

HOROLOGICALTM TIMES

August 2007



American Watchmakers-Clockmakers Institute



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COVER

This month's cover features the
Girard-Perregaux Vintage 1945
Large Date Moon Phase



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President's Message

By Dennis Warner, CW21

My term as president is nearing the end of its first year. I thank all members who have made it a success. By the time you read this three directors (Mark Butterworth, Mark Barker and Gene Bertram) will end their terms of office during the annual meeting. These gentlemen have served you well during the past years. We thank each of them.

We will be installing our two new directors, Doug Stuart and Lloyd Lehn. The IAB Director, REC Director and the Affiliate Chapter Director will be selected at the annual meeting and sworn in. This will give the Board a new face, but our goals will remain the same.

Please fill out the Committee Form for the committee that you would like to be considered for by the Board of Directors. Forms will be available at the meeting and on page 50 of the July 2007 *HT*. They should be sent, faxed or e-mailed to Jim Lubic at AWCI.

I want to thank the members of the Finance Committee who were able to prepare and present a budget that will lower the deficit and set us towards a balanced budget.

The year-end committee reports are a good barometer of the accomplishments, health and direction of AWCI. Members who attend the annual meeting will get a copy of those reports. If you will not be attending, reports will be available at the AWCI website in mid-September for you to download.

We had a very good membership increase during the past few months. We welcome those new members and hope to satisfy their needs. Thanks for becoming part of our family of horologists.

Executive Director's Message

By James E. Lubic, CMW21

As I write this we are preparing for AWCI's 47th Anniversary. Our anniversaries are celebrated every year at our Annual Convention and Educational Symposium, which for the past 8 or 9 years has been held the first weekend in August. By the time you read this month's message the festivities will be over. The specifics of the meetings, pictures and such will appear in the October issue.

In the meantime, I would like to thank the sponsors of this year's events.

The Rolex ELM Charitable Trust Fundraising Dinner and Awards Program: This is the fourth year that Rolex has sponsored the ELM Trust annual fundraising dinner. This year this event is being combined with the annual AWCI awards banquet. Thank you Rolex for your continued support!

The ELM Charitable Trust Auction and Dinner: This is also the fourth year that a Richemont brand has been a sponsor, only this year LeCoultre wanted to do more than they had in the past. We were able to accommodate them by including a dinner with this year's Auction. Thank you LeCoultre for your continued support!

Every year during our convention we need to arrange transportation for our members from the hotel to one of the dinners. Transportation for the past four years has been sponsored by The Swatch Group. Thank you The Swatch Group for your support too!

I'm also happy to thank a new sponsor of this year's event: LVMH Watch and Jewelry. LVMH Watch and Jewelry is a sponsor of the Educational Symposium and we are grateful for their participation, and look forward to their support for many years to come.

Participation in the Vendor Fair is also a key to the success of our convention. Terry Kurdzionak of Eckcells, Pat Cassidy of Cas-Ker Co., Gary Borel of Jules Borel & Co., and Henry Kessler of Sy Kessler Sales, Inc. were all present at this year's vendor fair, and all are longtime supporters of AWCI. Thank you for your support too!

Three more groups to thank: the AWCI staff, the AWCI Board of Directors, and AWCI committee members. All three groups are very dedicated to AWCI and our future and they very rarely are recognized.

I can't forget the speakers that everyone came to listen to and learn from at our Educational Symposium: Mark Butterworth, Lloyd Lehn, Laurie Penman, Tamara Houk, Tom Schomaker, and Manuel Yazijian. Most of us don't realize the time that goes into preparing a presentation and these individuals give of their expertise regularly throughout the year.

Of course those that came to the 47th Annual Convention and Educational Symposium should be thanked too. They took time away from their work, invested in themselves, and I'm sure had their batteries recharged. Our Annual Convention and Educational Symposium is a very positive experience. If you have never treated yourself to attending one you should. Next year we will be in St. Louis, MO the first week in August.

Hope to see you next year!

On the Web



AWCI Certification Exam Schedule



AWCI Certification information is available online:

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Continuing Education

Visit AWCI's website for a complete schedule and course information:

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Parts & Tool Forum

This forum assists AWCI members in finding watch and clock parts and tools. Check it out at:

<http://www.watch-clockmakers.org/msgbrd/index.php>



Pricing Survey

The AWCI Business and Pricing Survey provides statistics on business expenses, rates charged by watchmakers & clockmakers, and much more.



www.awci.com

Question

Here are photos of two watches I have in my accumulation of over 60 years of watchmaking. I would like to know if you could tell me anything about them.

#25 is a 16 ligne private label marked Isabelle & Co., Cincinnati. Since the dial fits friction tight onto the movement rather than having dial feet, it suggests

to me a high-grade Swiss that was made available to local jewelers if they purchased a specified amount of them. I would like to know the maker, if possible, and its approximate age. Is this a common watch with a large production or was it made in limited numbers?

#27 is a 19 ligne M. Tobias "Detached" (6 jewel?) Liverpool, fusee, keywind. I seem to recall that M. Tobias was a

rather prolific maker in England. I am interested in any information you can provide.

*Milt Stevens
North Bend, OH*

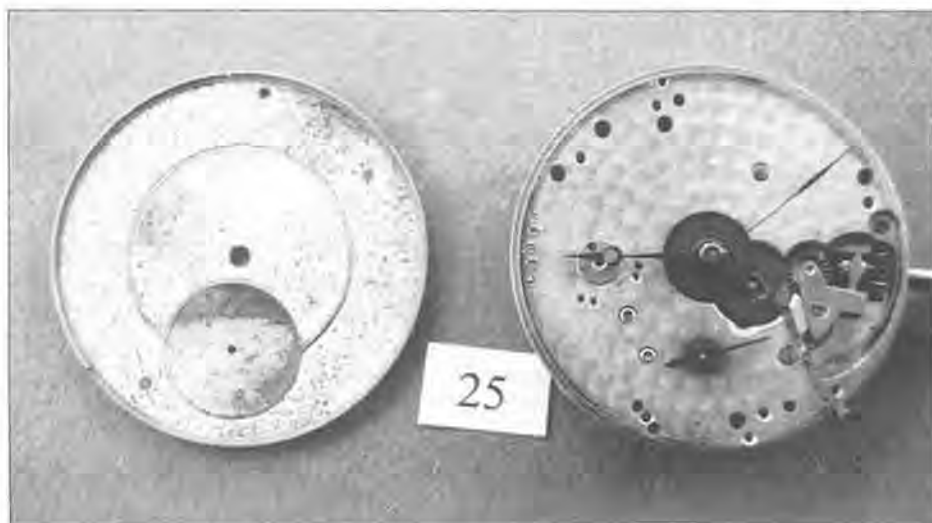
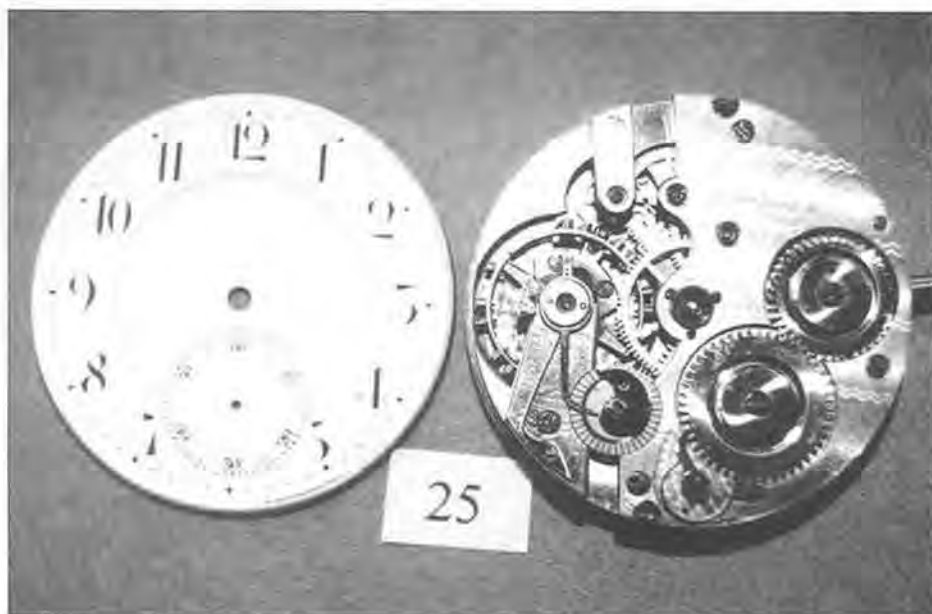
Answer

Watch #25: Your first watch is indeed a high-grade Swiss watch, private-labeled as you note for the retailer Isabelle & Co. of Cincinnati. However, it is the precision micro-regulator that is intriguing and gives us a close approximation of your watch's age.

F. Wilmont of New York patented this regulator with a snail-shaped disc and whiplash regulator on July 16, 1872. It was apparently first used by the Tiffany & Co. (the well-known jewelers of New York) on their watches produced in their own watch factory in Geneva. The Tiffany factory operated from around 1870 until around 1890 when Patek Philippe took over management of the Tiffany factory¹. Shortly thereafter, this form of regulator was frequently used by Patek Philippe on their own watches² from about 1891 to about 1913³. It is tempting to suggest that your watch was made by Patek Philippe, but I have seen this same regulator used on an Omega caliber 19 (@1894); on an early Longines railroad-grade watch (@1890); on a watch made by Jules Monard in 1900 and on the Longines Caliber 2129 (WWII model). I have not been able to identify your particular movement.

From the style of your watch movement and the use of the unique micro-regulating system, I can safely say it was made near the turn of the 20th century.

Continued on page 30.



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The Girard-Perregaux Vintage 1945 Large Date Moon Phase

Bold and Modern

By John Davis

This article was written by John Davis while he was a watchmaking student at North Seattle Community College and first appeared in *International Watch* and on ThePuristS.com

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Introduction

While some 30 years have passed since mechanical watchmaking suffered a near-death-experience during the great quartz scare, it seems that some watch companies are still not entirely sure what their unlikely survival means today, nor certainly what to do about it. While some manufacturers have become “lost in time”: redressing archaic designs with heretofore unseen levels of finish, others “innovate” with gimmicky time displays and complications cocktails. It is no surprise that Girard-Perregaux, a company with an illustrious history of technological innovation and award-winning timekeepers, knew exactly what to do: developing a line of forward thinking, in-house manufactured automatic movements other *manufactures* are still trying to catch up to.

First introduced at Basel in 1994, the thin and versatile Cal. 3000 and Cal. 3100 automatic movements paved the way for a range of modular constructions that thrust Girard-Perregaux more fully into the realm of *manufacturers* most convincingly (some portion of their *haute horlogerie* offerings have always been made “in-house”).

Now evolved into the Cal. 3200 and Cal. 3300 movements, they serve as the base movement for column wheel chronographs (and foudroyante chronographs), world time displays, perpetual calendars, moon phases and a dashing, patented big date mechanism, one of the few to display the two digits without any visible line separating the numerals.

The Vintage 1945 Large Date Moon Phase has bold, updated retro-styling and is a grand package for a tastefully complicated movement and an elegantly balanced dial. And it even has something for the gear heads: the Girard-Perregaux Cal. 3330 automatic movement, developed and manufactured by the grand old house themselves.

The Case, Dial and Hands

The Vintage 1945 case is a massive construction. While not excessively large, do not be fooled into thinking that it is the size of a gentlemen’s dress watch from the middle of last century, even if it is styled after the same. It is decidedly modern and deliberately masculine in its proportions and makes a powerful statement on the wrist.



While a width of 34 mm (without the crown) does not sound large by modern standards, on a rectangular watch that measures 48 mm from lug to lug and some 10 mm in thickness, it is nothing to sneeze at. Thankfully, the strong curvature of the case [1] distributes the mass nicely and keeps it firmly seated on the wrist, while visually adding to its thickness.

The dial is a classic cream color and complements the applied gold marker at twelve, Arabics at nine and three, gold dau-

phine hands and blued steel second hand nicely. The dark blue and gold moon phase is wonderfully detailed and the slightly raised moon gives it a great depth and visual appeal. The

standout feature of the dial however is the marvelous big date in a nicely beveled aperture. Rather than the common big date display, with separate apertures for each digit, the



patented Girard-Perregaux big date uses numerals printed on a clear disc for the ones digits, that, when viewed from an angle, appear to float just above the white background of the tens disc. This illusion makes for a seamless two-digit display and the instantaneous jump, precisely at midnight, only adds to the mystique.

The elaborately shaped case in 18K gold is completely polished and the execution is appropriately detailed, if not as immaculately as some first tier watches. In particular, the fit of the bezel was not perfect and the subtlest hint of raggedness was visible where the bezel met the middle portion of the case.

The sapphire crystal is domed to match the curvature of the case nicely and blends harmoniously with the curved and straight lines. The crown is appropriately sized and easy to use although the knurling is a little sharp for comfortable use [1 & 2]. A recessed pusher at 4 o'clock serves as the moon phase corrector [2] and the screwed on back (secured with four white gold screws) has a round sapphire window to show off the Cal. 3330 movement (internally designated 3306 by Girard-Perregaux Manufacture) [3].



The Calendar Mechanism



The movement is secured in the case by a rectangular, metal spacer ring [4], which fits snugly around the base caliber while being precisely the same size and shape as the calendar/sub-seconds module under the dial. With the dial and hands removed, the utterly traditional moon phase and clever big-date mechanism can be studied in some detail. A few crucial elements are hidden underneath the module, secured to the base movement with three screws [5].



An intermediate date-wheel that turns once every twenty-four hours drives the big-date mechanism. A post mounted vertically on the intermediate date-wheel interacts with a detent on the elaborately curved, beryllium-bronze date advance lever [6]. The post causes the date advance lever to compress and, a few minutes before midnight, the date advance pawl slips over a tooth on the date wheel. When the date advance lever finally slips off the post on the intermediate date wheel, the date wheel is flicked forward instantly,

advancing the ones disc, the tens disc or both, depending on the date.

The date-wheel [7] consists of a lower set of 30 teeth on a wheel divided for 31 teeth. The one missing tooth allows the date wheel to advance on the 31st of the month without advancing the ones disc (which remains on the number "1" while the tens disc changes from "3" to "0"). To ensure the date advance pawl advances past this missing tooth smoothly, the pawl has two teeth, looking something like a crab's claw. The upper portion of the date wheel has four triangular teeth, spaced appropriately to advance the tens disc from "09" to "10", "19" to "20",

"29" to "30" and "31" to "01" as needed. The date must be corrected via the quickset mechanism (the intermediate position of the crown) for months with less than 31 days.

The two-lobed quickset wheel [10] also interacts with a specially formed detent on the date advance lever [6]. The detent for the quickset wheel is placed closer to the fixed end of the lever so the greater torque of the manually operated quickset wheel can be capitalized on. (Shown here with the very tip of one lobe of the quickset wheel just about to release the date advance lever.) [8].

All told, this is an elegant mechanism to perform a complicated task and it does so admirably. The combination of the seamless display and the instantaneous change (Girard-Perregaux clocks it at 15/1000 of a second) make it possibly the most aesthetically pleasing large-date mechanism on the market. The top of the calendar/sub-seconds module (directly underneath the dial) is nicely perlagged with tumble polished steel levers and jumpers. The overall execution does not enjoy top-notch finishing, but it is on par with similar mechanisms in other high-grade automatics.

The Dial Train

Underneath the calendar/sub-seconds module, the intermediate sub-seconds wheel is exposed, but a dial train bridge must be removed before the other innovative aspects of the dial side mechanism can be observed. The dial train of the Cal. 3330 (and presumably the Cal. 3300 base movement) involves a dedicated handsetting train of four wheels [9] whose sole purpose is to eliminate the backlash (play) in the dial train when setting the hands.

The second intermediate handsetting wheel (the first handsetting wheel is on a rocker in the keyless works) turns a wheel underneath the minutes pinion (not really a cannon pinion as it is free floating on its post), which turns



a wheel underneath the minute wheel. This fourth intermediate handsetting wheel then turns the true cannon pinion that is friction coupled on the offset center wheel arbor. The cannon pinion drives the minute wheel, which pivots on a spring-loaded post, ensuring maximum engagement with the minutes pinion and hour wheel when turning counterclockwise (when the watch is running or the hands are being set forwards) and minimum engagement when turning clockwise (when setting the hands backwards). In this way, any backlash (play) left between the minute wheel, the minutes pinion and the hour wheel during backwards handsetting is summarily taken up by the spring action of the minute wheel post, eliminating any lag time in the advancement of the hands after setting the time.

This is a very elaborate setup for the sole purpose of giving the user a more precise control when setting the time and, while violating the engineering principle of “keeping it simple,” it seems to work well and is a refinement many users will enjoy without realizing it. It is a subtle and unsung innovation, but one that speaks to Girard-Perregaux’s desire to improve on existing movement designs rather than just remake the wheel.

The Keyless Works

One interesting feature of the keyless works [10] is the largish steel disc pressed in near the tip of the clutch lever. It makes it impossible to remove the stem unless the crown is in the first (hand winding) position. With many keyless levers, it is safer to remove the stem with the crown in the handsetting position, or risk misaligning the detent and clutch lever when re-inserting the stem. If this happens during final reassembly, one must take off the hands and dial to reset the keyless levers, an aggravating side excursion when properly setting the hands can take more than a few minutes.



In Girard-Perregaux’s keyless levers, the detent is held in place by an arm of the detent/clutch-lever spring. It encircles the lower pivot of the detent (the one visible in the picture), holding it securely in place when the stem release button is pressed. While this detent release configuration should allow a trouble free release of the stem in any position of the crown, earlier versions of this movement suffered from a tendency to release the stem unexpectedly. I can only conjecture that the steel disc that prohibits the stem from releasing when in the handsetting position was the solution to this problem.

The keyless works are otherwise conventional in their design, function and execution if distinctive in their layout. The levers are well made and entirely tumble-polished, as is common in most automatic movements.

A minor disappointment of the dial side is that the intermediate-quickset-wheel and quickset-wheel are permanently attached to the plate. Riveted wheels (or those with semi-permanent, pressed-in posts) are a common way to keep production costs down because a friction fit post is cheaper to produce than a screw. The unfortunate side effect is that they make it impossible (or at least completely impractical) to properly clean and inspect the load bearing surfaces when servicing the movement.

The Automatic System

The GP Cal. 3330 features a very straightforward winding mechanism that winds in the counterclockwise direction only. It has a gear ratio of 120/1 from the rotor to the ratchet wheel making it a little more efficient than most. While it might seem uni-directional winding would make it less efficient than a bi-directional system, discussions on the subject are in fact never ending. Some tests performed by A. Schild comparing the winding efficiency of the same movement, equipped in one case with bi-directional winding and in another with uni-directional



winding, actually demonstrated the uni-directional version wound more efficiently [from "Automatic Wristwatches from Switzerland" by Heinz Hampel]. A large percentage of modern automatic movements wind uni-directionally.

The rotor is held in place with a small bridge held by two blued screws and the rotor pinion engages with a uni-directional click wheel. This wheel translates rotor motion in one direction and spins freely in the other direction. The ratchet wheel on the lower side of this wheel also engages with the click and spring (permanently attached to the plate) to maintain the mainspring power. The lower pinion on this wheel drives a reduction wheel, whose pinion in turn drives a transfer wheel with a jeweled hub, held to the underside of the bridge with a friction fit post. This transfer wheel drives a final ratchet driving wheel that is secured to the underside of the barrel bridge with a sub-bridge of its own (with no further reduction of gearing).

The Barrel and Power Train

The hand winding train involves a tiny crown wheel and an intermediate wheel with friction spring [11] that drives the ratchet driving wheel. The intermediate hand winding wheel and friction spring are mounted on an undersized post so the intermediate wheel can slide out of



11

engagement with the ratchet driving wheel during automatic winding. The gearing ratio between the crown and the ratchet wheel is only 3.88/1, and when



12

combined with the tension of the friction spring on the intermediate hand winding wheel, this low gearing ratio results in a very stiff hand winding feel. This is not a problem, thanks to the largish crown.

The power train and the escape wheel are under the same bridge as most of the automatic train and the hand winding gears. The wheels and pinions are of course well executed if undecorated and otherwise unremarkable. A milled recess in the center of the movement could accommodate an indirect center seconds pinion as it does in other variations on the base movement. A sub-bridge with a single hole in it can be observed on the naked main plate [12] for the upper pivot of the sub-seconds transfer wheel, and the other side of the movable minute wheel post and its spring can be seen just to the right.



13



14



15

The barrel is very nicely made [13] and has an elaborate and well-designed ratchet wheel screwed directly onto the barrel arbor with three small screws [14]. This very secure design will hold the ratchet wheel firmly in place without rubbing on the barrel or the underside of the barrel bridge, a potential source of wear in an automatic watch especially. The barrel and ratchet wheel are nicely decorated and the inside surfaces of the barrel are satin finished. [15]

The Balance and Escapement

The escapement and balance assembly are entirely modern. The escape wheel is entirely polished with steeply beveled teeth and the pallet lever is secured under a bridge

with oddly very different sized screws. The escape wheel teeth and pallet stones appear to be lubricated with a modern “dry” lubricant, and the pallet lever pivots ride in convex olive jewels. Olive jewels are rounded on their bearing surfaces to reduce friction and are more expensive to produce because of this. These olive jewels even go one step further towards eliminating friction with their convex shoulder bearing surfaces.

The pallet jewels follow a modern trend of sharing the same exact shape for the entry and exit stones. I don’t know if the ideal geometry of one or both stones is compromised to achieve the same shape for both, but the entry stone appears to have a much sharper profile than is traditional. I can only surmise this is a cost saving measure employed by Nivarox to eliminate the need to make two differently-shaped jewels. Modern ETAs all feature these matching pallet stones in my experience and presumably any performance issues caused by this modified geometry are negligible.



16



17



The flat, Nivarox 1 hairspring is attached to the Glucydur balance with a laser welded Nivatronic collet [16]. This is the most modern, technologically advanced hairspring attachment available and is, at least in theory, slightly superior to the more common Greiner collet used by the vast majority of manufacturers. To my knowledge, only Audemars Piguet, Rolex and a few others use these laser-welded collets. The hairspring is cemented at the stud [17] using a hot-glue that allows for a secure attachment of the spring without disturbing its profile (as traditional pinning does) and can be adjusted with a pair of heated tweezers if necessary without deforming the spring.

The balance cock has a movable stud carrier with Spiro fin fine adjustment and Kif shock-protection. The balance and hairspring vibrate at 28,800 vph and this example was very well adjusted, resulting in a maximum deviation of 5 seconds between positions. The escapement, balance and hairspring are composed of the most modern, technologically advanced components available, employed admirably to positive effect.

One very surprising feature of this particular movement was the presence of a single, very well made shim (straight grained on both sides) underneath the balance cock next to the hack lever [18]. I've only ever encountered a shimmed balance cock in a very inexpensive Russian automatic previously so I was quite taken aback by its presence here. A shim is a perfectly sound engineering solution to variations in balance staffs and the placement of the jewel settings, but is certainly not commonly seen in mechanical watchmaking. It is considerably quicker and less expensive to slide a micro-thin shim in place than it is to manually adjust the height of the jewel assemblies, so perhaps this is a foreshadowing of watchmaking in the future.

Conclusion

The Vintage 1945 Large Date Moon Phase is a striking watch with massive appeal and traditional and modern elements blended into a harmonious whole. The otherwise utterly traditional dial with dauphine hands is punctuated by the innovative big date display, which manages not to detract from the vintage appeal.

The GP Cal. 3330 movement is an exciting, modern and innovative piece of work. It benefits from a tried and true automatic system, a rugged and extravagant ratchet wheel arrangement, an entirely modern balance assembly, an elaborate handsetting train and a novel big-date mechanism. It is executed without guile and with appropriate finishing throughout. Although, the feeling it imparts upon disassembly would be more impressive if it were not for the variety of wheels and levers permanently attached to the plates and bridges, these do not completely undermine its appeal. While these riveted or friction fit attachments are understandable as cost saving manufacturing decisions, they do not contribute to a sense of refinement nor certainly tradition amidst the modern mechanisms. The entirely practical nature of these solutions is highlighted acutely by the shimmed balance cock.



It would be far too simple to accuse this movement of cutting corners in an effort to keep costs down. The more expensive pallet pivot jewels, ratchet wheel attachment and hand setting train speak to the contrary. It seems that manufacturing costs were keenly observed, but with an eye for how the performance and longevity of the movement might be affected, and a sensible balance between extravagant and parsimonious engineering solutions was adopted. Only time will tell how well these concerns were addressed in this very young movement, but if I were a betting man, I'd put my money on the engineers at Girard-Perregaux.

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Clockmakers Get Ready

Your Time Is Here

That's right! After pretesting and piloting, the 21st Century Certified Clockmaker Assessment (or CC21 as it is now known) will be ready for you this October, 2007. Think you know about clock repair and restoration? Test yourself with the new certification program. To help you out, this month and next we will publish materials that you need to be practicing to "polish" your skills. After much discussion, study, revising, retrials and a bit of tweaking, the Clock Section of the Education Committee is satisfied that if you can pass this program, you have what it takes! The total assessment now has 10 items to challenge you. (Even though we added one more item, we simplified the entire process to reduce your costs.) Think you are knowledgeable? Then, it's time to compare notes with the AWCI Standards & Practices for 21st Century Clockmakers.

With all the industry changes and losses, now more than ever, we need a trained cadre of professionals who can maintain what has been left to us by our predecessors. Do you have the skills? How do we know? How does your customer know? One way to show them, is to show you care about what you do and are a professional in every way you can be—be a certified member of AWCI!

What does it take? As I mentioned, there are 10 assessments or performances for you to tackle. Unlike the Watch Section, clock people require a lot more equipment and room to tackle our products. Also, we require a longer period of time to test our products, so the Committee and the BOE have set up this program to be run in 2 sections. Tier 1 is a set of 4 performances that are viewed by an AWCI representative called a Mentor. His/her job is to observe the candidate doing specific tasks and then review the entire shop so AWCI has an idea of where you are working and "how you did it," so to speak. The Mentor is not there to assign a score or to tell you how to do something, but to tell us how you did it so we can better evaluate what you did. Tier 2 is comprised of 6

performances in 2 boxes. You will do these on your own. An important note with these materials, you must return each of the boxes within 14 calendar days of having received them. One box will be left by the Mentor at the close of Tier 1 work. This box must be returned, completed within 14 calendar days by the candidate. The other box will be sent to you upon receipt of the first. This second box also must be returned within a 14-day period like the first. Now, what do you have to do? Check out the following:

TIER 1

- 1.) The Mentor/Shop Review—this is done by the Mentor and is described above.
- 2.) The Written Assessment—this is a series of short answer questions divided into 6 sections that deal with various clock subjects and knowledge. Check out the S&P for more details.
- 3.) The Pivot Assessment—how good are your repivoting skills?
- 4.) The Wheel Tothing Assessment—can you put teeth in a wheel and make it look and function as good as the original?

TIER 2

The First Box (left by the Mentor):

- 5.) The Barrel and Mainspring Assessment—clean the barrel and reload the mainspring properly. Can you put a hole in a mainspring?
- 6.) The Lantern Pinion Assessment—we all have to replace the worn wires (leaves) of pinions from time to time. Can you do it?
- 7.) Floor Clock Movement Assessment—in the S&P we talk about "General Movement Service." You will be given a floor clock movement (see next month as there are some options you will be offered) to put through this process as prescribed—bushings, pivots, levers, the works. Even striking and chiming adjustments will be needed and, yes, it must meet the AWCI minimum timing standard!

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The Second Box (sent by AWCI):

8.) The Cuckoo with Music Assessment—you will NOT have to perform "General Movement Service" on this product, but you will have to adjust and fine tune this product, its music movement and the dancers—just like you would in your shop. You will need to get this clock to keep the best time that you can achieve.

9.) The 400-Day Clock Assessment—you will NOT have to perform "General Movement Service" on this product, but you will have to demonstrate your abilities to correct an escapement typical of this type of product and then make up a suspension unit specified by the BOE. There will also be a few questions to answer about items that we can more easily test for on paper.

10.) The American T/S Movement Assessment—you will NOT have to perform "General Movement Service" on this product, but you will have to show your abilities in adjusting this type of escapement as well as strike adjustments (even remaking a worn/missing lever). There will also be a few questions to answer about items that we can more easily test for on paper.

If you look real hard, you will see that this entire assessment is like the work you do every day in your shop. No tricks, no under-handed, off-the-wall challenges, just good solid bench work. That's exactly what we are expecting and evaluating—professional bench men and women who are passionate about their jobs and want to show the world they have the skills to do it right! Read the Clock S&P! Go to: <http://www.awci.com/documents/June2006sandpforclockmakers.pdf> and see for yourself. There is an excellent study section at the end of the document and there are many more that give tips and techniques to help you grow. Study what is required and you will quickly see what techniques are considered inappropriate to use. The S&P tells you what is expected.

To start the ball rolling, request the application materials from Nancy Wellmann, Education Coordinator, at AWCI, 701 Enterprise Drive, Harrison, OH 45030-1696, 1-866-FOR-AWCI (367-2924), or nwellman@awci.com. Fill them in and see if you meet the standards!



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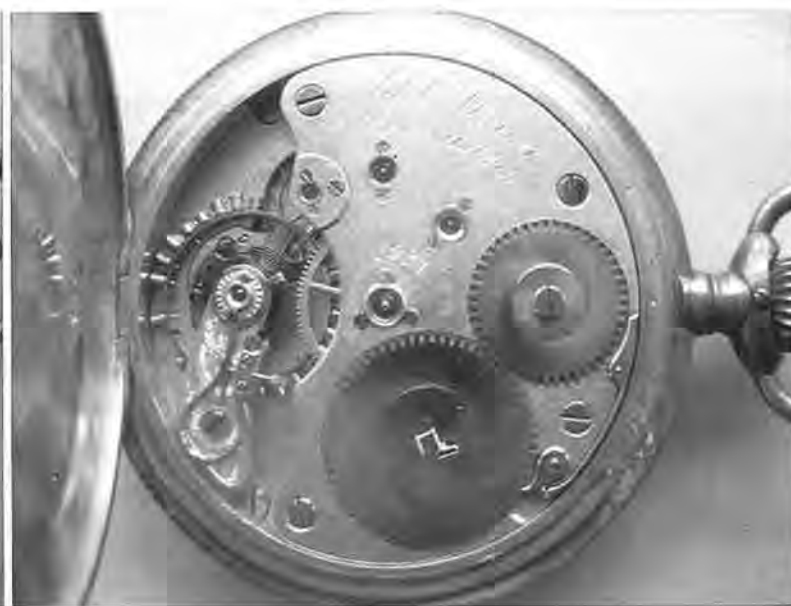
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Adolf Simon's Glashütte School Watch

Part 2

By David A. Christianson, CMW21, FAWI

Extraordinary Achievements of the Glashütte School

Throughout the years the teachers in the school published the incredible advances given to watchmaking by the Glashütte industry, along with the results of their own contributions to the local industry and thus also influencing in particular the organization and growth of the Swiss watch industry. But it wasn't until Kurt Herkner, a master watchmaker from the Glashütte School, published two books in the 1970s and 1980s, that the extraordinary achievements of the school and its students were brought to light. The first is *Glashütte und seine Uhren* (*Glashütte and its Watches*, 1978), which is at this time the most complete and detailed history of the watchmaking industry in that part of Germany. The second is *Die Lehre an der*

Deutschen Uhrmacherschule (*The Apprenticeship at the German Watchmaking School*, 1985). This book contains the reprints of several smaller books that were published between 1928 and 1932 and written by the instructors at the school. Kurt Herkner wrote introductory pages and included pictures and drawings of the school and actual student projects. Unfortunately for most of us American readers, the books are only available in German.³⁸

Among the most extraordinary achievements were the instructors' abilities to impart the essence of fine craftsmanship to the students and, in turn, the students' desire to demonstrate this fine craftsmanship in the various projects that they completed while attending the school.

For the period of 1882 to 1951, Kurt Herkner tabulated the various student projects that they completed. During this 69-year period there were 3188 projects.³⁹

1385 pocket watches were made:

- 1187 with jeweled lever escapements
- 112 with cylinder escapements
- 57 with chronometer escapements
- 24 pocket chronoscopes and
- 5 pocket repeater watches;

578 escapement models were made:

- 422 jeweled lever escapements
- 55 pivoted detent chronometer escapements
- 90 spring detent chronometer escapements and
- 11 cylinder escapements;



72 tourbillon models were made:

- 8 with jeweled lever escapements
- 9 with pivoted detent chronometer escapements and
- 55 with spring detent chronometer escapements; and

1153 other/diverse precision instruments were made that included:

- 309 non-static pairs of needles, possibly designed to detect magnetism in watches
- 711 precision measuring instruments, such as calipers, comparators and micrometers

- 69 marine chronometers and
- 64 precision regulator pendulum clocks.

In addition the school assigned special numbers to innovative or challenging projects that are not listed above. They were:

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- 19 with a chronometer escapement
- 16 board chronometers (with a lever escapement)
- 1 torpedo boat watch
- 3 special marine chronometers
- 2 pilot's watches
- 2 watches for navigation
- 1 scientific watch
- 1 pocket chronometer with a power reserve indicator
- 1 chronograph with date
- 1 pocket watch with date
- 1 pocket watch with jumping second
- 46 chronometers
- 1 pocket watch with a duplex escapement⁴⁰

The numbers are impressive but the impacts of these extraordinary accomplishments are in the photographs that Kurt Herkner was able to present: remarkable examples of escapement models, precision instruments, clock movements, tourbillions and pocket watches. One of these watches we have the opportunity to see here.

Adolf Simon's School Watch

The watch is a traditional Glashütte (Lange) caliber, stem-wind, lever-set, $\frac{3}{4}$ -plate movement housed in a coin-silver (0.800 fine) hunting case, stamped on the inside of the case with Mr. Simon's student number 2979, the case-maker's hallmark (a crescent and crown) and the case metal quality (0.800).

The movement itself is engraved *Adolf Simon, Pirmasens, 1921* on the $\frac{3}{4}$ -plate and is stamped with *Deutsche Uhrmacher-Schule, Glashütte Sa.* in an oval, and his student number 2979 on the dial side of the movement. The porcelain dial is imprinted: *Deutsche Uhrmacherschule Glashütte, Sa.*, with

full Arabic numerals and a sub-seconds dial and gold indicator hands. Mr. Simon's watch was one of 92 student projects completed at the school in 1921.⁴¹

The Movement

A closer look at the movement shows the Adolph Lange influence in Glashütte precision watchmaking. The stem is part of the movement, not part of the case, to ensure proper operation of the winding and setting (a Lange U.S. Patent #54831, May 15, 1866). The ratchet wheel is mounted to the barrel arbor with an offset, $\frac{1}{2}$ -head screw in the Glashütte manner.⁴²

The particular design of a straight-line lever is a Lange innovation that he introduced around 1852 – 54 with pallet jewels completely inset into the unequal arms of the lever.⁴³ The faces of the pallet jewels have different curves for the impulse and locking faces, convex on the entry pallet and concave on the exit pallet (an innovation first used by Breguet).⁴⁴ Another Lange innovation is shown in this watch: the escapement uses only one banking pin attached on the underside of the pallet fork arm of the receiving stone that banks in a hole in the main plate.⁴⁵

The balance is a Griessbach-style, high precision compensation balance, made originally by Richard Griessbach, a balance-maker who established his shop in 1888 in Glashütte.⁴⁶ Uniquely Lange's, the balance has a triangular shaped roller jewel mounted on one, reinforced balance arm, instead of on a roller table.⁴⁷ The balance is sprung with an overcoil hairspring. And finally, another Lange innovation is evident. The escape wheel is held in place with a special, separate little sub-bridge in the $\frac{3}{4}$ -plate, so that the escape wheel can be easily removed.⁴⁸

All of the Lange innovations, including the $\frac{3}{4}$ -plate movement design, were still being used by the Glashütte manufactures and by the School 75

years after Adolph Lange introduced them to the watchmaking world. And most of them were still being taught by the school in 1950, nearly 100 years after their introduction.⁴⁹

The students at the school would have received a blank Glashütte $\frac{3}{4}$ -plate movement without jewels, regulating organs or train wheels; but with a ratchet, crown wheel and winding parts (i.e., the main plate, $\frac{3}{4}$ -upper plate, balance bridge, pallet bridge, escape wheel sub-bridge and winding parts) all in an unfinished state. Their challenge was to depth, locate and drill the wheel train pivot holes and regulating organ holes; mill out the recesses in the main plate to accommodate the escapement and regulating organs (the escape wheel, pallet fork and balance assembly); make the jewel bezels, cap jewel settings, set the jewels and locate, mill and set the jewel settings and screws into the plates and bridges: two pallet jewels, a roller jewel, 12 train and balance pivots and 6 cap jewels on the balance pivots, pallet arbor and escape wheel pivots. The plates and cocks would need to be polished and gilded; the jewel settings and steel work polished to a mirror finish. The hairspring would have to be vibrated and shaped into an overcoil curve using one of the Gerstenberger or Helwig tables. And then the balance would need to be adjusted to heat, cold and five positions.

Each completed student watch, including Mr. Simon's, was a work of art and a demonstration of incredible patience, skill, and theoretical knowledge, both by the students and the teachers in the school.

The Glashütte Influence

The Glashütte School set a standard for all watchmaking schools to follow. Their emphasis was on industrial watchmaking: micromechanics and the hand finishing of watches, clocks and instruments combined with the application of horological theory. But, since all of the skills of the watchmaker are needed by the watch repairman to

analyze, repair, adjust and fabricate the damaged components of a watch, the students were prepared for enrollment in all phases of watchmaking, from design, to manufacture, to restoration of old timepieces, to the repair of current pieces.

By the time the Glashütte School (in East Germany) closed, the schools in West Germany were still using the *school watch* as an integral educational tool. Rudy Hoellein, a watchmaker in Indianapolis, told me that he made his school watch from a rough Junghans calibre 47 pocket watch movement, in the early 1950s. Rudy studied under a master watchmaker in Wuerzburg, West Germany, and, because of the dual system of training in Germany, attended the regional vocational school in Wuerzburg to receive his theoretical instruction and general studies classes.⁵⁰

Within the next 20 years the focus on watchmaker training in Germany changed from an emphasis on manufacture to an emphasis on repair and service, due undoubtedly to the great strides in automated machine manufacture and machine finishing (watch manufacturing didn't need actual watchmaker in the factory anymore). Yet the importance of fabricating parts as an integral part of instruction continued from the Glashütte influence.

Bernhard Stoeber tells us that in the early 1970s the Watchmaking School in Pforzheim did not require a *school watch* project in order to graduate or to sit for the journeyman exam (unlike some other full-time watchmaking schools). In those days the journeyman exam (three days) consisted of: a written theory test; a practical test that involved the making of a stem from a drawing; making a click for a clock from a drawing; the servicing of both an automatic wristwatch (with built-in defects) and an electronic watch (including the protocol of all electrical measurements); and finally a verbal theory test.⁵¹

Surprisingly enough, Bernhard's experience in the Pforzheim School was similar to some (but not all) of the U.S. schools in the early 1970s. At Gem City College and its branch, the Kansas City School of Watchmaking, students had to make a stem from a drawing, service an automatic wristwatch and an electronic wristwatch, take written and oral tests on the various aspects of horological theory and make a balance staff from "scratch." The students had the option to make a staff from a drawing or make a working one for a watch (see endnote #4).

During his one-year preparation course for his master's examination in 1975, Bernhard had to make an electronic watch model using the hairspring, dual balance discs, upper and lower shock absorbers, moveable stud-holder and regulator, the electronic circuit and battery insulator from a Junghans electronic caliber 600. He had to determine all measurements, design and make the main plate, balance bridge, and battery bridge, along with the balance staff to fit his model design (combining the skills of the watchmaker with the new electronics of the time).

Bernhard notes that "certainly the exams (both journeyman and master) in Pforzheim were not on the same level as the requirements in Glashütte up to the closing of that school in the 1950s. On the other side the focus in my training was more on practical bench work (servicing all kinds of watches and clocks in a retail environment) rather than on the micro-mechanical part that was emphasized in Glashütte."⁵²

The school watch project never seemed to be an integral part of most American watchmaker's training; although there were a few instances during the 120 year history of formal academic watchmaker training in America. The first watchmaking school in America, the Parson's Horological Institute (beginning in 1886) apparently used the school watch project, since they were

training watchmakers for both the service and the manufacturing industries (see endnote #5). The American Academy of Horological Engineering in Denver required the entire making of a watch starting in 1949.⁵³ And a few of the very early schools in the U.S. made school watches and escapement models, such as the Elgin Watchmakers College, which "was apparently an important source of skilled mechanics and new ideas for the Elgin Watch Company."⁵⁴

By the late 1940s Bradley University, successor to the Parson's Institute, had their students making component parts for watches, including train bridges, stems, staffs and jewel settings, as separate projects but not incorporated into a complete watch, as in Glashütte (see endnote #6). In the early 1970s Gem City College, the direct successor to Parson's and Bradley continued using these individual component projects, usually made from drawings,

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yet not to be part of a finished watch. By the late 1970s a lot of the micro-mechanics and component making and finishing projects were disappearing from American watch schools to be replaced strictly by the servicing and adjusting of mechanical timepieces and the new electrical, electronic and quartz timepieces coming onto the market; due mainly to an emphasis on the servicing of modern watches where replacement component parts were readily available, and de-emphasis on restoration (reflecting the general lack of interest in older timepieces by the watch-owning public).

The Tradition Continues

During the late 1980s and 1990s, coinciding with the renewed interest in high-quality mechanical watches, the exams in Germany have been updated and are much more in depth. The new master's exam includes making a small table clock from scratch (or a similar comprehensive task) and segments on accounting, bookkeeping and training methods for apprentices, besides practical and theoretical examinations.

Bernhard tells us that today a more balanced approach is used at all watch-making schools in Germany, with a strong micromechanical training combined with the teaching of efficient service techniques and processes that enable the students to find work in a broad range of companies, from retailers to restorers to trade shops to service centers and in manufacturing environments.⁵⁵

The tradition of the School Watch continues in the U.S. at the Lititz Watch Technicum in Lititz, Pennsylvania. The Lititz School opened in 2001 and offers a traditional training program (following the WOSTEP curriculum). In two years the students begin to learn the profession both in theory and in practice. Primarily aimed toward the repair and restoration of watches (reflecting a renewed interest in old watches by the watch-owning public),

the Lititz School was the first American school to offer a *school watch project* as an integral part of the training (followed by the Watch Technology Institute at North Seattle Community College). After basic micro-mechanical training, the students apply their knowledge and skills to make a series of components for a Unitas/ETA 6497 watch movement. Functional parts such as the winding stem, balance staff, ratchet wheel click, click spring, yoke, setting lever and setting bridge are made, followed by the more complex train and barrel bridges, for which the students can use their own creative abilities to design and make.

Just as in the past, the current making of a *school watch* integrates micro-mechanics with specific repair techniques: train wheels need to be uprighted and planted; train jewels need to be set and their end shakes adjusted; banking pins made and adjusted; a balance staff made from scratch and staked to the balance wheel; and the balance then trued, poised and sprung with a hairspring that needs to be vibrated for each individual's watch.⁵⁶ The school watch not only gives the students an opportunity to demonstrate their skill and knowledge, all in one watch; but it gives them the skill and confidence to analyze, diagnose and execute the repairs necessary in their future watch repair work.

Far more than a diploma of graduation, the school watch shows to the world the quality of the school that the watchmaker attended and the knowledge and skills that the watchmaker has known and demonstrated.

Endnotes

4. I chose the latter and somewhere in Kansas City is (or at least was) a 12/size Illinois pocket watch with a handmade staff that I made for a client who brought his pocket watch into the School for repair. We had to make

various hand tools, stems and staffs from scratch during our course of micromechanical skill development. I attended the school in 1975. Because of my previous apprenticeship, I was able to complete the course work in one year. We did not, however, have classes in general studies and, at the time, our theoretical instruction could have been better.

5. One of my predecessors in my shop was a graduate of the Parson's Institute in 1891. Among his personal items is a watch-size gear model project that demonstrated depthing and uprighting of train wheels; and a pocket watch main plate (obviously not a factory-made rough movement) that was made from scratch using a piece of nickel silver. I don't know if he made a complete watch in school and this main plate was a practice piece; or if he made this plate in our shop after graduation, but didn't take the time to finish it. He certainly had the tooling available to do it, since that tooling is still in our watch workshop today.

6. I have a Lepine-style center wheel bridge that was handmade and finished by a watchmaker attending Bradley University in the 1940s; along with various balance staffs, stems, hand tools and bezel-set jewel setting project plates that were made by students at Bradley, Elgin and Kansas City watch-making schools between 1926 and 1946.

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Acknowledgements

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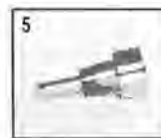
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Springs

Part 2

I discussed mainsprings last month and demonstrated the typical French and British strike and time barrel arrangement and the German chime barrel arrangement—half the volume of the barrel filled with spring so as to obtain the maximum value from the volume available. That is a useful thing to know since it avoids cramming the barrel with spring that it cannot use and which reduces the length of time that the clock will run.

However, one of the repairer's major problems is obtaining new springs for old clocks. There are two methods of specifying mainsprings. In American catalogues the length of the spring, width and thickness (or strength) are quoted, and in British catalogues the inside diameter of the barrel, width and thickness are the criteria. The reason for American suppliers quoting spring length is probably that so many American clocks had no barrel; they were open springs. Open springs were rarely used in Britain and the rest of Europe. The springs were contained by barrels. Quoting the length was not very convenient for the repairer, since it is a lot easier to measure the inside diameter of a barrel than to get an accurate figure for the spring length.

The result is that there is often a mainspring available for an American clock in British catalogues, and vice versa. All we need is to have a means of calculating the spring length from a quoted barrel diameter, or a barrel diameter from a quoted length, and that is really quite simple.

We saw that it was sufficient to calculate half the available area inside a barrel since the height of the spring was constant, (height would be needed if we wanted to calculate volume) and that this would tell us where the innermost coil of the unwound spring should lie. For a barrel with a winding arbor 0.3 times its inside barrel diameter this figure for the innermost coil radius was about 0.74 of the barrel's inside radius. Call it three quarters. This was simply so that we could determine whether there was enough spring or too much.

If we divide the available area by the thickness of the spring we obtain a fairly accurate figure for the length of the spring.

$$\text{So the available area} = (R+r)(R-r) \times \pi/2, \text{ or } (D+d)(D-d) \times \pi/8$$

Both formula are the same, and R = inside barrel radius, r = winding arbor radius, the D s are diameters, just remember which you decide to use.

Take an inside diameter of 2" and a winding arbor of 0.6" with a spring thickness of 0.025"

$$\text{Half the available area is } (2 + 0.6)(2 - 0.6) \times \pi/8$$

$$\begin{aligned} \text{Take } \pi \text{ as } 3.142: \\ (2.6)(1.4) \times 3.142/8 = 3.64 \times 3.142/8 = \\ 1.4296 \text{ square inches} \end{aligned}$$

Settle for 1.43 square inches and divide this by 0.025" to obtain a length of 57.18"

Spring lengths are never this accurate and an allowance has to be made for the ends, I would be satisfied with a length of 58" for an answer.

This example is fairly typical of a 19th century German chiming barrel. If a spring were wanted for such a clock, you would not be able to find its barrel diameter quoted in the American mainspring catalogues so you would either strip the spring out and measure it with a tape measure (which is not easy or comfortable) or do a quick calculation. I prefer the calculation.

The opposite is true, of course. It is often the case that the length of an open spring for a particular make of clock is known, but the spring is missing. Knowing the inside barrel diameter of a spring that would perform the same duty enables you to search the British catalogue for a spring

that is available. Thickness and width of spring must be the same as the original, naturally.

Spring Strengths

The business of finding a given spring becomes more of a problem each year as the number of springs being made declines. As a result we often need to compromise and find a spring that is close, but not exactly the same. Slight variations in length will not make a lot of difference to a clock that was originally classified as an eight-day, so long as it is wound regularly each week, which of course is only using seven-eighths (87.5%) of the "wind". A spring that is ten percent shorter than the original eight-day clock should do well, but if left to run for the eighth day, will probably gain more than you would expect. The spring is shorter and reaches the weaker end of the spring sooner, making shorter swings on the pendulum. As long as there is nothing wrong with the train and its pivots, less power leads to short pendulum swings and more beats to the hour—not what we were told at school!

A longer spring than needed is corrected by shortening it, of course.

But what about the height and thickness? The height ought not to be lessened, because of the need to control the sideways position of the spring as it works, and altering the height by ten percent (for instance) only alters the available power by ten percent. However, the stiffness of a spring is in proportion to the cube of its thickness and small changes there can have a very great effect on the power of the mainspring.

A spring that is 0.025" thick compares with one that is 0.002" thinner in the ratio 15625: 12167, (253: 233), which means that the thinner spring has only 78 percent of the power of the thick one.

That is a great reduction for only 0.002" difference!

However, using a new spring that was thicker by 0.002" would be a little worse. The thicker spring would store 26 percent more than before, which would lead to significant loading on the gears and the pivots. The stiffness of a spring is not precisely proportionate to the cube of its thickness, but it is close and you should never put a thicker spring in a clock, even if it is only 0.002" thicker.

Maintenance of Springs

For a mainspring to work properly and give up its energy smoothly it must be clean, free of kinks and bruises and, present wisdom proclaims, should be polished. I keep away from pronouncements like that because I have examples of early 18th century springs that only "died" in the 1990s. They have the roughest surfaces that you have ever seen, surfaces that were cut with rough files that left troughs that were visible to the eye. They ran along the length of the spring in the one case (1704) and diagonally in the other. My first thought was that the diagonals would be designed so that they opposed each other when the coils were touching, but in fact they were parallel, so that they could be expected to form locking surfaces, knuckling one into the other. It really was contrary to everything I had ever learned about springing. The earlier clock was 1695 and it was a striking bracket clock made by Guiger of London. After three hundred years it was very tired. I hope that the modern spring steel (I had to make the spring from sheet steel) lasts as long, but somehow I doubt it.

Nevertheless, the spring must be clean and have no stickiness from old oil or grease. If the edges are distorted in any way the coils will "throw" out of line and press heavily against the ends of the barrel in a way that mild telescoping never can. There is a point to be made here, telescoping is the description of the center of a spring leaning out to one side when it is held up by the hole end of the spring. This is often referred to as distortion, but it is not necessarily so. If one finger presses the center back as the coils hang there, it will go back into plane with very little pressure indeed. Many springs display telescoping from new, when released from the wire that keeps them coiled.

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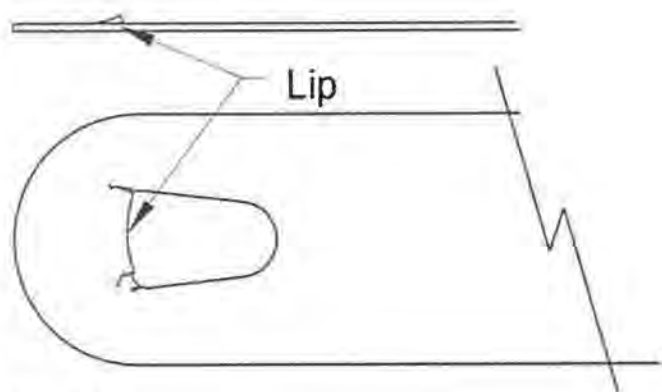


Figure 1

On the other hand, if the edge of the spring is bruised or turned down, or if the spring is kinked or dented, the section of the spring is twisted out of its proper position and can exert a great deal of sideways force when installed in the barrel. Pieces of grit, or packed dirt and grease have the same effect. It is for this reason that the spring is cleaned thoroughly and inspected for anything that might distort it.

Making a New Hole End

Holes take a great deal of load as the spring is wound up to its fullest extent, exerting a radial force towards the winding arbor. Over time this leads to "lipping" and cracks around the periphery of the hole, and quite frequently those cracks grow until the end pulls out (Figure 1). Whenever a clock is serviced the mainspring must be examined and in addition to cleaning the main body, the end must be looked at closely. The obvious lipping is obvious, but small cracks are not always easy to see. Take a loupe to the end and make sure that there are no cracks.

If the damage to the hole is not too extensive it can be filed to remove cracks and any other damage; precisely how much damage is too much is a matter of judgment, but Figure 2 shows guide dimensions for what I would consider to be the minimum amount of sound metal around the hole. Note the word "sound", this means that there are no cracks or nicks. A nick will generate a crack very rapidly. Filing must leave no corners.

None of the forces acting on the hole are purely tensile, they are complex and may be described as "tearing", consequently the minimum dimensions that I show above may be quite unsafe for a spring that has high loading on the end—a very stiff spring for a chime barrel or a large fusee spring barrel for instance. If there has been significant damage, cracks

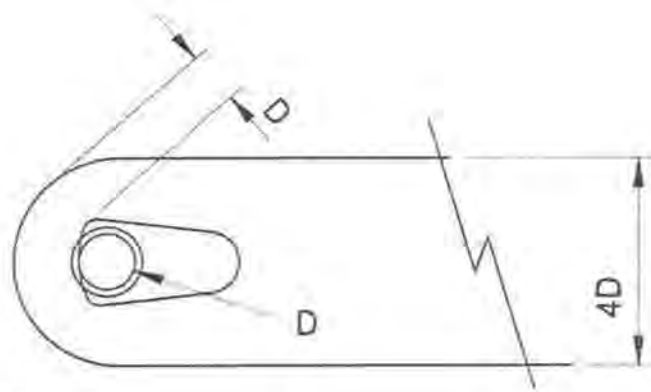


Figure 2

longer than about 0.015" or lipping that has lifted well past the thickness of the spring, do not repair, cut the end off and make a fresh hole in good metal.

Before starting, make sure that you are recovering a main-spring that has not had this work done before. One new hole is fine, repeating the exercise will produce a spring that is clearly shorter than the original and with metal that has been heat treated three times. Many steels become significantly weaker if repeated annealing operations are carried out. I would prefer to replace a mainspring that has already been repaired once.

The end of the spring needs to be annealed. This is done by heating it to cherry red, keeping it at that temperature for about one minute (less if it is a small section, say 0.5" x 0.015") and then burying it in dry sand or chalk so that it cools slowly. Figure 3 shows how much of the spring should be heated in this manner; the same figure shows suitable variations for the shape of the hole in relation to the diameter or width of the barrel anchor stud. Note that the large end is either flat (and at 90° to the length of the

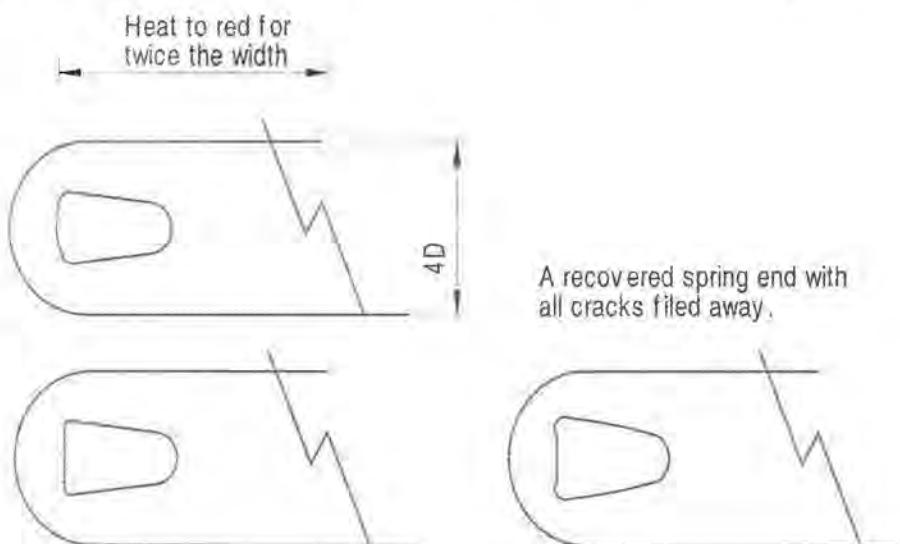


Figure 3

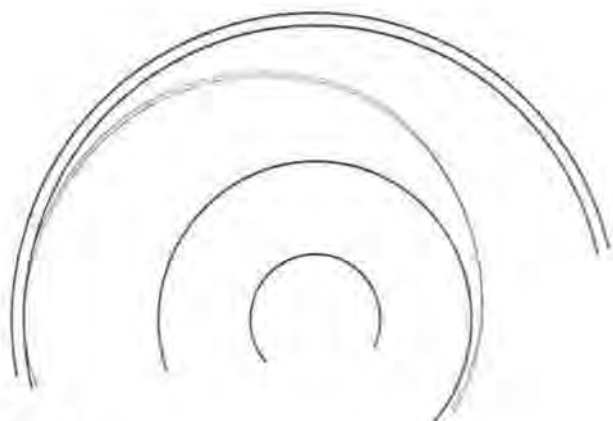


Figure 4

spring), or it has a slight curve. The idea is to allow the spring a small amount of sideways movement. If the small end were drawn onto the stud it would have a fixed position laterally, which would be fine if the manufacturing tolerances were tight. Those tolerances refer to: centering of winding arbor anchor in between the shoulders, centering of barrel stud along barrel length, position of the raised portion at the bottom of the barrel, position of the cap and any protrusion. Allowing the spring end to float slightly on the anchor stud removes any constraint on its lateral position; it is a safety measure avoiding the possibility of "popping" the cap.

Tapering the hole increases the effective width of spring on either side of it and this increases the stiffness of the spring end as it approaches the rest of the spring. As a result it makes a curve as it gets nearer to the anchor stud instead of folding over into a 90° bend at the anchorage (Figure 4).

Drilling the Spring End

Clearly a hole has to be drilled before the filing can take place and if you simply plank the spring on a drill table and pull the drill bit down into it, you will very probably never make the same mistake again with that hand. Drilling thin material with a relatively large diameter drill is very dangerous unless you set about the job properly.

First, rest the spring on a piece of brass and mark the center of the hole with a large center punch. This leaves a hollow mark and if you turn the spring over, a small up-standing pyramid. File this flat and you reveal a small hole that makes it easier for the first, small drill to bite in and drill right through. (This method works well for very small holes in untreated spring suspensions; it is quick and does not split the spring.)

"Springs" will continue next month.



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Questions & Answers

Continued from page 4

Watch #27: This watch is what is known as a first-grade M.I. Tobias & Co. pocket watch. As you noted M.I. Tobias was a very prolific maker of watches in England; the vast majority of which were for export to the United States. M.I. Tobias & Co. made three grades or qualities of watches but only signed their name to the first-grade.

Morris Tobias (1762/63 – 1846) was the first of three generations of the Tobias watchmaking family in England. M.I. Tobias (Myer Isaac) was part of the second generation. Myer was actually Morris' adopted son as well as his nephew. Myer worked with his father until he set out on his own in 1812.

M.I. Tobias & Co. produced good quality watches in Liverpool. His shop was a finisher of Liverpool rough movements, not a primary manufacturer. He enjoyed a good reputation in America. Importation to America stopped by the end of the American Civil War when U.S.-made watches quickly took over the American watch market. During its 50-year history, M.I. Tobias & Co. produced nearly 45,000 watches.

As with most well regarded watches, there were imitations and fraudulently signed Tobias watches, playing on the good name of Tobias. Most were Swiss bar-style movements, although there were also Swiss and English-made full-plate and ¾-plate movements, usually signed M.J. Tobias or just Tobias. Some are signed M.I. Tobias & Co. but are of obviously inferior quality. To quote Michael Edidin⁴, from whom all of this information about M.I. Tobias comes, "The many forged and fraudulent Tobias watches that were manufactured and sold are a backhanded tribute to the scarcity and the reputation of M.I. Tobias & Co. watches."⁵



Mr. Edidin extrapolated a production curve from 100 surviving (serial numbered) watches with hallmarked (dated) cases. From his curve I can date your watch right around 1838.

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1. Kathleen Pritchard, "A Tiffany & Co., Geneva Watch," The Answer Box column, *NAWCC Bulletin*, Volume 33/4, Number 273, August 1991, p. 459.
2. Martin Huber & Alan Banbery, *Patek Philippe, Geneve*, Ludwig Auer GmbH, Donauwörth, Germany. Second edition, 1993. p. 54.

3. Ibid. pp. 134, 139, 145, 146 and 156.

4. Michael Edidin, "English Watches for the American Market: A History of Watchmaking by the Tobias Families of London and Liverpool."

Part 1: *NAWCC Bulletin*, Vol. 34/5, Number 280, October 1992. pp. 515-544.

Part 2: *NAWCC Bulletin*, Vol. 34/6, Number 281, December 1992. pp. 659-693.

5. Ibid. Part 1, p. 544.



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The AWCI Board of Examiners needs your help. The 21st Century Clockmaker Certification program is seeking Hermle 1161.8531 movements, 114 cm or 94 cm pendulums, fair condition, no bent shafts, no solder, and no WD-40®. You can donate these to the ELM Charitable Trust and receive a tax deduction and help with AWCI's clock certification material supply all at once!

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Omega began the manufacture of this fine series of movements nearly fifty years ago with calibers numbered 550 to 552 and 560 to 565. The base caliber for this series is the 550, an automatic, shock resistant, central seconds, antimagnetic, 17-jewel movement. The rotor turns 360 degrees and winds in both directions. The other executions in this series have various features including chronometer rating, micro regulator, date, quick setting date, and 24 jewels.

Although these movements have been out of production for about 35 years, there is still a sizeable demand to service these watches. Their original owners are still wearing some while many others are in daily use by relatives of the former owners or by collectors who are now recognizing the quality of wristwatches equipped with these movements. Omega and its distributors supplied quality cases in gold filled, solid gold, stainless, and stainless and gold combinations for these movements. The dials and hands were commensurate in quality with the movements and cases. One cannot say many negative things about these watches except that they are now considered old, vintage, or whatever term one chooses. Overall, these watches were well made, with easily serviced movements, and always, excellent timekeepers.

Many other watches from that era cannot be adequately serviced due to a lack of spare parts. Understandably, numerous manufacturers have gone out of business or, if still in operation, no longer supply parts for watches they produced over forty years ago. Not so with Omega. They still supply parts for the caliber 550 movement and its varied executions as well as many crowns and crystals for the cases that housed these movements. This unique situation presents an opportunity for watchmakers experienced with these watches and their clients who wish to keep these watches in active service.

Any vintage watch that can be serviced requires more attention to detail than it did when it was relatively new. Parts that easily lasted for one generation of users may finally wear out during the second or third generation of wearers. Here are a few suggestions compiled from the experience of several watchmakers each having serviced several thousand of these watches over the past forty years.

- a. Replace the mainspring and use a genuine Omega part 722 0550 1208. (All Omega movement part numbers begin with 722. The next four digits indicate the caliber while the final four indicate the actual part.) The existing mainspring may be incorrect, damaged, or not supply sufficient power even though it visually looks fine.
- b. Replace the barrel using Omega part 722 0550 1200. A forty-year-old barrel is often badly worn.
- c. Check the barrel arbor hole in the barrel bridge. It is very often worn into an elliptical shape. This can be remedied by opening the hole, making certain the center of the enlarged hole has been restored to the position of the original smaller one. Insert a bushing, Omega part 722 0000 6152, into the barrel bridge. (Omega bushings and screws often fit a variety of movements, consequently the middle four digits of the part reference is 0000 indicating they are not specific to one movement.)
- d. Check the lower barrel arbor hole in the main plate. If slightly oversize, carefully close it.
- e. Check the pivots of all four wheels found in the automatic bridge. Replace any wheel with a worn pivot. In addition, for 17-jewel models, check the eight bushings in the automatic bridge for wear. Replace them as required. Omega has them available. AWCI has tech guides available listing all part references for these movements.
- f. After cleaning, take the reversing wheel (722 0550 1464) apart. The nut on the arbor unscrews. Lubricate the pivots on the internal pawl wheels and the bearing surfaces of the arbor. Reassemble the wheel. If this wheel is damaged or worn, replace it.
- g. Some of the center wheels have a very small internal bushing to support the tip of the seconds' pinion. Make certain it has not been lost. It is available as 722 0000 6107.
- h. If the second hand drifts due to inadequate friction, replace the friction spring 722 0550 1255. This is more effective than adjusting the tension of the spring.
- i. Genuine Omega screws should replace any missing damaged, or incorrect screws. They will fit and function properly.
- j. Check the case tube. Fit a new one as required. If genuine ones are not available. Use a quality generic replacement.
- k. Fit a genuine crown and crystal when available. They are high quality and restore the original external appearance of the case.

l. Always replace the case back washer, using a flat or o-ring washer as appropriate.

m. Genuine hands are hard to locate. If the original hands are still serviceable, they can be washed with soap and water before polishing with a clean leather buff stick. Luminous hands can be refilled. Bergeon supplies quality luminous material in various colors. If the hands must be replaced, search for genuine hands or quality generic replacements.

After proper servicing, these watches can be adjusted and regulated to keep close time, and in the case of chronometer rated models, COSC time. Test the case for water resistance. The majority of these watches can be restored to their original level of water resistance with proper service and parts. Many of these old Omegas have taken a serious licking for forty-plus years and, with your skilled service and care, they will still be ticking for many more years.

Jack Kurdzionak

Working from the Bottom Up, Not the Top Down

Most stores employ subcontractors, working off premises, to perform their watch, clock, and jewelry repairs. Stores employing subcontractors can provide a wide variety of quality repair services to their customers without the fixed overhead costs of equipment, employees, and workspace. More store assets can be allocated to product display and sales. Subcontractors, working for jewelry stores rather than consumers, are relieved of customer contact issues, receive repair work in quantity from a limited number of sources, and do more repairs and less administrative tasks per workday. This arrangement can be beneficial for both subcontractors and stores.

Robert W., a jewelry store manager, offers this advice about watch and jewelry repair to others who work in the watch and jewelry repair businesses. During his long career as an associate in watch and jewelry stores working with repair and sales departments, he has noted that many store owners and managers make the error of working from the top down rather than the bottom up as they employ subcontractors. Ideally, he says that watch and jewelry repair is a very simple proposition when done from the bottom up. When stores accept items from customers for repair, they document what they have received, issue a claim check, and send the item, along with many others, to a quality subcontractor. The subcontractor examines the

items, estimates the repair charges, and forwards the estimates to the retail store. The store marks up the repair charges in accordance with store policy, gets the customers' approval to do the repairs, and notifies the subcontractor who in turn makes the repairs and returns them to the retailer. In this scenario, each approved repair is done well and yields a profit for both the store and the subcontractor.

However, the world is not perfect. Some retailers work from the top down by setting their retail repair prices, regardless of what a subcontractor may charge for a repair, even before the subcontractor sees the work. That being done, rather than assigning a substantial volume of work to one trusted subcontractor, these retailers resort to frequent negotiations with various subcontractors to obtain lower cost repairs, lower quality repairs, or a combination of both. As an example, a retail store quotes a watch repair price of \$95 that the customer approves. The watch

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goes to the subcontractor (trade watchmaker) who quotes a repair charge of \$70, far higher than the retailer had in mind. The retailer has several options: A. Approve the \$70 repair and accept a smaller profit margin for this repair. B. Negotiate with the watchmaker for a lower cost repair (essentially ask the watchmaker to accept a pay cut), a lower quality repair, or a combination of both. C. Shop the job around to other subcontractors to search for a lower cost repair.

Robert's advice for profitable watch and jewelry repairs is not complicated. Take in the repair. Send the repair to a quality subcontractor for an estimate. Add your customary profit margin to the estimated cost and sell the repair. Every approved repair becomes a profitable sale. The retail price of a repair should always be constructed from the bottom up by adding of all costs involved plus a profit margin. When the retail price is built from the top down, it often results in a conflict between the retailer and the subcontractor, both competing with each other for a fair share of a retail price initially set too low to allow a fair return for both retailer and subcontractor.

Jack Kurdzionak

You Are Invited

Do you have a solution to a watch or clock repair problem that you want to share with our membership? Do you have a question about a repair problem you would like to ask? I invite you to participate in this column with your suggestions, questions, and comments. It is easy. Just e-mail me at AWCI <magazine@awci.com> or write using the old standby known as the postal service. You can even fax me at 513-367-1414.

I will do my best to help you help the membership. By sharing your questions and suggestions, all of our members can benefit from our combined knowledge and experience. The ideas, tools, techniques, and products presented in this column are suggested by the author and contributing members and are not endorsed by any manufacturer, supplier, advertiser, or AWCI itself.



The American Watchmakers & Clockmakers Association is excited to announce its DHL shipping program for members. DHL brings AWCI members a full suite of domestic and international shipping services, covering over 220 countries and territories around the globe.

Through AWCI's partnership with DHL, members are also eligible for special association member pricing. To find out more about your DHL benefits and set up your account, or if you have questions regarding your current account, please contact the dedicated association hotline at 1-800-MEMBERS (1-800-636-2377, 8 am – 7 pm, ET) or log onto www.1800members.com/awcinet



AWCI Business & Pricing Surveys

The AWCI Business & Pricing Surveys provide statistics on business expenses, rates charged by watchmakers and clockmakers around the country, and much more.

The purpose of the business survey was to learn more about members' business environments, income, and demographics such as age and location. The results for most questions are presented with a national average and a high and low range, and regions are also broken out.

The purpose of the pricing survey was to learn more about members' charges and hours, their business, their income, and their demographics such as age and location. The results for most questions are presented with a national average and a high and low range, and regions are also broken out.

Examples of questions and answers in these surveys:

Income

Q. In 2005 what was your annual gross income?

A. The average income reported was \$38,120 and the maximum was \$80,000.

Job Opportunities

Q. Do you have enough watchmakers, repairers or technicians to meet consumer demand?

A. Answers ranged from 40% Yes and 33% No. Of those needing additional watchmakers, repairers or technicians, the average need was 3.



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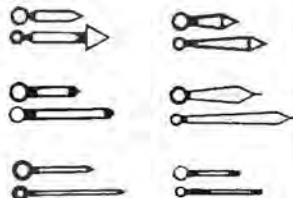


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12-99	\$1.66
100+	\$1.42

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Term Limits

I'm a strong believer in term limits in politics. The longer elected officials stay in office, the more they focus on being re-elected and the less they do the help the constituents they've been elected to serve. I think volunteer organizations are the same way. One definition of insanity is defined as doing the same thing over and over and expecting a different result, and with that in mind, I was very glad to see two new people elected to the Board, as we are in a different time and place now, and we need new viewpoints and ideas.

I have had an interesting year being the Affiliate Chapter Chair. It took me too many conference calls to figure out what time zone I was in so that I would be on time to the conference call. Just for the record it was duly noted that I was on time for the last conference call. I have enjoyed the *Tic Toc News* that comes from the Western Pennsylvania Watch and Clockmakers Association, though I've been frustrated by the vacuum that comes from the rest of the affiliate chapters. When I was elected I had high hopes for starting a fund for our students and getting committed, interested people to use our energy to become even better.

One of the things that came along with being Affiliate Chapter Chair was getting to be on the membership committee. This year, someone decided to contact all of the people who hadn't yet renewed their membership, and so all the names were divided up and we were asked to call them. I had 43 names from all over the country and in Canada. Four of the members had died and there were four more who were surprised by my phone call and had been planning to renew their membership the next day, so there was 20% right there. As to the other 80%, the people who were not renewing were not the "professional" people that I feel the organization feels it is composed of. I spoke with only four people who were actually "working" at the trade. Most of the people I called, even those with separate phone numbers for home and work, had answering machines informing me they worked 12-5 m-w-f or something else. I called many of these people several times to actually talk to a real person, and the people who were leaving were the ones who were serious hobbyists or had

a father as a watchmaker and were still interested but the *HT* was getting thinner and the good writers of articles were gone so there just wasn't much to keep them paying those dues.

I think a good discussion for the AWCI would be: Who do you want to be when you grow up? From the banner of the website, it would appear clear what that was: AWCI is an international not-for-profit trade association dedicated to the advancement of horology. Horology is the study of the art and science of timekeeping devices. AWCI provides educational and technical services for members and referral services for the general public.

If you look, the AWI's (From before clockmakers were included in the AWCI banner) Mission Statement reads: "The American Watchmakers-Clockmakers Institute is the premier International Organization dedicated to preserving and promoting the highest standards of workmanship in the horological crafts. It is the role of AWI to set the standard of excellence to be applied to the quality of instruction for both the restoration and repair practices that are taught worldwide."

With the new 21st century watchmaker tests and clockmaker test, and the many other rankings of workers all slated to have their own tests and instruction, it would appear that the mission is being addressed. The problem I see is that I am not sure anyone truly knows who AWCI is at this moment. There are many new and wonderful things going on — AWCI had a booth at the last Las Vegas JCK Show, and Rolex® has sent a letter confirming its desire to continue its relationship with AWCI, and all vendors of Rolex® must be members of AWCI, and have their watchmakers certified or Rolex has cautioned that accounts may be lost. What we now need is to educate our customers as to who we are, what we do, and why it is of great importance, both for us and for our customers, to have a strong association.

Yes, this is my last article. I have tried to make contact with you all. I wish the next person luck and thanks for my year. ☺

BULLETIN BOARD

ITEMS STILL NEEDED

Hahl Automatic Clock Co.

AWCI is looking for an instruction manual/service information for a Hahl Pneumatic Clock.

Sonic 4 Ultrasonic Cleaner

Charles Goad, Fairland, OK, is searching for a schematic for a Sonic 4 Ultrasonic Cleaner.

Mido Multifort Supermatic Water Tester

Gaetan Demers, Lawrence, MA, is looking for parts and an instruction manual for a Mido Multifort Supermatic Water Tester.

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send your information or requests to: *Horological Times* Bulletin Board; 701 Enterprise Drive; Harrison, OH 45030-1696; Toll-Free: 1-866-367-2924, ext. 307; Phone: (513) 367-9800; Fax: (513) 367-1414; E-mail: dbaas@awci.com ☺

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Visit AWCI's website, www.awci.com and click on "Members Page" under the "Home" menu and follow the Office Depot link, click on the link to register for the discount.

Note: Office Depot Benefits are available only in the U.S.A.



Introduction to Basic Quartz Watch and Quartz Chronograph Repair

Instructor: Manuel Yazijian, CMW21

November 5-9, 2007

AWCI - Harrison, OH

Purpose

This course is designed to teach the student all of the fundamentals of modern basic quartz watch repair and quartz chronographs that are most prevalent on today's market. The student will learn how to perform the various important electronic tests (e.g. current consumption, coil resistance, lower working voltage, fault finding, etc.).

Prerequisites

- Some basic understanding in electronic watch functions
- Knowledge of watch terminology
- Membership with AWCI
- Ownership of the book *The Theory of Horology* is essential. Must read Chapter 15 prior to attending the course.
- It would be of extreme benefit for the student to be familiar with some watch theory and also previous experience in watch repair (e.g. AWCI Basic Watch Repair Course, Modern Automatic Watches, etc.)+
- Knowledge of various Swiss calibers covered

Course Objectives

1. Brief historical background of quartz watches
2. Discussion of all the components in detail and their purpose
3. Recap and discussion of measurement points for analog quartz watches
4. Modern cleaning procedures
5. Modern lubricants as it applies to 21st Century watchmaking
6. Practical exercises
7. Introduction to and practical exercises with the Witschi QTest 6000
8. Additional exercises

For further information, please contact Nancy Wellmann, Education Coordinator, nwellmann@awci.com or call toll free (866) FOR-AWCI (367-2924), ext. 303 or visit AWCI's website: www.awci.com.



ACADEMY OF WATCHMAKING CLASSES

Manuel Yazijian, CMW21 Instructor

AWCI is offering a series of 5-day watchmaking classes. Each 5-day block will cost \$600. For additional information, contact Education Coordinator, Nancy Wellmann
nwellmann@awci.com
or call 1-866-FOR-AWCI (367-2924), ext. 303. Class information is also available online
www.awci.com

August 27-31, 2007	Modern Automatic Watch Repair
September 24-28, 2007	Vintage Chronographs - Bernhard Stoeber, Instructor
October 22-26, 2007	Basic Watch Repair, Servicing and Adjusting
November 5-9, 2007	Introduction to Basic Quartz Watches and Quartz Chronographs
January 7-11, 2008	Watchmaker's Lathe I
January 14-18, 2008	Watchmaker's Lathe II
February 4-8, 2008	Basic Watch Repair
February 11-15, 2008	Servicing and Adjusting the Lever Escapement
March 3-7, 2008	Precision Timing and Dynamic Poising
March 10-14, 2008	Modern Automatic Watches
April 7-11, 2008	Basic Quartz Watch and Quartz Chronograph Repair
April 14-18, 2008	Modern Mechanical Chronographs, Servicing and Adjusting



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August 13-16, 2007	Saint Paul College	Saint Paul, MN
August 27-30, 2007	Lititz Watch Technicum	Lititz, PA
September 4-7, 2007	North Seattle Community College	Seattle, WA
October 8-11, 2007	Oklahoma State University	Okmulgee, OK
January 28-31, 2008	AWCI Training Facility	Harrison, OH
February 25-28, 2008	AWCI Training Facility	Harrison, OH
March 24-27, 2008	AWCI Training Facility	Harrison, OH
April 28 - May 1, 2008	AWCI Training Facility	Harrison, OH

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For more information contact Cas-Ker Co., 2550 Civic Center Drive, Cincinnati, OH 45231; Phone 800-487-0408 or 513-674-7700; www.casker.com.

Victorinox Swiss Army, Inc. Announces Promotion of Patty Bentley to Vice President Field Sales North America

J. Merrick "Rick" Taggart, President Victorinox Swiss Army, Inc. (VSA), announced the promotion of Patty Bentley to the newly created position of Vice President Field Sales North America. Bentley joined VSA in 2006 as Director of Sales for the Western United States field timepiece business as well as the Duty Free division and

Canada. Prior to joining VSA, Bentley spent 19 years in various sales and management positions within The Swatch Group.

"In this new role, Patty Bentley will lead our independent timepiece accounts; continuing to support our growth in the \$500 - \$1500 price range and increasing distribution and focus of chronograph and mechanical timepieces. Additionally, she will significantly expand our Duty Free business as well as our visibility in the Canadian market. I am extremely excited to begin working with her in this new role and look forward to continued success and growth for the brand in the timepiece category" said Taggart.



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The AWCI Correspondence Course in Clock Repair package contains all the material and information necessary to successfully learn the fundamentals of clock repair, including *The Clock Repairer's Handbook* by Laurie Penman and a one-year subscription to Steven G. Conover's monthly publication, *Clockmaker's Newsletter*. Course participants will be invited to attend a 2-day meeting at AWCI to confer with Mr. Penman and meet other students.



AWCI Members - \$800

Non-members - \$925

Contact Nancy Wellmann, AWCI Education Coordinator

E-mail: nwellmann@awci.com

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