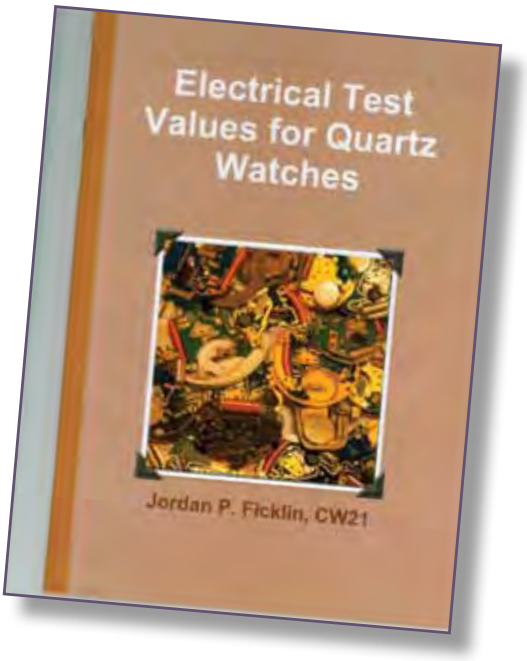
I used to service quartz watches without the modern testing equipment that I now have. At best, I hoped that my multi-meter was measuring properly as I tried to find the electrical values necessary in whatever technical guides were available. Most modern watch timing machines now include electronic watch measuring capability, and we no longer have to simply hope the parameters are in the correct range. You'll find *Electrical Test Values for Quartz Watches*, by Jordan Ficklin, CW21, is an invaluable tool to the modern watch technician.

Review

Ficklin presents a primer on quartz watches in his Forward to the booklet, as well as a brief explanation on why taking these measurements is necessary. The booklet explains using the oscilloscope function on modern watch timers to diagnose the difference between electrical issues and mechanical blockages.

I think the one attribute that makes this manual most beneficial is that it collects the pertinent electrical values necessary for quartz watch service, sorted by manufacturer and by caliber, and places it all in a convenient catalog within arm's reach. You no longer need to move to a file cabinet to retrieve tech guides and you don't have to thumb through documents to find the electrical values page.

Most Swiss and Japanese calibers are listed, although some values have been left incomplete at the time of publication because the information was not yet available. The calibers are listed and the lines are open and left blank, to be filled in as the information becomes available. This will definitely be added to my bookshelf of horological resources. It is self-published by Mr. Ficklin and is available online at: www.watchmakingblog.com/quartz, or from lulu.com for $15.99 plus shipping & handling.



AWCI Academy of Watchmaking Schedule 2012

All classes qualify for 5 CEU's

Jan 9 - 13	Basic Quartz Watch Repair
Jan 30 - Feb 3	Modern Automatic Watches
Feb 13 - 17	Modern Mech. Chronograph 7750/7751
Feb 20 - 24	Advanced 21
Feb 27 – Mar 1	Certification, Okmulgee, OK
Mar 5 - 9	Polishing & Refinishing
Mar 12 - 16	Balance Staffing & Timing
Mar 19 - 23	Advanced 21
Apr 9 - 13	Lever Escapement
Apr 16 - 20	Advanced 21
May 21 - 25	Advanced 21
Jun 11 - 15	Basic Watch Repair
Jun 18 - 22	Advanced 21
Jul 16 - 20	Polishing & Refinishing
Jul 23 - 27	Advanced 21
Aug 27 - 31	Advanced 21
Sep 10 - 14	Advanced 21
Sep 17 - 21	Modern Mech. Chronograph 7750/7751
Sep 24 - 28	Modern Automatic Watches
Oct 15 - 19	Advanced 21
Nov 12 - 16	Advanced 21

AWCI advanced 21

In 2012, AWCI will offer all CW21 and CMW21 holders a special series of continuing education courses focusing on the service procedures of specific high-grade mechanical watches. Look for more information coming soon.

5-day block: $875.00 * 3-day block: $525.00 * All classes held in Harrison, OH

TO REGISTER FOR CLASSES OR EXAMS, please call toll-free 1-866-FOR-AWCI (367-2924), ext. 303 or e-mail Daniela Ott: dott@awci.com.

SIGN UP EARLY!

We reserve the right to cancel a class if there are less than six participants signed up 30 days prior to the first day of class, so we encourage you to wait before making travel or hotel arrangements until this deadline has passed. If in doubt, please contact Daniela Ott at 866-367-2924, ext. 303. Should a class be cancelled due to lack of participation, the fee will be returned the same way you paid (i.e., credit on your credit card or check). Or if a class is offered again later during the year, you have the option to transfer to that class. You can also transfer the fee to another class if space is available. Information is available online at www.awci.com. This schedule is subject to change. Seats may become available for the classes; please contact AWCI to be added to waiting list.

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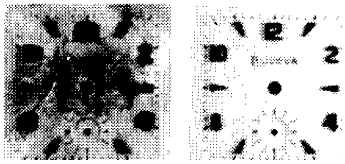

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