

October 2020



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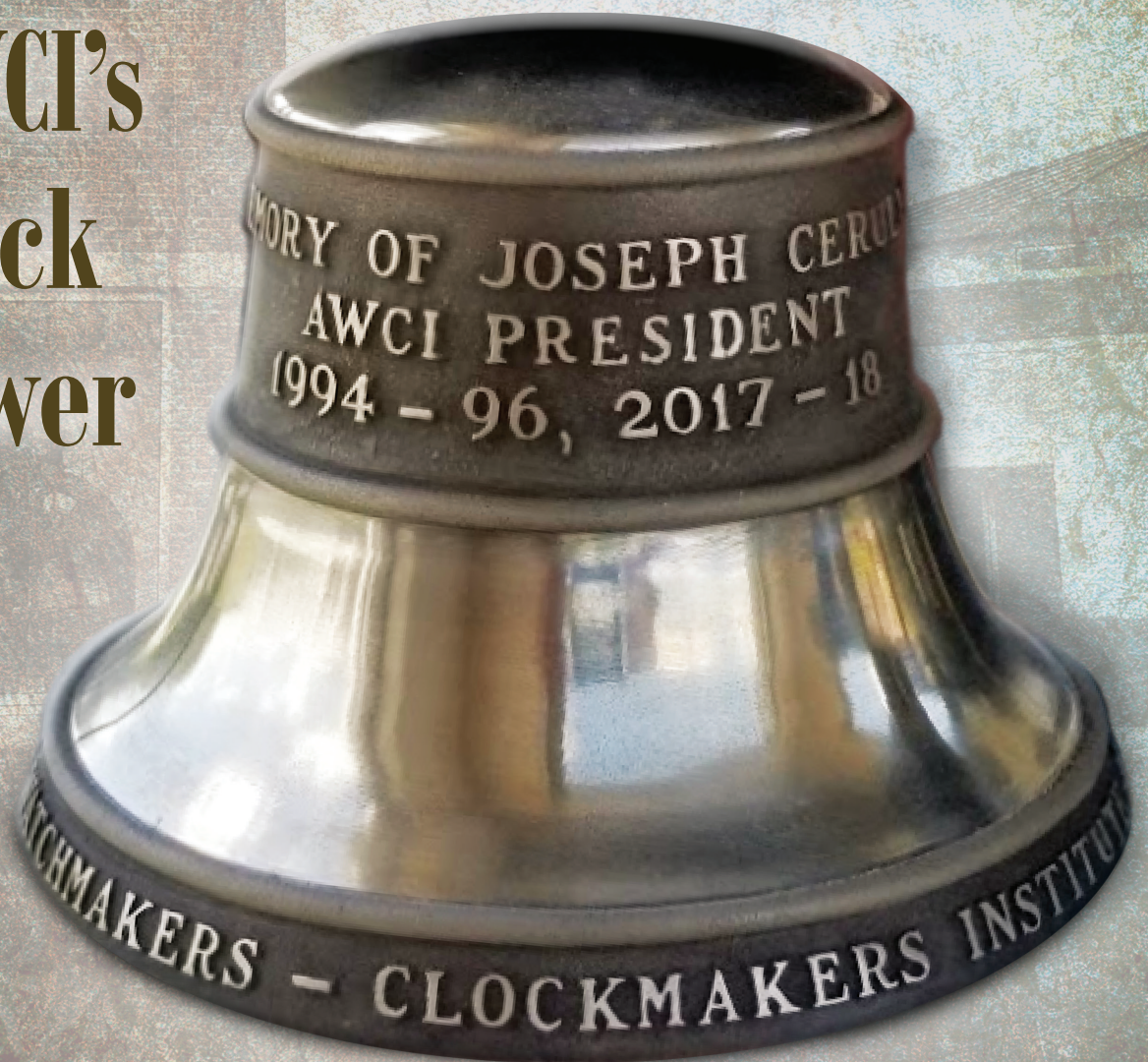
Physics of the Hairspring and Escapement, Part 2

7750 Let-Down Tools

Pegwood Tip for Amplitude Troubles

K&H Watchmaking Competence Centre

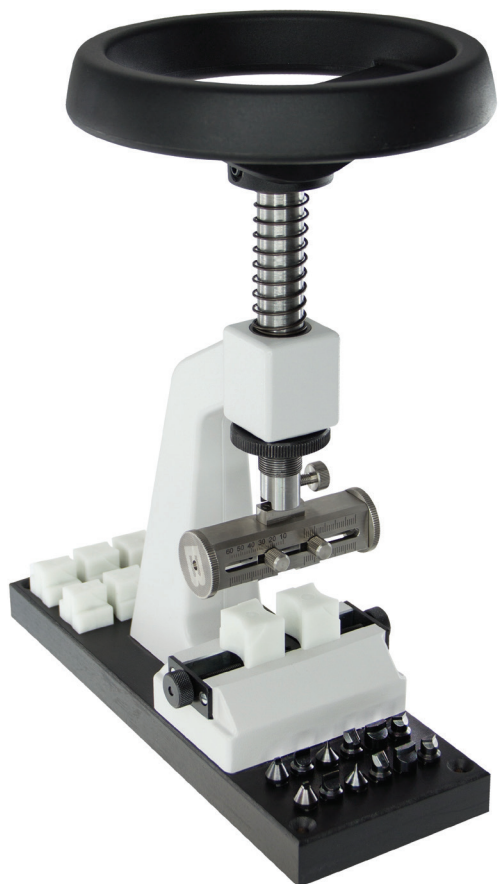
A New Bell for AWCI's Clock Tower





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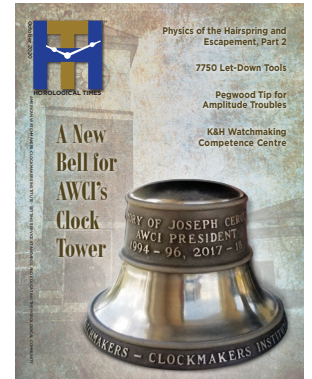
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A commemorative bell honoring former AWCI president Joseph Cerullo was installed in AWCI's clock tower. See page 11.

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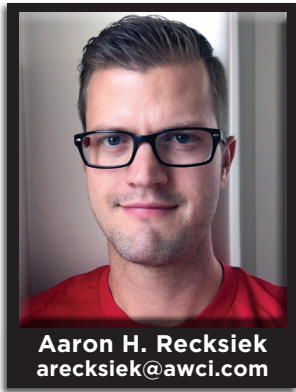
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Last month I was interviewed by Victoria Gomelsky, editor-in-chief of *JCK Magazine* and a contributor to the *New York Times*. She was writing a news piece about the changing environment of after-sales service in the mechanical-watch world. We spoke on the phone for at least 45 minutes about the

status of the industry from the watchmaker's perspective and some of the history over the last couple of decades.

I want to elaborate on my quotes that she used in her story and expand on some of the other aspects we discussed. Here are the quotes:

- The independent watchmaker as we know it is disappearing.
- For centuries, people have loved the idea of the guy on the corner you can take your watch to and he can diagnose it, but those guys are either being pushed to work at a service center or a store that sells the product.
- These brands are smart—they realize if you bring your watch back for service, you're exposed to new product and it increases your chances of buying a new watch.

There are multiple layers to the statement: The independent watchmaker as we know it is disappearing. The number of independent watchmakers out there is absolutely shrinking, but there are still opportunities to be had in this industry. We are currently operating in a profession of specializations. The all-around watchmaker who would work on anything that came through the door is mostly a thing of the past. To survive this changing industry, most of us have had to choose a specialty. For example, some of us only work on modern

watches, and others specialize in vintage repair or parts fabrication.

That's why it is critical to expand your network through an organization like AWCI. This can be a major asset to your business, whether it be by referrals or sending the work out yourself for a small profit. The customer experience can still remain at a high level, even though the dynamics behind the scenes have changed slightly.

Although it may run counter to the nostalgic idea of the independent watchmaker, working at a service center or for an authorized dealer is definitely not a bad thing. Many of those employed through the COVID-19 pandemic saw very little change to their pay or benefits. Some service centers continued to pay their employees at full pay for months, even when the centers were closed and no work was

being performed. For the most part, the luxury brands took care of the watchmakers through this time of uncertainty. That strengthens our profession and builds loyalty.

I have said it for many years, and I will repeat it again here. If the majority of luxury-watch consumers demanded that independent watchmakers be able to repair their watches with genuine spare parts, the brands would make the parts available. Unfortunately for those who have lost parts accounts or have

been unable to acquire them, the consumer did not fight hard enough with their almighty dollar, and the experience of taking the watch to an authorized retailer or sending it back to the service center was not a meaningful enough change for them to shift their buying habits.

While on the surface these statements may seem like doom and gloom, they are not. Most of the watchmakers I know are busier than ever and have no problem making a very good living in the current situation.

I encourage all of you to find your specialty if you haven't already and perfect it. We will need your specific expertise—whatever it is that you decide to do.

Thank you for reading and stay safe and healthy.

It is critical
to expand
your network
through an
organization
like AWCI.



AWCI educational calendar

Check out AWCI's complete line of courses for watchmakers and clockmakers!

AWCI will not be holding classes in Harrison, Ohio, or on its mobile classroom until projections of the virus subsiding have become more predictable or there is a vaccine widely available. In the meantime, we invite you to browse our **course catalog**, www.awci.com/course-catalog, which offers 46 classes for watchmakers, including classes for beginners, technicians, and, of course, experienced watchmakers who want to sharpen their skills.

In the catalog, you'll find classes on:

- Introduction to Watchmaking
- Quartz
- Vintage Watch Repair
- Tool Making
- Precision Timing

We also have 46 classes for clockmakers, including classes on:

- American Time-and-Strike Movement
- Advanced Clock Repair
- Introduction to the Lathe

See our catalog for more!

We can use your help

We are always looking to expand our course catalog and educational resources as well as increase our team of instructors. During this downtime, we want to develop new courses and find new instructors who will collaborate with us. Reach out to us at education@awci.com if there is a class you would like to collaborate on as an instructor.

We look forward to receiving your class requests when the pandemic is under control, and we hope to have a new list of classes to offer.



Because of COVID-19, the following classes have been postponed until 2021. New dates will be posted to the website soon. If you were signed up for the convention or any class that has been canceled and have not received your refund, please contact AWCI at 513-367-9800, ext 303 or email AWCI at awci@awci.com.

October
5-7

Herschede Tubular Bell Clocks
Instructor: Michael Ganey, CC21
AWCI Headquarters, Harrison, Ohio

\$595

Michael will share his knowledge gained from 40 years of experience through his extensive PowerPoint presentation with over 200 photos focusing on examples of issues before and after a rebuild that are unique to most common Herschede Tubular Bell movements.

October
11-13

Practical Gear Cutting for the Horologist
Instructor: David Lindqvist
AWCI Headquarters, Harrison, Ohio

\$595

Come to AWCI after our convention for this practical, hands-on class where gear-ing and gear cutting will be practiced. Not only will the student learn the basic setups involved in cutting horological gears, but multiple approaches to tooling will be explored as well as theory from a practical standpoint.

October
5-7

WATCH 420S:
Vintage Chronograph Short Course
Instructor: Bernhard Stoeber, CW21
AWCI Headquarters, Harrison, Ohio

\$595

Back by popular demand. In this course, you will go through, theoretically and practically, different vintage chronograph calibers with emphasis on troubleshooting, repair, and adjustments to each mechanism. Lemania, Landeron, and Valjoux calibers will be covered.



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 - Hairsprings
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 - Workshop
- Professional Essentials
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Stay involved, sharpen your skills, ask questions, and so much more! Have a topic in mind for a webinar?

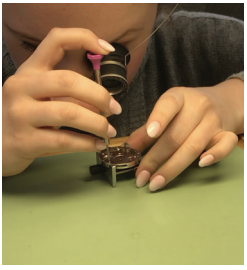
Send your suggestions to awci@awci.com!



For additional details about specific courses in comprehensive syllabi form, including complete tool lists, visit: www.awci.com/classes or contact the education director, Jason Champion, CW21, at 866-FOR-AWCI (367-2924), ext. 303. For additional calendar events visit: www.awci.com/calendar.



AWCI events calendar 2020



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To find out how you can bring one of these events to your store,
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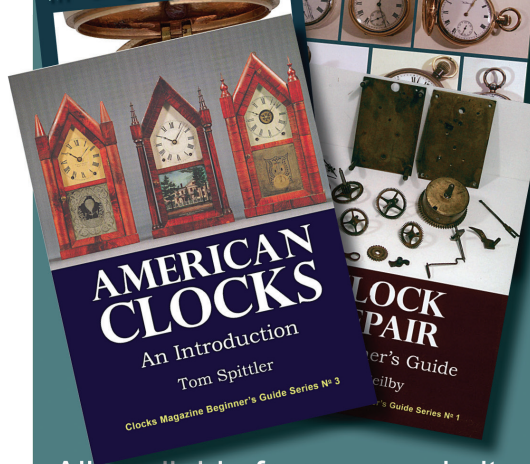
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In Honor of Joseph Cerullo, CMW, CMC, FAWCI

One of the many casualties of the COVID-19 pandemic was AWCI's annual convention, which would have celebrated AWCI's 60th anniversary. Special events had been planned that we were unable to carry out. One event was the unveiling of a commemorative bell in the clock tower in front of AWCI's headquarters building in Harrison, Ohio. The inscription on the bell reads, "In memory of Joseph Cerullo, AWCI President, 1994-96, 2017-18."

Joe Cerullo was president of AWCI when the new building was being constructed in 1994-95. Joe designed the clock tower. He acquired the movement for the clock in the tower from the Rockville

Center High School in Long Island, New York. The movement was manufactured in 1924 by the E. Howard Clock Company in Boston, Massachusetts. Joe and his father, Louis C. Cerullo, and Warren Rizzo restored the movement. James Lubic, Jesse Hueg, Louis Burwinkel, and Russell Smith donated their time and talent.

The clock tower was a tribute to Henry Fried, who was a well-respected watchmaker, teacher, author, and a Fellow of AWCI. More than 300 people attended the dedication ceremony for the Henry B. Fried Clock Tower in 1995, and Henry Fried was present.

The new cast bronze bell in the clock tower.



The new bell is cast bronze and was made by Verdin Bells & Clocks of Cincinnati, Ohio. Verdin installed the bell in the tower in February, and it has been ringing on the hour since then. Many AWCI

members knew Joe Cerullo and remember him with fondness and respect. If you visit AWCI's headquarters in the future, listen to the bell and remember Joe and his contributions to AWCI.

Henry Fried (facing the crowd) and Joe Cerullo (in red tie) during the ribbon-cutting ceremony in 1995.



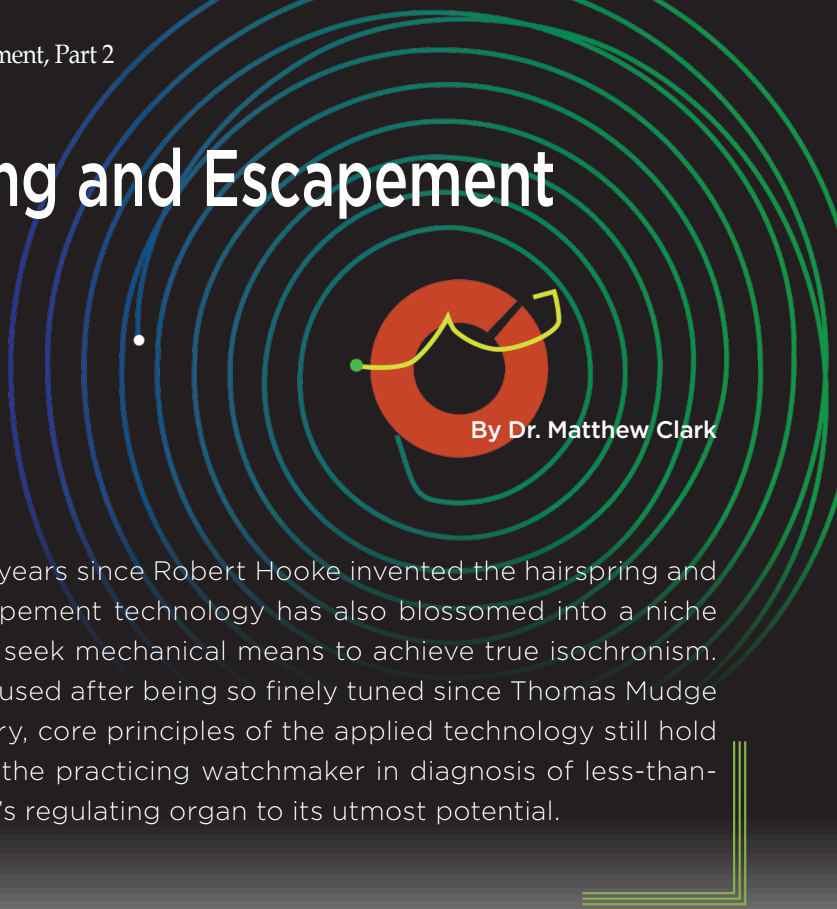
Ann Whitney, wife of Marvin E. Whitney, cuts the ribbon for the new building and clock tower in 1995.



Physics of the Hairspring and Escapement

Part 2

Previously published in *Horological Times*, July 2007



Watchmaking has come a long way in the 400+ years since Robert Hooke invented the hairspring and Christiaan Huygens installed it in a watch. Escapement technology has also blossomed into a niche that sets certain calibers apart as watchmakers seek mechanical means to achieve true isochronism. The lever escapement in particular is still widely used after being so finely tuned since Thomas Mudge invented it in the late 1700s. Given its long history, core principles of the applied technology still hold true today. Knowing these principles can assist the practicing watchmaker in diagnosis of less-than-ideal timing issues and help to fine-tune a watch's regulating organ to its utmost potential.

-Andrew DeKeyser, CW21

Effect of Curb Pin Spacing on Isochronism

Several popular texts discuss altering the timing of a watch by increasing or decreasing the spacing of the curb pins.^{7, 8, 9, 10} The effect of a larger spacing of the curb pins is that in shorter arcs of the balance wheel the spring is not in contact with the pins and, therefore, is slowed as compared to the larger arcs where the motion of the spring causes it to contact the pins and speed the oscillations. Figure 16 shows the computed effect of increasing the spacing of the pins on the timing of the watch.

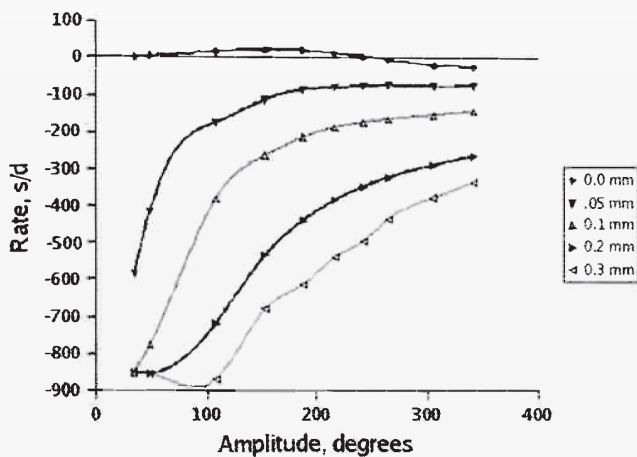


Figure 16. Rate vs. balance wheel amplitude for several curb pin spacings.

It appears from this graph that a slight pin spacing can indeed overcome the natural tendency of the spring to lose time as the amplitude increases higher than 220°. Figure 17 shows a close-up view illustrating that a very small curb pin spacing reduces the tendency to gain time as the mainspring winds down.

Measuring the rate and balance wheel amplitude as a function of curb pin spacing is normally a very difficult procedure. In standard configurations, it is difficult to adjust the spacing of the curb pins while keeping them parallel.

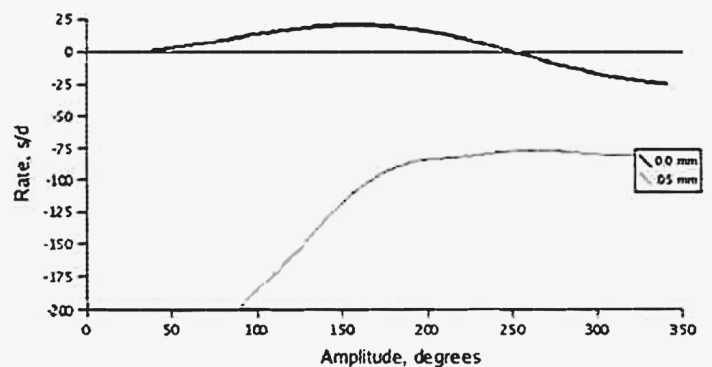


Figure 17. Rate vs. balance wheel amplitude for 0.0 and 0.05mm curb pin spacings.

It is even more difficult to adjust them and re-assemble the watch with the regulator in the same position.

Fortunately, many ETAT watches are equipped with the Etachron regulating system. One of the features of this system is a rotatable curb pin block. As the block is rotated, the spacing can be adjusted without removing the balance from the watch. Figure 18 shows how the system can adjust the spacing. The Etachron system has a variety of mechanisms for adjusting the escapement. Figure 19 shows the curb pin assembly adjusted to allow a wide spacing between the pins in a model 2802.

In addition, the curb pins can be adjusted to be farther or nearer the balance staff to center the hairspring between the pins.

Figure 20 shows the measured timing vs. the running time of the watch with wide and narrow curb pins. As expected, the wide pins afford a very slow watch, and in the experimental configuration, removing the gap speeds the watch considerably—a difference of 300 seconds a day. Interestingly, this difference is in very close agreement with the difference between 0.0 and 0.2mm spacing shown in Figure 15 (see September 2020 HT, page 23), from a computational model of a similarly sized spring.

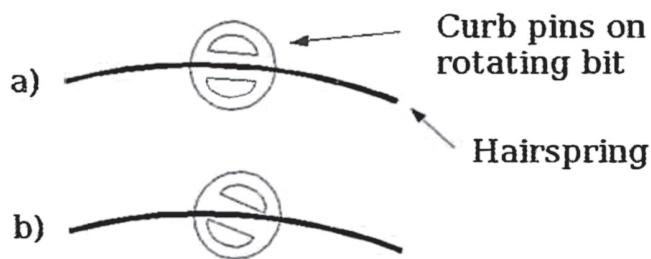


Figure 18. Etachron system curb pins in a) open and b) fully closed positions.

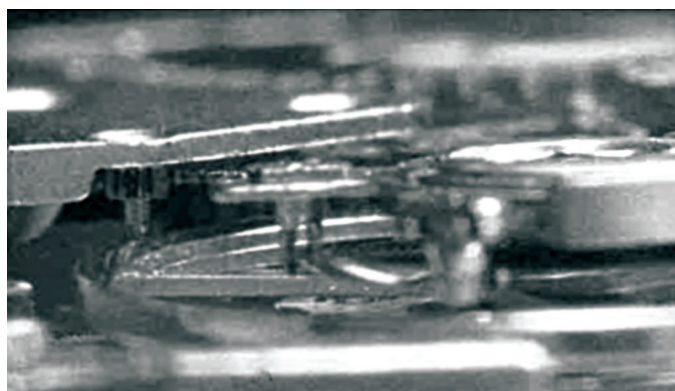


Figure 19. Etachron system curb pins.

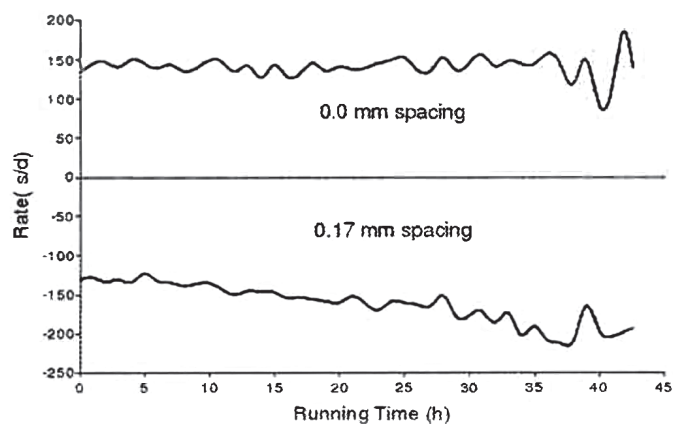


Figure 20. Measured rate vs. time at two curb pin spacings.

The timing of the watch was measured over 48 hours, capturing the amplitude and rate every five minutes with equipment developed in this laboratory. Because of the combined variations in computed amplitude, and variations in rate, the measured amplitude vs. rate graphs show quite a bit of variation over this period. However, the overall trends in amplitude are clear.

Effect of Curb Pin Spacing on Positional Timing

While the effect of changing the curb pin spacing on timing has been discussed by many authors, the effect on positional timing has not. For the model hairspring system used in this study, the positional timing is not greatly affected until the spacing is greater than 0.3mm on each side, or 0.6mm total, as shown in Figure 21. This figure graphs the timing in “radial” format; the spokes show the angle of the watch, and the distance from the center denotes the rate change. Each spoke represents a number on the watch. The distance of the line from the center represents the timing when that number is vertical. This type of plot is a better representation of the cyclical nature of the variation as the watch is rotated than other types of graphs.

The measured positional timing at closed and open pin spacings is shown in Figure 22. With the pins closed, the positional timing is excellent, varying a maximum of 2.3 s/d in the fastest vs. the slowest position. With the wide pin spacings, the pull of gravity changes the interactions as the hairspring oscillates between the pins and causes a more erratic timing.

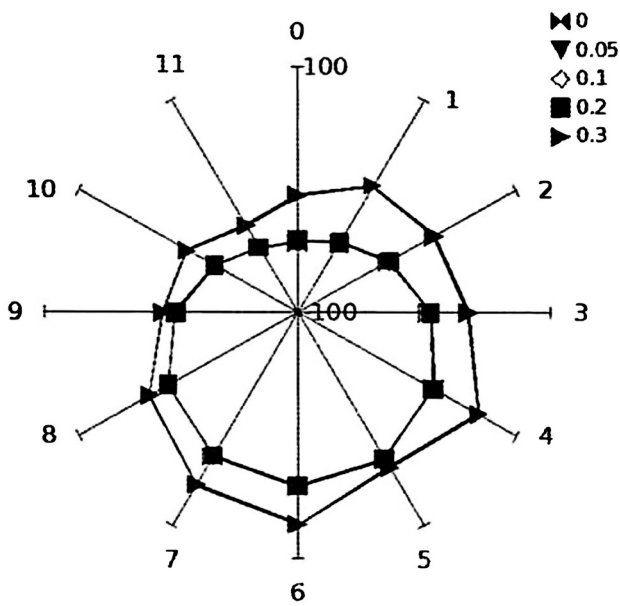


Figure 21. Computed positional timing for different curb pin spacings.

Effect of Unlocking Energy on Isochronism

The effect of the energy removed from the system during unlock was addressed in great length by Airy in the 19th century.¹¹ From a complex mathematical analysis he determined the following general rules:

- Impulse before center of swing causes a gain in rate.
- Energy lost (unlocking) before center causes a slower rate.
- Impulse after center slows the rate.
- Energy lost after center quickens the rate.

During unlocking, the roller jewel must force the lever to move and unlock the jewel from the escape wheel. Figure 23 illustrates the process. At the moment



Figure 23. Unlocking of lever escapement.

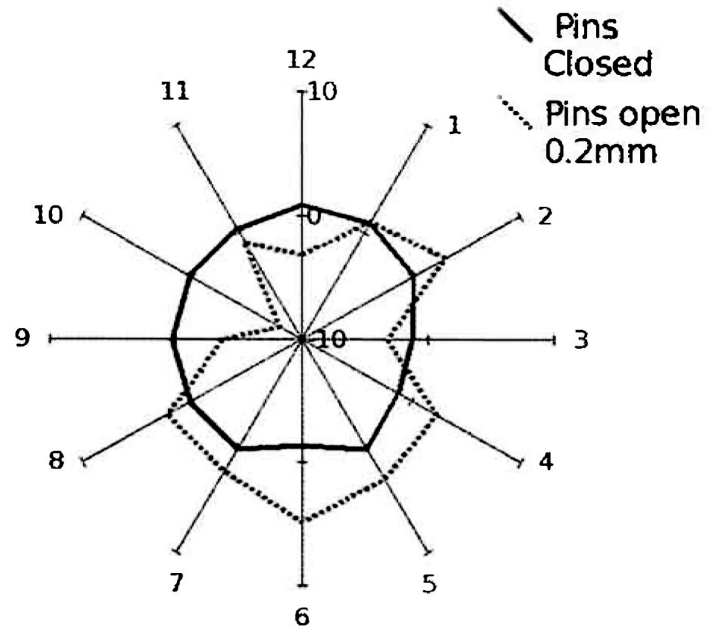


Figure 22. Measured positional timing for different curb pin spacings.

of unlocking the balance wheel and roller table rotate clockwise in the figure. The impulse jewel contacts the fork in the lever, which pulls the upper jewel away from the escape wheel tooth. To overcome the draw of the escapement, the escape wheel moves backwards slightly, recoiling, during this process. The energy required for the unlocking is thus removed from the balance wheel, and made up later when the fork slot gives the impulse to the roller jewel.

As Airy pointed out, the effect on the dynamics of timing are dramatic. Figure 24 shows the isochronism of the balance wheel at different energy levels of unlocking energy. The slowing of rate is in agreement with Airy's analysis. As the energy and amplitude decrease, the balance quickly stops when the total energy is less than the unlocking energy.

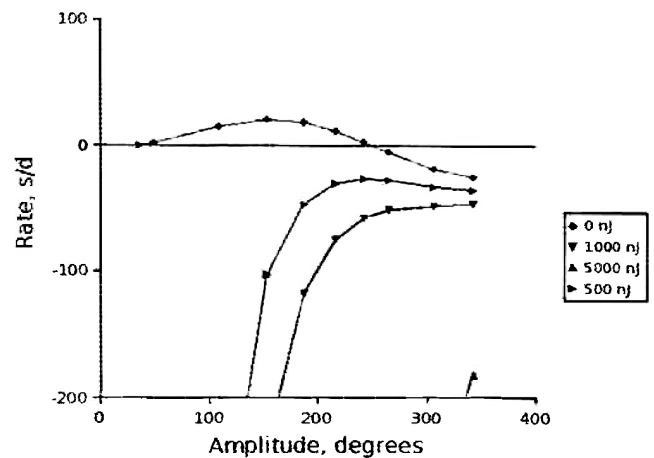


Figure 24. Rate vs. amplitude for different unlocking energies.

A close look shows that the effect of the unlocking alone will reverse the trend of gaining slightly as amplitude decreases from 300° to 200°. The unlocking energy of the lever escapement is a significant factor in designing a hairspring and escapement configuration for optimal timing.

Effect of Impulse Position on Timing

The impulse is normally given halfway between the unlocking and locking. From Airy’s work one concludes that impulse before center will cause the rate to gain; after center the rate will lose (both as compared to the rate when impulse is delivered at the center).

This effect is difficult to measure in a lever-escapement watch movement. However, the computer simulation shows the magnitude of Airy’s effect. Figure 25 shows that the effect on isochronism is minimal; the impulse position merely moves the curves up and down.

This suggests that altering the impulse position will not be helpful in improving the timekeeping. Figure 26 shows the effect in the simulated spring is about two seconds per day per degree of impulse change. It shows that the effect is very linear, and the detailed computations are in agreement with Airy’s estimates from 1830. If the impulse is before center (negative values in Figure 26), the rate is increased; if it is after the center the rate is decreased.

Conclusions

This study probed several ways that varying the escapement can affect the timekeeping properties of a watch. Some of the effects are interesting for understanding the mechanism but have limited practical implications for watch adjustment. However, adjustments to locking and curb pin spacing have long been discussed by watchmakers, and understanding how they change timekeeping is of practical interest to many watchmakers.

Several interesting theoretical principles are illustrated in this study:

- The effect of the escapement moves the optimal pinning angle to 0°, from the optimal value of 90° found in spiral hairsprings without escapement effects. The energy required to unlock the escapement is removed from the balance assembly before crossing the midpoint, and this tiny change affects the isochronism of the watch.

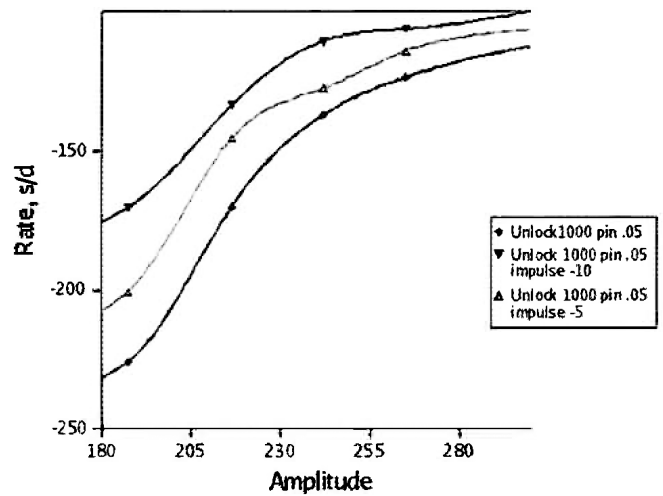


Figure 25. Computed effect of impulse position on rate and isochronism.

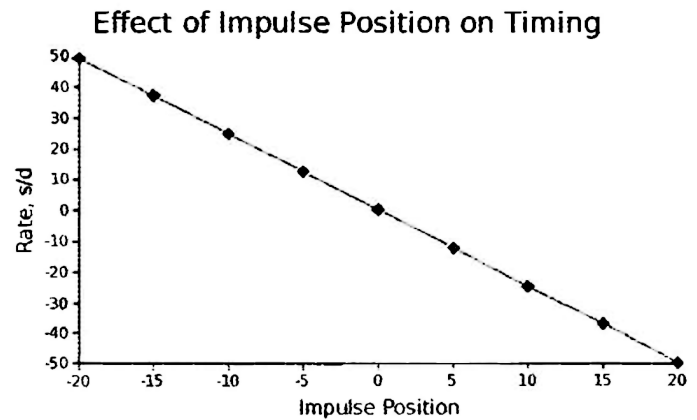


Figure 26. Computed effect of impulse position before and after center on rate.

- The extended outer coil of flat hairsprings helps improve isochronism, as well as having the utilitarian function of allowing space for the curb pins.
- Several common adjustments have significant impact on the timekeeping:
- Increasing the spacing of the curb pins can improve isochronism, but the effect is easy to overdo and can interfere with positional timing if the spacing is too wide. It is more practical to use the shape of the overcoil to adjust the pinning angle to bring the watch into isochronism.

- Increasing or decreasing locking may have some effect on timekeeping, but it is difficult to measure accurately. In light of this, the normally recommended amount of locking, 1/3 of the pallet jewel thickness,¹² is a practical guide.

The excellent agreement of observed and theoretical studies suggests that the computations accurately predict the effect of various changes in the escapement and hairspring configurations and are useful for understanding timekeeping of watches.

Acknowledgements

Wit Jarochofski for advice and watch movements.

Robert Porter for supplying materials about the Institute of Oscillographic Horology.

Jim Lubic and the AWCI for encouragement and technical support.

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eBay to Authenticate Watches

By Andrew DeKeyser, CW21

Buyers have been wary of purchasing high-value watches on eBay, the popular online auction marketplace—and with good reason. Counterfeiters have been known to sneak in. However, realizing the market potential in luxury watches, eBay has been slowly rolling out a new authentication service to their largest watch retailers. This fall, all watches over \$2,000 will be eligible for an Authenticity Guarantee.

The company expects around 80,000 watches to hit the website with this guarantee when it fully launches. Watches must be priced over \$2,000 to qualify. Brands include but are not limited to Rolex, Omega, Piaget, Patek Philippe, Omega, Audemars

Piguet, Breitling, and Panerai. The listings will bear an “Authenticity Guarantee” badge to indicate to potential buyers the eBay guarantee.

After a guaranteed watch is purchased, it is shipped to an undisclosed third-party authenticator for an assessment that verifies the listing title, description and images, and includes a multipoint physical inspection. Watches that have been customized with aftermarket components will not qualify for the service. After the inspection, the watch is then shipped to the customer with an Authentication Guarantee card with information such as brand, model, reference number, movement type, case material, bracelet type, and serial number.

Sources

<https://www.jckonline.com/editorial-article/eBay-authenticate-watches-2k/>

<https://www.ebay.com/e/fashion/watches-authenticity-guarantee>



Andrew DeKeyser is the owner of HCP Watchmaking in Sisters, Oregon. He graduated from the Lititz Watch Technicum with WOSTEP certification.

Grand Seiko Announces Tourbillon

Grand Seiko spun off from Seiko in 2018 and has continued to differentiate itself with the introduction of two new calibers earlier this year. Now the company has announced its first tourbillon concept movement, which also features a remontoire or constant-force escapement. The inclusion of both a tourbillon and remontoire puts this caliber in an elite category that includes offerings from F.P. Journe, Haldimann, IWC, Andreas Strehler, and Derek Pratt.

While this is a concept piece with no plans for production, it aptly demonstrates what Grand Seiko can produce.

Caliber T0



Source

https://www.hodinkee.com/articles/grand-seiko-t0-constant-force-concept-tourbillon-in-depth?mc_cid=1808636501&mc_eid=458d3d721b

JLC Uses World's Smallest Movement, Again

Jaeger-LeCoultre's caliber 101 has held the world record for the smallest mechanical watch movement since it was introduced in 1929 at just 14mm long and 5mm wide. JLC uses the movement sparingly in certain high-fashion ladies' watches. Due to its tiny size, the movement is very difficult to produce. Therefore, although it is one of the longest-running production movements, it is rarely utilized.

JLC has announced that it will use caliber 101 in the limited run of two new watches, the Bangle 101 and the Snowflake 101. The Snowflake will have 904 set diamonds of brilliant- and pear-shaped cut totaling 20.9 karats, while the Bangle will have 996 brilliant-cut diamonds totaling 19.7 karats. Both watches will be made of pink gold and utilize IF to VVS quality diamonds.

Source

<https://robbreport.com/style/watch-collector/jaeger-lecoultre-debuts-two-new-jewelry-watches-with-its-101-caliber-2942484/>



IWC Offers Virtual Tours

In light of the global pandemic, IWC is now offering guided virtual tours of its Schaffhausen headquarters. The tours must be booked online and are customizable to your liking. Participants can observe any part of the manufacturing process, from machining to final assembly and testing.

The company developed a special loupe they call a Cyberloupe for their watchmakers. The loupe has an integrated camera so tour participants can see exactly what the watchmaker sees through the loupe.

The first tour of this kind was scheduled for September 28. Book your tour by emailing: visit@iwc.com.



IWC offers virtual tours of its headquarters.

Sources

<https://www.iwc.com/us/en/company/manufakturzentrum.html>
<https://hypebeast.com/2020/8/iwc-schaffhausen-guided-virtual-tours-info>

Vortic Watches Wins Lawsuit

Vortic Watch Company's founder, R.T. Custer, announced on Instagram September 13, "Vortic Watch Company defeats foreign conglomerate Swatch Group on all counts." Custer is referring to a cease-and-desist order from Swatch in May 2015. Swatch sued the Vortic Watch Company and Custer personally. The case has been dragging on in US Federal Court for over five years, but Judge Allison Nathan passed down her decision on Friday, September 11.



Source
https://www.instagram.com/p/CFHo7U_n6jh/

Andrew DeKeyser is the owner of HCP Watchmaking in Sisters, Oregon. He graduated from the Lititz Watch Technicum with WOSTEP certification.

Gerald Genta Brand Makes Comeback

LVMH's Bvlgari has reintroduced the Gerald Genta brand with an all-new model, the Arena Bi-Retro Sport, with yellow accented dial and titanium case. The watch gets its name from the dual retrograde hands that display minutes and date. The hour is displayed in a window near 12 o'clock.

Bvlgari obtained the Genta brand in the early 2000s primarily for their watchmaking expertise. The brand name has been underutilized ever since; some models have even been rolled into the

Bvlgari brand. Gerald Genta was a consummate watch designer, having designed watches such as the Audemars Piguet Royal Oak and the Patek Philippe Nautilus. His iconic designs shaped the Swiss watchmaking industry for decades.

This new watch will be wholly produced by Bvlgari and branded Gerald Genta, which has been given a new logo. This may indicate that Bvlgari intends to expand the Genta line in the future.

Source
<https://www.ablogtowatch.com/gerald-genta-arena-bi-retro-sport-watch-marks-return-of-brand-under-bvlgari/>





From the Workshop

By Jack Kurdzionak, CW21, FAWCI

Pegwood Tip for Amplitude Troubles

The balance wheel amplitude of an almost fully wound watch conveys a considerable amount of information to the observant watchmaker who takes the time to study it. There was a time when I could observe the amplitude of a two-arm balance, listen to the high-pitched ringing sound from a steel escape wheel, and make a fairly accurate determination of how well a watch was running before testing it on a watch rate recorder. Well, the years have taken their toll on my hearing so that I can only hear the escapement sounds through the amplifier of a watch rate recorder. Most watches now have a three-arm or four-arm balance, which makes visually estimating the amplitude more difficult even though I can still make a close estimate of amplitude for a two-arm balance. I like to compare the information obtained by listening to escapement sounds and observing the amplitude to that which a doctor gleans listening to heart and lung sounds with a stethoscope while observing a patient's pallor and breathing. These observational skills require very basic equipment, but they provide important diagnostic information for both the watchmaker and the doctor. As a beginner, I learned many basic observational skills by studying American pocket watches and later extended those skills to more modern watches by using watch rate recorders that could measure amplitude and amplify the escapement sounds through a speaker. Now, over 98% of my work involves watches with three- and four-arm balances vibrating with a frequency of 4 Hz, which limits what I can visually determine.

This month's focus will be on two watches, both with Sellita SW200-1 movements. They are Swiss-made and a nearly exact copy of an ETA 2824-2 movement. The ETA and Sellita movements look alike, utilize the same dial and hands, have almost the same repair instructions in their technical guides, and

have the same factory time-keeping specs. Although they are visually equivalent, their parts are not interchangeable—with a few exceptions. That being said, these diagnostic skills and repair techniques apply to almost all watches regardless of the caliber.

Watch A, a Sellita standard execution SW200-1, was completely serviced and had a new mainspring installed. However, when tested after being fully wound, its amplitude was lower than I'd expected for this movement after repair. When you examine Tape #1, you will see that the amplitude in the dial positions is about 250° and in the 235°-degree range for the pendant positions. The timekeeping and deltas were quite good even with the somewhat low amplitude, but this watch movement can be made to run much better than that. Since the watch had just been serviced and all the amplitudes were consistently too low in five test positions, my thinking went directly to examining the balance wheel, its roller jewel, and its pivots.

Customarily during my cleaning procedure, the balance wheel jewels are removed and cleaned. The balance stays attached to the balance cock and the main plate during the cleaning and movement reassembly. For most of such repairs, the balance pivots and roller jewel seldom require close inspection. This repair was one that required further attention to the balance wheel. After separating the balance

Tape 1

Results and statistics			aut./50°/10s		
□ +000	249°	0.0	D	05.4	018° 0.1
□ +002	250°	0.0	X	+00.9	241° 0.1
○ +004	237°	0.1	X _v	+00.7	236°
○ -001	232°	0.1	X _H	+01.1	249°
○ -001	240°	0.1	D _H	-00.4	-013°
			D _v	05.4	008°

Mitschi Electronic AG
 CH-3294 Buëren a.A.
 Beper nom, nombre, nome
 07/17/2020 /18:41:25
 01.SW200-1 1 4 q/z syst param seq.

wheel from the balance cock, the roller jewel was found to be secure, the pallet fork slot was not worn, and the balance pivots were straight with no visible damage.

Before I installed the balance, I wanted to make sure there was nothing on those balance pivots that could cause extra friction. I prepared a piece of pegwood, about 3.0mm in diameter, by rubbing one end of the pegwood on a piece of fine sandpaper to make the end clean and square. Next, I held the

balance in one hand while pressing a balance pivot into the end of the pegwood and spun the pegwood between my thumb and index finger. If there was any film on that pivot, the pegwood would remove it quickly. Then I repeated that same operation on the other balance pivot. After fitting the balance with the balance cock to the movement, the amplitude and rates were again checked with the chronoscope. Those values are shown on Tape #2. The change in amplitude was significant—a gain of about 40° in all positions, along with a reduction in the delta from 5.4 seconds to 3.3 seconds. This rather basic Swiss movement now displayed timekeeping that rivaled many chronometer-rated movements.

Watch B was another standard execution Sellita SW200-1 movement that had been completely serviced with a new mainspring. The initial timing Tape #3 showed good amplitude in all five positions, but the timekeeping delta was at the high end (15.4 seconds) of the tolerance range allowed for this movement. The delta in the two dial positions was 13 seconds, which was also too high. Again, making the assumption that the service on this watch was well done, it was time to check those balance pivots and the roller jewel. Although these pivots appeared perfectly clean, I pressed each one into the pegwood's tip while spinning the pegwood. Then I installed the balance into the movement and tested the movement with the chronoscope as shown on Tape #4.

The results again were improved. The delta was reduced from 15.4 seconds to 7.6 seconds. The dial position delta was 2 seconds instead of 13 seconds. The amplitudes were also significantly increased, so much so that they were now at the upper limit for this movement. Again, here is another ordinary Swiss movement that was repaired and regulated so that timekeeping matched that of chronometer-grade movements. Please compare the above results to the timekeeping standards as shown in the chart on page 23 from the Sellita SW200-1 technical document and note these movements were tested in five positions rather than the two- and three-position tests specified for the standard and special executions of these movements.

These two repairs are good examples of how to utilize your understanding of balance amplitude and delta to quickly analyze a problem and then solve that problem in the simplest manner by using a clean piece of pegwood to remove some unseen film from the balance pivots. I could also have

Tape 2

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CH-3294 Buëren a.A.
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Results and statistics			aut-50°/10s		
□	+002	281°	0.1	D	03.3 014° 0.3
□	+000	291°	0.2	X	+01.1 282° 0.1
○	+003	277°	0.3	X ₀	+01.0 279°
○	-000	280°	0.0	X _H	+01.2 286°
○	+000	280°	0.0	D _H	-00.2 -007°
				D ₀	03.3 003°

01.SW200-1 1 4 qx syst param

Tape 3

Witschi Electronic AG
CH-3294 Buëren a.A.
Beper nom, nombre, nome
07/17/2020 /19:07:57

Results and statistics			aut-50°/10s		
□	+002	281°	0.1	D	03.3 014° 0.3
□	+000	291°	0.2	X	+01.1 282° 0.1
○	+003	277°	0.3	X ₀	+01.0 279°
○	-000	280°	0.0	X _H	+01.2 286°
○	+000	280°	0.0	D _H	-00.2 -007°
				D ₀	03.3 003°

01.SW200-1 1 4 qx syst param

Tape 4

Witschi Electronic AG
CH-3294 Buëren a.A.
Beper nom, nombre, nome
08/21/2020 /09:28:38

Results and statistics			aut-50°/10s		
□	+005	319°↑	0.0	D	07.6 031° 0.2
□	+007	317°↑	0.0	X	+07.3 304° 0.1
○	+012 ↑	298°	0.2	X ₀	+08.4 294°
○	+007	288°	0.1	X _H	+05.7 318°↑
○	+006	297°	0.1	D _H	+02.7 -024°
				D ₀	06.2 010°

01.SW200-1 1 4 qx syst param

Sellita Timing

Exécution – Ausführung – Range		Standard	Spécial (Elaboré)	Premium (Top)	Chronomètre
Positions Lagen Positions	0 h	(2) CH, 6H	(3) CH, 6H, 9H	(5) CH, FH, 6H, 9H, 3H	
Marche moyenne Mittelwert Gang Middle rate		12 ±12 s/d	7 ±7 s/d	4 ±4 s/d	Critères COSC COSC Kriterien COSC criteria
Ecart max. toutes positions Max. Abweichungen alle Lagen Max. divergence all positions		30 s/d	20 s/d	15 s/d	
Isochronisme Isochronismus Isochronism	CH 0 h - 24 h	±20 s/d	±15 s/d	±10 s/d	
Amplitude max. Max. Schwingungsweite Max. amplitude	CH 0 h	315°			
Amplitude min. Min. Schwingungsweite Min. amplitude	6H 24 h	200°			

solved the problem by replacing the balance staff or the balance complete. Either one of those part replacements would have yielded the same positive result but would have cost more in material and labor. This is a case where the simple solution is the best and fastest way to solve the problem.

More COVID-19 Hits

The year 2020 will be long remembered for so many reasons. They include COVID-19 and its hundreds of thousands of victims, the national political climate, urban troubles, and massive unemployment, along with social isolation and innumerable changes to our lives caused by the virus. Our industry and our profession have not escaped the effects of the virus, as we have had to cope with lockdowns, business closings, both temporary and permanent, in addition to our concerns with personal safety that affect how we process watch services and sales. It seems there is nothing that was unaffected by the events of this year.

I had planned to attend Baselworld 2020 last spring, but, due to the virus, it was postponed until 2021. Not long after the postponement, Rolex and several other major brands announced they would not participate in Baselworld 2021. As a result of those brands vacating Baselworld, the Baselworld management announced the permanent closure of that annual event. In 2018 rumors began to circulate that Baselworld was doomed because of its high cost,

declining attendance, and a shrinking exhibitor base. The 2019 show was a financial disaster, but the management was determined to carry on into 2020 and beyond. What the rumor mongers and Baselworld did not anticipate was the coup de grâce brought on by COVID-19.

Next to go was the EPHJ exposition in June in Geneva, which was postponed until mid-September 2020. Then, suddenly, at the end of August, EPHJ announced the 2020 show was canceled. The next EPHJ is scheduled for June 2021. That announcement was followed by JA canceling its October show in New York.

Last March, optimists thought this virus would pass in a month or two and our lives would get back to normal before summer, while pessimists were warning that the virus could be with us for a far longer term. Unfortunately, the pessimists' outlook was the more accurate prediction. Six months have passed and many schools are still closed, trade shows are canceled, many Americans are wearing face masks, and we are getting accustomed to this "new normal."

I have gained a few positive benefits from the past six months. They include learning how to be patient, recognizing that many fellow humans are also displaying an amazing level of patience, gaining a new appreciation for home-cooked meals, and having more time to enjoy the gifts in life the virus did not take away.

Jack Kurdzionak, watchmaker and watch material specialist, owned a Boston-area watch sales and service shop for 40 years. He has a BS (Northeastern University, 1967) and has studied at ETA, WOSTEP, BHI, SGUS, and AWCI, and works for Eckcells Watch Materials.

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HOROLOGICAL EDUCATION AROUND THE WORLD



By Donna Hardy

K&H Watchmaking Competence Centre Le Locle, Switzerland

The K&H Competence Centre was founded in 2010 by watchmaker Henrik Korpela, FBHI. Its 4,000-hour Fullskill program is designed to produce watchmakers who can operate in after-sales service, repair and production of new watches, and restore antique and vintage watches, including, in some cases, where the production of parts is necessary. The first year focuses on developing micromechanical skills. In the second year, students' micromechanical skills have developed enough to start learning watchmaking. There

is also a school watch project, where students are free to do what they want if the instructor agrees that the project can be accomplished within four months. Students are admitted to the program after passing the taster course/bench test.

Shorter courses are also offered: an eight-month watch repair service technician course for those who want to learn to service modern mechanical watches; a five-day restoration course; vintage chronograph Valjoux 22/23; hairspring, finishing techniques, and tailor-made courses for watchmakers and companies. For more information, visit khwcc.ch.



Henrik Korpela, standing, helps a student during the Fullskill program. Classes are no larger than six students, and instruction is individualized.

The following questions were answered by **Svenja Knecht, administrator, and Henrik Korpela, FBHI, director and instructor.**

How is COVID-19 affecting how you conduct your classes?

Fortunately, our workshops are spacious, and we can respond to all hygienic requirements.

During the lockdown, students set up workshops in their apartments and practiced the same exercises as they normally would in school, such as adjusting endshakes, pallet adjustments, turning pivot gauges, etc. When the students were done with the exercises, they would notify the teacher via Skype or WhatsApp and place them in a plastic box with their names written on the box outside their apartments. The teacher would then pick them up and leave new exercises in another box without having to see the students in person. The teacher would then evaluate the work and give feedback via WhatsApp or Skype while filming a screen connected to a microscope for close-up feedback. This was almost like being in school but from a distance. Demonstrations were also done the same way, either by filming a screen connected to a microscope or filming the action on the bench while demonstrating a technique. Likewise, some of the students could film or take photos through their

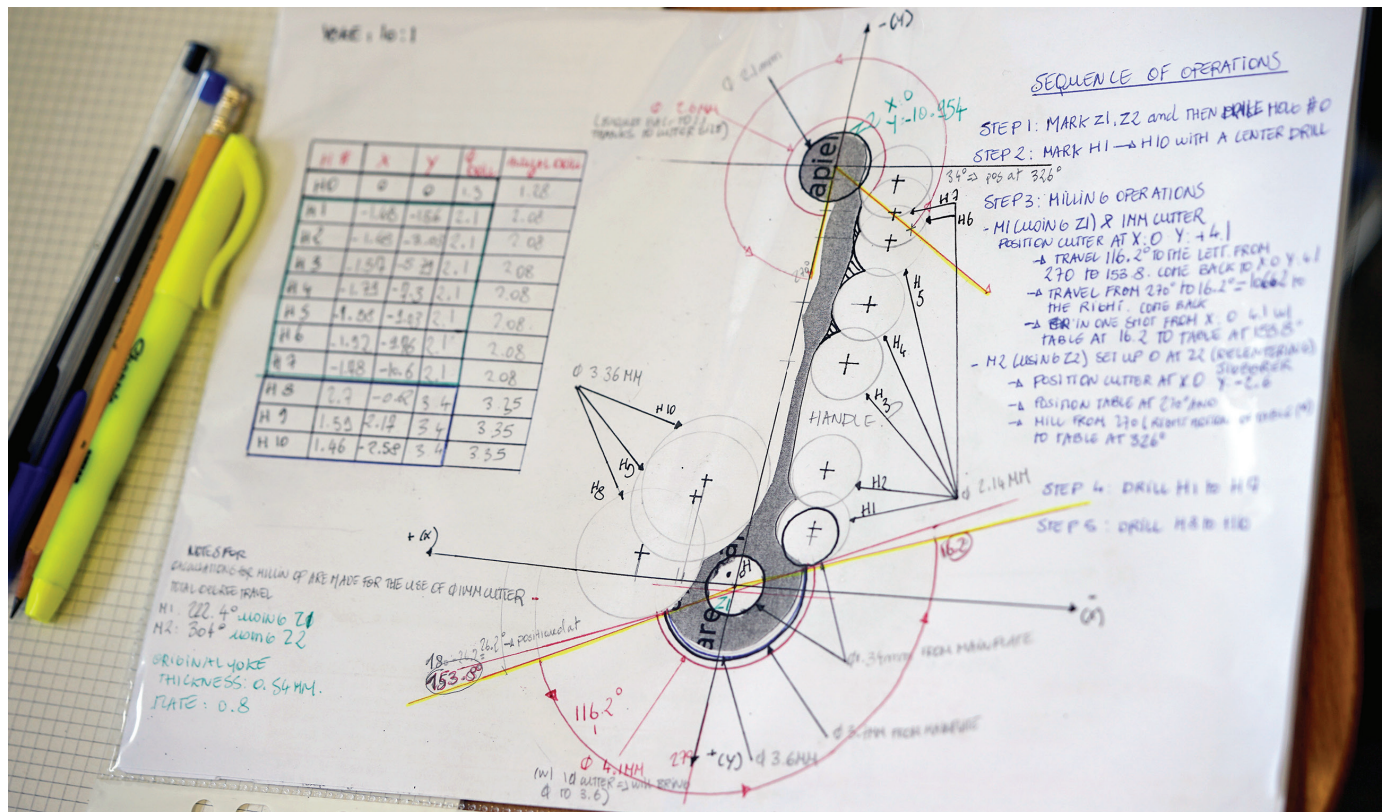
microscopes at home to discuss a specific problem. This method worked out well individually as well as in group sessions on both WhatsApp and Skype.

What segment of the industry do most of your graduates go into—after-sales service for brands, private companies, independent jewelers?

It's not possible to say where most go since they all do different things. Some work for independent watchmakers, some create their own luxury watch brand, and others work in after-sales service centers or independently. Some work in a watch store or for a famous watch brand. Some students even work for other students who graduated earlier. It varies from student to student, probably because of different opportunities, life situations, or individual interests.

What are the academic requirements for potential students?

Students must have completed the regular school cycle and speak and understand basic English, which is the language used for instruction. Our school emphasizes hands-on training, and the theory is accessible to every student.



Explaining the sequence of operations to machine a component.

What is covered in the taster course/ bench test that potential students must take?

The taster course is not an exam in the common sense. It allows our teacher the opportunity to see how a student evolves and if he or she has the spark and the skills to become a watchmaker. Also, the student will get a feel for the environment and the school life, which is important given that he or she will spend two years in Le Locle. From our side, we will see if the student's personality fits into the class. There are only six students in the Fullskill program, so it is important we all get along.

When are your typical semesters?

Ideally, we start in March/April or September for the Fullskill class. However, sometimes the visa process takes more time than planned, and we have to delay the school start for the student. For the other classes, the dates are set according to our agenda.

Are most students local or do they relocate?

We are an international school, and our students mostly come from abroad. We have had students from all continents. It is nice to have a mixture of nations and cultures, because it enriches the personal experience.

Often, students help each other out during their study and stay friends after graduation.

For our tailor-made short courses for companies, we have welcomed mostly watchmakers from Swiss watchmaking companies so far. Of course, all companies around the world are welcome to train with us. For watchmakers' short courses (restoration and finishing classes, etc.), there is a mixture of international watchmakers and locals.

Do you help non-local students find housing?

The school has a few apartments available for the Fullskill training students. If none are available, the student will have to find a place, and we will assist in doing so. For some students, it is a first experience to travel and live abroad, and they may be a little intimidated by moving to an unknown country where they are not familiar with the customs. We stay in close touch during the admission process and accompany the students through this time, trying to answer their questions. Once they arrive in Switzerland, we explain everything they need to know, and the other students are always willing to help with information and advice. We are a small school and it feels quite like a family.



A student trying out the topping tool.

A student made screws with his own pattern design for grip.



Can you describe a typical student?

There is no typical student profile for the Fullskill training. Students mostly share the passion and the desire to acquire solid skills and an extensive learning and working experience. There have been years where the majority of the students were aged between 30 and 50 years, and other years the age might be more between 20 and 30. In our technician class, the age range is between 30 and 40 years for the current class.

Our short courses, however, are popular with students who already have a career; some students were over 70 years old. It is never too late to learn, and it's wonderful to meet such passionate people.

Are there many older students who are switching careers?

Yes, many of our students enroll for our training as a second career choice.

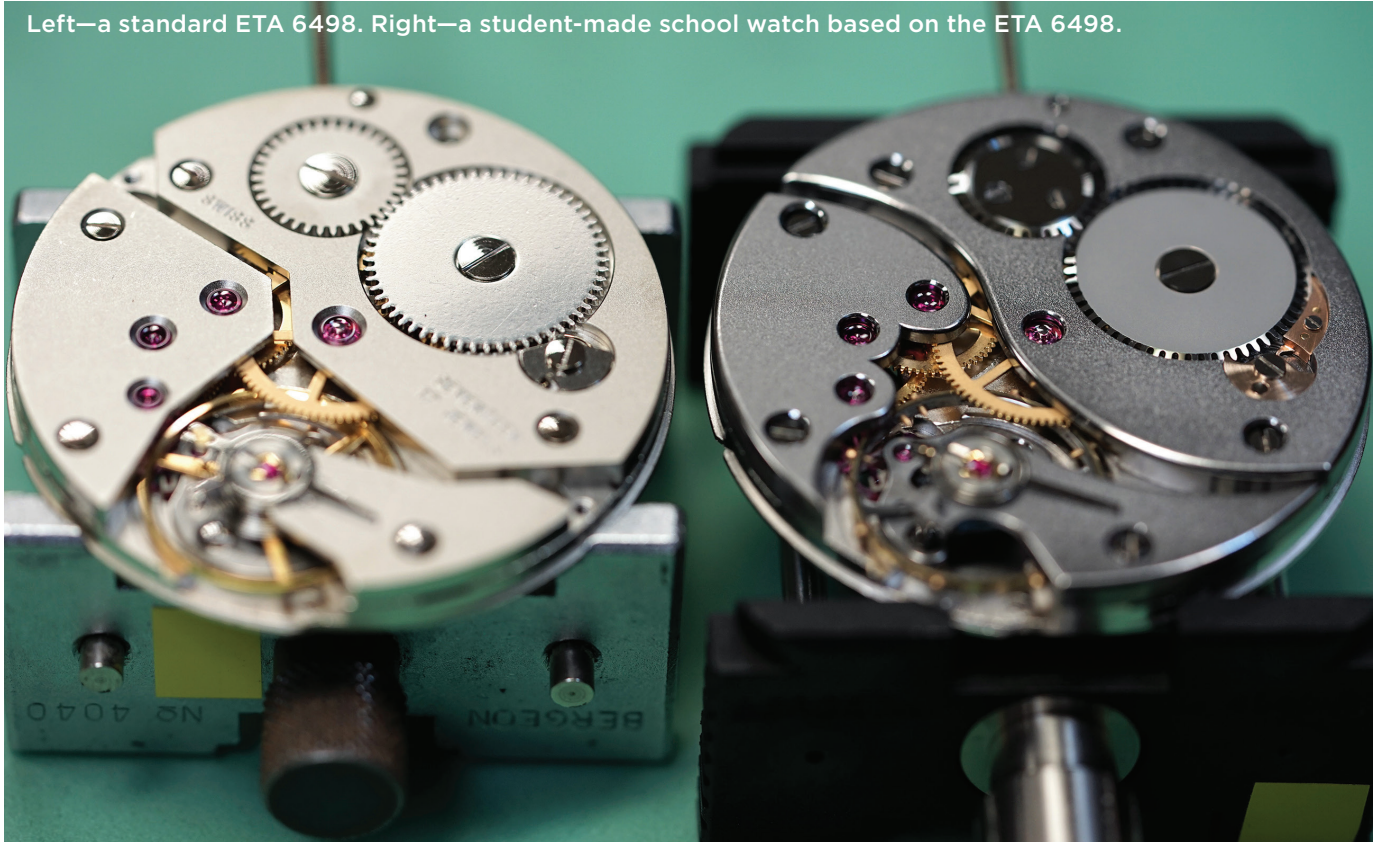
Are the students required to have a workshop at home? Or are they able to get back into the classroom throughout the week (after hours) to work on projects?

Access to school is possible until 10 p.m., and they can work on weekends too, if they wish. We encourage individual progress, and usually our students stay longer in the evening. Henrik, our principal, is a passionate watchmaker and teacher and always willing to answer questions. For all these reasons, they do not need a workshop at home.



A student burnishes balance staff pivots in a Jacot tool.

Left—a standard ETA 6498. Right—a student-made school watch based on the ETA 6498.



Are students' tools procured through the school as needed?

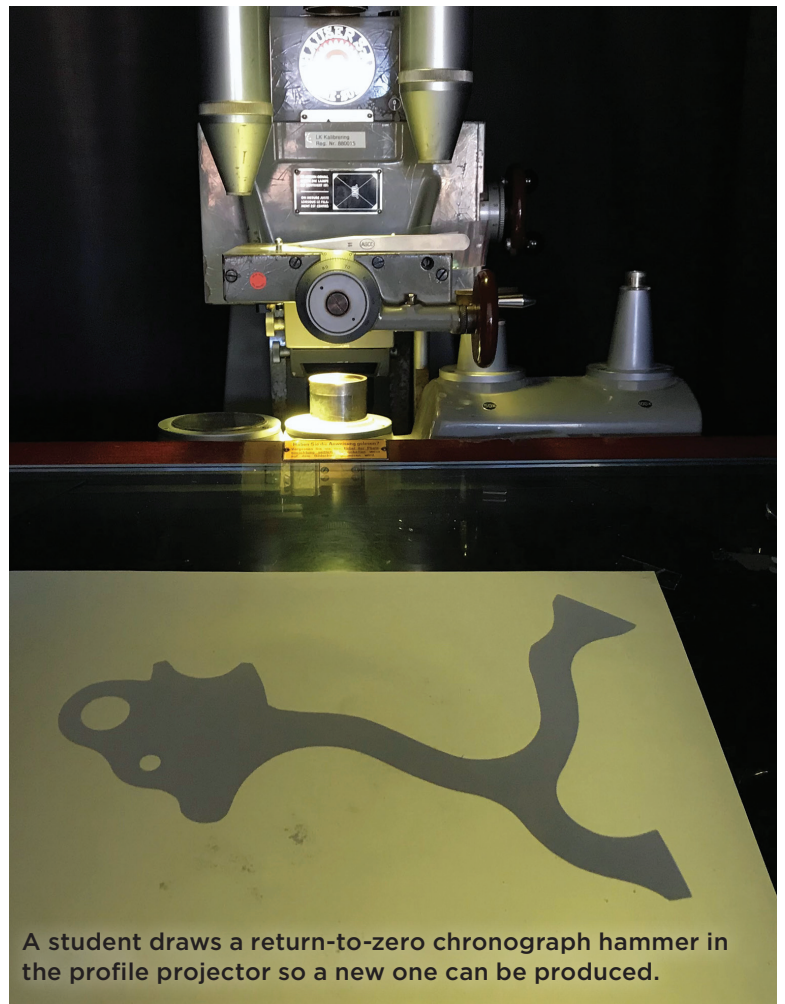
We have very well-equipped workshops and machine rooms. It is a real asset for our students to access freely and anytime the machines they need to ensure a free workflow. The school procures the needed tools for the Fullskill training. Personal tools that are not part of the basic school set may be purchased at a good price. We are lucky to have all the famous tool factories close by.

What is the current tuition?

The tuition fees are available on request by students. We only publish the fees for short courses.

Are there financial-aid options?

Here we have student loans that are a federal program and Pell Grants for older students who no longer rely on their parents. Persons residing in Switzerland may apply for a student loan. Some countries will grant loans



A student draws a return-to-zero chronograph hammer in the profile projector so a new one can be produced.

to their students studying abroad under certain conditions. Frequently, students ask if loans are possible to obtain. The students have to send the request by their own initiative to their government or find a personal sponsor. As a private school, we do not sponsor any students. If a student wishes to make a request for a sponsorship, the school may recommend, in special cases and situations, a Swiss foundation without any guarantee of acceptance and only after completion of the bench test in our school.

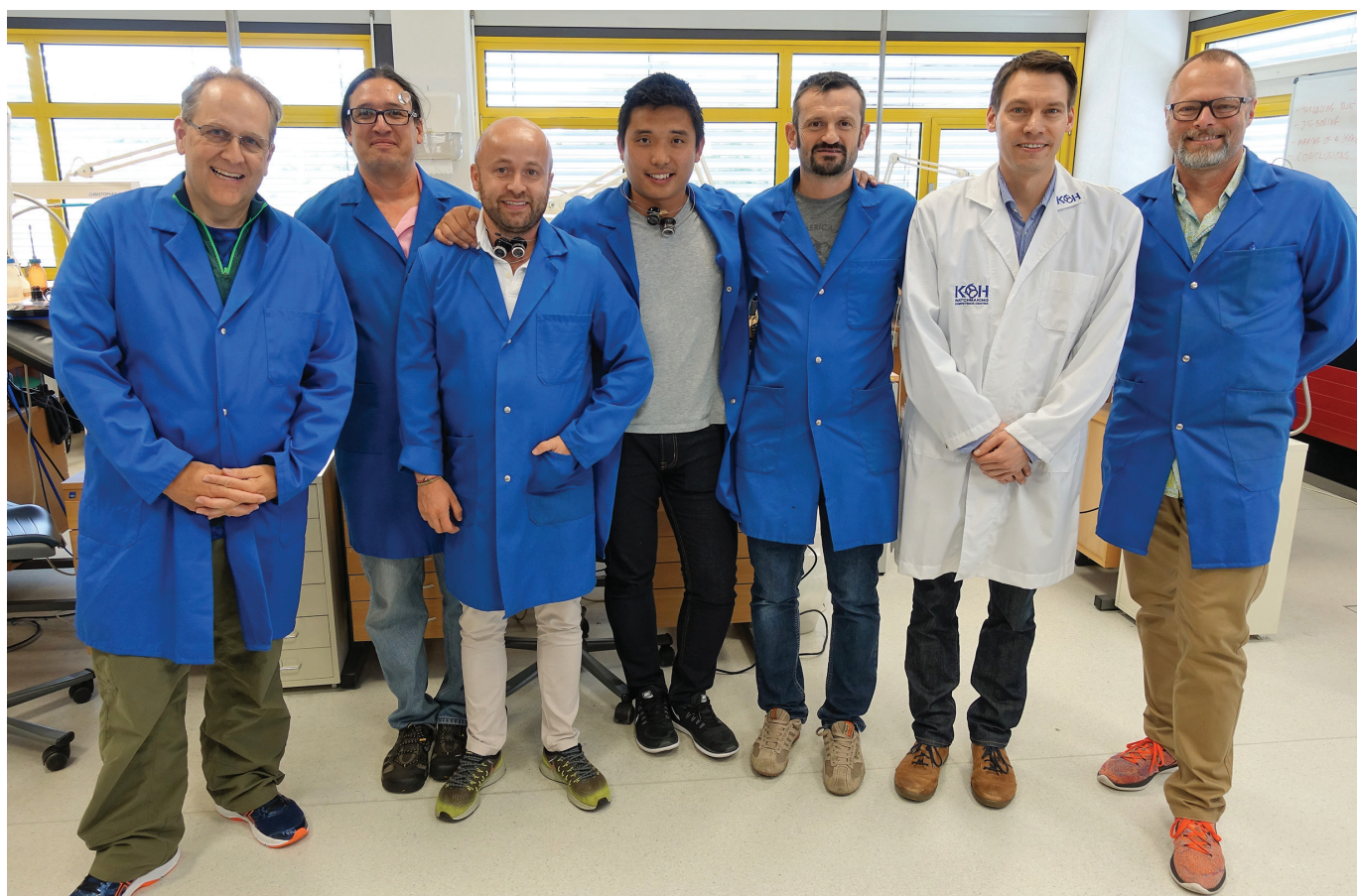
Does completion of your courses prepare students to gain a certification? Is what they learn in your school comparable to WOSTEP curriculum?

Yes, students must pass several exams during their Fullskill or technician program and will pass a final exam. After passing all the exams and completing their work, they will receive a diploma. Our students

appreciate the attention they receive for their individual way of learning. We have high standards, so the students are ready to work in any environment.

As an independent watchmaking school, we are not tied to the specific requirements from the industry, which means we are given a greater latitude in the teaching and learning process. Henrik used to teach at WOSTEP and always dreamed of a school where classical watchmaking could be taught in a creative way, emphasizing the student's personal skills and talents. We believe in the importance of micromechanics and the individual learning process. Our classes are limited to six students, and the curriculum is dense.

Henrik Korpela has been making guest appearances on the Naked Watchmaker's blog. Here he discusses tweezers. <https://www.thenakedwatchmaker.com/blog/2020/7/28/henriks-minutes-tweezers-the-watchmakers-first-tool>



Many AWC1 members have traveled to Switzerland to study with Henrik Korpela. Here is a restoration class from 2017. On the left is Craig Stone. To his left is Chris Kelly, and on the far right is Ron Landberg. Many more members have had training with Henrik either at an annual convention or at headquarters in Harrison, Ohio.



The Smithsonian Magazine ranked Columbia, PA, among the top 20 best small towns to visit in the United States, in part, because of its strength in history.

The National Watch & Clock Museum provides a wealth of information about the art and science of timekeeping. When you can't visit the museum, check out the webinars and podcasts about horology for everyone who loves watches, clocks, and all things to do with keeping time. Listen on Spotify, iTunes, and Sound Cloud.



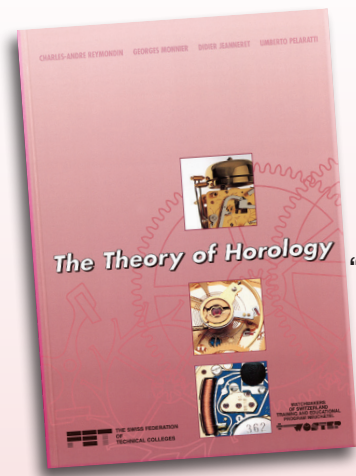
Visit **NAWCC.ORG** and click **EVENTS** to view upcoming events and classes.

Contact the Education Department at 717.684.8261, ext. 237 or education@nawcc.org.

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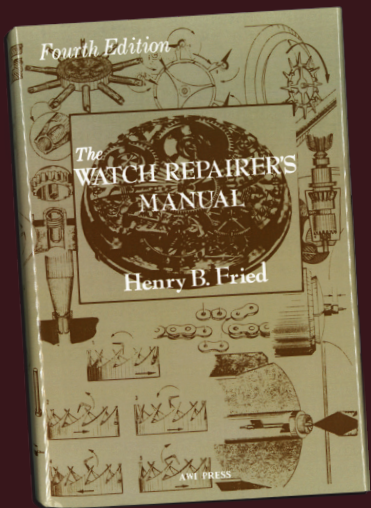
This book has become the "bible" for schools, training centers, and even watch specialists.

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The Watch Repairer's Manual by Henry B. Fried

This book is frequently used as the textbook for courses in watch and clock repair. It is ideal for individual study as well. Published in 1986, the 4th edition includes the six chapters on case settings and winding systems, motor barrels and jeweled main wheels, the verge fusee watch, repairing fusee chains, how to make a verge (staff), and the duplex escapement, which were not present in earlier editions. A total of 26 chapters comprise this 456-page book, along with a glossary, appendices, and over 550 illustrations.

Written by Henry B. Fried, dean of American watchmakers, BHI Silver Medalist, and honored teacher, this book is the perfect reference for the beginner, the trade watchmaker, hobbyist, collector, or anyone interested in horology.

To order, go to the online store at www.awci.com/online-store.



\$59.99

Recommended reading for CW21 certification

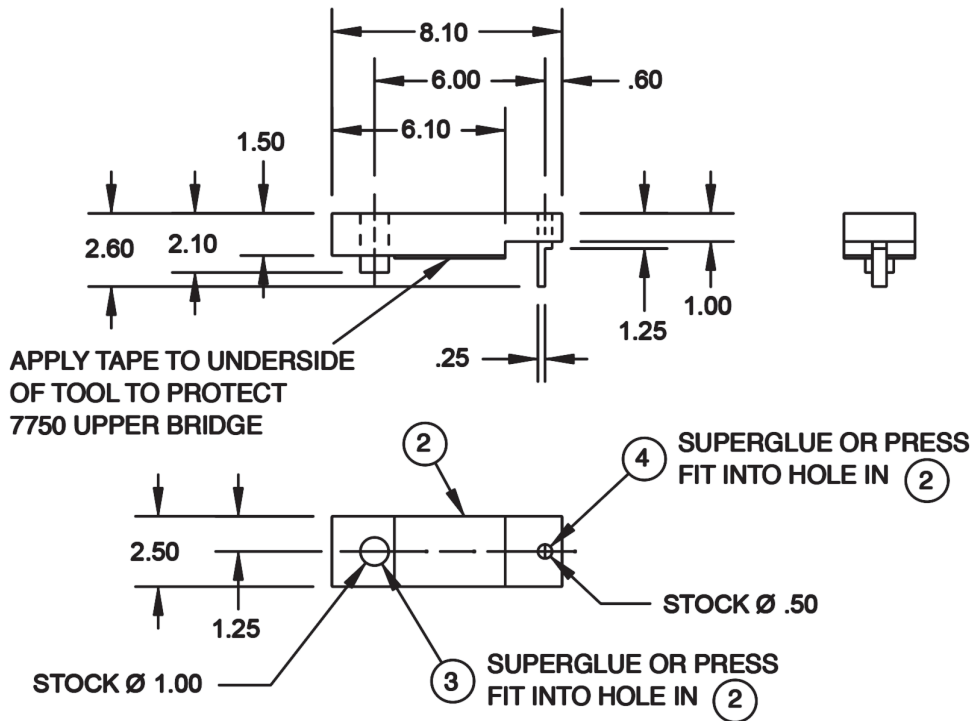
TDIY Tool Maker

7750 Let-Down Tools

By Hans Schwarz, CW21

The main purpose of these tools is to gain a timing measurement of a 7750 movement at half wind, after it has been fully wound, without the need to wait for it to run down on its own. A YouTube video by perplxr, “7750—Letting Down the Mainspring Power,” (<https://www.youtube.com/watch?v=3btOsxAvekq>) describes a method that requires some disassembly of the movement. Watchmakers not experienced with this method could damage the springs or scratch the bridges. Use these 7750 let-down tools for another solution. Set the brass tool onto a well in the upper bridge with the finger on the other side of the tool pulling the reverser spring away from the reverser as shown. The steel finger of this tool should be bent so that the finger just clears the reverser as it spins. Next, install the pegwood tool into a hole next to the click. Turn the pegwood tool to move the click away from the ratchet wheel while holding the crown with the other hand and allow the mainspring to unwind.

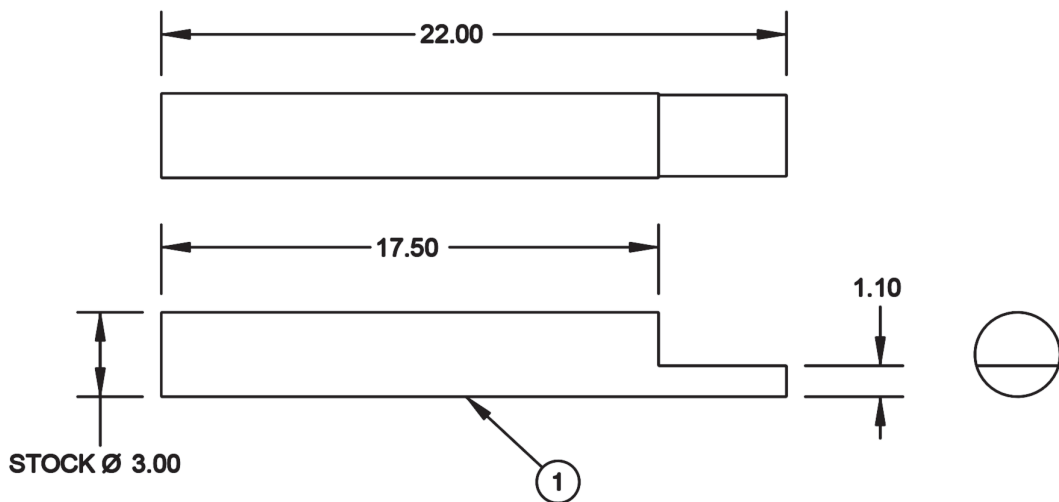




④	MAKE FROM SPRING STEEL
③	MAKE FROM 360 BRASS
②	MAKE FROM 360 BRASS

DIMENSIONS IN MM

7750 LETDOWN TOOLS



①	MAKE FROM BEECH PEGWOOD
---	-------------------------

DIMENSIONS IN MM

7750 LETDOWN TOOLS



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All members are invited to participate in the monthly conference calls of the Board of Directors. The meeting will be streamed live using the GoToWebinar format, which will allow all interested AWCI members to participate.

To participate in the next meeting you will need to register at least 24 hours in advance. You will need to have your AWCI member number available.

After you register, we will verify your membership. The morning of the call you will receive an email with instructions to join the call.

You will be able to listen to the entire meeting. At certain times during the meeting your feedback may be requested, and you will be able to briefly share your thoughts by using the "raise your hand" button in the platform. The experience will be very limited for individuals who call in on the phone without logging in on their computer.



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- AWCI Code of Ethics

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