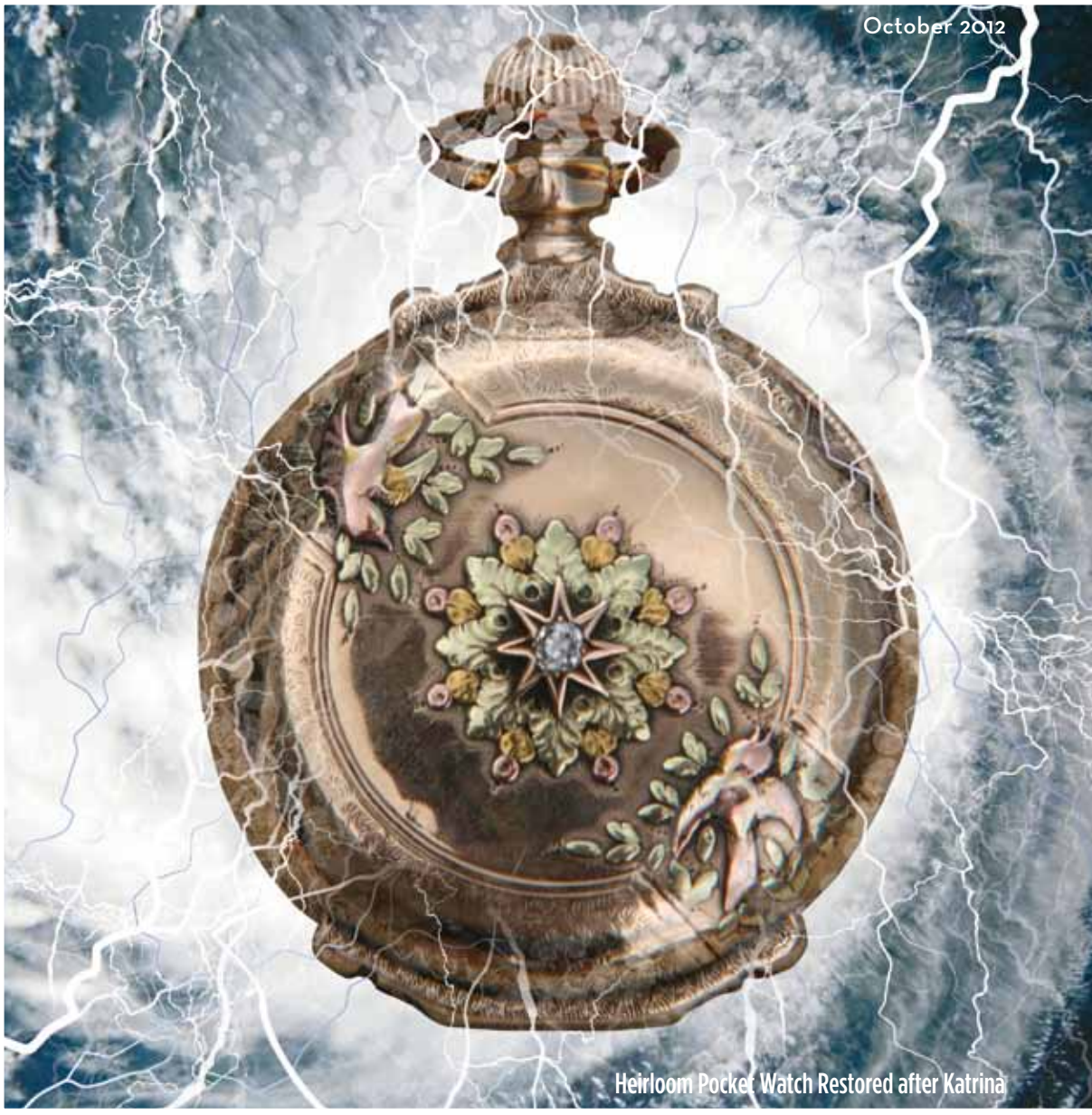
HOROLOGICAL TIMES™

ADVANCING THE ART, SCIENCE & BUSINESS OF HOROLOGY

October 2012



Heirloom Pocket Watch Restored after Katrina

AMERICAN WATCHMAKERS-CLOCKMAKERS INSTITUTE

Technical Challenges: From Restoring the Old to Repairing the New

Salvaging an Heirloom from the Ravages of Hurricane Katrina

Stephen Forsey: The Watchmaker's Watchmaker

The Atomic Wristwatch: Amazing Technology

Vacheron & Constantin During WW I, Part 2

In a Material World

Adjustable Armrest Watchmakers' Benches

EXCLUSIVELY at Jules Borel & Co.

new!

BN101/OAK
Oak Single Bank Workbench
Breadboard on right side.

We took our best-selling watchmakers' bench design and added many new features!

- Armrests can be adjusted from level to 25° slanted, and 6° out from bench
- A pull out breadboard is located above each bank of drawers.
- Two tool tray drawers are above the cloth-lined catch tray
- A pre-drilled hole allows for instant installation of a Waldmann or Dazor Lamp.
- A predrilled hole is also provided for the VOH Vacuum/Pressure arm.

Solid Wood Benches with Adjustable Armrests

Description	Stock #	Width	Depth	Height	Price
Oak Single	BN101/OAK	47.5"	26"	40"	$ 2695.00
Maple Single	BN101/MAPLE	47.5"	26"	40"	2495.00
Oak Double	BN102 OAK	61.5"	26"	40"	3195.00
Maple Double	BN102/MAPLE	61.5"	26"	40"	2995.00

new!

Lamp Mount & Holes for
VOH Arm and Lamp Wiring

BN102/MAPLE
Maple Double Bank Workbench
Breadboards on both sides

BN1452 VOH Vacuum/Pressure Arm

The VOH Vacuum/pressure arm fits the new bench using a pre-drilled 40mm hole. Includes aluminum pressure handpiece and vacuum handpiece with soft white brush tip. $529.00

Borel

Jules Borel & Co.
1110 Grand Boulevard ■ Kansas City, Missouri 64106
Phone 800-776-6858 ■ Fax 800-776-6862 ■ julesborel.com

Official Publication of the American Watchmakers-Clockmakers Institute

EDITORIAL & EXECUTIVE OFFICES
American Watchmakers-Clockmakers Institute (AWCI)
701 Enterprise Drive
Harrison, OH 45030
866-FOR-AWCI (367-2924)
or 513-367-9800
Fax 513-367-1414
awci@awci.com • www.awci.com
www.facebook.com/MyAWCI

Amy S. Dunn
Managing Editor & Advertising Manager
Ext. 307 adunn@awci.com

James E. Lubic, CMW21
Executive Director/
Education & Technical Director
Ext. 310 jlubic@awci.com

Thomas J. Pack, CPA
Operations Director
Ext. 311 tpack@awci.com

Thomas D. Schomaker, CMW21
Watchmaking Instructor/
Certification Coordinator
Ext. 309 tschomaker@awci.com

Daniela Ott
Education & Certification Administrator
Ext. 303 dott@awci.com

Horological Times (ISSN0 145-9546) is published monthly and copyrighted by the American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696. Subscription price for the public is $149.00 per year ($8.50 per copy). Members subscription is $70.00 which is included with annual dues of $149.00. Periodicals postage paid at Harrison, OH 45030 and additional entries. POSTMASTER: Send address changes to Horological Times, 701 Enterprise Drive, Harrison, OH 45030

IN THIS issue

VOLUME 36, NUMBER 10, October 2012

features

technical discussions

industry news

awci news

education & certification

classifieds

Horological Times Advertising Policy & Editorial Policy

The publisher reserves the right to approve all advertising copy and reject any advertisements not in keeping with the publisher's standards. The publisher may, at the publisher's sole discretion and for any reason and without notice, decline to publish or republish any ad, in which case any fees submitted or paid for such ads shall be returned or rebated to the advertiser. The publisher reserves the right to edit all copy. The advertiser and/or agency agrees to assume liability for all content of advertisements printed. They will also accept responsibility for any claims or suits arising therefrom brought against the publisher. Printed articles may also be used without permission expressly sought, or payment made, on www.awci.com or the American Watchmakers-Clockmakers Facebook page. Editorial material and letters of opinion are invited, but reflect the opinions of the authors only and do not represent the views of the American Watchmakers-Clockmakers Institute (AWCI), its directors, officers or employees. AWCI reserves the right to edit all submitted materials and is under no obligation to accept any submitted materials for publication. The appearance, reference, or advertisement of any product or service in this publication shall not be deemed an endorsement of such products, methods or services by AWCI, its directors, officers or employees.

a message from the president

MANUEL YAZIJIAN, CMW21

The summer vacation period being over after all the fun and excitement that we all deserved, we quickly realize the fall season has drawn fast upon us. It is time for reflection and assessment of our current standing, followed by planning and preparation for the following business year.

Planning for the future is always a good thing to do. Many of us are artisans and technicians, involved in the small world of watch and clock repair and restoration that comes across our workbenches. Each repair has its own set of challenges that we have to identify and solve with the ultimate goal of rendering that timepiece back to working condition; and not just any working condition, but close to that of when it left the factory. This is a tall order. However, we quite often drown in the details of solving the challenges of the job in front of us, and this takes us away from the task of planning and growing our business. It is important to set time aside for this and ask someone else to help with planning if you are unsure of how to go about it. Asking for help does not mean we do not know, it means we want to plan better by minimizing mistakes.

Take one day off. Get out of your workshop if you need a different environment, a place where there are no interruptions, with no phone calls or e-mails. Get yourself a large calendar, some pens and markers, sticky notes, water and snacks but most importantly, your creative thinking. Use these tools to plan your year ahead and set some realistic business goals with some flexibility built in to them. Once you have a clear view of your year ahead, you can always verify your progress as the days advance. It will give you a better sense of control over your workdays.

I would like to report to you that your Board of Directors this year are a committed group of people who are diligently and carefully working on growing this organization for the future. The planning process is not always easy and this is where we require your input. Please take the time to take a notepad and write down your wishes and desires as to how the watch repair and clock repair profession can be better and more enjoyable. After this, I would like you to e-mail them to me at the address mentioned below so I can share them with the rest of the team on this Board of Directors.

Also, if you would like to serve on a committee or have questions, comments and concerns I encourage you to contact me at the following e-mail address below.

In the meantime, keep your skills honed, your standards very high, your attitude professional, your tools and equipment in great condition and your workshops clean and organized. You never know who may come by to pay you a visit.

Manuel Yazijian
myazijian@gmail.com

GET TO KNOW YOUR NEW WEBSITE:

Did you know?

- **Find Thousands of Technical Guides Online**
  Go to *For Watchmakers,* scroll down to *Technical Guides & Requests*
- **Free Marketing Artwork To Customize and Print**
  Go to either *For Watchmakers* or *For Clockmakers,* scroll to *Downloadable Direct Mailers/Product Inserts*
- **Get Free Leads From Membership Directory**
  Set up your listing by going to *Member Log-In,* then click on *Admin/Directory Listing.* Put in your membership number and first letter of last name capitalized. Once inside, click on *Manage* and follow the directions. Some members are getting scores of leads from all over the world!

Take some time and browse through all the site has to offer!
www.awci.com

a message from the executive director

BY JAMES E. LUBIC, CMW21

In this month's issue you'll find a recap of the exceptional AWCI convention we had in Denver. On page 14 you will see lots of photos and all the AWCI members involved in all our many events. The highlights were:

- 125 attendees including the entire horology class from OSUIT(Oklahoma State University Institute of Technology)
- 11 vendors and a very busy vendor fair
- Archie Perkins appearing to sign his newest book: *Antique Watch Restoration, Volume 1*
- My friend and fellow WOSTEP classmate, Stephen Forsey of Greubel Forsey was our keynote speaker
- 6 highly-informative educational courses
- Lots of chances for fun and networking including a breakfast sponsored by Breitling USA, the ELM Charitable Trust Fundraising Dinner party sponsored by Paneri, and the grand finale—the AWCI Awards Banquet sponsored by Rolex USA. We also want to thank The Swatch Group US for transportation.

Denver was a remarkable place to have both a convention and a vacation, and many of us took advantage of both of these opportunities. Conventioneers visited Pikes Peak, Mount Evans, took in a Colorado Rockies baseball game and visited the 16th Street Mall. Several also saw many of the museums and the zoo.

An Important Note: The Next AWCI Convention is in 2014

One important change we have decided to make for the next convention is to test out an **every other year format**. We expect to hold the next AWCI convention in the late summer of 2014, probably in the Midwest or Eastern part of the country.

Why are we trying an every-other-year schedule? There are three main reasons:

1. This gives vendors more time to develop new products and methods so there will be much more for you to see and experience at each vendor fair.

2. Conventions are valuable business functions, but they mean you have to take time away from work. A two-year schedule may be easier to manage for businesses, especially for sole proprietorships.

3. Members have asked us to look at ways to reduce costs. A two-year window will allow AWCI time to look at various options and different venues that may help reduce costs, both for members and for AWCI.

Thank you again to all the sponsors and attendees. You made the AWCI 2012 Convention and Educational Symposium a real success!

BY AMY DUNN

Figure 1: The dial of the beautifully-restored E. Howard 1880s watch that was damaged by Katrina.

The Challenge:
Salvage an Heirloom from the Ravages of Hurricane Katrina

Imagine this: Your prized 1880s E. Howard gold pocket watch is covered in dirty, Gulf Coast salt-water whipped up by the worst hurricane in our lifetime. Then imagine the sheer pressure of 7.5 feet of water inside a bank vault bearing down on the delicate crystal and parts—and this situation lasts for weeks on end. This watch is exposed to the same aberrant conditions as any ocean shipwreck. Then imagine this is your family's heirloom, and for all you know, it's gone for good.

Surprisingly one day, the owner of the watch learns his family's watch has been found. Despite Katrina's damage, he's determined to have it restored. But, if you don't know anything about watches, where would you start looking for help? This owner went to the AWCI website under "Find a Professional" and found Fred White. After some discussion—with no promises as to the outcome—he chose Fred for the challenge. Fred White, CMW21, brought in several other AWCI resources and specialists as his "salvage crew." It took multiple people, plus information from the wider AWCI network, to actually restore this shipwreck of a watch.

This pocket watch was an E. Howard & Co. Boston, N Model, Serial #210487. The owner glowingly described how the watch had looked before Katrina. It was a beautiful 14K tri-colored case with flowers of rose gold. The leaves were of green gold and the case was yellow on the back and had been mounted with a diamond of approximately one carat in size. The watch had been presented to a family member on April 8, 1888. (See Figures 1, 2 and 3.)

Figure 2: The tri-colored case with flowers of rose gold and a one carat diamond.

salvaging an heirloom from the ravages of katrina

BY AMY DUNN

Figure 3. The inscription most probably reads: Presented to Hugh Curry by the Trackmen of the Vicksburg, Shreveport & Pacific (V P & S) and the Vicksburg and Meridian Railroads (V & M, the predecessor) on April 8, 1888. (Information provided by railroad watch expert, Bill Thomas, of Twin City Supply.)

"Can't Never Did Nothin"

When Fred opened the case and removed the balance cock, he saw hints of what was to come (Figure 4). Once the train bridge and then the dial were removed, he saw layers upon layers of rust (Figures 5 and 6). As he began to take apart individual pieces for assessment, he wondered if restoration was even possible. Most of the steel parts were rusted: The C-spring, the train wheels, and the list went on and on. The bridge front, however, had survived and the cock was in decent shape.

As Fred describes it, the task seemed daunting. But at one point, the words of his father came to mind, and he realized how true they were: "Can't never did nothin'."

Assembling the "Salvage Crew"

Fred explored the possibility of finding replacement parts first. He put in a call to Dean Sarnelle at *Once Upon A Time Clock Shop*. He found Dean had an "N" model with most of the parts intact. Then a call was made to Matt Henning, CW whom Fred considered an expert in fabrication. They talked about ways to handle the antique "rust bucket," and Matt decided to join in on the venture. Matt requested the problem pieces to use as samples for his fabrication (Figure 7).

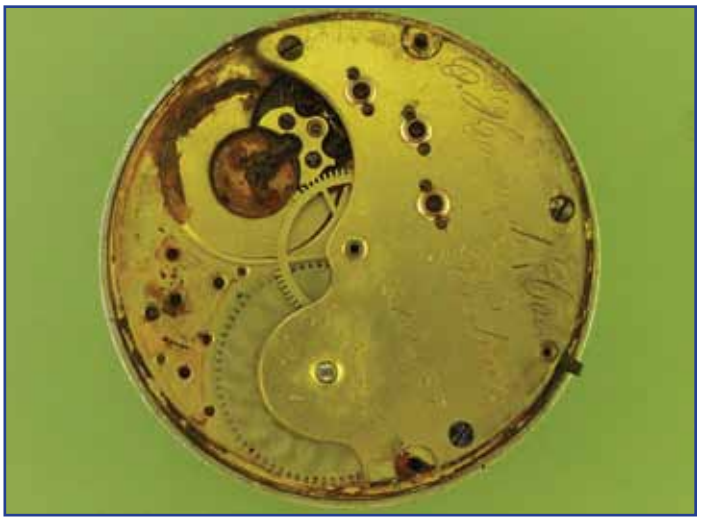


Figure 4: Removal of the balance cock revealed a hint of the rust inside.

Figure 5: Removing the train bridge showed all train wheels were rusted.

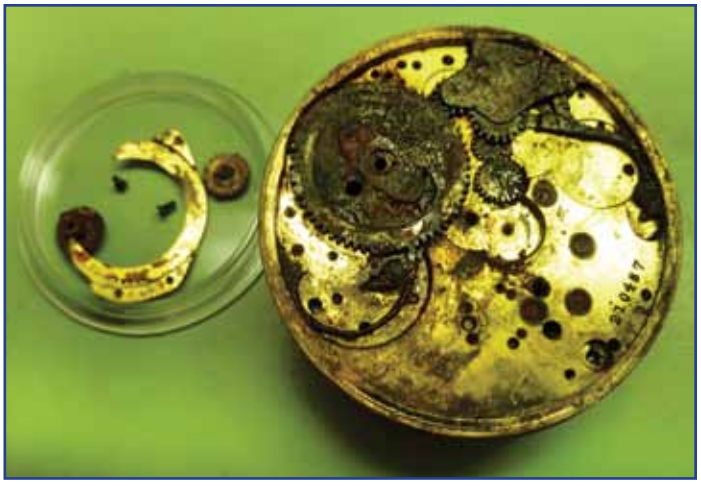


Figure 6: The dial was removed indicating significant rust damage.

salvaging an heirloom from the ravages of katrina

BY AMY DUNN

Figure 7: Some parts were sent to Matt Henning to remake.

The new movement from Dean had the time train fork and balance complete. But as every restorer knows, it's not uncommon to have the same watch with the same model number built in the same year, but with components of varying size and construction. Fred found the train wheels were too large to fit the jewels; the pivots were too big to go through the jewel holes. Fred had to turn and alter them in various ways so they would fit.

Additionally, there was a good deal of rust removal required, and to handle this, Fred used a flex shaft with a variety of buffs, grinders and cutters. As Fred describes the process, for the flex shaft he used 3M® radial disk bristles that were 1" in diameter. He had a set ranging from fine to coarse (these are available from the manufacturer from 36 to 120 grit). Fred soaked the parts in industrial strength toilet bowl cleaner that contained hydrochloric acid. This solution will not attack the metal unless it is left in the solution too long. You must constantly check on the progress and make a judgment call on when you think the process is complete.

The next steps involved washing the parts with water, drying them, then placing the parts in a cleaning machine for pre-cleaning. Next he used the various brushes again to brighten up the metal, or he sometimes used a lathe or hand tools. Again, these were judgment calls and depended on what was needed to finish an individual piece.

As for Matt's part, he was asked to remake a stem, a fitted crown, a balance staff, case springs, and a C-spring (the catch to hold the stem in setting position). According to Fred, all parts were precise and professionally finished, and he considered it a superb job overall. Matt Henning adds, "My goal is to recreate parts to match the original factory design. Through my services, watchmakers like Fred can complete difficult repairs and restorations in an efficient way. This allows a watch or clockmaker to accept a job they might otherwise be forced to refuse, simply because they're unable to get the parts." (See Figure 7 for some of the parts Matt was asked to remake.)

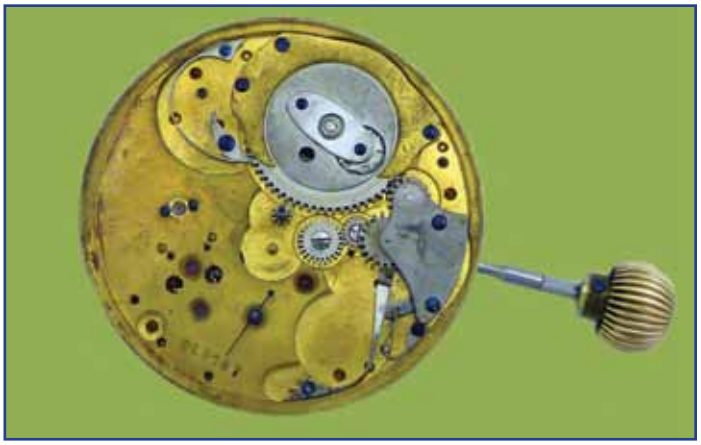


Figure 8: The initial steps of reassembly.

Figure 9: C-Spring after reassembly.

The Tortoise on a Fence Post

Fred's intention was to keep the restoration historically accurate in every way possible. He did a lot of networking among fellow AWCI members to get input. According to Fred, "AWCI gives you an entire group of professionals to call upon. I've asked for technical advice, and I've developed friendships along the way, because sometimes, you just need moral support." Fred describes his networking in a humorous way, "You can bet if you see a tortoise on a fence post, he sure had help getting up there." (See Figures 8 and 9 for the reassembly process.)

salvaging an heirloom from the ravages of katrina

BY AMY DUNN

The Shipwreck Brought Back from the Deep

When all was said and done, Fred was pleased. The customer was thrilled. The restoration had maintained historical accuracy. And the fully restored watch did what a quality timepiece is supposed to do: Keep excellent time once again. ♦

Fred T. White, CMW21 has been an AWCI member for 30 years. He has had an active career as both a watchmaker and a clockmaker and is the owner of Michelle Lee Jewelers in Clinton, Maryland. He is known as an expert in antique timepiece restoration and once restored a pocket watch owned by Napoleon Bonaparte. He has also restored antique clocks for both the U.S. Navy and the Department of the Treasury. Fred was president of the Horological Association of Virginia and now serves on the Board of Directors for AWCI. Fred is so well known, in fact, that he has clientele from all over the world.

BY JORDAN FICKLIN, CW21

Stephen Forsey: The Watchmaker's Watchmaker

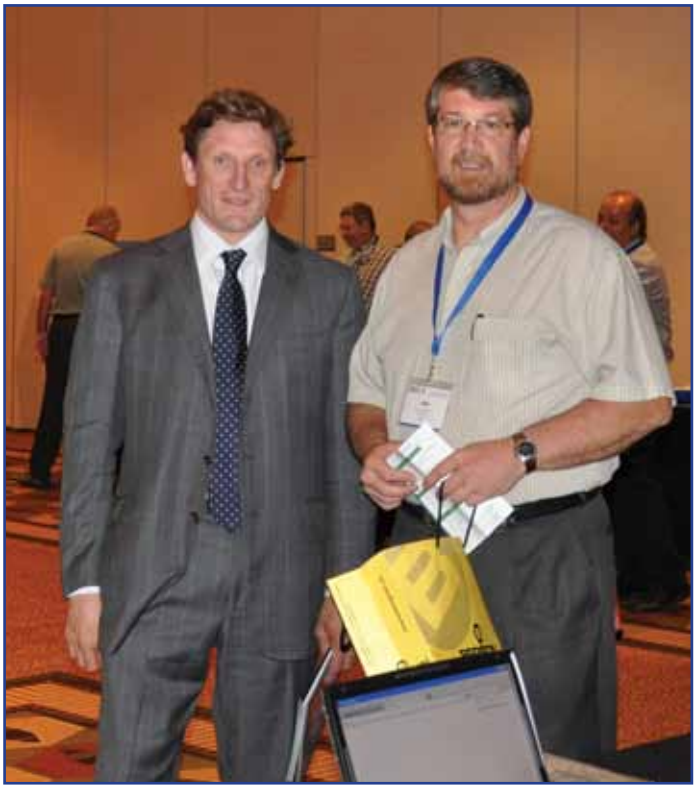
This interview was conducted on August 3, 2012 during the AWCI Convention.

Those of you who attended this year's annual convention were privileged to spend some time with Stephen Forsey of the watchmaking duo, Greubel Forsey. I was in awe of his humility and his down-to-earth demeanor. He truly seemed to enjoy taking the new Greubel Forsey GMT off of his wrist and watching from afar as it travelled around the room while watchmakers pulled out their loupes to marvel at his craftsmanship. Those who were in attendance felt truly privileged to be in his company, to learn about his philosophies, his techniques, his history, and his plans for the future.

I sat down with Stephen Forsey at the annual convention and asked him a variety of technical questions. We had a wonderful conversation that lasted over an hour and covered a myriad of topics. I found his answers to my questions thoughtful and inspiring. To give you a glimpse of his remarkable talent and business savvy, I've tried to organize our discussion into a variety of topics. When appropriate, I have quoted him directly. You'll find his responses have been summarized under headings which reflect the questions that came out of our lively conversation.

Stephen Forsey on *Learning the Art of Watchmaking and Growing in the Profession*

Forsey admits to perhaps being "in the right place at the right time." As a young man, he was interested and passionate about mechanical things. His grandfather was an engineer and he learned to turn on the lathe at the young age of just 9 or 10 years old. He entered the profession at a time when watchmakers were not in great need. In London, he attended Hackney College and graduated from their two-year



Stephen Forsey of Greubel Forsey and Jim Lubic, Executive Director of AWCI, were classmates at WOSTEP in Switzerland.

technical horology course. Immediately upon graduation from Hackney College, he worked for himself for three months restoring clocks while waiting to join Asprey's watch restoration department in London. While at Asprey's he was very lucky to be able to work on a large array of pieces, including chronographs, repeaters and other complicated watches. During this time, he also took the opportunity to further his education by attending the refresher course (1988) and a complications course (1990) at WOSTEP.

When thinking about his time at WOSTEP, Forsey said, "Simonin gave us the possibility to develop our skills. Teaching is not just rote learning; it is enabling somebody to develop their skills. There are pointers you can give . . . when there is a problem, if somebody tells you the solution, it is not as good as when you find the solution for yourself."

For aspiring watchmakers who wish to further their education, Forsey recommends building a portfolio of restoration work using antique movements that are still available. Set aside one day a week, or one evening, to build yourself up a portfolio. Take ad-

BY JORDAN FICKLIN, CW21

vantage of the Internet and the books in the library at AWCI to find the information you need. Among the books he recommends is the Francois Lecoultre book, *A Guide to Complicated Watches*, which illustrates many of the components of repeaters, perpetual calendars and the like.

"We are seeking to push back the boundaries of what was possible in the past using the very technology that almost destroyed the industry during the quartz revolution."

He says working in the employ of a manufacturer is also a possibility for growth. The danger, however, with U.S. watchmakers leaving to work for manufacturers in Switzerland would be the loss of talent from the American watchmaking community.

Watchmakers can be stronger by getting together and using a platform such as AWCI to have a common voice. He believes there should be no secrets in watchmaking. We all need each other, and we should share our knowledge to help preserve and improve our craft.

Forsey thinks that much of the art of watchmaking could easily be lost, and this why he and Robert Greubel, along with Philippe Dufour, are working so hard on the Le Garde Temps, Naissance d'une Montre project. For those who are not aware, this is a project developed to preserve and document all the skills and traditional techniques necessary to create high-end watches. "By preserving this knowledge, current and future generations of watchmakers will be able to both recognize the wonderful traditional techniques and tools available to them, and also master these techniques for crafting their own superlative timepieces." (www.legardetemps-nm.org)

Stephen Forsey on *Inventing, Prototyping, and Manufacturing*

Today Greubel Forsey has a fantastic workshop, the EWT (Experimental Watch Department), where they investigate, develop and test prototypes for their watches. Forsey notes that, with only a few of the right machines, one can begin work on building watches from the ground up (a jig borer and a good Schaublin lathe are all that is really necessary). As a young watchmaker at Hackney College, he created

The design goal was to offer a three dimensional view within a circular backdrop highlighting the beauty of the Tourbillon 24 Secondes Contemporain mechanism. The distinctive 12 o'clock index in relief is an example of the innovative spatial management of the components. A transparent synthetic sapphire tourbillon bridge gives a captivating and hypnotic impression of the regulator floating in mid-air and underlines one of the highly creative challenges which are to be found throughout the timepiece. An efficient fast-rotating, 24-second revolution tourbillon cage inclined at 25° minimizes the negative effects of gravity on the oscillator.

a "wish list" and over the years he acquired what he needed. Some of the equipment he started out with at CompliTime were Jig Borers (Hauser 2-A2, M1), Schaublin lathes (70mm and 102mm), some watchmaker's lathes, a profile projector, and a Pivofix, just to name a few.

"We try to make our timepiece so that the closer you get, the better it gets."

Developing a new caliber is extremely time consuming, labor intensive and very expensive. It is a process that can take many years. In 2006 when challenged by Harry Winston to collaborate on Opus 6, thanks to the work in progress on their future Invention Piece 1 project (presented a year later in 2007) and by switching over their dedicated team, they were able to complete a prototype from start to finish in just six months.

stephen forsey: the watchmaker's watchmaker

BY JORDAN FICKLIN, CW21

The Quadruple Tourbillion Secret houses Greubel Forsey's second fundamental invention, the Quadruple Tourbillon: A reliable high-performance mechanism comprising four tourbillons configured in independent pairs, which are linked by a spherical differential that averages out any timing errors between the two regulators. The movement comprises 519 components of which 261 make up the four tourbillon cages and is powered by two mainspring barrels which provide an effective power reserve of 50 hours. The oscillators feature variable inertia balance wheels, Phillips terminal curves and beat at 3Hz/21,600 APH.

At Greubel Forsey they use CAD software and 3D simulation, but this only allows them to eliminate perhaps one stage of prototyping. "For example, you can't actually simulate very well the motion and the working of the escapement. The escapement has a releasing, an impulse, a drop and then a locking phase. To get the right coefficient of friction for all of these different elements [is difficult using just the software]. The laboratory allows us to qualify and measure what we have actually pre-calculated, and to say whether it is right or not and if we need to change it," says Forsey. When developing the quadruple tourbillon they had an initial working prototype and then three phases of movement development beyond that. At one point, they did a complete reconstruction upon discovery that the watch could accommodate larger barrels. They had to reconfigure the entire gear train.

Stephen Forsey says, "For us, it's not a question of making as many [watches] as possible and being industrial from that perspective, it's pursuing our own philosophy and ideas and getting the performance we want. A huge amount of energy is in our EWT, Experimental Watch Technology. It's our laboratory of ideas to research and evaluate new inventions and mechanisms . . . We are looking to make a bespoke timepiece, but with the level of reliability usually expected of a larger series product."

Greubel Forsey has a physicist, a mathematician, and a material scientist as a part of their EWT team. "There are things that, as a watchmaker, you think and feel; you have this intuition, but you can't identify why. When you have these guys there, you can ask them why. You can ask them why you should go this direction, or that, and better understand that 'why.' Then you can go forward."

Stephen Forsey on *Tourbillons and Their Timing*

The Witschi timing equipment is great if you have just one escapement, but with the Quadruple Tourbillon you need special equipment. At Greubel Forsey, they make slave movements to drive the separate tourbillon cages for timing and for after-sales service. They had to develop their own equipment to time out the Quadruple Tourbillon. First, they adjust the instantaneous rate with the individual tourbillon cages installed in the slave movements. Then they use optical comparison to measure the actual performance over time. This equipment, developed specifically for Greubel Forsey, helped them prepare for the International Chronometry Competition.

"We don't want to just add an existing mechanism to our product line, but for Greubel Forsey, we want each time to look at a mechanism and see how we can improve on something more . . . better security, timekeeping, or better suited to the wristwatch, or further perfect hand finishing and decoration, etc."

In 2011, Greubel Forsey competed (and carried off first prize in the tourbillon category and the highest overall score of the competition with 915/1000 points) in the International Chronometry Competition held at the Museum of Horology in Le Locle, Swit-

stephen forsey: the watchmaker's watchmaker

BY JORDAN FICKLIN, CW21

zerland. The test consists of 45 days of chronometer testing including exposure to multiple temperatures, shocks and magnetism. They entered their Double Tourbillon 30° Technique and took first prize with an average daily rate within 0.3 – 0.8 seconds (45 days). This watch was specially selected (from the two they had completed and made available) and was adjusted for the competition. For example, they usually time their watches in six positions, but since the terms of the competition used only five position tests, they fine-tuned the watch to those specific circumstances.

Even when not in competition, Greubel Forsey watches are delivered with a very impressive maximum deviation in daily rate of just three seconds with a second criterion (delta across all six positions) of just three seconds for the *Quadruple Tourbillon*, four seconds for the *Double Tourbillon 30° Technique* and five and one-half seconds for the *Tourbillon 24 Secondes.* When discussing the precision of their timepieces Forsey says, "We're down to tenths of a second, without exotic materials, but with our ground breaking mechanisms."

Stephen Forsey on *Watchmaking Tools*

I asked Stephen Forsey if he had a favorite watchmaking tool and he struggled to choose just one, but he came around to telling about "a nice comparator that was made in one of the technical schools." Clearly, he appreciates all of his tools (maybe more than his children). He shared a story about finding his Dumont Hairspring Cutters from his home workshop in a kitchen drawer. I'm sure we can all relate to this kind of nightmare scenario. When it comes to tweezers, he says, they use mostly "nickel-silver; it's a bit tougher than brass. Bergeon made them, but you have to refinish them." For me, it was inspiring to think that when I am at the bench, I am using the same tweezers that put together the masterpieces at Greubel Forsey. His favorite, he says, "are probably the Dumont Tweezers with boxwood tips. Teflon is really slippery, but boxwood is nice."

Stephen Forsey on *Changes in the World of Watchmaking*

When asked about changes in the world of manufacturing, Forsey pondered for a moment and said, "If we look over the last generation since the quartz crisis, the technology that almost destroyed the mechanical watch has actually enabled us to do stuff we could never do before—technologies like, 3D CAD, machining, and EDM, for example."

"You can't get people to work like machines and expect them to be artistic."

When it comes to after-sales service and retail watch sales and repair, "There has been a drive to raise the level of service. There is a challenge to educate the client. The retailer has a big role to play there. Consumers still harbor a misconception that it is not normal to have your watch serviced." At Greubel Forsey, they recognize this challenge and they have two after-sales service watchmakers available to fly anywhere in the world and meet with a customer who is in need of some technical assistance. This way, they can talk to the customer and explain how things function, as well as communicate their passion and understanding for mechanical masterpieces. This is

stephen forsey: the watchmaker's watchmaker

BY JORDAN FICKLIN, CW21

2011 first-place winner of the Chronometry Competition, the Double Tourbillon 30° Technique in red gold is a mechanical hand-wound movement, calibre GF02s. It features an hour and minute display, small second display, outer tourbillon 4-minute rotation indicator, inner tourbillon 60-second display and power-reserve indicator (120 hr. reserve.) The complete movement has 385 parts, 2 tourbillon cages and there are 43 jewels. To see the many specifications of this and the other timepieces featured visit: www.greubelforsey.com

a part of customer service. It makes a real difference to have a watchmaker in the store who can explain the workings of a watch.

"It's our responsibility to do the best we can."

Another thing that has changed in watchmaking is the level of the consumer's knowledge, and the retailer is obliged to up his game to meet the level of expertise of the consumer who is coming to buy. The consumer is coming in prepared, he has done his homework, because from the Internet and from the specialized magazines he can get a lot of information up front, and he comes in with many questions. This is positive because it means consumers are interested in their watches, so the retailer must be able to rise to this new challenge.

Stephen Forsey on *Lessons Learned in Watchmaking*

When I asked Forsey what he would tell his younger self, it only took him a second to come back with, "Work harder." He also noted that, "In the beginning when Robert and I were doing the movement construction, an eight-hour day just wasn't long enough. It takes some time to get going and plunge right to the heart of the project."

"Everything that can be hand finished without destroying the technical function is."

In terms of movement design, Forsey says, "Don't forget basic mechanical principles. This is one of the key things, and even in watch repair as well, there are basic mechanical principles. Don't forget about tolerances, check the free play of the components, be rigorous, don't assume everything is good. You have to be curious and analytical. To be a good watch repairer you need to have that sense of diagnostics, you need to be able to diagnose a problem. So many times watchmakers are pushed to work fast and even lose their concentration on the all important details. . . Even when constraints exist and you have objectives to meet, you have to work efficiently . . . practice makes perfect. When that first balance staff is no good and the second one is a little better, that third one is getting good, by five you are doing quite well, and by ten it is coming together."

Some Final Thoughts on *Greubel Forsey's Philosophies and the Future of the Company*

To conclude, I wanted to leave you with quotes from Stephen Forsey. These are insights into his thoughts, and in turn, have helped develop the processes and watchmaking philosophies of Greubel Forsey. You'll find these nuggets of watchmaking wisdom have been spread throughout this article in the form of interjected quotes. ♦

BY JORDAN FICKLIN, CW21

The Atomic Wristwatch:
Amazing Technology

One of the most amazing pieces of technology in the world of timekeeping is the radio-controlled or "atomic" wristwatch. The radio-controlled wristwatch is an ordinary quartz watch with typical quartz accuracy, but once a day (typically around 2 a.m.) the watch will synchronize its time with that of a standard time source, like the WWVB here in the U.S., the DCF77 in Germany, or the JJY40 and JJY60 in Japan. These time standards are controlled by extremely accurate atomic clocks and ensure that the timepiece on your wrist is never off by more than a second as long as it can receive the radio signal from one of these time sources. The technology isn't exceptionally "new." Patents referencing the positioning technology in these movements go back as far as 1982 and Junghans patented the entire system almost identical to the one in use today as early as 1987.

These atomic wristwatches can have a digital display, an analog display, or both. I'll focus on the analog version because it is much more interesting, and there are some details about the service of these watches which cannot be overlooked, should you need to perform a complete service. The analog movement has three basic functional groups:

1) An ordinary analog quartz movement for timekeeping
2) A radio receiver
3) A system for tracking the position of the hands

The most interesting aspect of these watches is the system for determining the position of the hands. In 1982, ETA filed a patent for "an Electronic watch with means for detecting the movement of a hand through a reference position" (U.S. Pat 4420263). In

the atomic wristwatch: amazing technology

BY JORDAN FICKLIN, CW21

order to achieve this, the watch was "provided with an electro-optical detection device." This patent is later referenced by Junghans, Seiko, and others in development of their own systems.

The electro-optical detection device consists of a broadcast device and a receiving device placed exactly opposite each other attached to two circuit boards, one which rests between the dial and mainplate, and the other above the train bridge. (See the square-tinted components in Figure 1 and the diamond-shaped component encircled left-of-center and visible through the hole in the silver-colored gear in Figure 2.)

Figure 1

Figure 2

The watch has two gear trains each driven by a distinct motor. The train for the seconds hand consists of a rotor and four wheels. The intermediate wheel (as are all of the wheels) is solid brass and has one hole in it. Its associated pinion drives two different wheels, one with a long pivot for the seconds hand and another wheel with the same tooth count as the seconds wheel that overlaps the intermediate wheel and which is used only for positioning. Once per minute, the hole in the intermediate wheel will align with the hole in the positioning wheel directly over the sensor located on a circuit between the dial and mainplate (center of Figure 2). This alignment is used to reference the position where the second hand points to 12 o'clock. (Figure 3)

Figure 3

The position of the hour and minute train is referenced by the alignment of holes in four different wheels, the hour wheel, the center wheel, the intermediate wheel for the hour and minute train, and the seconds wheel from the seconds train. All four holes align only once per 12-hour cycle precisely at 12 o'clock. In order to ensure the seconds wheel doesn't block transmission of the electromagnetic radiation it is positioned first at the twelve o'clock position and then stopped. The hour and minute train is then advanced until the other holes align with this hole above the sensor. (Figure 4)

With this system, the programmed intelligence can only confirm the position of the hour and minute hand at exactly 12 o'clock, but can confirm the position of the seconds hand every 60 seconds. Once the time signal has been received and the hands are set and operating, the watch only confirms the position of the second hand at 2 a.m. when it turns on its radio receiver. It is assumed that the hour and minute hands will still be accurate. Once it has received the correct time signal, the position of the seconds hand

BY JORDAN FICKLIN, CW21

Figure 4

is confirmed and corrected, ensuring the time is exactly set.

Because of this positioning system, it is important to position the wheels of the gear trains correctly when assembling the gear train. First you need to know the position of the lower sensors (either by having that circuit in place before installing the gear train or by being aware of its positioning). Install the hour wheel with its opening over the sensor. Then install the minute wheel and center wheel with its hole aligned over the hole in the hour wheel. Install the intermediate wheel with its hole aligned with the hole in the hour wheel and center wheel over the bottom sensor. When installing the rotor, care must be taken that it is positioned with its magnet aligned with the field of the stator. When you install the rotor, if it forces the gear train to shift the holes, the point of alignment may occur during "steps" instead of between steps. Because the rotor turns 180° at a time, each step of the intermediate wheel is large enough to displace the entire distance of the hole in the wheel.

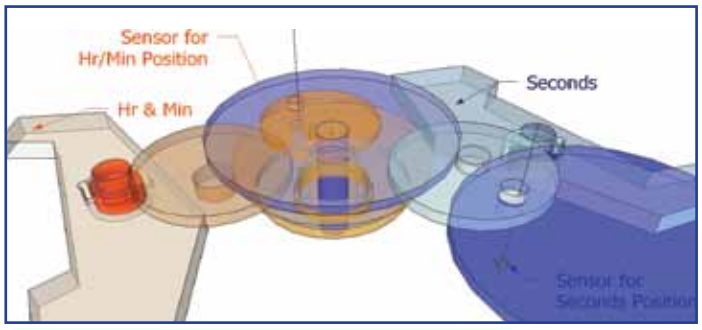


Figure 5

With the hour and minute train properly aligned, install the seconds train by aligning the hole in the intermediate wheel over the bottom sensor. Align the hole in the positioning wheel above the hole in the intermediate wheel and align the hole in the seconds wheel over the aligned holes in the hour and minute train. Once again, be sure the rotor is at rest with its magnet aligned with the field of the stator, and that it does not shift when installed in the upper bridge.

When you install the battery (after finishing installing the circuits, etc.), the seconds motor will begin to turn until the wheels reach the known reference position (where the holes align) and then the hour and minute train will turn until it reaches the reference position. Once both trains have finished their rotation, you can install the hands, all three pointing to 12 o'clock, and wait for the watch to receive the time signal. The watch will set the time itself.

If after you install the battery, either motor spins or does not stop, that is an indication the corresponding gear train has been installed in such a manner that the holes never align correctly and the reference position cannot be ascertained. You will need to try to reposition the wheels, paying special attention to the positioning of the holes in the wheels over the sensors. The alignment must occur between steps of the motor when the rotor is at rest.

Most watches are unaware of the position of their hands and they have no need to know; they just keep ticking away until somebody changes the time. But, in a watch that self-corrects every night, hand position is critical. As watchmakers we are used to installing the wheels of the train without paying any attention to which teeth of a wheel engage with the teeth of the next wheel. This self-correcting technology requires that the watchmaker take care when installing the gear train to be sure that the correct teeth of a wheel interact with the appropriate teeth of the adjacent wheel in the train. It takes just a few seconds more when installing these wheels, just so long as you understand how they need to line up.

See the accompanying 3D modeled animation of the wheels positioned correctly (Figure 5) in relation to the sensors. Also, be sure to watch the fascinating video posted on the AWCI website. ♦

This article, along with a video, is available on www.awci.com on the NEWS blog. Go to FOR WATCHMAKERS & CLOCKMAKERS and click the News section on the left side.

A Major Horology Event Where Watchmaking Star Met Horology Legend!

Stephen Forsey of Greubel-Forsey was our Keynote Speaker and Archie Perkins, renowned educator and author, came to sign his latest AWCI-published book, *Antique Watch Restoration, Vol. 1.*

The Archie Perkins book signing. *From left to right* Amy Dunn - AWCI Marketing Director, Archie Perkins - Author, Ron Landberg, CW21 - AWCI Board Member, Jim Lubic, CMW21 - AWCI Executive Director, Stephen Forsey - Greubel Forsey.

Nearly 100 people purchased books to be signed. *From left to right* Archie Perkins, CMW, FAWI, Jena Borel and Gary Borel.

Mr. Forsey graced us with a 45-minute speech and showed one of his latest creations, the GMT watch, and the audience was in awe.

AWCI Invites Members to all Governance Meetings

We conduct many different meetings during conventions and swear-in any newly-elected board members. All members are welcome to come and give their input at any meeting.

Here's your Executive Committee! *From left to right* Henry Kessler, Treasurer, Manuel Yazijian, CMW21, President, Wesley Grau, CMW21, Vice President and David Douglas, CW21, Secretary.

The Parties, The Food, The Fun

Between the ELM Charitable Trust Dinner at the Forney Museum of Transportation sponsored by Panerai, and the Rolex-Sponsored AWCI ELM Charitable Trust Awards Dinner, there was lots of time to meet people, to network and to relax and enjoy yourself. Plus, there were wonderful breakfasts and lunches where you had more opportunities to make new friends in the business.

We had a fun dinner at the Forney Museum of Transportation. *From left to right* Kris Amen and Chris Amen, CW21 of SwissTech and Heinz Leuenberger and Kari Halme of Rolex.

Mary Lynn and Charlie Cleves, CMW21 at the Forney Museum dinner party which showcased historic automobiles, trains, motorcycles and bicycles.

Lots of New Products and Vendors at the Busy Trade Fair

There were 11 displays exhibiting over the two half-days of the show. This number of exhibitors was up 57% over the prior year.

Henry Kessler (left) Treasurer, welcomes our European guests from Greiner Vibrograf, Michaela Zeller and Robert Arn.

The trade fair kept everyone hopping and also included special presentations in a nearby room.

Nikki Floyd mans the MicroPower Battery Booth, a new exhibitor this year. Another new exhibitor for 2012 was Mile-Hi Clock.

The busy Bergeon booth with Gerard Meulensteen at the helm.

OSUIT Horology Students and Instructors Attend This Year

We were pleased to have the Oklahoma State University Institute of Technology (OSUIT) school and their instructors, Jason Zeigenbein, CW21 and Jason Champion, CW21, attend the convention.

Announcing the Fellow Award: Congratulations to Jerry Faier!

Our long-time and very deserving member, Jerry Faier, was given the AWCI Fellow Award this year. A CMC21 and the owner of *The Clockmakers* in Glendale, Arizona, Jerry has been the Education Committee chair, and he was instrumental in developing the Clockmaker Standards and Practices and the 21st Century Clockmaker Certification. He was also an author and instructor for AWCI over his 30 years with the Institute.

AWCI FELLOW

Jerry Faier, CMC21, the newest Fellow of AWCI.

Reaction of the crowd at the Awards Banquet upon hearing that Jerry Faier was given the AWCI Fellow Award.

The Fellow Award was presented by John Bryant, CC21, Michael Gainey, CC21 and Bob Ockenden, CMC (*from left to right*). A video was made of the event and sent to Jerry who could not be present.

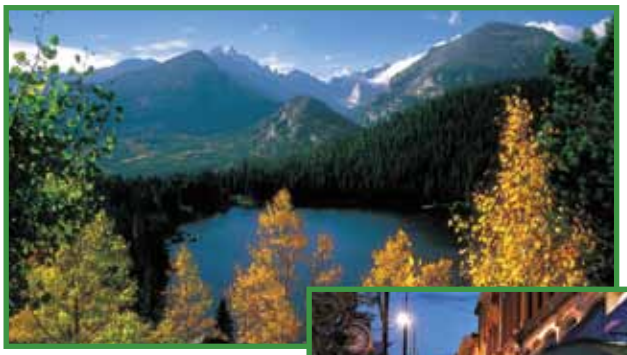
Informative Watch-Clockmaker and Business Classes

Attendees could hear presentations on everything from *Marketing Your Horology Business* to repair ideas for *French Striking Clocks* to *Water Resistance Testing for Protection and Profit.*

Six classes were offered. Watchmakers who attended all three of the watchmaker topics earned CEUs. Overall, the classes were so informative, we had clockmakers attending watchmaker courses and vice versa. Yet, everyone believed they came away with key learnings, even if the course wasn't in their main field. We would like to thank the six presenters who put so much time and effort into preparation, then gave each session twice during the convention so the maximum number of people could attend.

Denver: The Perfect Convention and Vacation Spot

From a night on the town to all the beauty the Rockies have to offer, many stayed over to enjoy some vacation fun.



Many of us spent time in Denver with its museums, shops, restaurants and nightlife.

Only an hour from Denver, the Garden of the Gods had magnificent sandstone structures that were an incredible sight to see.

AWCI Owes Many People and Companies Many Thanks

We would like to thank the following sponsors of major events:

OFFICINE PANERAI FIRENZE1860 — Sponsorship of the ELM CharitableTrust Fundraising Dinner

ROLEX — Sponsorship of the Rolex AWCI Charitable Trust Awards Dinner

BREITLING 1884 — Sponsorship of the breakfast for the Keynote Speech

SWATCH GROUP — Providing Transportation to the Friday Evening Dinner Event

We would also like to thank the members of the Convention Committee. They worked hard on preparation and continued to work throughout the convention to keep everything on track. Thank you Ron Price, Chairman, Terry Kurdzionak, Mark Butterworth, Tom Nesbit, CW21 and Jim Lubic, CMW21. ♦

This Year:

- Attendance up 56%
- Vendor Fair Exhibitors up %57
- Attended by Students & Instructors from OSUIT
- 6 Watch-Clockmaker Classes
- Numerous AWCI Governance Meetings with Members in Attendance

Next Convention in 2014!

Look for the next convention in two years, possibly to be held in July in the Midwest or East (for more information see the Executive Director's message, page 3).

flickr from YAHOO! **ANYONE WANT PHOTOS OF THE CONVENTION?**

Get online and download them for FREE:
www.flickr.com/photos/awci-august2012convention/

The 2012 Convention — A Student's Point of View

OKLAHOMA STATE UNIVERSITY INSTITUTE OF TECHNOLOGY

The following are comments and photos of some students from the class of the Oklahoma State University Institute of Technology (OSUIT) horology school. We appreciate the efforts of the school and the instructors, Jason Zeigenbein, CW21 and Jason Champion, CW21 who made the effort to get both classes of students to Denver. We also thank the following companies who sponsored the students at the AWCI Charitable Trust Awards Dinner:

Cas-Ker Co. • C.R. Time Co. • Eckcells
Jules Borel & Co.• Sy Kessler Sales, Inc.

Some thoughts from DAVID HO:

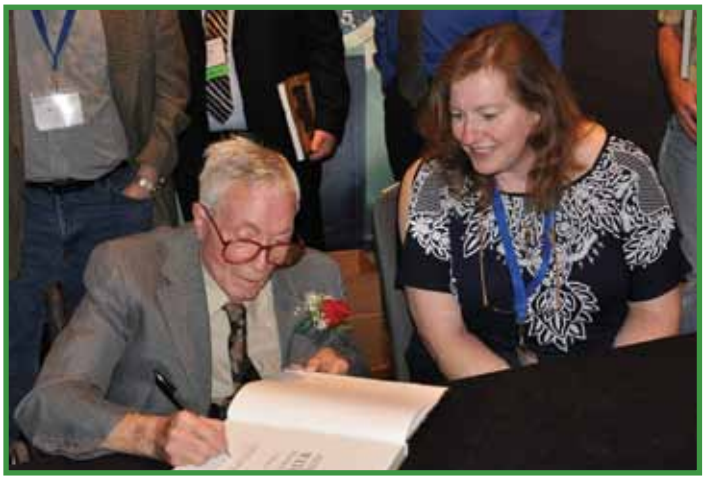
I was able to meet one of my idols, Stephen Foresy, at the convention. I had the chance to tell him that he had inspired me to become a watchmaker. The convention was a great time to broaden my network and connect with others, and I enjoyed every event that took place. I would love to attend more of AWCI conventions whenever they occur, but that will be something I'll have to work on after I am done with my training at OSUIT and have a bit more time to help out with AWCI.

I did attend all of the watch classes and took a lot of beneficial notes. I found the Water Resistance class valuable since that is directly related to our class course for this semester. During the dinner at the museum of transportation, John Sokol from Richemont gave me his last business card to share with my classmates. He asked us to call him for possible available positions. I was also able to share a bit of my time speaking to Manuel Yazijian, the new president, about my future after graduation from OSUIT.

A Student's Point of View

Students attending the keynote address, (From left to right) Jason Shelton, OSUIT, Andrew Campbell, OSUIT and a student from the Texas Institute of Jewelry Technology.

OSUIT students and instructors attend the Trade Fair to learn about various products and vendors in the industry.



Archie Perkins signs his newest AWCI-published book for Jill Sterling, OSUIT student.

A Note from JASON SHELTON

The convention was great! I enjoyed the classes and everyone was wonderful. I definitely will be attending more in the future.

Comments from ANDREW CAMPBELL

I was one of the watchmaking students who attended from Okmulgee's OSUIT school. I heard after I returned from break that AWCI wanted to hear from us about the convention. My take is, it was a true honor to meet both Mr. Forsey, and Mr. Perkins, both a huge inspiration for me as a student!. I never imagined I would get the chance to question Steven Forsey himself about coupled sympathy in tourbillions and gear hobbing, but I did! I had more fun meeting some incredible horologists from all over the U.S., and heard some amazing stories from everyone. I definitely had a wonderful time and can't wait to come back to the next AWCI convention. You will definitely be seeing me again. Thank you for having us all.

Observations From JILL STERLING

Never in my wildest dreams, have I ever expected a group of strangers to treat me with so much warmth and true hospitality as I was when I arrived at the convention! I felt as though I was meeting a group of old friends...that I had ironically never met before.

My favorite time of the day was in the morning, having the opportunity to have breakfast with so many interesting people that I had so much in common with. There were discussions ranging from the trials of owning a business to what sort of exotic wood John Harrison fashioned his famous clock from!

I really enjoyed Mr. Forsey's presentation, and was fascinated at the prospect of incorporating the incredible work of Willard Wigan into a timepiece! Then, getting to meet Archie Perkins was icing on the cake! What a kind, generous soul!

I am grateful to everyone who sponsored us, as it made every student in our program able to attend. I am looking forward to the next AWCI convention in 2014, and hope that in the future my paths cross again with so many interesting and wonderful AWCI people!

My thoughts on the AWCI convention from LORENA WILKINSON

This was my first AWCI convention, and I could not have felt more welcomed. It was overwhelming and such a good feeling to feel welcome and included with this group of such accomplished and experienced watchmakers and clockmakers. There were so many people eager and willing to share their knowledge and valuable advice, ranging from how to go about getting a job, what locations were ideal, down to what the best tweezers are! It was such a wonderful opportunity to learn from them. The classes offered were also interesting and helped me attain a deeper understanding of the subjects covered. I am so grateful to everyone for giving me such a positive first experience. Thank you!

Remarks from MINKYU KIM

This is the first AWCI annual convention in my life. I wasn't sure what to expect as a watchmaking student, but after arriving and getting to talk to a lot of AWCI members that were in attendance, I realized there are a lot of things to learn and share at a convention. Even with my basic understanding, I was able to come away with a lot of valuable knowledge regarding horology. I was also very inspired by Mr. Forsey's creations. He was an amazing speaker and left a very strong impression on me in regards to my future watchmaking career. ♦

Asif Ahmed Ashraf also has his copy of *Antique Watch Restoration, Vol. 1* signed by Mr. Perkins at the AWCI convention.

AWCI Convention 2012: One Member's Musings

BY BLAKE PETERSEN

There was much value at the AWCI Denver convention. The most obvious value is realized when it converts to income at the repair bench and at the customer counter. And there is a hidden value in the expanded network of professional associates and new friends. If you came to the convention with the right attitude and were open to discovery, you probably left with many new ideas that were gleaned from other members, or were teased out of a presenter. Astute members found much more value at the convention than was advertised.

The 2012 Denver convention was my first. Here, I met, in person, some of my *Horological Times (HT)* acquaintances for the first time. They really are nice people. In fact, I found the convention full of nice people. One of the first was Michael Gainey. Before the welcome reception was over on Thursday evening, Michael had challenged me to write part two of his article, *Another Man's Thoughts and Experiences* (October 2010, *Horological Times* p.42).

About 1979 I joined what was then the AWI (American Watchmakers Institute). I had grown up around my father's clock repair business where I learned to repair clocks. My first experience was tearing down an Ansonia time and strike movement without any instruction or supervision. It exploded in my hands. I will never forget what Dad said, "Anybody can tear something apart. It takes someone with brains to put it back together." He told me that if I could put it back together he would show me how to adjust it so that it would run properly. That uncased movement kept time on my bedroom wall until I left home some years later. Dad could see my aptitude and interest and said that he would teach me...after I finished reading *Practical Clock Repairing* by Don de Carl. I remember reading about tools and techniques that I had never seen and would not see again or use for many years... if ever. But I read it anyway. I enjoyed the fascination of the machine and the satisfaction of an old worn clock running again. I thought Dad new everything and could fix anything. I continued to learn many more repair techniques through my teenage years.

One Member's Musings

Denver

BY BLAKE PETERSEN

When I was 18, Dad associated his repair business with AWI master watchmaker Allen White (now deceased). This exposed me to a whole new world of tools and fascinating time machines. Dad encouraged me to learn watch repair. Allen offered to help. I studied the Chicago School of Watchmaking program and practiced my new skills under Allen's careful supervision. I loved clock and watch repair and continued in the business until the early 1980s. At that time there were still many experienced watchmakers and a diminishing demand for their services. I was married and starting a family. Watch and clock repair did not look like a good career path for me. My repair work was reduced to part-time nights and weekends. In a few years it was boxed up and stored for 25 years. I could not have imagined that I would ever return to the repair business professionally.

In 2004, Dad needed help with his clock repair business. A little brushing up on some clock repair skills and a few weeks with Dad and I was excited about clocks again. I enjoyed it so much that my wife and I offered to buy the business. We began with an expansion plan that in 18 months had doubled the size of our business.

So what does this have to do with the AWCI 2012 convention? In acquiring our new business I knew that a lot had changed in the years that I had been away from the business. Many of the watch and clock repair people were gone. My skills were not as sharp as they had been. There was a new, but different, opportunity for skilled mechanical clock repair people. I was confident that if done properly clock repair could be profitable. I knew there was a lot to learn about succeeding in a small business, and many more technical skills to be acquired, as well as a network that needed to be developed. I re-joined the AWCI. I began reading all of the literature that I could find. There are volumes of information in the AWCI library. The *Horological Times* past journal issues became my frequent companion as I gleaned through volumes of tips, tricks, techniques and theory, as well as business skills and history lessons. I checked out many training videos and presentations from the library. I scoured the Internet for answers to every new question. I came to know, through these media, many current and past authors. They offer a gold mine of information and help and have left a well-marked trail of literature. One of the many recurring themes I came across was the encouragement to join in the training and networking opportunities that are part of the association benefits, particularly those available at the annual convention. Our business was growing, I was busy, and conventions are expensive. The library, videos, and journals would have to do. Seven years passed. I seriously considered attending the 2011 Vancouver convention. Family commitments prevented my attendance. Convention 2012 was in Denver. I committed to attend, and this time I made it.

Beginning with the board meeting on Thursday afternoon I attended everything that was possible including the final breakfast on Sunday morning. A lot happened in these 4 days. Education, networking, customer relations, benchmarking, business models and techniques, comparing notes, sharing struggles and successes, witnessing victory and defeat, watching members offer a helping hand and an encouraging word. Everything that I experienced at the convention validated all of the articles and advertisements inviting members to participate. Three of the classes offered at the convention were specific to wristwatch repair. Our business does not offer service for wristwatches but I attended the classes anyway. I was handsomely rewarded with something from each of these classes that will be useful in our business. There were take-away and practice pearls that will help with the success of our business. I saw business professionalism, learned more customer skills, learned about a variety of business models for specific problems, and learned about looking up and down the line for problem sources. I went with an open mind hoping to discover what I didn't know and I wasn't disappointed.

During my professional years as an Industrial Safety Engineer I had the opportunity to attend many conventions. Hundreds, and sometimes thousands of members attended. The industry suppliers filled convention centers larger than a football field. Keynote speakers began with on-stage fireworks and ended with thunder. Seminars were filled with hundreds of attendees. I don't remember having an opportunity to visit personally with a keynote speaker or a seminar presenter at any of these conventions. At the AWCI convention I stood with a half-dozen other members at a social table and enjoyed more than an hour of personal conversation with Steven Forsey,

BY BLAKE PETERSEN

the keynote speaker, a very cordial and successful horologist turned inventor and entrepreneur. He shared his journey of hopes and dreams, hard work, ideas and business adventures. How exciting it was to see and hear of his work and success. Opportunity is still available in the clock and watch industry, even if you have to invent it yourself. I was able to visit individually with seminar presenters, board members, and members of the executive/administrative staff. They were all available to me. The size of the AWCI organization, no doubt, has caused the organization to change the way it operates in order to maintain fiscal balance. But it has also concentrated some of the very best horologists and business professionals into a uniquely intimate group with tremendous value for the members. These people were available to me and they are available to others, as well. It was a great convention for me. I would encourage each member to plan now (you have two years to save and prepare) to attend the next convention in 2014.♦

affiliate chapter news

Future Meetings:

North Carolina Watchmakers Association

NCWA Auction - Watchmakers and Clockmakers Sponsored by GTWG

Sunday, Nov. 4, 2012, Doors Open 8 a.m., Auction at 11 a.m.

Embassy Suites Hotel, 204 Centerport Dr., Greensboro, NC 27409

$5 Cover Charge • 10% Sellers Fee – Buy or Sell!
For more info contact:
Rick Dunnuck 336-674-2686
rick@rickstimeshop.com

Minnesota Clockmakers Guild (MCG)

Upcoming Meetings

Thursday, November 1, 2012 MCG Meeting
Topics: Laser welding for small part repair and construction by Duane Tvenge, owner of Jayandee Services.

PLace: Jayandee Services, 2271 Waters Drive, Mendota Heights, MN. 55120

Thursday, December 6, 2012 MCG Meeting
Topics: Display and discussion of clock class clocks; Election of officers; Brass—what is it, what makes it good for clocks by Elliot Tadmore, University of Minnesota Aeronautical Materials Engineer.

For more info contact:
Dean Ziegenbein, 952-322-4776,
dpz72@hotmail.com

BY JACK KURDZIONAK, CW21

Make Some Lemonade

Long ago, and not too far away, I spent fifteen years teaching science in a large public high school. One colleague named Karen, a biology teacher, had a poster on her classroom door that featured a picture of some lemons and a glass of lemonade. The caption on the picture read, "If life hands you lemons, make lemonade." Karen always encouraged her students to make the best of whatever situation life presented them. Karen did not have us watchmakers specifically in mind when she taped that poster on her door, but we would do well to consider the advice and reevaluate our current replacement parts situation, particularly as it applies to quartz watch coils and circuits manufactured by ETA in Switzerland.

ETA notified us about this time last year, that they would discontinue the supply of electronic components for their quartz watches. Many watchmakers had become highly skilled in the repair of quartz watch movements and suddenly they found that a critical component, necessary for many repairs, is gone. ETA still provides the other components for their quartz movements but without a circuit, they justifiably ask the question, "Why bother repairing the movement?" Well as Karen, the biology teacher advised; "Try making lemonade from these lemons."

ETA still provides complete quartz movements. Quartz watches do not care if the watchmaker repairs or replaces the movement, so why not replace the movement? It takes less time to replace a movement than it does to rebuild that component. The new movement will be more reliable than a rebuilt movement. Yes, the material cost for a new movement is greater than a circuit, but the labor cost involved in the movement exchange is far less than the cost of rebuilding the movement. The total return for the parts and labor involved can be greater than the return generated by rebuilding the old movement. All major watch companies now exchange (the factory term for movement replacement) the quartz movements in the products sent to their service centers. Perhaps, they know something we do not. They would not be exchanging movements in these service centers if it were more profitable to rebuild the old ones.

The last time I checked, Swatch Group and its subsidiary brands, which include ETA, have an annual business turnover of well over $10,000,000,000 and that is billion with a B. Why not let ETA's supply of complete watch movements help us turn lemons into more palatable lemonade?

A Great $40 Tool

Where can a watchmaker find a great tool with multiple uses for $40? You will not find such a versatile tool in any Swiss catalog and do not let its low price fool you. The watchmakers I know who own one use it many times a day. This tool is a great help when removing crystals bonded to a case with epoxy or UV cement. The same tool loosens bracelet screws that have been secured to the bracelet links with some variety of Locktite. It will also break the adhesive bond securing case tubes to watchcases. If you have a basket of cleaned watch parts that did not thoroughly dry in the heater of the cleaning machine, it is not a problem as this tool will dry those parts in a few minutes. Got a wet case and/or bracelet that need to be thoroughly dried? Use this tool.

Many watch manufacturers now specify Epilame (AKA Fixodrop) treatment for certain movement parts after they have been cleaned. This treatment requires heat to set the Epilame on the part. Again, this tool comes to the rescue. Finally, do you need to warm up a slice of left over pizza from yesterday's lunch? This tool will heat leftovers for your lunch.

This tool shown in the accompanying photo is a Black and Decker brand convection oven that retails for about $40 from Wal-Mart which will do the jobs mentioned above and many more not yet thought of. The manufacturer sells it as a multi-purpose toaster, broiler, oven, and convection oven. However, watchmakers will find it most useful as a convection oven. Convection ovens, in addition to the heating unit, have a fan that continually circulates the heated air inside the oven so that the inside temperature is evenly distributed. This low cost unit comes with a spring-powered mechanical timer regulated by some sort of escapement that sounds like the ticking of an old alarm clock. The thermostat has a range from barely warm to over 450°F. The glass door permits a good view of anything placed on the adjustable height shelf inside the oven.

Watch cases and bracelets dry very well when left in the oven at about 150-160°F for ten minutes or so. The circulating warm air inside the oven helps evaporate any water trapped in a case or bracelet.

It takes more heat, about 300°F, to break the bond between a crystal and bezel for crystals secured with epoxy or UV cement. Again about 10 minutes at that temperature seems about the correct time. Any watchcase and crystal heated to 300°F needs to be handled properly until cool to avoid any personal burn injury. 300°F is too hot to handle. Many manufacturers secure bracelet link screws with thread locking adhesive such as Locktite. These screws can be difficult or impossible to remove without damaging them. Weaken the thread locking bond before attempting to turn the screws by heating the bracelet to about 300°F for a few minutes. Again, until the parts cool to a safe temperature, handle the heated parts with care.

Do not subject painted parts, gaskets, plastic crystals and parts made of plastic material to the high temperatures generated by this oven. Remove any such parts from the case and/or bracelet before heating. Only heat metal components, or parts you know that can withstand high temperatures, in this or any oven.

Bear in mind, this unit is not a commercial grade oven, but with careful use, it will do a good job for many simple shop tasks. If you buy one and decide not to use it in the shop, it does a good job toasting bagels for breakfast. ♦

BY MATTHEW BLEECKER

Vacheron and Constantin and the "War To End All Wars" Part 2

A Brief History:

In May 1918, purchasing agents from the American Expeditionary Force (AEF) drafted an order for 5,000 Vacheron and Constantin pocket watches. These watches were headed to the U.S. Corps of Engineers to be used primarily for the supervision of railroad operations in France. 3,289 of these chronographs were delivered by the end of WWI and the author's great grandfather eventually came to own one of them. This series of articles details the author's work to restore this family heirloom while a student at Lititz Watch Technicum.

An Overview

This article series was developed from my thesis at Lititz Watch Technicum. The first article in the September *Horological Times* covered a brief history and technical information about the Vacheron and Constantin pocket chronograph being serviced. I introduced the theory behind the "hedgehog" stop works, but all work done on that came later. Due to time constraints, no practical portion of the stop works fabrication was included in the original thesis, but this will be covered in Part 3 of this series in the November issue.

This month's segment details the repair done to the main plate and the process of making the first half of the new balance staff.

The Balance Hole Jewel

The next undertaking was to actually fix the lower hole jewel for the balance. This needed to be done because the jewel was the wrong style jewel. Under these conditions I was very surprised that the watch was even running. The balance staff was incorrect and worn because of its incorrect relationship to the jewel. Metal shavings had begun to build up inside the jewel. The process was carefully thought out with a necessary backup plan. I sketched the arrangement of the current hole jewel with the extra cap. (All sketches have been redrawn here for clarity—see Figure 1).

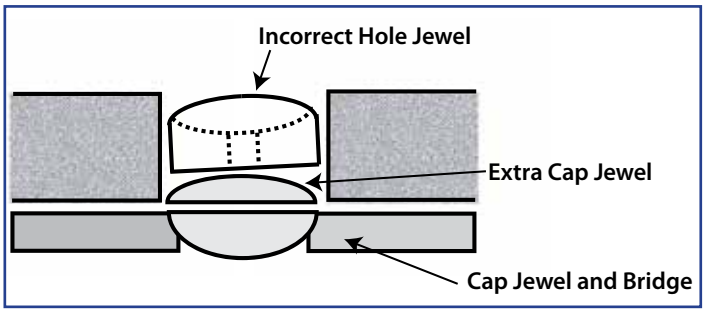


Figure 1

I began by searching for a jewel with the correct hole diameter and correct outer diameter to be re-burnished into the main-plate. When I found that I had a few jewels that would most likely fit, I went ahead and shattered the jewel (Figure 2).

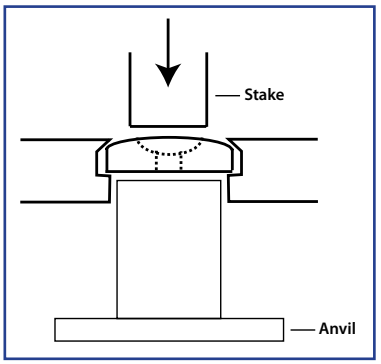
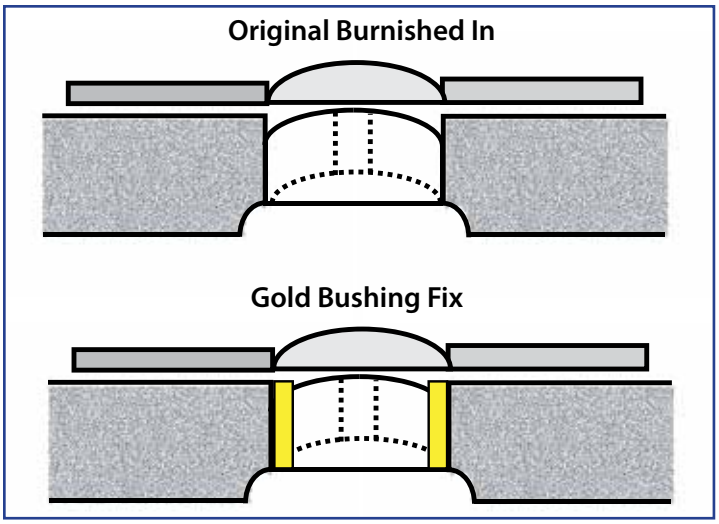


Figure 2

I discovered after shattering the jewel that it was actually friction fit in and not burnished, as I had thought. This was good and bad news. The decision had to be made as to whether to cut a new shoulder for a new burnished-in jewel, which would bring it back to its original form, or to take a different route. I decided that it would be safer to take a less invasive route. As it stood, the existing lower jewel hole had been reamed to a 1.39 mm diameter hole and a burnished in-setting was friction-fit into place. This meant that the jewel was burnished into a gold bushing, and the bushing was then friction fit into the main-plate. The bushing measured 1.4 mm diameter and had a inner hole diameter of the jewel hole for the balance staff of .12 mm (Figures 3 and 4).

It was necessary to alter the diameter of the gold bushing to the correct and exact size. To accomplish this, I turned a centering post of .12 mm diameter

BY MATTHEW BLEECKER



Figures 3 & 4

and glued the jewel bushing in place. I then turned the outer diameter to the correct dimension. I was only able to find one burnished-in jewel setting with the proper hole diameter, so this operation had to go without a hitch the first time through. It did, and now it happily resides in the main-plate of the watch.

The Balance Staff

This is perhaps the longest and most necessary chapter in this entire project. Since the jewel situation in the previous section housed a balance staff that was now significantly too short, I was about to undergo what has been called "finding the ghost staff."

From the old staff I derived the diameters and what I assumed to be the proper length dimensions for the upper half of the staff. The lower half of the staff was half there. The roller table had proper divisions, so the length of that cylinder only needed to be long enough to accommodate the roller table. This roller table has the Swiss-style roller and safety roller as all one piece, which makes the staff easier to construct. The only part I really had to figure out was the length of the lower tapered oil shoulder and pivot. Because pivots are always the same length, the only real mystery was the overall length. It took me three tries before I made a staff that was the proper length.

The first operation is to cut the upper half of the staff. I consider this the hardest half because of the number of shoulders whose dimensions have to be exact. The order I follow for cutting a staff is this:

1. The largest diameter
   - which is the seating area for the balance wheel
2. The rivet shoulder
   - which fits though the hole in the balance
3. The collet shoulder
   - which also defines the length of the rivet shoulder and the undercut for the rivet
4. The upper taper oil shoulder
   - which defines the length of the collet shoulder
5. The pivot
   - both the pivot and conical shoulder

After all dimensions are verified, I then proceed to finish those shoulders that need to have a very good surface finish. In this case, I wanted the tapered shoulder and the end of the collet shoulder to have a near-polished finish. This I achieved after some trial-and-error in my techniques. In Figure 5, the undercut has not yet been made. This step I changed to its new version in the process above. Previously, I had been waiting to cut it, but some former mishaps caused me to rethink the process.

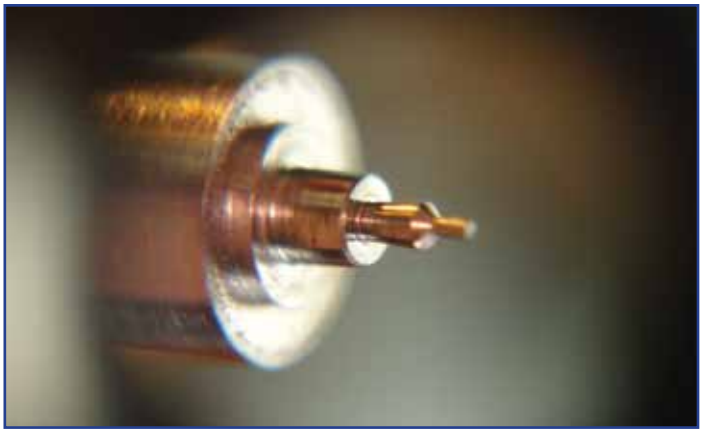


Figure 5

The balance seating shoulder is then cut into definition from the backside. I used a slot cutter to achieve most of the dimensions from here on out. I prefer to cut a balance staff in one turning operation which helps insure centricity. The length of the balance seating shoulder as it descends into the lower half of the staff is also the roller table seating shoulder. This defines both the division of the balance wheel and the roller table.

In next month's Part 3 of this article the balance staff will be finished. The stop works will also be discussed with photos of the setup and final product. ♦

BY J.M. HUCKABEE, CMC, FBHI

Ask Huck

Excerpts from the J.M. Huckabee *Ask Huck Clockmaking Bits* Series in *Horological Times* Magazine.

Reversing Great Wheels

Q: Oftentimes, the great wheels of older clocks have considerable tooth deformation. This seems to be more common in older American-made clocks. Do you reverse these wheels, or what is a suitable repair?

A: This is a problem that appears to have no good solution. Replacement wheels are not available and this leaves us with a dilemma without an answer. I've read about reversing wheels, and have also done this many times, yet it's an unpleasant thing to do—being less than the best job.

My first experience with this situation was in the late 1940s working on the 1,000-series clocks for IBM. These old-timers were as much as 40 years old and no wheels were available. The wheels were about 4" in diameter and 1/8" thick. We would lay the wheels flat on a large bench block, and with a flat-faced hammer, form the cold-flow material back into place. It looked and worked pretty well, but within a year, they were back in the same condition. I think our result was more imaginary than real. The wheel structure did not permit reversal.

Wheel reversal is not a quick and easy job. We must remove the wheel from its arbor, remove the click and click spring, and transfer these to the opposite side. We may need a new click rivet and spring, depending on removal problems. Then the riveting shoulder that holds the wheel in place may need some work, possibly cutting the face of the wheel seat deeper. The job burns up lots of time.

When finished, we still have the same old wheel, just operating on the opposite face of the teeth. I dislike this type of workmanship, but there are cases where it's just about the only alternative we have. I'm concerned for every antique clock that falls into destruction because this is a piece of our history that is forever lost. The zeal for keeping our history in place causes me to yield to some types of repair that I'm less proud of.

When you encounter a job of this type, be sure the pivot bearings are in good condition and that wheel and pinion depthing is in order. Should we slip mesh, the consequences are very grave.

Drill Bits

Q: Where or how can I determine a size range and number of drill bits used in the repair trade?

A: Let's base this answer on mid-range sizes of clocks, say from small shelf clocks through large grandfather sizes. Our largest pivots will be the winding arbor of the big one and the escape wheel pivot of the small one. This will range from about ¼ to 7 mm diameter. Drills in the number system almost span the range. A set of 61-80 bits get the small one, but a set of 1-60 misses the large size a good distance. Add a set of 1/16 to 3/8" sizes and you will cover the range. In my shop the set of 1 – 60 bits covers about 90% of my needs. If you are not familiar with the numbered sizes, look in most parts catalogs for a chart of Stubbs wire gauge sizes—the basis of the numbered system. These bits are closely-spaced in size and are very useful.

We clockmakers usually work with brass or mild steel. High speed steel bits will have a good long life. Learn to sharpen your bits and they will last for many years of daily use.

It is not necessary to purchase premium grade industrial bits for the material and usage of a service shop. I have found some of the high speed steel bits from [foreign countries] to be economical and completely satisfactory.

CLOCKMAKERS: GIVE US YOUR IDEAS ON REVERSING GREAT WHEELS!

Even the revered Mr. Huckabee says "this is a problem that appears to have no good solution." Maybe you have discovered a good solution and we've love to hear about it. Please contact Amy Dunn, Editor, *Horological Times*, 866-367-2924, ext 307, adunn@awci.com.

BY BILL THOMAS

In A Material World

The Hamilton 992B Represents the Last American-Made Railroad Pocket Watch

This article will be more a historical nature than what we would normally present in a discussion of materials, although I will still touch on watch material where it relates. The subject is the truly legendary American-made classic railroad pocket watch: The Hamilton Watch Company's 16 size, 21 jewel grade 992B "Railway Special." The watch was introduced in 1940 and was the state-of-the-art watch manufactured when sales began. The watch replaced Hamilton's successful grade 992 railroad watch which was first introduced in 1903 and was undergoing technical improvements during the course of its production. It was finally obsolete by the 1930s.

The first model of 992B from 1940 at the beginning of production. It has a yellow gold-filled railroad model case with winged wheel motif design around the back and bezel.

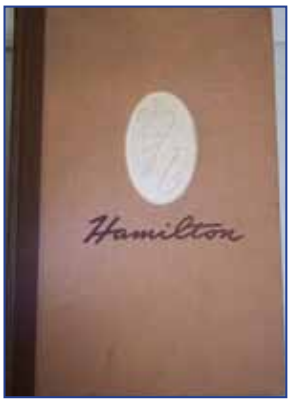
BY BILL THOMAS

A transitional grade, the 992 Elinvar, was introduced in 1931 using the Elinvar non-magnetic hairspring. Railroading itself was changing in the 1930s, with many lines becoming electrified. With the advent of the diesel electric locomotive, railroad watches with steel hairsprings would be a liability and subject to magnetism, which would be detrimental to accurate timekeeping. The first Elinvar hairsprings were not the answer as they proved soft and subject to deformation while servicing. Hamilton developed a stronger, more reliable version and called it "Elinvar Extra," and this was incorporated in the new 992B movement. As Hamilton's service bulletin for the grade 992B stated, "this is a completely new model whose parts are not interchangeable with previous models of grade 992."

Original catalog pages for the Hamilton railroad watches shown.

With the 992B, we have truly interchangeable parts. Hamilton had achieved such manufacturing precision that all the movement parts (except the hairspring) were perfectly interchangeable. The friction staff was easily removed and replaced into a steel hub in the balance without disturbing any adjustments. (The friction staff originated with Waltham's 16-size model 1899, but came in various pivot sizes and oversized versions: Hamilton's 992B used one staff—period.) The friction jewels were standardized and easily removed and replaced with no worry about end-shake, the proper depth assured in the design of the jewel hole.

As I mentioned at the outset, the 992B watch was introduced in 1940. When the United States entered the Second World War, the 992B also went to war. There were several modified versions made for the armed forces of America and its allies, most notably the navigational model 4992B with a hacking sweep seconds function and a true 24-hour dial (it had black non-reflective background with white painted figures and hands, like a typical aircraft instrument). The story of military watches and clocks has been well researched and written about, so I won't discuss it here.



Preserved 1940 Hamilton dealer/retailer catalog used at Twin City Supply where Bill Thomas is the resident watch materials expert.

After the war, Hamilton rushed to get back into civilian production, but there were shortages of proper cases and Hamilton was forced by necessity to use some cheap base metal cases from1946 to 1947, as well as some bizarre cases consisting of a gold-filled frame with stainless steel bezel and back (struck from dies that were used in Bunn Special cases from the mid 1920s), actually a hybrid version of its popular bar-over-crown model. This was not successful as the steel back and bezel cut into and damaged the threads of the softer gold-filled case center frame. As time went on and the company's costs increased, the porcelain dials were eventually replaced by the new wonder material of melamine. By 1950 the changeover was complete. However, Melamine tended to deteriorate over time and the survival rate wasn't good, but they couldn't foresee this in1950. Also, the first stainless steel railroad watch case was introduced in 1950 and lasted until the end of production in 1970. Hamilton also made watches for the Ball Watch Co., the 992B being given the Ball grade number of 999B. Hamilton's relationship with the Ball Watch Co. went back to the 1890s, but disagreements arose between the two companies and they parted ways forever in 1954.

This Hamilton 992B is a fun model to collect. There were a dozen or so documented cases used and not all were advertised and various dials were used. You'll find a few basic styles and minor variations thereof along the way. Material is still generally available (the government allowed a lot of material to be produced for the military models and accumulations of this material turns up occasionally). I am interested in this watch as it is contemporary with part of my

BY BILL THOMAS

own life experience. I was born in 1952, 12 years after the watch came out and was graduating from high school as the last 992b movements were produced in 1970, essentially a "clean-up" run using up the last of the factory's own stock of material. I have a fairly complete collection of all the 992B models, but just the other day, I observed one of those 1946 models in base metal that I never knew existed! The photos you see here are from my personal collection.

The Hamilton 992B represents the last American-made railroad pocket watch. With the end of time-table control and the advent of central traffic control and radio communications, railroad operations relaxed the strict standards for railroad grade watches. Of course, today we have satellite GPS and computerized operations, where a train in Minneapolis can be dispatched from Texas. But the Hamilton 992B has appeal to watch collectors and railroad collectors both because it remains a true American-made classic. ♦

A late model of Hamilton 992B. There were 15 in all of this Hamilton railroad model in all stainless steel. It was a later model near the end of production in the mid-1960s.

Our Members' Passing

Henry Loeser, CMW, was a member of AWCI for 48 years. He was also a past president of the Horological Society of New York (HSNY) and was involved with that chapter for many years. The following is a tribute written by his family.

In Memoriam: Henry Loeser, CMW

Henry Loeser passed away on August 26, 2012 after living to the age of 90. He was a loving and dedicated husband, father, grandfather, brother and uncle to his family with his lifelong commitment to putting his family first. As his wife and daughters, we write about our dad with love, warmth, respect and admiration.

He gave so much to us and to others, whether family, personal friends, colleagues or even strangers in need. His kindness was abundant and selfless. We know that these qualities carried over to all parts of his life, in particular his dedication to his profession where he was always striving to do his best and give the best of himself.

Our dad's craft—professional watchmaking and jewelry design—enabled him to give to others in the way he knew best. Our dad had a brilliant technical mind, always ready to take on a challenge that others could not solve. He referred to himself as the problem solver and it made him tick. More than his technical acumen, however, it was his desire to do things with kindness, proper ethics and warmth.

While president of the HSNY, he was extremely proud to be in a leadership position in his trade and the plaques hang proudly in our home letting all know that this area of passion was such a great part of his life. Additionally, his many years at Cartier, running the Service and Special Orders Departments, challenged and enabled him to channel his artistic inclinations, as well. The sketches of re-designed jewelry would start on a napkin in a restaurant and then... voila! It would become a reality.

We know he had so many close friends, colleagues, mentees and mentors in his industry, and in particular in the HSNY, and he treasured every one of them. As his family we want to express for him our gratitude to the horological community. We know he wanted you to continue with vibrancy and passion.

With appreciation and affection,
Thea Loeser, Arlette Loeser and Felise Katz (Loeser)

Tommy Kin Mo Wong, CW21

The AWCI community also mourns the untimely death of Tommy Wong of Herndon, Virginia last summer. He was an active member of the Horological Association of Virginia (HAV), and we saw him often at continuing education courses at AWCI. We will remember him for his dedication to his craft and for always pushing to learn the most he could from every class with us.

According to Tom Schomaker, CMW21, our Watchmaking Instructor and Certification Coordinator, "Tommy Wong was an ideal example of what could be accomplished when you put your heart and soul into it: Coming from a foreign country, learning our language, working hard for others so that one day, he could live the dream of owning and managing his own business here in the U.S. Tommy was a very active member and attended many, if not, all the courses we currently offer here at AWCI. He prepared and passed the CW21 exam and that meant so much to him. He would always travel together with his two watchmaking friends, Dung Duc Lam and Manu Lebaun. All three of them were just here this April attending the Advanced 21 class.

'A hard working family man' is often the term used to describe the wonderful person that he was. Always smiling and very happy was his usual demeanor. Unselfish and putting other people's needs before his own made this man a special person indeed. Unfortunately his life ended far too soon, and under circumstances that are hard for anyone to understand. He will be greatly missed by all who had the pleasure of knowing him. I may have been instructor, but through knowing him, I often felt that he was really the teacher.

Our thoughts and prayers go out to his family and friends. He will be deeply missed."

BY RON LANDBERG

Antique Watch Restoration, Vol. I

By Archie B. Perkins
Publisher: AWCI

Recently, I had the great privilege of witnessing around 100 watchmakers line up at the recent AWCI convention in order to have the chance to meet Archie Perkins and purchase a signed copy of his latest book, *Antique Watch Restoration, Volume 1*. (See Figure 1.) I have a strong belief that a book imparts a portion of the author's soul and personality to the reader. To be able to hold that in your hands and reflect on our chosen profession (or obsession) is extremely powerful.

Figure 1: During the Archie Perkins book signing at the AWCI convention in Denver, the waiting line for books wrapped around the room.

As watchmakers, clockmakers and horologists we serve to preserve many craftsmens' professions which now serve a semi-exclusive luxury market more so than the general population of the past. *Antique Watch Restoration* is packed with numerous hand-drawn illustrations and photos all done by Archie, each picture worth at least "a thousand words." (See Figure 2.)

Many common repairs of the past are now considered restorations of magnitude and the skills involved aren't practiced on a regular basis, making them daunting at the very least. When receiving an historic timepiece for repair, we indulge the desire for a challenge often throwing profitable repair aside for a chance to work on something extraordinary. While you're doing this project, I recommend you take pictures and write an article for *Horological Times.* Archie Perkins did exactly that for over 25 years, sharing what he learned along the way, imparting the necessary skills to accomplish successful repairs.

Volume 1 of *Antique Watch Restoration* covers a lot of information in its 300 or so pages (Figure 3). The first seven chapters or 87 pages cover fusee repairs and constructions. To say the skills covered in these chapters extend well beyond the fusee is an understatement. The cleaning procedure covered in the first chapter is extremely valuable for anyone working on delicate watches that shouldn't be run through a modern cleaning procedure.

Chapter eight is dedicated to the use of the watchmaker's second most valuable tool, the staking set, definitely used more often today than the watchmaker's first most valuable tool, the lathe. Archie has also published a book dedicated to watchmakers lathe work entitled, *The Modern Watchmaker's Lathe And How To Use It*. I highly recommend that every watchmaker own a copy of this, too; the skills covered in the lathe book will prove useful for many restorations. The staking tool chapter covers a brief history of the staking set, the different models and their tooling. Most importantly, it reviews all the different operations that can be performed using a staking set. There are numerous pictures and drawings to clearly illustrate these procedures.

Chapter nine through the rest of the book discusses something I discuss on a daily basis with numerous watchmakers around the world. We have all been confronted with watches with broken or missing gears. Chapter nine discusses calculating gears and trains. It's usually easier to find a replacement gear with this information. You can also use

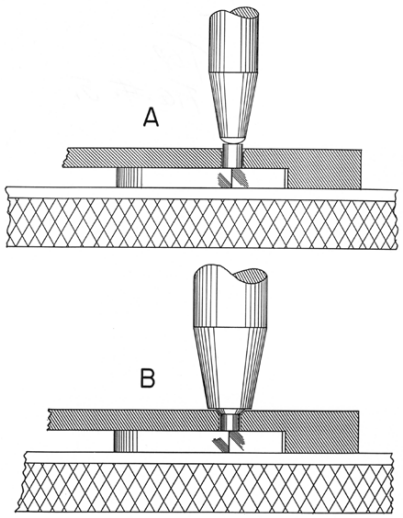


Figure 5. Riveting the new click to the maintaining ratchet wheel.

Figure 2: Mr. Perkins is known for his highly-detailed illustrations done by hand. You could compare his quality and accuracy to any CAD program today.

BY RON LANDBERG

this information to design your own watch train, and then use chapters 14-16 to learn how to do it. Chapter 14 covers the necessary cutters for wheels and pinions. Many of the techniques for cutting the gears and pinions are covered in greater detail in *The Modern Watchmakers Lathe And How To Use It.*

The cutters used for cutting gears and wheels and the numerous systems for selecting the appropriate cutter are covered, as well as techniques for making cannon pinions and winding gears. This includes gears with beveled teeth and clutch teeth. There are chapters dedicated to correcting wheel teeth, finishing winding wheels, and the repair or restoration of pivots. There is even a chapter which describes worms and worm wheels used in clocks and music boxes, not just describing them, but discussing the equations for their design and how to set up equipment to cut them.

All in all, I consider this book a must-have for any watchmaker doing repairs and actual restoration. Numerous sections will also improve skills for trouble shooting and manufacturing. It's written in English and is easy to read and understand. My only problem is that I want the rest of the volumes now. How's that for patience! ♦

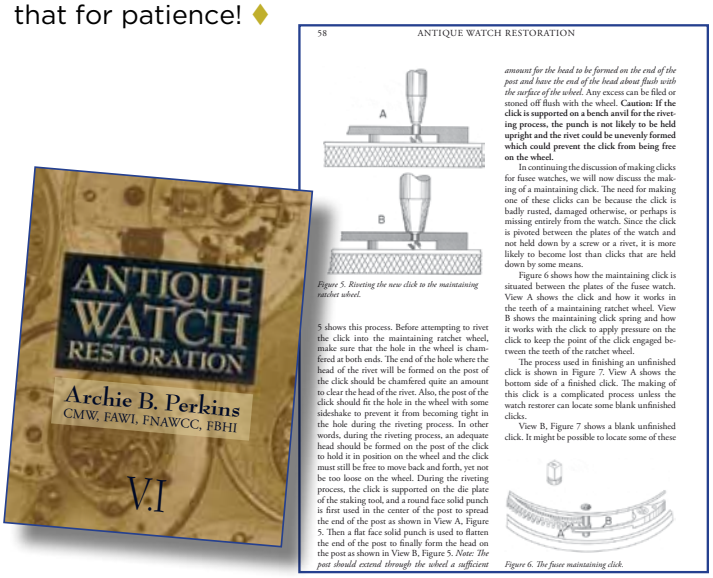


Figure 3: *Antique Watch Restoration, Vol. 1* is available for purchase at www.awci.com in the Online Store.

The payment processor you can rely on for service and stability.

Exclusive Members-Only Credit Card Processing Program

Take full advantage of your membership benefits with the American Watchmakers-Clockmakers Institute. Serving merchants for more than 55 years TSYS Merchant Solutions offers a payment processing program tailored to your business needs.

With this program you will receive:

- Negotiated member-only rates
- Qualified service representatives available 24 hours a day
- An account management team
- Free online reporting

SAVINGS GUARANTEE
We can save you money on your credit card acceptance – Or we will pay you up to $500.*

Call 888-749-7860 today for a cost savings analysis!

TSYS Merchant Solutions℠

*Three consecutive months of current statements required to verify current price. Payouts are calculated by TSYS Merchant Solutions on a sliding scale according to the estimated annual MasterCard® and Visa® transaction volume projected from your three most recent consecutive months processing statements. Offer ends 12/31/12.

LETTER TO THE EDITOR:

I write out of deep concern for some of what has recently been included in *Horological Times*. In particular I was struck by the section, Butterworth Clocks, in the "What's New" section of the July, 2012 issue.

In the article there is a reference to a YouTube video done by Mr. Butterworth, in which he demonstrates his bushing method with a drill press. There is no discussion about the direction of wear, nor any about compensating for that wear. All we are shown is a hole being drilled, freehand, oversized to allow the insertion of a bushing. As one who uses a drill press to ream and insert bushings I know from experience that his method, as presented, will yield a pivot location somewhere between the unworn, factory hole position and the worn position with no easy way to correct the damage caused by the original wear and subsequent terrible "repair."

I, too, use a drill press to ream and press bushings, but I file out the worn holes opposite the direction of wear, an amount equal to the wear (very quick with a lens file). I then check the centering on the original oil-sink, as soon as the reamer cuts all the way around, to make sure I am on the original center, making any necessary corrections before I push the reamer all the way through. Not as fast as his method, but I am sure I am back on the original center.

Plainly, the object of bushing a clock is to restore the original, unworn position, leaving the gear train functioning as it was the day it left the factory, not anything else. I suggest that mentioning this video in *Horological Times* lends credence to a destructive, sub-standard technique. There could easily be people who, after seeing the immediate past president of AWCI demonstrating this as "an instructional video on using the drill press for bushing work," who would then use it with disastrous consequences on a clock, justifying the technique because, "I saw it in *Horological Times*." As such, it does not contribute "to preserving and promoting the highest standards of workmanship in the horological crafts. It is the role of AWCI to set the standard of excellence to be applied to the quality of instruction for both the restoration and repair practices that are taught in North America."

For the sake of growing credibility in AWCI, and in *Horological Times*, I believe this method as it is presented in the video, needs to be immediately, explicitly repudiated in the magazine lest anyone think this is acceptable practice.

I understand that this was submitted as a "press release" type blurb, but there must be more careful scrutiny of such submissions lest sub-standard information be lent credibility and passed along to the readership as acceptable professional practice.

Most Sincerely,
David Arnold, CMC

Response:

Of course, the plates must be prepared before bushing work is done. I agree completely on the need to re-center the worn holes in a plate before commencing to bush the movement. At Butterworth Clocks, we most certainly do that in our own shop. We generally use files as well, but cutting burrs also work and are faster. We do the re-centering of all the holes needed on both plates before starting the bushing work. The bushing work itself is a separate operation to preparing the plate to be bushed. After the bushing work is done, it is just as critical to also polish the pivots of the clock wheels. That is yet a separate operation. We have a separate short YouTube video on that using our polishing disks.

There are various methods and tools available to cut the hole and install the bushing. The existence of hand reamers designed to hold either KWM or Bergeon cutters, simple broaches, and bushing machines come to mind. The purpose of the video was simply to show how quickly and effectively cutting the hole and installing the bushing can be done with a relatively inexpensive drill press and a $7 adapter.

I take the feedback in the constructive spirit in which I know it was intended. We did not intend to imply in any way that simply drilling holes in a plate was all there is to the complete job of doing bushing work. Having said that, it is my intent to get a better camera and show the complete job.

Mark A. Butterworth
Butterworth Clocks, Inc.

BY STAN PALEN

Hard Drives

The external hard drive I use for backups is now only good for a boat anchor. I cannot access it at all. My system has been crashing lately, so I took a good look at my backups and there was no response. I immediately got another hard drive and made a full backup. I then ordered a new larger external hard drive. At least I got some warning this time. I may be in the market for a new computer soon. What does this mean? HARD DRIVES WILL FAIL.

Windows 8 is Coming

Windows 8® has been released to computer manufacturers for shipment with new machines. You can also download a trial version from Microsoft's web pages. Folks that have a TechNet account can download the full version for no additional cost. If you do not want Windows 8® you might be able to step back to Windows 7®. There are several other alternatives. Linux Red Hat® is an open source operating system that operates fine on a PC. Zorin OS® is another relatively new open source Linux software. It can emulate Windows 7 or Windows XP® with the click of a button. It is much faster than Windows® and uses much less space on your hard drive. Go to http://zorin-os.com to give it a try. There are other operating systems also available.

Software for the Horology Business

I was invited to be the speaker for the Chronometer Club meeting as part of the AWCI convention on August 2, 2012. The title of the talk was *Software and the Internet and Your Business*. Some of the basic parts of the talk will be repeated here. The handout at the presentation is available on my website www.stanpalen.com. It contains links to the websites that I mention in my talk. There is a word TEST on the right hand side in the middle of the page. Click on it and it will bring up a page with clickable links.

The first thing I looked at was business software for running a business like ours. An Internet search will find lots of them. The ones that looked the most promising to me were RepairTracker® and At Your Service®. RepairTracker® comes with a USB camera that attaches to your computer and it records one or more pictures of the incoming job. It handles all of the information in one place. It is web-based so that several people in your place of business can be online at once. You can also access it from anywhere if you need to. (See prior *HT* article, "New Repair Tracking Software Keeps the Focus on Repair," May 2012, pg 23.)

RepairTracker handles e-mails to your customer to send estimates and get approvals. Photos can be added to the job at any time showing progress. Vendors or subcontractors can be linked to your job so you can be aware of the status at any time. When the job is finished, you can add photos of the finished product. This gives you a permanent record with photographic evidence of what came in and what went out. Once the file is set up during take in, it does not have to be entered again.

You can go to www.repairtracker2000.com and sign up for a 30-day free trial without giving your credit card information. If you decide to continue with the program, the data will be preserved. The cost is a $195 initial fee and $19.95 a month afterwards. One advantage to the web-based program is that if there is an upgrade it is no additional cost. The developer is adding more capability all the time.

At Your Service is a similar program that does inventory, billing, job tracking and much, much more. It is also quite a bit more expensive. There are both web-based versions, as well as several that would be installed in your computer system. As the level of complexity increases, the cost also increases. They have monthly plans, as well as outright purchase plans. They also have a free trial version than you can use for 30 days. At Your Service links directly into QuickBooks® to handle all your accounting and banking. The program can give you reports on how well you are doing at almost any way you could imagine.

Personally, I use an Excel® spread sheet for my business because I do not do a high volume of work. Excel has worked fine for me for many years. I can add columns or sort the data any way I need. ♦

Questions?

To submit your questions to the regular column, contact Stan Palen, 8283 Oak Wood Drive, King George, VA 22485 or via e-mail to spalen@crosslink.net or call 540-775-7027. Stan also has a web page located at www.stanpalen.com .

SWATCH GROUP

New Swatch Group Products Advanced 21 Class

November 5 – 9, 2012 Featuring the Caliber 3303 Omega

Hurry! Only A Few Places Left.

Instructor, Dan Fenwick, SWATCH GROUP US

Dan Fenwick from The Swatch Group US, will focus on "Swatch Group Products" for this class. Students will fully service the Frederic Piquet automatic chronograph with column wheel and vertical clutch. This is the Swiss Lever version used by Omega as caliber 3303. The new generation of Tissot Tactile products, including the T-Touch Expert and the Sea-Touch will be introduced. Students will work on the ETA 2894 modular chronograph from Longines.

Longines is requesting that watchmakers be trained on the service of this commonly-exchanged chronograph module. Completion of this course will allow the participant to purchase the specialized tool that permits convenient assembly of the unit. As time permits, students may also review Swatch Group water testing/equipment, information packages and the evolution of the Omega Co-Axial escapement.

AWCI advanced 21

2012 / 2013 Courses and Certification Exam Schedule

2012

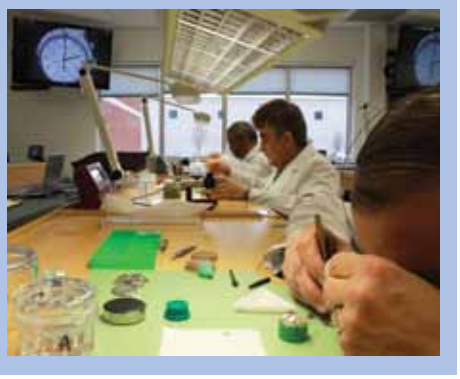
Advanced 21 Series classes (5 CEUs each) are offered only to current CW21 and CMW21s.

Nov 5 - 9 - Caliber 3303 Omega - Advanced 21 Series - This class will be taught by Dan Fenwick from The Swatch Group US. Its focus will be on "Swatch Group Products". Students will fully service the Frederic Piquet automatic chronograph with column wheel and vertical clutch.
Please read the details on this course on opposing page.

2013

Feb 11 - 15 - Advanced 21 Series - TBA
March 11 - 15 - Advanced 21 Series - TBA
May 13 - 17- Advanced 21 Series – TBA
June 17 - 21 - Advanced 21 Series - TBA

5-day block: $1000.00



AWCI Academy of Watchmaking 2013

Jan 28 - Feb 1	Balance Staffing & Timing (5 CEUs)
Mar 4 - 8	Quartz Watch Repair & Testing (5 CEUs)
Mar 18 - 22	Basic Watch Repair
April 1 - 5	Modern Mechanical Chronograph (5 CEU's)
May 6 - 10	Industry Class - (5 CEU's)
June 10 - 14	Polishing & Refinishing (5 CEU's)

5-day block: $1000.00

CW21 Exam Schedule - 2012/2013

Dec 3-6	OSU Institute of Technology, Okmulgee, OK
Feb 4 - 7	AWCI Training Facility, Harrison, OH
April 5 - 18	AWCI Training Facility, Harrison, OH
June 3 - 6	AWCI Training Facility, Harrison, OH

Please visit the www.awci.com website for information on classes and exams.

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.

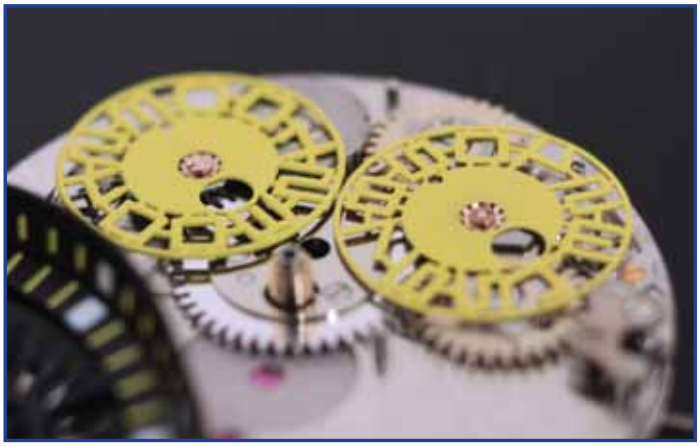
TO REGISTER FOR CLASSES OR EXAMS, please call toll-free 1-866-FOR-AWCI (367-2924), ext. 303 or e-mail: dott@awci.com.

Striking Designs and Colors in New Linde Werdelin Diving Watches

The Oktopus II has an appearance like its predecessor, but the case construction is totally new. Linde Werdlin says the watch line offers excellent anti-corrosive performance against the impact of lengthy submersion into sea water. These watches house a custom-made movement that powers a big-date display in double wheels in an air-sealed cylinder. Drawing upon their in-house expertise in developing dive computers, they have crafted a robustly-constructed case based on the structure of an air-tight pressure chamber to offer absolute water resistance. The company states they use most innovative case construction technology and precision that would not have been possible a decade ago.

The skeletonized look of the line brought its own unique challenges. The discs of the dual date wheels needed to be incredibly thin, but the intense heat of laser cutting caused deformation. The company had to develop a special process to overcome the problem. The next issue was spray painting these wheels for color. Even a hair's breadth of extra paint could inhibit the functioning of the wheels. Each date wheel was delicately spray-painted by hand.

When it comes to the Titanium Yellow version shown here, the finish and color were challenging. There is a DLC (diamond-like-carbon) coating on the 3 and 9 o'clock case-attachments for scratch resistance. The bright yellow color was difficult to achieve in the natural rubber strap. The watch also features a yellow accent on the dial and a large date in double wheels, powered by a highly-finished Dubois Dépraz custom-made automatic movement for enhanced readability.



Acccording to Morten Linde, Creative Director and brand philosopher, "Analogue is the best way to read time; digital is how you assimilate technical details." This seems to exemplify the philosophy of Linde Werdelin which specializes in mechanical timepieces and attachable digital instruments for skiing and diving.

There are three designs and each are limited to an 88-piece production run. These are: The **Oktopus II Titanium Yellow** retailing for $10,580. The **Oktopus II Titanium Blue** which retails for $9,880 while the **Oktopus II Rose Gold** sells for $20,580 and features a rose gold bezel and rose gold 3 and 9 o'clock case-attachments. The line is sold in the U.S. through Totally Worth It, 76 Division Avenue, Summit, NJ 07901, www.TtotallyWorthIt.com. ♦

clock classes

Clock Repair, Making & Designing by Laurie Penman
Laurie Penman's Correspondence Course has run since 1990. One-to-one tuition, 24/7 distance instruction and help by Internet and Skype.
No time limit on individual courses. £550.
Classes in the gorgeous English countryside.
One student £800, Two £450 ea. Three £330 ea.
Mid-day meal included.
Details: laurie_penman@hotmail.co

for sale

Order On Line 24/7

We inventory 1000's of keys, pendulums, dials, hands, bezels & dial pans, chime rods & gongs, clock chain & cable, cuckoo parts, clock glass, glass domes, fasteners, verges & wheels, barometer parts, Atmos style tools & material, ultrasonic cleaners, mainsprings, quartz & mechanical movements, electric movements, tools, magnification products, batteries, books, suspension springs, clocks, cleaning solutions, lubricants, & more.

Timesavers
Box 12700 • Scottsdale, AZ 85267 • USA
Phone: 480-483-3711 • Fax:480-483-6116
info@timesavers.com • www.timesavers.com
Our 172 page illustrated catalog #37 is free online or only $5 in North America for a printed copy.

Our new 2010-2011 Catalog of Parts and Repair Supplies is now available... Free with any order!
or call/write for your copy today... $5.00 postpaid
- Watch Repair Tools & Supplies
- Clock Repair Tools & Supplies... for American and European clocks
- Horological Repair/Reference Books

Browse through our inventory and order on-line 24-hours a day!
www.merritts.com

Merritt's Clock & Watch Repair Supply
1860 Weavertown Rd,
Douglassville, PA 19518
610-689-9541 FAX: 610-689-0567

CLOCKMAKING & MODELMAKING BOOKS & DVDS
by W. R. Smith, 8049 Camberley Drive, Powell, TN 37849. Phone 865-947-9671; www.wrsmithclocks.com

DISCOVER THE SOURCE! in building a collection of clocks and watches or finding horological parts and tools for the trade. **GORDON S. CONVERSE & CO.** Consignments now accepted! 610-722-9004. • **WWW.AUCTIONSATCONVERSE.COM**

PARTS - CIRCUITS - MOVEMENTS
Including but not limited to calibers 201.001, 210.001, 950.001, 959.001. We also have parts for ETA, ESA, AS, FEF, FHF, UNITAS, FELSA and other calibers.
bhswatch@gmail.com • (208) 676-8430

WELCH MANTEL CLOCKS
Patti, Gurster, Cary, Mint condition. Have been in my possession for over 20 years. Pictures available, clocks are in NC. Must be sold as set. Asking $5000, 336-469-9172.

Dashto Inc
Established in 1974

Tom Mister
Virginia Beach, Va
Huge and ever-changing selection. Used and new horological items. Sold by internet only

Check out our site:
www.dashto.com or www.dashto.org

TOOLS/EQUIPMENT/MATERIAL ASSTS/PARTS
POCKET/WRISTWATCHES/WATCH MOVEMENTS
WATCH CASES & DIALS/WATCH BRACELETS/BUCKLES
& MUCH MORE

WE BUY AND TRADE ALSO: Dashto@cox.net

help wanted

WATCHMAKER? SERVICE SWISS WATCHES?
Call or text me: 404-543-0329 Tammy, ATLANTA.

CW21 OPPORTUNITY, MADISON, WI
Leading jeweler and only authorized Rolex jeweler and repair facility in Madison, WI., known for quality and philanthropy, seeks Century 21 (CW21) Certified watchmaker. Offers competitive compensation and benefits. Madison enjoys a moderate cost-of-living and was voted "One of the ten most livable cities in the US." Contact John Hayes: 608-257-3644, john@goodmansjewelers.com. EOE

Full-time Watchmaker Needed, South Houston, TX
CW21 certification required for luxury independent retail store with competitive salary and benefits. Saturdays required. Email resume to: info@mylewisjewelers.com or call 281-332-8433

EXPERIENCED WATCHMAKER, RHODE ISLAND
Full time position for an experienced watchmaker to step into well established position/retail location. Located in Rhode Island. Must have experience with such brands as Tag Heuer, Rolex, Omega, Patek, and Cartier. Contact us at overstockgray@aol.com

Battery Service Technician – Part-Time
Highland Park, IL: Mechanically inclined individual to perform battery services and to assist the Repair Coordinator. Able to perform basic services on quartz watches; includes testing movement, replacing gaskets / batteries and testing water resistance. Additional: data entry, shipping, customer service and inventory. * Strong customer service skills * Mechanically inclined * Detailed Oriented * Excellent data entry skills * Knowledge of Word, Excel preferred * Experience in watch industry preferredContact: manager@razny.com

UWR
Universal Watch Repair

UWR is looking for highly skilled WATCHMAKERS experienced in Quartz & Mechanical movements

Contact: Jerry F 1.248.723.5550 Birmingham MI.
www.universalwatch.net

help wanted

Watchmaker Needed – LIVE & WORK IN PARADISE
Little Switzerland is one of the largest Caribbean-based retailers of fine jewelry and timepieces. We sell Breitling, Tag Heuer, Omega, Cartier, Rado, Baume & Mercier, Raymond Weil, Movado and more. Must have completed factory training and certification by at least one of the following: WOSTEP, Breitling, Omega, Tag Heuer of Cartier. Full watch service facility located in St. Thomas, USVI. To apply, email resume to mcooney@nxpco.com.

Certified Watchmaker, Richboro, PA
Time After Time, Inc., a Philadelphia-region Watch Retailer is looking for a certified watchmaker.
•Complete Services (Mechanical, Quartz, Automatic, Chronograph and Movements with Complications)
• Maintenance Services • Battery Changes
• Crystal Replacement • Diagnosis • Quick Services
• Dismantling • Maintain Productivity Goals
• Must have skills to service all types of watches from basic mechanical and quartz movements on.
Compensation is determined by experience. Position is based out of our Richboro, PA office. Contact: 215-802-7711 or lisa@timeaftertimewatches.com

Opening for CW21 in Ocala, FL
A professional watch repair business located in Ocala, Florida is seeking a CW21 watchmaker to work on Rolex watches and all major brands. Must be proficient in all phases of vintage mechanical movements. Min. 5 years experience with a ORJ preferred. Experience with ETA mechanical movements also preferred. Great opportunity to join a long-established, fast-growing business. We have state-of-the-art equipment and will supply you with an apartment. Contact: guy@ocaladiamond.com

Talented, Certified Watchmaker – Long Island, NY
H.L. Gross & Bro. Jewelers is a fifth-generation family owned jewelry store located in Garden City, NY on Long Island. We are currently building a new 5,000 sq foot store where we will be moving that will feature a Rolex Boutique as well as a certified Rolex repair center. We are seeking a talented and certified watchmaker for a full-time position in our store to handle all Watchmaker-related responsibilities. Call 516-747-6666.

Watchmaker Wanted – New York City
A legendary watch repair business located in the heart of New York City is seeking a watchmaker to work on all major brands. Must be proficient in all phases of vintage mechanical movements. Experience with ETA mechanical movements preferred. Great opportunity to join a long-established, fast-growing business. Grand Central Station location, state-of-the-art equipment, very competitive compensation. Contact Steve Kivel at stevekivel@yahoo.com or 212-685-1689 x4.

Need Certified Watchmaker – Cranston, RI
Saltzman's Watches is hiring full-time certified watchmaker to repair watches for certified after-sales service centers and independent jewelers around the U.S. We offer competitive salaries and benefits packages. The job is in Cranston Rhode Island and is from Monday through Friday. Contact: evan@saltzmans-watches.com

WATCHMAKER WANTED – IL
Great starting salary, Vernon Hills, IL. Contact: Jodie 224-715-5102.

CW21 Watchmaker, Louisiana
Immediate position available for CW21 watchmaker. Come work with an energetic and motivated staff. Great hours, competitive salary, and medical. The sky is the limit when you seize this opportunity. Must be motivated with enthusiastic personality. Contact: jay@clarkesjewelers.com

Certified Watchmaker Needed, Cranston, RI
Saltzman's Watches is hiring a full-time certified watchmaker to repair watches for certified after-sales service centers and independent jewelers around the United States. We offer competitive salary and benefits package. The job in Cranston is full time Mon - Fri. Contact: evan@saltzmans-watches.com

Certified Watchmaker Needed for Rolex Boutique in Long Island
H.L. Gross & Bro. Jewelers is a fifth-generation family-owned jewelry store located in Garden City, NY on Long Island. We are currently building a new 5,000 sq foot store that will feature a Rolex Boutique as well as a certified Rolex repair center. We are seeking a talented and certified watchmaker for a full-time position to handle all Watchmaker-related responsibilities. Contact: brad@hlgross.com

Watchmakers at Various Levels Needed in CA & CT
Watchmakers with various levels of experience from basic repairs to CW-21 certified needed for our facilities in Rancho Cucamonga, CA and South Windsor, CT. M&G Jewelers is an authorized repair facility for major brands and a centralized watch repair facility servicing major retailers. Candidates must be motivated, work well in a fast-paced, goal and productivity-driven environment. Competitive wages, medical/dental benefits, paid vacation, and Simple IRA Retirement Account. Please email your resume to rcardell@mandgjewelers.com

Hubot Seeking Certified Watchmaker, Ft. Lauderdale, FL
Hublot, a LVMH brand with a fast growth in the USA, seeks a watchmaker responsible of repair of Hublot watches, in Fort Lauderdale, FL. Position: Assure all after sales service activities on our watches, analyze and give technical estimates, perform repairs of automatic movements. Profile: Technical education with watchmaker certification. Please submit resume with salary history to K.Schaffer@hublot.com

situations wanted

CLOCKMAKER
Experienced seeking full time permanent situation.
For more information contact AWCI at: adunn@awci.com, 866-367-2924, ext. 307.

tradesmen

LARRY BLANCHARD, CMW21
At Palmer's Jewelry
101 East Sycamore St., Kokomo, IN 46901
Phone (800) 207-1251 • Fax (765) 457-8517
E-mail: service@palmersjewelry.com
Facebook.com/palmerjewelry
Continuing with service of tuning fork Accutron, vintage American and fine Swiss watches.

FENDLEY & COX WHEEL AND PINION SPECIALIST
1530 Etain Rd., Irving, TX 75060
RICHARD COX 972-986-7698 • CMC, FNAWCC, CMBHI
www.fendley-cox.com

MAINSPRINGS
Clock and music box - All sizes.
Custom made. Brass gear blanks.
Timewise (formerly TANI Engineering)
Ph: 330-947-0047, E-mail: twclock08@att.net

HAMILTON ELECTRIC WATCH RESTORATION
Expert, experienced service on all Hamilton 500 and 505 Electric watches. René Rondeau, P.O. Box 391, Corte Madera, CA 94976, Phone (415) 924-6534
www.hamiltonwristwatch.com

Watch Parts Fabrication:
I make all types of movement parts: Vintage to modern.
MATT HENNING CW, 413-549-1950
www.henningwatches.com

BEARINGS
We will install our patent pending ButterBearings™ in your chain wound movement. These bearings reduce friction by over 90% and come with a lifetime warranty.
For details contact: Butterworth Clocks, Inc.
5300 59th Ave. W., Muscatine IA 52761 tel 563.263.6759
fax 563.263.0428 email butterworth@machlink.com

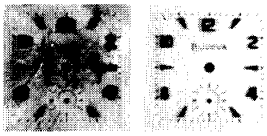
SERVICE/SALES OF TIMING AND CLEANING MACHINES
Vibrograf, L&R, and Watchmaster
Over 14 years experience
Quick repairs & reasonable prices
www.timemachinerepair.com
Dale Sutton 609-374-5880 or service@timemachinerepair.com

DIAL REFINISHING CO. FAST SERVICE, FINEST QUALITY, quantity works welcome. Specialize on changing dial feet positions to fit the quartz movement. Send your works to: **KIRK DIAL OF SEATTLE**, 112 Central Avenue North, Kent, WA 98032; (253) 852-5125

ATMOS SERVICE/REPAIR
Warranty 2 Years Parts & Labor
314-968-1010/877-437-1774, Clockmaster, Inc. – Robert Good
2537 So. Brentwood Blvd. St. Louis, Missouri 63144

LASER WELDING REPAIR
Reconstruction of watch cases, bands (gold and two tone), antique mountings, welding, cracked or broken clock arbors, hands and other metal parts. All aspects of jewelry repair.
Joel Lefaive (520) 579-8668

DIAL REFINISHING



BEFORE AFTER

Quartz Conversions
Diamond Dial Conversions
Emblem & Name Personalization

Write for Brochures
INTERNATIONAL DIAL CO., INC.
58 W. SUGARTREE
P.O. BOX 970
WILMINGTON, OH 45177
(937) 382-4535

tradesmen

DENNIS KAYE
108 Corgy Drive • Cary, NC 27513
888-363-9510 • 540-SERVICE
Porcelain Dial Restoration
Watch • Pocket Watch • Clock
Platform Escapement Repair
Atmos Parts & Service
400-Day Clock Repair
Kundo Coil / Electric Clock Service
Prompt Reliable Service . . . Guaranteed™
Large Supply of Watch Movements & Parts for LeCoultre, Wittnauer & Longines
Call Us or Visit dialrepair.com

wanted to buy

WE BUY WATCHES
Rolex, Patek, Cartier, LeCoultre, Vacheron, Breitling, Audemars, Tudor and others. Modern or Vintage. Doug Giard, 586-774-3684

WANTED: USED SILVER OXIDE BATTERIES
Payout: $60/lb. and up for used silver oxide batteries. Free secured shipping & pickup. Payment issued immediately. You can DONATE all or portion of EARNINGS TO AWCI'S ELM TRUST as tax write off. For details contact: info@batterybuyers.com 800-764-7458 • www.batterybuyers.com

Wanted: Chronograph Movements and Parts
Paying for Valjoux 69,72,88 up to $800.00, Venus 178 $300, Longines 13 ZN, 30 CH $500.00, Movado 90,95 $300.00. Also buying high-grade movements and parts. Dean Sarnelle, 25 W. Beverley St., Staunton, VA 24401, 1-866-877-8164, onceuptime@aol.com.

$$WANTED ANYTHING$$
Rolex - Cartier - Patek - Breitling- Panerai - Le Coultre Vacheron - AP - Etc.
Watches, Boxes, Dials, Links, Parts, Bands, Movements, Crystals, Bezels, Crowns, Clocks, Signs, Posters, Catalogs, Instruction Books, Polish Cloths, Wallets, Hats, Shirts, Promo Items, ANYTHING!
Doug Giard, 586-774-3684

WANTED WATCH BOXES
Buy - Sell - Trade
We want most major brands. Also buying high-end jewelry brand boxes. **Doug Giard, 586-774-3684**

TOP PRICES PAID
for karat gold scrap (any amount)! Also, buy filings, gold fill, sweeps, silver, platinum! Immediate 24-hour payment return mail! Ship insured/registered mail to: AMERICAN METALS COMPANY, 253 King St., Dept. HT, Charleston, SC 29401. Established 1960. Phone (843) 722-2073

HAMILTON 505 BALANCE COMPLETES WANTED
Paying $20 each. Must have good coils/hairsprings. Worn-out contacts okay. René Rondeau, PO Box 391, Corte Madra, CA 94976. rene@rondeau.net.

ATTENTION RETIRED WATCHMAKERS
Call us before you sell your parts, tools, and watches. We have helped over 200 watchmakers in the last 15 years to dispose of their accumulations. When you're really ready to sell, we're ready to buy! Phone (229) 928-9092 or (727) 327-3306. Ask for Jeff or Nancy. E-mail: jeffnancy@mchsi.com

Get $60 lb—And UP!
For Used Silver Oxide Batteries
Earnings can go to AWCI's ELM Trust (if desired).
watch battery BUYERS
FREE SECURED SHIPPING/PICK UP
PAYMENT ISSUED IMMEDIATELY
877-670-7799
info@watchbatterybuyers.com • watchbatterybuyers.com

WANTED!
Entire Watch Collections
Scrap Watchbands
Gold-Filled Cases & Scrap
Gold, Silver & Platinum Scrap
Call Toll Free 1-800-208-2608
Visit our website for more information
www.specialtymetalsrefiners.com
Specialty Metals
2490 Black Rock Tpke.
Fairfield, CT 06825
203-366-2500 - Local
800-884-7966 - Fax
sales@specialtymetalsrefiners.com
Member: Jewelers Board of Trade

ROLEX PARTS WANTED
Buying Rolex crowns, crystals and material, new stock only. Also buying Rolex watches, bracelets and movements any age.
Call Paul at 978-256-5966
or e-mail Paul@pduggan.com

Buying Gold-Plated Watchbands $20 lb. & Up!
Gold-Filled-Even More!
Earnings can go to AWCI's ELM Trust (if desired).
watch battery BUYERS
FREE SECURED SHIPPING/PICK UP
PAYMENT ISSUED IMMEDIATELY
877-670-7799
info@watchbatterybuyers.com • watchbatterybuyers.com

services

ELECTRONIC INSTRUMENT SERVICE
We are Factory Authorized Service for:
- **Greiner VIBROGRAF**
- **TICK-O-PRINT & L&R**

We service all makes of ultrasonics, all makes of watch rate recorders, and related equipment. 25 years experience.
190 Deepstone Drive San Rafael, CA 94903
Used Equipment Bought & Sold
For Information
(415) 479-8960
www.electronicinstrumentservice.com

CHELSEA CLOCK
Repair | Restoration

All Brands · Warranteed Work · Free Estimates
Mention Code HT2011 and Enjoy 15% Off
chelseaclock.com | 800 284 1778

We also fit glass crystals to Openface, hunting, and English chain drive watches. Complete watches, dials, movements, case springs for sale
G F Specialties
1-800-351-6926
P.O. Box 170216
Milwaukee, WI 53217
www.gfspecialties.com

HT Classifieds Work For:
THE SWATCH GROUP, Canada
"We had a wonderful response to the [recruitment] ad."
Human Resources,
THE SWATCH GROUP, Canada

CLASSIFIED RATES 2012
Ads are payable in advance $1.10 per word, $1.50 per word in bold type. Classified display ads are $47.50 per column inch, 2¼" wide. Color an additional $15.00. Copy must be received 30 days in advance.
Horological Times
701 Enterprise Drive Harrison, OH 45030
Toll Free 866-367-2924, ext. 307
Phone (513) 367-9800 • Fax (513) 367-1414
E-mail: adunn@awci.com • www.awci.com

MINIMUM SCHEDULE: 3 months
Advertising studies show it takes over 3 viewings for readers to recognize specifics in your ad.

TO PLACE YOUR AD:
Contact: Amy Dunn, 866-367-2924, ext. 307, adunn@awci.com

BOARD OF DIRECTORS

Officers

Manuel Yazijian, CMW21: President
myazijian@awci.com

Wes Grau, CMW21: Vice President
Affiliate Chapter Director
wgrau@awci.com

Henry Kessler: Treasurer
hkessler@awci.com

David Douglas, CW21: Secretary
ddouglas@awci.com

Immediate Past President

Dennis Warner, CW21: President
dwarner@awci.com

Directors

Tom Nesbit, CW21
tnesbit@awci.com

Gene Bertram, CC
gbertram@awci.com

Fred White, CMW21
fwhite@awci.com

Michal Blaszczyk, CW21
mblaszczyk@awci.com

Ron Landberg, CW21
rlandberg@awci.com

Jordan Ficklin
jficklin@awci.com

Jason Ziegenbein, CW21
REC Director
jzeigenbein@awci.com

Terry Kurdzionak
IAB Director
tkurdzionak@awci.com

Fellows

*Robert F. Bishop
*James H. Broughton
Fred S. Burckhardt
Alice B. Carpenter
David A. Christianson
*George Daniels
Wes Door
Jerry Faier
*Henry B. Fried
*Josephine F. Hagans
*Orville R. Hagans
*Ewell D. Hartman
*Harold J. Herman
J.M. Huckabee
*Gerald G. Jaeger
Jack Kurdzionak
*Benjamin Matz
*Robert A. Nelson
*Hamilton E. Pease
Archie B. Perkins
Antoine Simonin
William O. Smith, Jr.
Milton C. Stevens
*Marvin E. Whitney *Deceased

American Watchmakers-Clockmakers Institute
701 Enterprise Dr.
Harrison, OH 45030
Ph: 866-FOR-AWCI • 513-367-9800
Fax: 513-367-1414
awci@awci.com • www.awci.com

ADVERTISER'S INDEX

WE THANK THE IAB

AWCI would like to thank our Industry Advisory Board members for their ongoing support of the Institute and the industry.

RW Manufacturing Co.
STAR TIME Supply Co., Inc.
WATCHFACTS no two watches are the same
Simon Golub & Sons, Inc.
SWISStime care, Inc.
PTRC Inc.
Global Battery Buyers
LVMH WATCH & JEWELRY
CHELSEA CLOCK
Esslinger & Co.

INDUSTRY ADVISORY BOARD

BREITLING 1884
GABER & COMPANY USA
GemOro SUPERIOR INSTRUMENTS
Kessler SY KESSLER SALES, INC.
renata batteries
C.R. Time Company "WHERE WE HAVE THE TIME FOR YOU"
Twin City Supply
Reimers Electra Steam
Cas-KerCo.
ROLEX
Movado Group Inc.
Borel
Butterworth Clocks, Inc.
Energizer
SWISS WATCH SERVICE GROUP, INC.
Swiss SERVICE CENTER, INC
eckcells watch materials and tools
SEIKO DEDICATED TO PERFECTION
Richemont
Livesay's
SWATCH GROUP

Introducing Renata Multi-Pack

Multi-Pack incorporates the benefits of Tear-Strip (TS) and Volume Strip (VS) in one package!

Renata, the environmentally friendly battery brand!

Over the 4th Quarter of 2012, Renata will launch its new, exclusive Multifunctional Packaging! Multi-Pack will replace and eliminate both Volume Strip and Tear Strip packaging for silver oxide batteries, while eliminating the need for distributors to stock 19 duplicated silver oxide SKUs.

Renata was the first full line Mercury Free brand available in North America! Reinforcing Renata's environmental leadership, Multi-Pack is made of only one, easily recyclable material, while saving multiple football fields of packaging materials and virtually eliminating dimensional freight costs!

Swiss Quality
Environmentally Conscious
Cost Effective Without Compromise
RENATA!

- Each single blister can be torn away from the compact strip of 10 cells.
- Renata's type number, corresponding Japanese number and best before / use by date are printed on each individual blister.

- Easy-open flap located in one corner of the blister.

- Packaging nests, conserving space and solidifying the package.
- Boxed into increments of 100, requiring only slightly more space than VS and substantially less space than TS.

- Each carton is freshness dated and safety sealed, with a simple rip-open tab.

NJS
NEWARK JEWELERS SUPPLY
800.900.9544 / Fax 973.762.7767
www.NewarkJewelers.com

renata batteries
0% MERCURY