

September 2021



Traditions & Transitions

How a Ticking Watch Drew a Student to Horology

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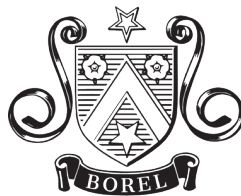


Restoration Projects Done at WOSTEP in 1991

Part 7: Restoring a Ulysse Nardin
"Small Format" Chronometer

Bucket List:

Making a Tall Case Clock



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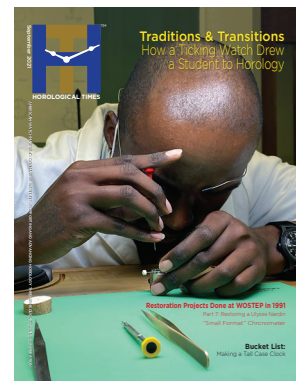
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From the Editor



Let us take you, readers, on a variety of journeys and adventures this month.

Whether it's someone relatively new to the world of horology and clockmaking talking about their journey toward making a tall case clock of their own, or an experienced clockmaker offering his pointers on dividing and crossing a wheel out by hand, or two students from entirely different disciplines restoring a beautiful horological

work of art, there's a journey for everyone inside this edition of *Horological Times*.

I'm a huge fan of reading about someone's journey in life. I love hearing how they got to the place they got, what spurred them to take that road, what inspires and motivates them, and what they take from it. So, when new AWCI member Stu Lord came to us and offered to write a series of articles detailing his path to making his very own tall case clock, from beginning to end, of course we said "Yes!" Who wouldn't?

We all have those paths we've taken to get where we are today, and each of us has an interesting backstory about our journey on that path. This month, we get to learn about Stu, a gentleman who retired from a career in manufacturing and simply had a desire to achieve a bucket list item, which happened to be building his own tall case clock.

While the process might be familiar to the many clockmaking experts of our readership, it's also enlightening to see how a beginner not only became interested in clockmaking, but undertook the process of learning how to be proficient in it. That's what Stu's journey is conveying to readers with the first part of his series this month—showing those who might be interested in the art of clockmaking how to learn it, and do it right, no matter their previous experience level.

Speaking of experience, there's nothing like Stephen Franke showing us how we can divide and cross a wheel out the "old school" way, by hand. Talk about science, art, and craftsmanship all rolled into one—that's Stephen's column in a nutshell.

As is another article this month, which has a clock student and furniture student at West Dean College, in the United Kingdom, working together to restore a 19th Century Black Forest Cuckoo Clock. Their adventure of taking a clock which came to them in, to put it mildly, poor condition, and how they combined their talents to bring it back to life is utterly amazing to me and will be to readers also.

When talking journeys, read about AWCI member Antonio Ledbetter and his path from North Carolina to Paris Junior College and the world of horology. "Inspiring" would be an apt term to use to describe it. Read it and see for yourself.

Of course, we have Jack Kurdzionak enlightening all of us, once more, in "From the Workshop" with an informative adventure he took over the course of a weekend, along with a friend, to determine what was wrong with several watches—all without opening the cases. And finally, we close out Bernhard Stoeber's excellent series of WOSTEP restoration projects by finding out just how he restored that Ulysee Nardin "Small Format" Chronometer. It's the perfect way to close out his wonderful series of articles, where he took us along in recounting his 1991 WOSTEP journey.

So, there's a little something for everyone this month. We hope you all enjoy it as much as we did putting it together for you. It's quite the journey, as you'll see in the coming pages.

James Sprague
AWCI's office manager
and managing editor
of the *Horological Times*



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AWCI's vision is to have an
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a message from the president

JUSTIN HARRELL, CW21



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Summer is coming to an end and school is back in session. This looks different for kids all over the country, but getting back to a schedule is good for everyone.

School systems, teachers, and parents are all still adapting and trying to figure out how to educate the next generation.

Regarding the COVID-19 pandemic, technology is now being used to teach our children in ways we never thought of. With significant consideration given to technology after the pandemic, a complete re-thinking of education is happening, and horology should pay attention.

As horologists, we are surrounded by brilliant colleagues in our field, and learn so much from each other whenever we are together. Why can't we learn those things from each other when we're apart?

The problem is we are scared. Yes, scared! I understand that it can be intimidating to do this, because as proud watchmakers, we do not like to make mistakes or like to be publicly criticized. I am guilty of scrutinizing every month's President's Message and spending too much time lamenting if I'm being politically correct, or political, or whatever. We all need to start being more honest, vulnerable, and even open to criticism. When more of us engage and put together content that helps each other, our collective knowledge grows and everyone wins.

As this issue is going out to everyone, Jason Champion is taking the Archie Perkins Mobile

Classroom to Las Vegas for the JCK show. I will be joining him, and would like to personally thank JCK for allowing the mobile classroom to be displayed inside the show. Their generosity in providing this opportunity for us, to unveil our new specialists and technician programs, is important for relationship building, and should not be taken for granted. If you attended the show, I hope you had an opportunity to stop by, say hello, and take a tour of the Mobile Classroom.

Personally, September is my favorite time of year. I love the start of the crisp air and unforgettable Blue Ridge sunsets. This also starts the peak time for visitors in my town, and the holidays are in sight. Many of us will get a boost in business this time of year, so we must be conscientious with our efforts.

I use "conscientious," because the word has been stuck in my head for a few days. A mentor of mine talked to me recently about the adjective. The word is defined as "guided by or in accordance with the dictates of conscience; principled." Basically, wanting to do what is

right, especially to do one's work or duty well and thoroughly.

It seems more and more people do not act with conscience in mind. Employers, employees, teachers, students, government officials, and yes, even horologists often act in a way that only benefits themselves, and not the greater good.

Let's remind ourselves to be conscious when performing our work, and be ambassadors for the profession. Let's share our knowledge with the next generation of watchmakers and clockmakers with good intention, and promote competition.

"Let's remind ourselves to be conscious when performing our work, and be ambassadors for the profession."



AWCI educational calendar

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

With in-person classes returning to AWCI Headquarters in Harrison, Ohio, 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:

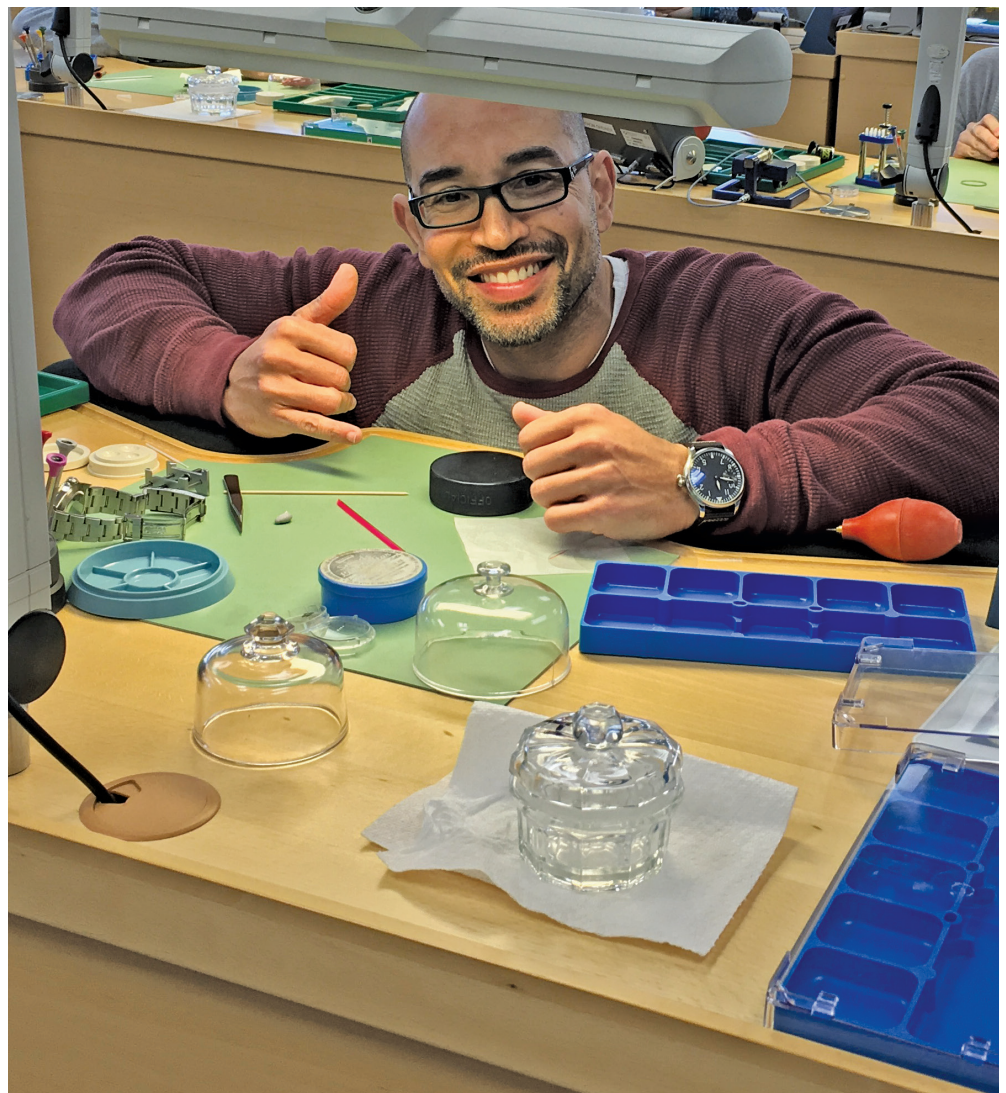
- American Time-and-Strike Movement
- Advanced Clock Repair
- Introduction to the Lathe

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 have been brainstorming on new courses to offer and searching for new instructors who will join forces with us. Your input is valuable. If there is a class you would like to collaborate on as an instructor, reach out to us at education@awci.com.

We are planning a new list of classes to offer for 2022. We look forward to receiving your requests and/or inputs!



**Reserve your spot today. Contact the education director, Jason Champion, CW21,
at 866-FOR-AWCI (367-2924), ext. 303.**

Prices reflect members' discount! Contact us so we can help you find the best course suited to your skill level, expertise, and interests.

**September
13-17**

WATCH 100:

Introduction to Watchmaking

Instructor: Jason Champion, CW21
AWCI Headquarters, Harrison, Ohio

**\$1095 members
\$1245 non-members**

A survey course for the new or prospective watchmaker covering the basic skills and techniques used by the modern watchmaker. This class is perfect for anyone thinking about entering the profession of watchmaking or for the individual who just wants to gain a better appreciation for the art of watchmaking.

**October
18-22**

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Instructor: Jason Champion, CW21
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**\$1095 members
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A survey course for the new or prospective watchmaker covering the basic skills and techniques used by the modern watchmaker. This class is perfect for anyone thinking about entering the profession of watchmaking or for the individual who just wants to gain a better appreciation for the art of watchmaking.

**November
4-6**

AWCI Fall Symposium

AWCI Headquarters, Harrison, Ohio

Come join us at AWCI headquarters for three days of celebrating horology, AWCI membership, and getting back together as friends and colleagues. For additional information, go to the back cover of this issue or visit www.awci.com/event/awci-fall-symposium/



<https://www.awci.com/webinars>

Free/discounted webinars for AWCI members!

You asked for it, you got it!

Many of you have asked for online education. While AWCI's in-person education is on a hiatus, you can still learn from our excellent instructors—Tom Schomaker, CMW21; Jason Champion, CW21; Jordan Ficklin, CW21; Bernhard Stoeber, CW21; David LaBounty; and Ken De Lucca.

Missed a webinar? No worries, check out the on-demand webinars. Choose a topic from a list of pre-recorded webinars. Here are some of the topics we cover.

- | | | |
|---|---|---|
| <input checked="" type="checkbox"/> Watch Basics for Beginners and Collectors | <input checked="" type="checkbox"/> Explore Watchmaking | <input checked="" type="checkbox"/> Professional Essentials |
| <input checked="" type="checkbox"/> Basic Watch Repair Skills | (A Hands-On Digital Webinar for Beginners) | <input checked="" type="checkbox"/> Tool Maintenance |
| <input checked="" type="checkbox"/> Hairsprings | <input checked="" type="checkbox"/> Workshop | <input checked="" type="checkbox"/> Clocks |

And more!

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.



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AWCI Board Meetings Open to All Members!

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.



Education News

By Jason Champion, CW21

Fall Symposium and Education Opportunities

Stick with me as you read this, and you will see the connection as you read to completion.

In the last few weeks, my family has had the chance to trace back yet another of our ancestors. We made a trip to western Indiana, to a great community in New Harmony, Indiana, and a library known as the Working Man's Institute. The purpose for the trip to this quaint little town was to track down a transaction of a steam engine and separator—threshing machine—that my great-grandfather purchased, while he was employed for Keck-Gonnerman, in the first quarter of the twentieth century.

While we were successful in finding a record for the separator, we were not successful in our endeavors for the steam engine. We did, however, get quite the education about the operation and sales of steam engines at the turn of the twentieth century and before. It was eye-opening and quite insightful, regarding how these marvels of their time were manufactured, sold and serviced. Upon being shown an image of the steam engine we had assumed was a Keck-Gonnerman, we were informed by a great guy named Andy that we were mistaken—it was in fact a Case, not a Keck-Gonnerman.

This experience is much like what we do to our customers, when they come to our facilities. Our consumers have an expectation of their timepiece or experience in our shops, and we as watchmakers and clockmakers either exceed or fall short of their expectations, thus setting a foundation for further commerce or the lack thereof. There are certain

aspects of our profession which, unfortunately, have disappeared with our ancestors of horology passing on. There are also aspects of our profession which will change in the future. The connection between this is education, in both history and the future. If we are not looking to better ourselves, then we are setting our own expiration date. I am always amazed at what can be gained from sitting with like-minded individuals, discussing our profession and things that you find interesting. Open minds and discussion lead to understanding, and that is a very good thing.

“ If we are not looking to better ourselves, then we are setting our own expiration date. ”

We are excited to have classes going again here at AWCI, and our hopes are that we can continue to do so with an understanding of COVID-19, and utilizing best practices to keep everyone healthy. We have a great opportunity with our upcoming Fall Symposium to get together and discuss options on how everyone can work to better our profession. This may be learning a new tip or trick to take back to your shop, or it may be the rest of us benefiting from your time, talent, or expertise. It will be a good time, either way.

Just like that identification of the steam engine, we all have knowledge in a specific area, and there is certainly someone out there looking for the knowledge we have. I hope that you all consider coming to this experience. Come to share your ideas, and leave with a new group of resources to help yourself and bring others along also.

I look forward to seeing you in classes and this November in Harrison.

Jason Champion is AWCI's education director.



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The AWCI shoulder bag is the perfect companion to keep everything organized, secured, and readily accessible when away from the shop. Constructed with 600 denier polyester fabric for long-term durability, there is a roomy main compartment with pockets and storage slots for electronic devices, pens/pencils, small tools, business cards, and supplies. Handy outside storage pockets can carry larger items. A key clip, durable snap buckles, and a removable shoulder strap add additional versatility. The AWCI logo is embroidered directly onto the main flap, so it will remain visible for many, many years without peeling or chipping away.



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AWCI, NAWCC Put Heads Together at National Convention

By David Lindow

It's been quite a while since any horological conventions or symposia have taken place, so it was good to see the National Association of Watch and Clock Collectors (NAWCC) National Convention move forward July 15-18. Many of our members are also members of this organization, so it was a good opportunity to meet, gather, and see some old friends.

Among the attendees were several members of our Board of Directors, as well as our Education Director, Jason Champion, who drove the Archie Perkins Mobile Classroom upon invitation to the event and parked it prominently on the parking lot near the front entrance. It was well-received, and a good number of attendees, including members of the NAWCC board, took a tour of the bus as did some prospective students.

The meeting was held in Hampton, Virginia. The trip afforded Jason Champion the opportunity to stop off at Jamestown and spend a bit of time chasing down the gravestones of his ancestors, who were some of the early settlers there. Champion is a rare and unusual last name. To find it amongst the ranks of those early settlers is exceptional. Jason's delight in having found the stones was obvious in his demeanor. It was something that had been on his list of things to do for a long time.

AWCI Board of Directors member and Education Committee Chairman, Nick Butt, gave a lecture on the history of the Chelsea Clock Company on Friday, July 16. Nick is presently an employee of Chelsea Clock and works in the repair department. One might say he knows these clocks from the inside out. However, he not only knows the inner workings of the movements, but is quite knowledgeable about the cases, finishes, and how they fit into the company's history. Nick's lecture accompanied a special exhibit from the Chelsea Clock Museum, <http://chelseaclockmuseum.com>, which brought specimens that gave a physical representation of this history. The exhibit included several clocks from each era of the company, along with its pre-history. It showcased

clocks from Tiffany, which used their movements in the early twentieth century, as well as a section of clocks made for the US Navy.

On Saturday, July 17, Nick was kind enough to give a walk through the exhibit, expounding details about each type of movement and many of the cases. This walkthrough was attended by Jason Champion, as well as several others including AWCI Board of Directors member David Lindow and AWCI President Justin Harrell.

The NAWCC invited AWCI to set up a table in their Mart room, which Jason did. The table offered copies of the *Horological Times*, as well as the books that AWCI has published for sale, in addition to information on classes. AWCI member Jacob Curtis stopped by and commiserated for some time, as well as discussing at length some of the hopes for the future of AWCI's education plans. Jacob, 31, is a watchmaker who works at Once Upon a Time in Staunton, Virginia, and is also a 2017 graduate of the Lititz Watch Technicum.

Perhaps the most significant event at the convention was a joint meeting held on the topic of education. The meeting was attended by 20 people in person, with 10 more joining through Zoom; and the institutions represented were the NAWCC, AWCI, New York Horological Society (HSNY), and the Willard House and Clock Museum. Among the attendees were Rory McEvoy, incoming executive director for NAWCC; Richard Newman, prior chairperson for NAWCC; Jay Dutton, board member for NAWCC; Cathy Gorton, board member for NAWCC; James Price, newly elected chairperson for NAWCC; Justin Harrell, board president for AWCI; Nick Butt, board member for AWCI; David Lindow, board member for AWCI; Jack Kurdzionak, board member for AWCI; Paul Wadsworth, board parliamentarian for AWCI; Jason Champion, education director for AWCI; Wayne Andrews, president of the Willard House and Clock Museum; and Nicholas Manousos, executive director for HSNY; as well as many members of the various organizations.

The meeting was opened by Jay Dutton, NAWCC board member, and after introductions of the attendees Dutton turned the floor over to David Lindow, AWCI board member, who laid out his idea of building a clock education program through a joint cooperative endeavor. Lindow's vision includes a system where multiple institutions work together toward teaching a younger generation to restore and build clocks, while teaching them the art of horology. In his opinion, the resources of each institution are too meager to accomplish the task on its own, but if there is a general cooperation, a synergy can be developed that accomplishes the task.

After Lindow laid out his vision, a productive discussion ensued. The consensus was that if a program for clock education was not moved forward, the future of clockmaking in America was bleak. The average age of the convention's attendees was a stark reminder of this fact. However, the consensus was also that a cooperative endeavor with a horological education program, with participation from the various institutions, was not only possible but also desired.

Nicholas Manousos, executive director of HSNY, did share some concerns, however. Manousos stated that the HSNY had honed an introductory watchmaking class that they had proliferated throughout the world. He wanted to continue with their watch class for enthusiasts and avoid getting into a competitive situation. Nicholas suggested that each organi-

zation stick to their strong suits and offered an interest in pursuing a joint scholarship opportunity. After pointing out that there was no current clockmaking program in America, toward which a scholarship program could be directed, the group discussed that a partnership agreement might address competitive concerns.

The representatives from AWCI and NAWCC all seemed to be on board with the idea in concept, and expressed a desire to move toward developing the mechanics of how the idea could be brought into a practical reality. It's hoped that much of this work can be done before the AWCI annual meeting, which is to be held November 4-6, where a similar meeting could be held.

This year's AWCI annual meeting will include the annual Board of Directors meeting, but it will be devoid of the convention atmosphere of most years. It will be held at the AWCI headquarters in Harrison, Ohio, and is to be seen as a social gathering in celebration of the ending of COVID-19 and a new resolve to move the institution forward. Part of the meeting will be the first attempt at composing a class by committee in the manner David Lindow suggested in his introduction at the recent meeting.

There will be no charge for attendance to the meeting. For more information on this meeting see the AWCI website, awci.com. We hope to see many of you there.

David Lindow is member of AWCI's Board of Directors and serves on AWCI's Education Committee. He owns Lindow Machine Works in Gravity, Pennsylvania, and also serves as president of the Ornamental Turners International and is co-founder of the Plumier Foundation, whose mission is to preserve and teach the arts of ornamental turning and fine woodworking.

Starting from Scratch

AWCI Member Tackles Bucket List Item of Making a Tall Case Clock of His Own, Part 1

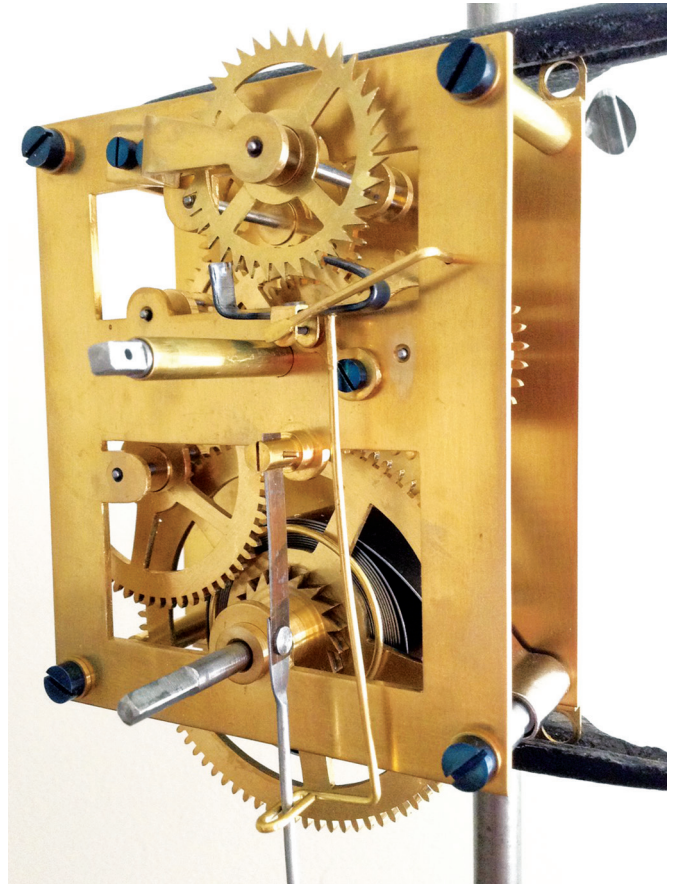
By Stuart Lord

About thirty years ago, my father-in-law asked me if I wanted a box of clock parts he had in his basement. I'm not sure where he got it from, but that box happened to be sitting next to the cat litter box, and the cat was obviously, at times, confused which box was which. Because of its present condition I was reluctant, but threw caution to the wind and took the box. After some months, I decided to dig into the box to understand its contents. What I found were dirty parts of perhaps two complete clock movements, partially assembled and in disarray, and their cases.

I've always been fascinated about how things worked, and I always loved working with my hands. I was more apt to jump right into a project than read the directions. My trial-and-error approach was not always the most efficient, but when I was done, I knew how it was built and how it worked (e.g. the disassembled bicycle that was delivered by Santa for my kids). I was also interested in woodworking, inspired by an uncle who was a fine cabinet maker. I tinkered with making toys for my kids, refinishing our basement, and making cabinets. So, I was up for the challenge this box of parts offered me. I knew nothing about clocks, but my fascination to learn drove me forward. Could I get the movements to work and repair the cases, so they deserved to be on my mantle?

After separating the parts, I came to realize that I had two Seth Thomas clocks—one 30-hour cottage clock and the other a nice, eight-day “Eclipse” model shelf clock. The eight-day movement looked cooler, as it was a lyre movement and the case was in better condition, so that's where I started. I knew I had to finish disassembling the clock before I started to clean things up. Lesson one—never take apart a clock without first letting down the springs! I spent the next two hours in the garage looking for the parts that went flying. Luckily, no damage was done to the clock, nor my hands, and I was able to find the scattered parts. Lesson learned.

I cleaned the parts up the best I could using WD-40, steel wool and dish detergent, then used



A front view of the movement made by AWCI member Stu Lord, as part of his bucket list goal of building a tall case clock.

my trial-and-error technique to assemble the movement. Things looked like they actually fit together. After a considerable amount of fidgeting and adjustment, I cautiously wound the springs, made some additional adjustments and it worked! It started to make that “tick-tock” sound and chimed mostly on the hour, as it was supposed to. I was hooked. Over the years, as my skills progressed, I applied them to the clock and now it is on my mantle keeping great time. Since that day I heard the first “tick-tock,” I've learned so much more.

While flying back from Europe on a business trip, I was reading one of NAWCC's *Watch and Clock Bulletin* and came across an article about two guys, Benjamin Lord and Nichols Goddard, who were in business making clocks in Rutland, Vermont, from

1797 to 1805. I wondered if Benjamin was any relation to my family. I couldn't wait to get back home to find out. Luckily, my uncle had thoroughly researched our family genealogy, so I was able to find Benjamin Lord in his documentation. The names, birthdates, spouses, and children's names all matched. He was my great-great-great-great-great-great uncle. Subsequently, I was able to locate two of these clocks, and my family now owns two circa 1802-05 Lord & Goddard tall case clocks #97 and #98. Now I knew I had to take my skills to the next level – it was in my genes. I knew that one day I had to build a tall case clock of my own from scratch—the movement and the case. It went on my bucket list. I had much to learn.

While living in Cincinnati, Ohio, I stopped in a clock repair shop looking for a part, a verge escapement. My wife brought home a clock she thought I could fix, so she could sell it in her antique business. Looking at my work, the gentleman asked me if I wanted to join his night courses in a local technical school on beginner and intermediate clock repair. In his beginner class, he covered the very basics: styles of clock cases, types of movements, types of escapements, striking systems, part names, tools necessary, cleaning, lubrication, resources available, and of course the proper way to let down springs. The intermediate course focused on disassembly, assembly, and synchronization of three train clocks—time, strike, and chime—along with proper bushing techniques, gear train calculations, and how to put a clock in beat. One of the more memorable lessons was the importance of power, transmission, and escapement in how a clock works, and how to solve problems in each. While taking both his beginner and advanced classes, I ended up helping other students with their work as I had already learned much the hard way. That course, along with several hundred clocks my wife subsequently brought home for repair, gave me the confidence to take my bucket list item to the next step when I retired.

Along the way, as most antique dealers do, my wife and I started picking up clocks, keeping the ones we liked and selling the others. OK, so I was the one with the clock fetish, not my wife. Our collection grew, we traded up, and have been able to put together a modest collection, which we now enjoy. Among those are tall case clocks including our two Lord & Goddard's; an early 1770s Benjamin Willard; what is thought to be an early David Rittenhouse; two pillar and scroll shelf clocks (which are



Lord & Goddard tall case clock #97, circa 1802-05, which was made by Stu's great-great-great-great-great-great uncle, Benjamin Lord, and Nichols Goddard.

offset pendulum Seth Thomas clocks); an Eli Terry & Son's whale's tail; a few shelf clocks—including a Timby Solar timepiece, a Birge & Fuller wagon spring, a Forestville acorn, and an Elisha Manross fusee steeple-on-steeple; and an Aaron Willard Jr. Massachusetts shelf clock. The wall clocks include a Joseph Ives Looking Glass and an Aaron Willard Jr. banjo clock, among others. My wife says that if I want anymore, I must make them myself. Game on!



A look at the dial and hood of the Lord & Goddard tall case clock #98. The two tall case clocks, made by his ancestor, inspired Lord to want to build one of his own.

After 33 years in the corporate world, I was lucky to find that my employer provided some educational assistance to those who wanted to change careers at retirement. Although I was not interested in changing careers, I was interested in taking my clock skills to the next level. Being an NAWCC member, I took advantage of their weeklong courses and attended many of them, including “Using the Micro Lathe for the beginner,” “Using the Micro Mill for the beginner,” “Wheel and Pinion Cutting on the Micro Mill,” “Introduction of Machine Tools and Materials,” “Build a Clock: Design and Construction I and II,” “Clock Escapements,” and “Clock Case Restoration.” With that behind me, I invested in some basic Sherline lathe & mill equipment and decided to jump in and build clock number one, a trial run for my tall case “bucket-list” clock.

Steven G. Conover’s book, *Building an American Clock Movement*, was my guide for clock number one. This time I read, then reread the instructions first,

and didn’t fall back on my trial-and-error method. I’ve been characterized as a “cautious learner,” and I didn’t want to make any mistakes. I wanted it to work. After all, when building a clock, you don’t really know if it will work until it’s completely built.

After about a year’s work, on and off, I completed my first time-only spring driven movement in April 2014. It’s anything but perfect, but it’s running behind me on the wall as I write this article and it’s 100% built by me. After taking Joe Zeh’s online course on how to use the SketchUp software for woodworkers, I applied my woodworking skills by designing the case, then built the case from cherry wood. I also painted the dial, a skill I picked up along the way. What I learned from this experience was how to take theoretical knowledge and turn it into practical application, to make something that works from scratch. Wheel and pinion depthing, wheel placement, the use of the lathe and mill, the use of hand tools, tool making, and metallurgy, are some of the skills I started to appreciate more fully. I was moving from a beginner to a novice, which means that I was starting to scratch the surface in understanding what I didn’t know.

A longtime family friend and avid clock collector, introduced me to the person who helped me bring my bucket list project to fruition. David Lindow, a renowned clockmaker from Gravity, Pennsylvania, was delivering some clocks I purchased from our mutual friend, who was downsizing his collection. He looked at my clock number one, politely said some nice things, then told me that he could teach me how to make it better. “I’m all in,” I told him. But, instead of making number one better, I wanted help making number two, my bucket list tall case movement. I wanted it to have a sweep second hand, a calendar hand, a strike train, some dial automation, and I wanted to make all of it myself. Further, I told him after the movement was completed, I was going to make the case in the traditional style of a Simon Willard Roxbury design. He looked at me strangely, thought a moment, hesitated, then said “OK, I’ll teach you.” I then met Stephen Franke while in David’s shop.

Editor’s Note: This is Part 1 of a three-part series. Next month, Part 2: “What I learned in making the time and strike train and the process I used.”

Stuart Lord is an AWCI member with a degree in Chemical Engineering from Clarkson University. He retired from Procter & Gamble after 33 years working in manufacturing, sales, supply, network design, and corporate strategy development. He and his wife live in New Hampshire.

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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.



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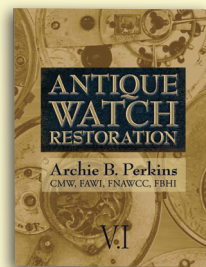


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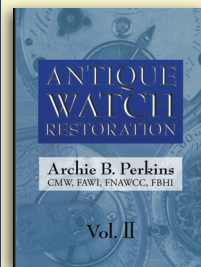
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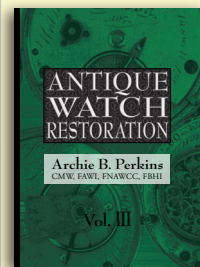
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TRADITIONS & Transitions

By Kathleen Cardwell

It is common practice in professional and social circles to ask: “So, what do you do for a living?” Yet, Ralph Waldo Emerson’s words, “Life is a journey, not a destination,” invite us to look deeper. The destinations—the places we call “work” and the job titles we hold—are worthy of sharing. But the journeys are far more intriguing and reveal the best stories.

This series, Traditions & Transitions, explores the stories of watchmakers, clockmakers, technicians, designers, educators, industry leaders, and shop owners—but with a twist. Some will share traditions—tales of strong family heritages, of businesses that have been passed down through generations, or learning the trade from a beloved parent. Others will recount transitions—linear or circuitous paths that led them from a career as a teacher or engineer to a career as a clockmaker or watchmaker, or how they turned a treasured hobby into a livelihood.

It’s About Time

It’s five o’clock, and Antonio Ledbetter has finished a 10-hour day of classes at Paris Junior College in Paris, Texas, where he is in his second semester of horology classes. His conversation is quick and lively, as he talks about escapements and hairsprings. He looks studious in his dress shirt and tie. As he proudly adjusts the magnifying loupe he wears around his neck, he also looks like a budding watchmaker. Antonio’s energy and enthusiasm is contagious, and it’s obvious in the photos he shares that he is at home in his surroundings and with his classmates. One would never guess that he began his studies without any mechanical aptitude or skills in hand work. And yet, already, he’s keenly aware of the depth and breadth of what he is learning and what he is training to become—a watchmaker.

‘Fingerspitzengefühl’ is the German word for fingertip feeling. I’m learning about the feel of tools and how my body reacts and responds. It’s less about the physical aspects of the tool or material, and more about how it works. I’m learning

how much torque I can create with a screwdriver without having an instrument to measure the torque. I’m learning how to use tweezers to pick up and move materials that are smaller than grains of dust.”

Although the start of his studies was nerve racking and stressful, to Antonio it still felt right, like he was exactly where he was supposed to be, and where he is beyond thrilled to be under the tutelage of Instructor Stan McMahan, an AWCI member.



Paris Junior College Horology Instructor Stan McMahan (left), with Antonio Ledbetter, one of his students and the first-ever awardee of the Horological Society of New York’s Benjamin Banneker Scholarship for Black Watchmaking Students.

“Personally I love the pictures! To me it shows a combination of a studious nature and that we can have fun, too! I think a large majority of people think of a watchmaker as some 73-year-old man tucked inside a room and never comes out. But we’re a lively group of youthful energy, and I think that’s important to note when considering interest in the profession.”

According to Antonio, the learning curve is a complexity, but by no means an impossibility. “I didn’t have the functional skills or thought processes, but I’m determined to be optimistic, and I keep telling myself that I’m here for a reason... the opportunity more than surpasses the risk.”

He Had not a Clue (or a Home)

Less than one year ago, Antonio was homeless and living out of his car. Following a terrible accident that involved a flatbed truck slamming into his car, he essentially lost everything—his car and all his belongings. The only thing he was able to salvage was an Armitron watch he had purchased a few months earlier. As he sat in the deafening silence of his loss, he remembers hearing the tick-tock-tick-tock of the watch, and realized he didn’t have a clue how it worked or why it made the noise it did.

It was at that exact moment that Antonio realized he had a choice. He could view his situation as negative and turn it on everyone around him. Or he could use it as an opportunity to overcome, to make a change, to become something. And so, he let his curiosity lead the way. Before long, he was watching A. Lange & Söhne videos on YouTube and discovering a watch collection he didn’t know his father had. He began researching schools on the internet, including Gem City, the North American Institute of Swiss Watchmaking (NAIOSW), and the Nicolas G. Hayek School of Watchmaking.

When Paris Junior College turned up in a search, he sent an inquiry. It wasn’t long before he was talking and emailing with Instructor McMahan, who Antonio fondly describes as “... like a big kid, full of energy and enthusiasm... all for watchmaking.”

Antonio gladly shares his gratitude for his newfound mentor. “I knew from the first conversation that Instructor McMahan had a lot of knowledge, a lot that he could teach me. I hold the utmost respect for him... his encouragement and his belief in me is hard to fathom. He kept telling me ‘Make it happen. Don’t worry about finances. Just get here and we’ll figure it out.’”

Lots of Miles and Little Money

It was the fall of 2020, and Antonio was determined to get to Paris Junior College, but he had several challenges in front of him. While helping one of his brothers get his life back on track, he was also taking a few classes online. On January 4, 2021, he had little money to call his own, and classes at Paris Junior College started on January 7. Within days, he rustled together enough money for gas, lodging, and food to get him the nearly 2,000 miles from Hookerton, North Carolina, to Paris, Texas. For most people, this would be a daring risk, a leap into the unknown with no promise of success. For Antonio, it was no problem to “get up and move on.” He had already lived in more than six states and been through a lot, so Paris, Texas, was simply the next part of his life’s journey.

Antonio’s move to Paris, Texas, wasn’t just about pursuing a new career as a watchmaker. It was also about breaking free of the poverty and hard times he endured growing up in New Bern, North Carolina, and Hookerton, North Carolina, and to let others understand what they too, could become, just by looking at his experience. “I want to be an example for those who suffered through even greater poverty than I have. There are so many from the same ‘nowhere’ that I came from. When you are living that kind of life, without seeing an exit, it’s really hard to know there is a way out.” He’s also ardently motivated by his family’s legacy. His grandmother, Christine Becton, was active in the civil rights movement in New Bern, and today, his family is still a very big part of the community. Antonio wants to be a part of that legacy, to carry forward all that his family has accomplished.

Grit and Determination

Eight months into the horology program at Paris Junior College, Antonio firmly believes that his progress is due in large part to the values instilled by Instructor McMahan, and also, because each Friday they study ethics, even though it isn’t a requirement of

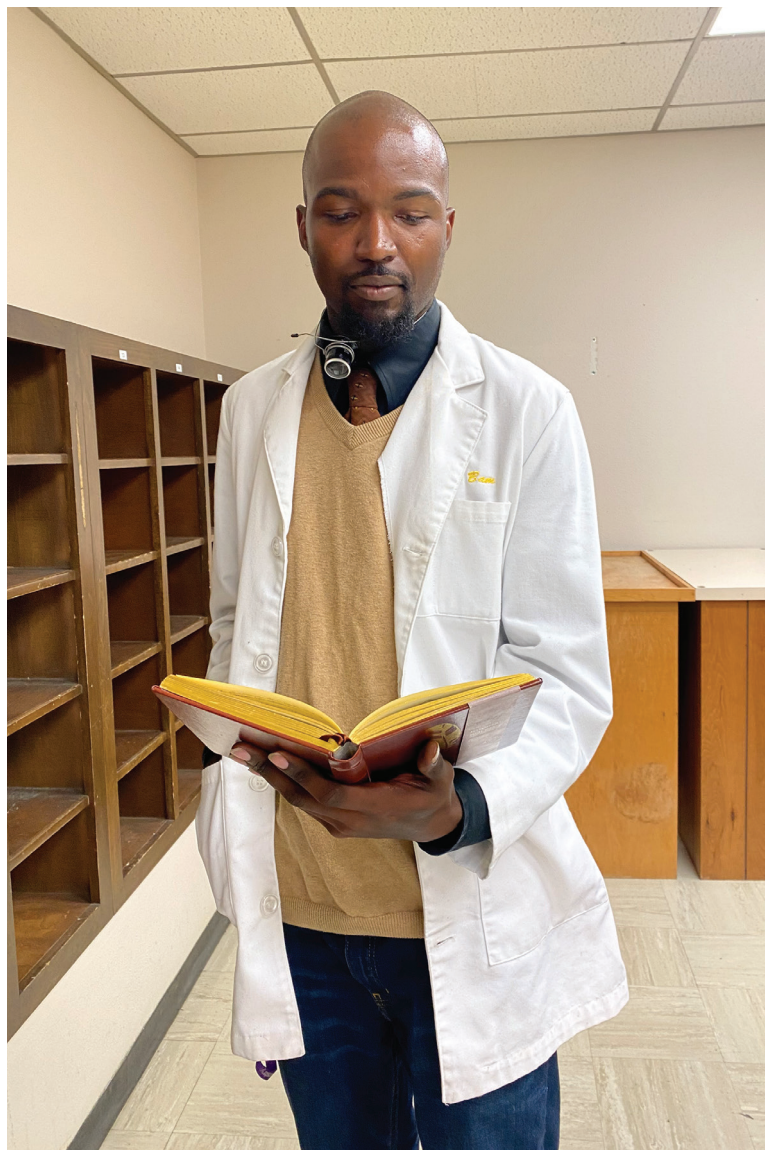
the program. This learning ethos is reinforced by the words Antonio sees on the classroom whiteboard every day: “Grit and Determination.” For Antonio, these are the core skills of both a competent watchmaker and of a complete person. “For me, it’s more than what you do, or the experiences you have. Who you are as a person and the life skills you use to become a success are important.” The word “Why?” is also written on the classroom whiteboard. Again, Antonio attributes its meaning to Instructor McMahan. “He’s teaching me that you have to have more than the answer; you have to perform. Instructor McMahan isn’t just teaching me watchmaking, he’s teaching me how to think.”

Instructor McMahan has been teaching horology courses at Paris Junior College since 2018. From the start, he had a feeling Antonio was special. “In Antonio’s case, he’s like a blank canvas or an empty vessel. He didn’t come with any preconceived notions of watchmaking or horology. It’s gratifying to teach someone who is open and eager to learn everything there is to know.” Antonio is well aware of the challenges he continues to face, including the long days of classes, the nights of studying, and the time commitment. For him, it’s all part of the transformation he’s undergoing, one step at a time.

Recognition and Respect

Antonio’s finances for his education were a worrisome burden from the beginning, but an unexpected connection to another legacy changed everything. After listening to an in-class presentation by John Teifert, president of the Horological Society of New York (HSNY), Antonio delved into learning everything he could about HSNY, AWCI, and other organizations that supported horology. He found information on HSNY’s Benjamin Banneker Scholarship for Black Watchmakers and decided to apply. He was awarded the scholarship in March 2021.

While the thought of financial support was in the back of his mind, it was also important to Antonio that he become part of the legacy of Black watchmakers and that he appreciates the incredible resources these organizations offered. “I’ve come to really respect the entities that enable aspiring watchmakers like



Ledbetter examining a horological text in the classroom.



Ledbetter at the watchmakers bench.

me to have so many resources and networks to further our learning and to become a part of the global horology family.” Antonio does not take being the recipient of the Benjamin Banneker Scholarship lightly. Rather, he sees it as his responsibility to be a part of Benjamin Banneker’s legacy and to immerse himself in the technology, materials, design, and science of horology. “When I learned about how Benjamin Banneker made a clock without knowing how to do so, I was amazed. I want to experience that thrill, that curiosity.”

Watch Him Go Places

Antonio’s plans for the future are as big as his smile and as bright as his eyes. He’s on track to graduate in the summer of 2022 with an Associates in Applied Science for Horology. His ambitions include furthering his education at a polishing school or finishing school in Switzerland, and in 10-15 years, being an inventor in the watch industry. Even though he’s just getting started, his perspectives are grounded and his definition of horology is beautifully simple. “I am beyond grateful for where I am today, and where I am headed. For me, horology is its own curiosity... it’s just you and the device in front of you. It definitely requires a blending of theory and practice, but for me, it’s fundamental... it’s also appreciating the art and science of energy and how energy is harnessed and moved, to make a watch work. I know the day



Paris Junior College horology students (from left) Rachel Peterson, Numan Mutlib and Ledbetter have some fun between classes.

will come when I have my own workbench and I’ll be as thrilled with my work as Benjamin Banneker was. That feeling of not wanting to do anything but watchmaking is already there.”

Benjamin Banneker

A self-taught mathematician, astronomer and horologist, Benjamin Banneker built one of the first wooden mechanical clocks in North America, in 1753. His clock was modeled after an imported pocket watch that he disassembled and studied. Banneker’s hour-striking clock kept precise time and ran for 50 years before it was destroyed by fire. Banneker is honored with many schools, streets, and recreational and cultural facilities named after him.



Paris Junior College is located in Paris, Texas and has continually operated since 1924. The College is especially proud that horology and jewelry were the first workforce programs begun at the College in 1942. To learn more about the watchmaking and repair program at PJC, go to www.parisjc.edu/watchmaking.

Photos courtesy of Numan Mutlib.

If you have a story to tell or you want to recommend a friend, colleague, or family member for the Traditions & Transitions series, email us at editor@awci.com.

Kathleen Cardwell is a freelance writer/editor based in Cincinnati, Ohio, US. Prior to freelancing, she spent 30 years working in higher education and corporate communications.

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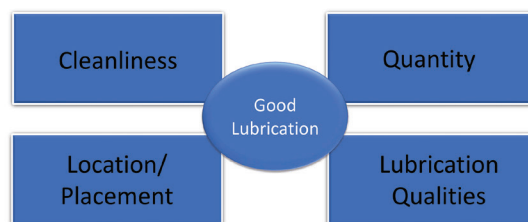
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Lubrication 1: General Principles of Lubrication

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- History of watch lubricants
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- Surface tension
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Four Important Factors



Handouts

- General Lubrication Chart
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Presented by Jordan Ficklin, CW21, this webinar presents information on the chronograph, including:

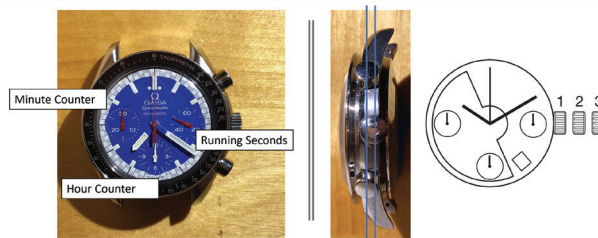
- The history of the chronograph
- Types of chronograph dials
- Types of chronograph scales
- Types of mechanisms
- Operation of the chronograph—including demonstrations with slow-motion video
- Identifying common chronographs, including ETA 7750 and variants, Omega 861 and 1143, modular chronographs, and Rolex Daytonas 4030 vs 4130

Handout

PowerPoint slides

Omega 1143

Modular Chronograph — ETA 2892 Base Movement



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Dividing and Crossing Out a Wheel by Hand

By Stephen Franke

Creating new wheels is a task which I am frequently faced with in repair and restoration work. Since I primarily practice “Sympathetic Restoration,” I’ll often trace the crossing pattern of the original wheel directly onto my replacement wheel, preserving the feel and look of the first clockmaker’s hand.

Occasionally, when I am creating wheels for an original movement or making missing pieces for a restoration, I find a need to create my own crossing pattern. This can be done quite easily by using a compass, dividers, a ruler or center finder, and basic geometric techniques for dividing a circle, all which have existed for centuries or millennia, Figure 1. This is a great skill to keep in your “mental toolbox,” and will come in very handy for not only wheel work, but numerous other practical and horological applications should the need arise.



Fig. 1. Various tools used for creating a crossing pattern.

Creating Your Crossing Pattern by Circle Dividing

In this case, let’s consider creating a typical four-spoke tall clock wheel pattern with radiused-bottom crossings. Begin by positioning your freshly-cut wheel in some form of holding jig, which contains a plug inserted into the center hole of the wheel and a small divot drilled into its center, Figures 1 and 3.

This little plug will act as a pivot point for your compass or dividers to ride in. Next, using your compass, scribe a large circle onto the wheel, just below the point where the cutter has passed. This circle creates the “upper limit” for your pattern, and eventually will become the outer rim of the crossed wheel. It’s important to not make the rim so thin that the wheel loses integrity, but also bear in mind that thinner proportions look better than thicker ones.



Fig. 2. Wheel with the upper- and lower-limit circles drawn and the starting mark in place.

After the large circle is drawn, draw a small circle near the center of the wheel. This will be your “lower limit” for your pattern, and will act as a guide for drawing in the spokes themselves, Figure 2.

Once your upper and lower limits are drawn, you can now begin by dividing the circle for the outer rim into four equal parts. I like to begin this step by popping a very light center punch mark, somewhere around the circumference of the circle, to act as a detectable starting point for my dividers, Figure 2. Open the dividers to reach approximately one-quarter of the way around the circle. Then, using the little punch mark as a starting point, walk the dividers around the

circumference four times and observe where you end up with respect to the starting point.

Should the tip of the dividers land past the starting point, close the tool up slightly, and likewise, if the tip lands short of the starting point, widen the tool’s span slightly. Repeat the process of “walking” four steps around the circle, until the tip of the dividers lands back into the exact starting mark, Figure 3. At this point, you’ve successfully divided the circumference into four equal parts, and can now strike four lines by walking the dividers around the circle once more.

I find it helpful to make three more light punch marks where the strike lines intersect the circumference. These four little dots will serve as your guide for drawing in the spokes of the wheel, Figure 4. Connect the four dots with a ruler, so that they form a cross pattern, and the framework for the spokes is complete, Figure 5.

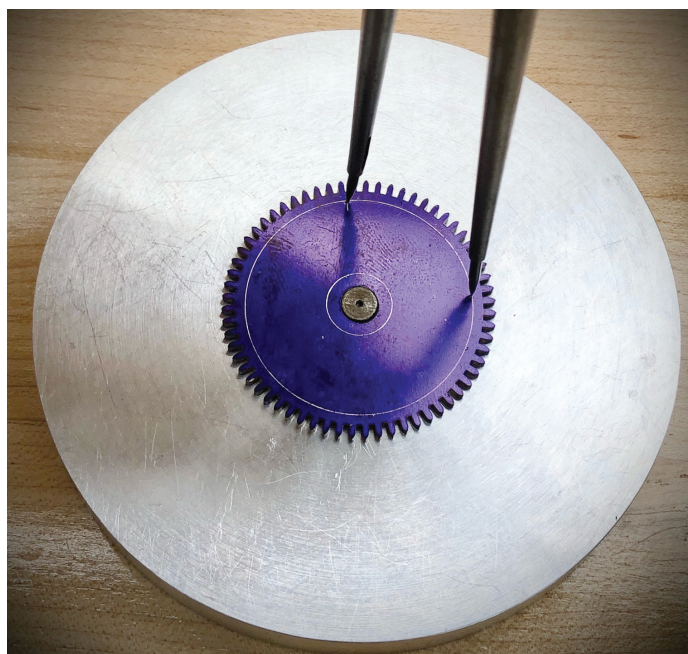


Fig. 3. “Walking” a dividers four times around the circumference.



Fig. 4. The four strike marks with slight divots made at their intersections.

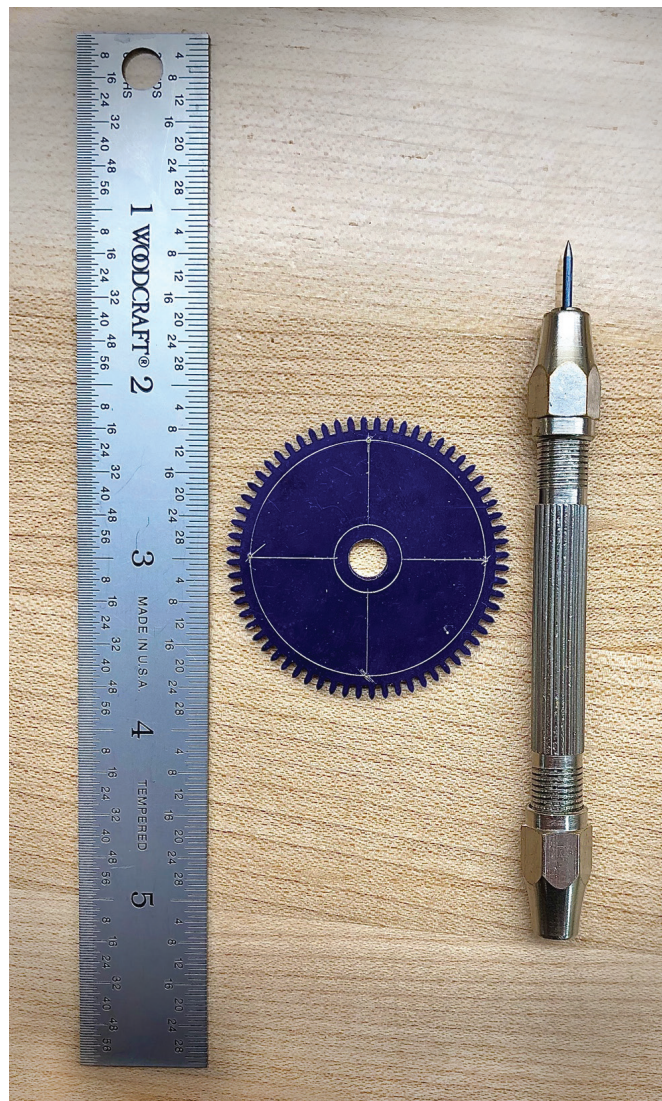


Fig. 5. Spoke framework laid out using a ruler and scribe.

At this point there are a couple of options for finishing your pattern's profile. One very practical option is to use a cutout from a previous wheel project as a template for you spokes, but let's assume you don't have one, and need to create the profile from scratch.

A common radiused-bottom crossing pattern can be made by a combination of drawing tapers to the spoke lines, and finishing off by drawing radii at their bases using virtually any round object as a template, Figure 6. To draw in the tapers, take a pair of calipers or a ruler and determine how thin you want the tip of the spokes to be. Divide that number in half, and scribe a mark on each side of the spoke center line, intersecting with the upper rim circle. Widen the calipers to the desired amount, and repeat the process at the smaller, lower-limit circle near the center of the wheel. Connect the points, and you should have a tapered spokes, Figure 6.

If you're not satisfied with the taper, adjust it slightly and try the new dimensions on the next spoke until you find a satisfying look. A helpful hint is to multiply the width you chose for your spoke's top by the Golden Mean, 1.61.

The final step to the layout process is drawing in the radiused bottoms. Being mostly a matter of preference, virtually any round object of appropriate size works for a template. I usually take a piece of rod stock and place it at the base of the spokes, in a spot where it can easily be repeated for the other three. The most practical location is where the circular template touches tangent to the edges of the adjacent spokes, Figure 6.

An alternative method for creating the radiused bottoms is to divide the outer-limit circle into eight segments, and use the midpoints in between the spokes as pivot points, allowing you draw the arcs by using a compass. This method takes longer, but it adds accuracy to your pattern. Once repeated for each quadrant, your pattern is complete. Drill a hole into each negative space and piercing can commence, Figure 7.

This technique can be used to create crossing patterns of any spoke count, and has many useful applications in dial work, moon wheels, general component fabrication, machine work and even in creating indexing plates themselves. Mechanical indexing and CNC are more preferred and precise, but this ancient method of circle dividing can come in very handy



Fig. 6. Using a template to radius the spokes after tapers were drawn.



Fig. 7. The completed crossed wheel after piercing and filing.

as a quick alternative to setting up a machine, or for the ambitious and adventurous horologist who seeks the satisfying rewards and accomplishments of using traditional, tactile techniques.

Stephen Franke is a member of AWCI and a clockmaker as well as owner and operator of Test of Time Horology in New London, Wisconsin, where he repairs and restores mechanical and period clocks.

Restoration Projects Done at WOSTEP in 1991

Part 7: Restoring a Ulysse Nardin “Small Format” Chronometer

By Bernhard Stoeber, CW21

A Brief Introduction to the Earnshaw Spring Detent Escapement:

When the balance wheel turns clockwise, the unlocking pin (E) touches the passing spring (A) without unlocking the escapement. When the balance wheel turns counterclockwise, the unlocking pin (E) lifts the detent (B) and the escape wheel rotates to provide an impulse to the jewel (D). Therefore, only every second beat an impulse is given to the balance wheel and the seconds hand jumps twice per second.

For a more detailed description and drawings of this escapement, see also *Watchmaking* by George Daniels, pages 124 and following, 1985 edition.

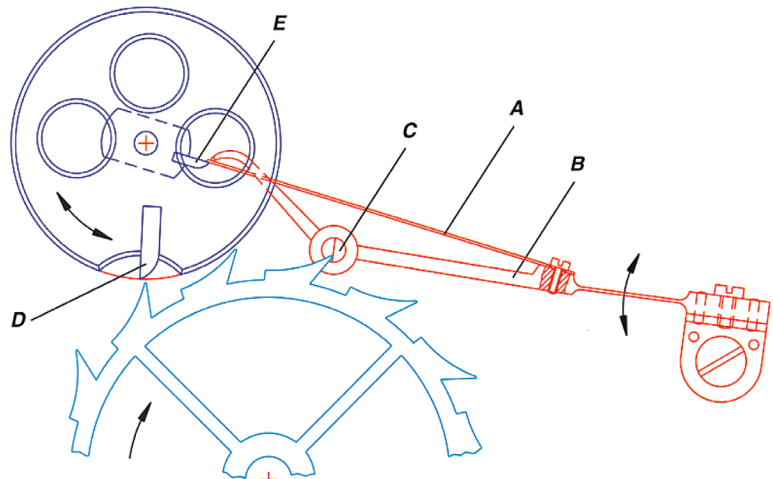


Fig. 1. Earnshaw's Spring Detent Escapement.

- | | |
|-------------------|---------------------------|
| A. Passing spring | D. Impulse jewel |
| B. Detent | E. Unlocking pin or jewel |
| C. Locking jewel | |

Making the Various Parts

1. Detent

To make the detent I studied *Watchmaking* (as mentioned above) and *The Ship's Chronometer* by Marvin Whitney, pages 185 and following, 1985 edition.

Fortunately, the old one was still available to make a drawing and take the necessary measurement.

The detent was filed out of one piece of steel using the drawing and the old one as a template.

Shortly after this photo was taken, I reduced the thickness of the spring further and then hardened and annealed it, without separating it from the original part to the right.

The thickness of the spring was then further filed, and using a grinding compound, reduced close to the final thickness.

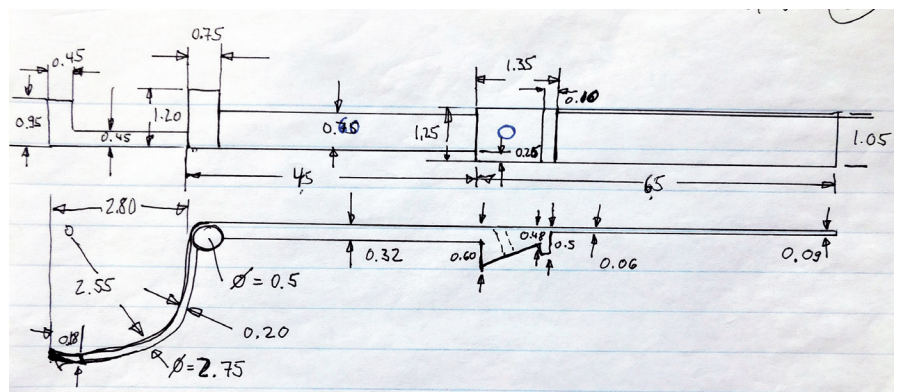


Fig. 2. Drawing of the Detent.

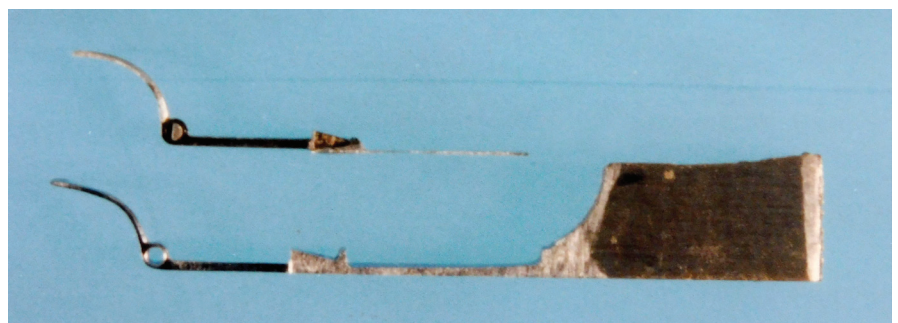


Fig. 3. Old detent (top) and the new one in progress.

The last step was to polish the spring with diamantine and a zinc slip.

To shape the pipe for the locking jewel, I had made a screw and a nut with correct outer dimensions and hardened both.

Since the locking jewel had been replaced by a piece of steel, a drawing of the new jewel was made and forwarded to a specialized company that produced the new jewel.

Here is a detailed view of the finished detent with locking jewel. As can be seen, the jewel is held in place by a D-shaped pin made of brass.

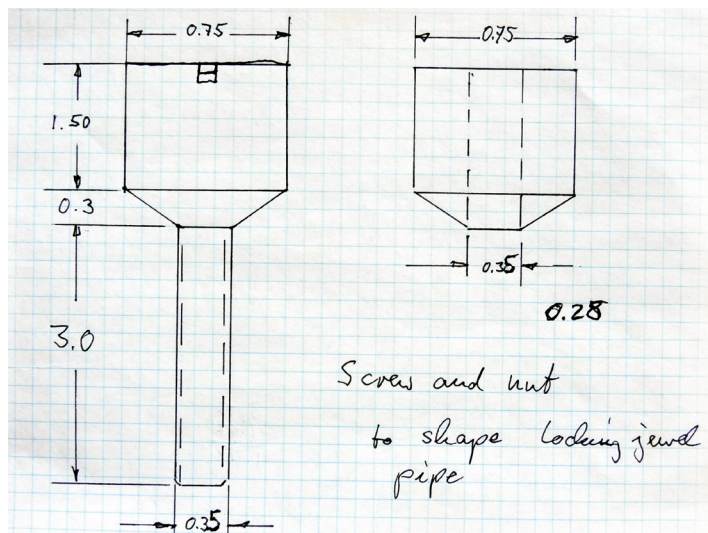


Fig. 4. Screw and nut to shape the locking jewel pipe.

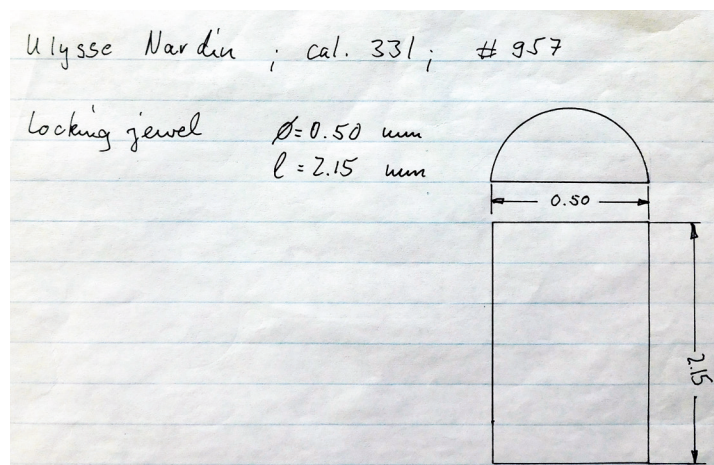


Fig. 5. Drawing of Locking Jewel.



Fig. 6. Completed detent with locking jewel and passing spring.

2. Balance staff

As mentioned in Part 6, the balance staff needed to be remade since the pivots of old ones were damaged and rusted.

Making the new staff was straight forward, by turning all the different steps and diameters "flying" from one piece of steel. All diameters were left a little oversized, as were the pivots.

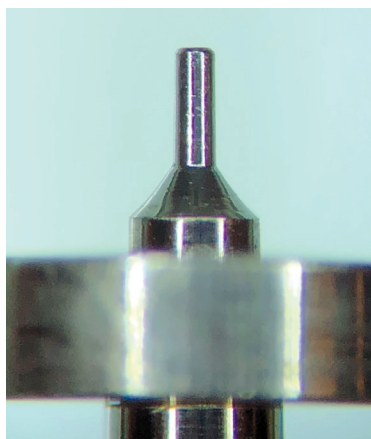


Fig. 7. Lower balance staff pivot.



Fig. 8. Lower section of the balance wheel.

The staff was then hardened and annealed, and the final dimensions turned between centers after the

supporting pivot had been separated from the stock. The pivots were then burnished using a Jacob's Lathe.

3. Banking Disk for Detent

As mentioned earlier, the banking disk for the detent had been improperly filed and needed to be replaced. After establishing the dimensions from the old one, a new one was made from brass and polished. The final filing of the flat portion was done after the detent had been installed, to ensure that the passing spring would point to the center of the lower balance wheel hole jewel.

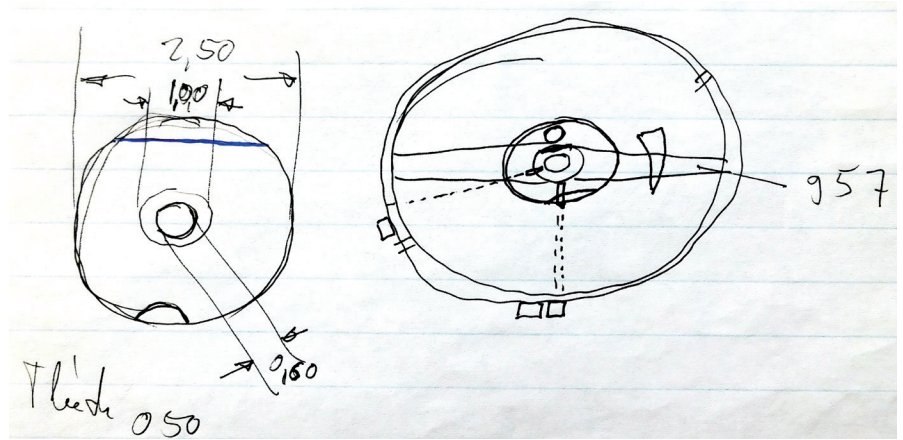


Fig. 9. Drawing of the banking disk, and the arrangement of the unlocking pin and impulse jewel.

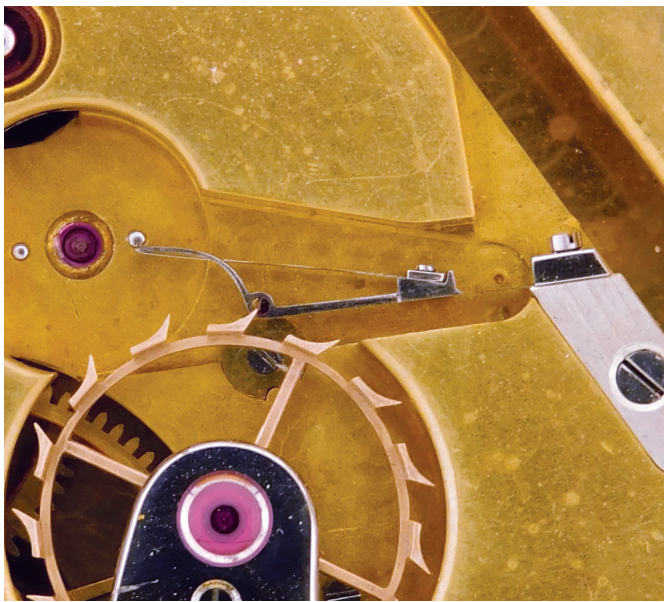


Fig. 10. New detent and banking disk installed.

Acknowledgments

My special thanks go to Tony Simonin, who shared a wealth of knowledge and guided my colleague, Peter Speake, and me during this very intense course with great success. Also, I like to express my gratitude to the late George Daniels, who visited WOSTEP during my time there, autographed several of his books for me, and answered specific questions related to the making of the detent.



Fig. 11: George Daniels (left) and Tony Simonin at an AWI Convention in Cincinnati in the late 1980s.

Photo and Drawings Credits

Fig. 1. The Theory of Horology, Page 126; Edition 1999.

Fig. 3. Author's WOSTEP Report.

Figs. 2, 4, 5, 9. Author's Notebook.

Figs. 6, 7, 8. Courtesy of Drew Zimmerman CW21.

Fig. 10. Author.

Fig. 11. Unknown.

Bernhard Stoeber is an experienced watchmaker who has worked for more than 40 years for the Swiss watch industry in Europe, the US, and China (with Omega, Movado Group, and Rolex). He retired from his corporate activities in 2018 and now lives in Mount Joy, Pennsylvania.

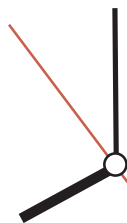
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From the Workshop

By Jack Kurdzionak, CW21, FAWCI

A Research Project

Now that the pandemic is winding down, I was able to spend a weekend with an old friend, Jerry Sussman,¹ working with several watches that did not run well. We wanted to study these watches without opening the cases to determine what we could learn about their operating condition and then form hypotheses to explain why they did not operate properly. With the aid of a Witschi Chronoscope M1, we obtained positional rates, amplitudes, and oscilloscope readings, plus we listened to the sounds of the watches' escapements. Our goal was to see how accurately a diagnosis could be made by reviewing the observed operating faults and then studying the chronoscope readings and listening to the escapement sounds. All this was done before actually opening the watch case to verify if the hypotheses were correct.

A customary procedure that is followed by many shops is to look for worn or damaged parts while completely disassembling the watch movement. After disassembly, they clean all the parts including any new replacement parts. They reassemble the movement, lubricate it, and give it a test run. In a majority of cases, this comprehensive procedure will produce a watch movement that again runs to factory specifications. If it does not, then the analysis and diagnostic procedure begins and the watch may need a complete disassembly again to locate the problem and make the necessary repair. We wanted to see if it was possible to do the diagnosis first and demonstrate that it is possible to develop one's diagnostic skills through careful thought and analysis utilizing good equipment, coupled with a thorough understanding of the mechanism.

A Hamilton Cape Horn Super Compressor

The first watch in our research project was a Hamilton Cape Horn Super Compressor wristwatch, case ref. 64040-3, caliber 64A (ETA 2452), circa late 1960s. This watch had been in storage since 1985 and had no known history of service while in storage. It was equipped with two crowns, one for winding and setting, and the second one for rotating a moveable bezel. Both crowns were the original cross-hatched style. Additionally, the watch's bracelet was the original one from Hamilton. The overall conditions of the case, crystal, dial, hands, and bracelet were quite good for a watch that was more than 50 years old.

The watch wound and set properly and the calendar advanced with no problem. It displayed no observable mechanical faults other than very erratic timekeeping during an earlier test run. The watch was fully wound by the crown and tested on the chronoscope. Dial up or dial down, the chronoscope could not obtain a reading. However, it would display a reading for the pendant-down position of -33 seconds/day with 335° of amplitude. The chronoscope's microphone confirmed that in the dial-up and dial-down positions, the roller jewel was striking the outside of the pallet fork due to excessive balance amplitude.

Two Hypotheses and a Plan of Action

After studying the chronoscope data, we formulated two hypotheses. First, something was amiss with the power supply. Someone may have installed a mainspring with excessive strength; or the slipping bridle of the mainspring was binding against the inside wall of the barrel. Either one of these scenarios would have produced a similar result—excessive amplitude.

1. MIT professor of computer science.

The second problem was a slow rate in pendant-down position. Perhaps this could be remedied by moving the regulator. We decided to study the watch's functioning in the pendant-down position by utilizing the oscilloscope function of the chronoscope. That was when we observed a low volume, extra escapement sound about 50 milliseconds after each tick and tock sound. Neither of us could hear the sound with the microphone, but with the oscilloscope, it was clearly visible as a sound with a sharp onset followed by damping. Both tick and tock sound displays were

textbook perfect but each of those sounds were followed by a somewhat weaker sound that should not have been there, Figure 1A. Because the frequency of this additional sound was synchronous with that of the balance oscillations, it was clear that the origin of this sound was associated with the balance or the pallet fork. We ruled out any interference with the balance wheel—such as rubbing on a bridge or train wheel—because the extra sound was closely synchronized with the escapement sounds. Then we thought about the possibility of the pallet fork action being sluggish and taking a little extra time to strike the banking on each side. That was all we were able to deduce without actually examining the movement itself.

The next step was to open the case, remove the automatic bridge and rotor, and remove the hands and dial, so we could take a close look at the movement. There was no obvious damage or rust in the movement. Other than a few old repair marks in the case, the watch appeared to be in very good condition. Next, I unwound the mainspring by about four turns and again tested the movement on the chronoscope. The movement was still overpowered in the dial positions as well as having excessive amplitude in the pendant positions and the extra sound was still there. It was time to test our hypotheses regarding the source

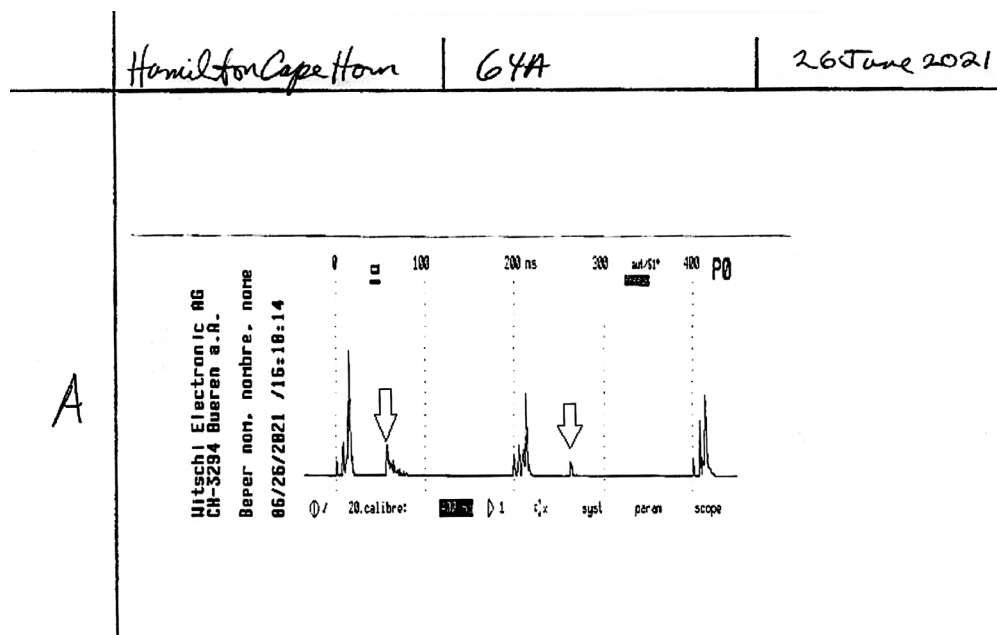


Fig. 1A. Using the oscilloscope function of a chronoscope, a low volume, extra escapement sound was found about 50 milliseconds after each tick and tick sound.

of the extra sound, the erratic timing, and the excessive amplitude.

After releasing the mainspring power, I removed the Glycudor balance and then the pallet fork. I cleaned the pallet fork with hexane and the pallet arbor jewels with pegwood. The pallet fork was then installed, followed by lubrication of the pallet stones. After installing the balance and partially winding the mainspring, we checked the chronoscope display. Nothing changed. Amplitude was still very high and the extra escapement noise was still there.

Could it be that the train wheel was causing the noise? Again, I released the mainspring power and removed the escapement. The train was sluggish with no recoil when the mainspring was wound slightly. Perhaps the fault was in the train? Thinking so, I removed the fourth and escape wheels, cleaned them, and reinstalled them with fresh oil on the pivots, followed by the installation of the escapement. A few turns of the ratchet wheel got the watch running again but there was no improvement. Finally, our attention turned to the balance itself. I cleaned the balance pivots with pegwood and washed the jewels in hexane. The jewels were quite dirty, so I cleaned the holes with sharp pegwood before oiling the jewels and reinstalling the balance and its jewels.

Conclusions and What's Next

Jerry and I were able to determine that the escapement noise and erratic timing problems were confined to the balance wheel, without opening the watch case. We did this by analyzing the rate and amplitude of the balance as well as the oscilloscope readings of the escapement sounds. The thinking and analysis were done before the case was opened. Once we opened the case and began to rule out possible causes in the escapement and the train for the extra sound, we finally closed in on the

source of the noise, which was the balance pivots. This confirmed our initial hypothesis that the extra sound was associated with the balance rather than anywhere else in the movement; but we checked all of the other possibilities just to rule them out and to confirm that the sound was definitively related to something amiss in the balance. Unfortunately, we did not positively confirm that gummy lubricant on the barrel wall was causing the excessive amplitude but it is reasonable to assume that was the source of that problem. After we cleaned and lubricated the barrel and installed the old mainspring, it delivered consistent and appropriate power to the escapement. Nothing else in the going train could have caused this problem because the train can only deliver the power supplied by the barrel and that power is reduced by the frictional losses in the train. The train's design increases the speed of the wheels while it reduces the torque available at each successive wheel in the train.

The other watches in our research project were two old Rolex watches made in the 1960s, which coincidentally were almost duplicates of each other. Neither of these watches were running well and we put them through the same type of analysis as we did with the Hamilton. I will share what we learned about those two movements in a future column.

B

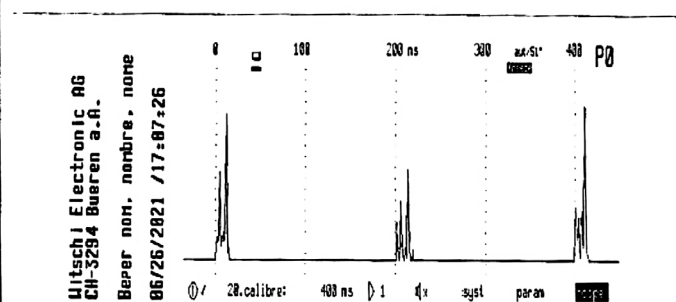


Fig. 1B. After removing, cleaning, and lubricating parts such as the escapement, the balance and the jewels, the extra escapement noise was eliminated, but the oscilloscope still showed excessive amplitude.

Finally, we met with success in eliminating the extra escapement noise. Cleaning the balance pivots and the jewels solved that problem. Although we could see no visible fault other than dirty jewels, the noise was now gone but the excessive amplitude was still there, Figure 1B.

I took the entire movement apart to find all of its component parts in very good condition before I ran it through a regular cycle in the Wellner L1 cleaner. The lubricants throughout the movement were quite gummy, including the lubricant on the barrel wall. All jewels were carefully pegged clean before reassembly. Once the movement was assembled and lubricated, it was ready for testing. The escapement noise was gone. The amplitude was now within factory tolerances in all positions and the dial-up and dial-down rates matched. The pendant-up and pendant-down rates both gained compared to the dial positions. That was solved by opening the regulator pins slightly and centering the hairspring between them. After that adjustment, this movement conformed to modern chronometer timekeeping parameters even though it is 50+ years old.

Cannon Pinion Care

With few exceptions, every mechanical and quartz analog watch is fitted with a cannon pinion, the purpose of which is to permit the time display to be changed without interfering with the time train of the watch. The cannon pinion provides a controlled friction coupling that connects the dial train with the time train. That friction connection must be tight enough to drive the time train without losing any time and still be loose enough to permit the hands to be adjusted without causing any damage to the time train or the setting train. In other words, the friction should not be too tight or too loose, but just right. Horological engineers can specify the ideal torque required to turn a cannon pinion, but in actual practice, few watchmakers have a torque gauge at hand to determine if a cannon pinion is too loose or too tight. This is not a problem, because with a little experience, as watchmakers turn the crown to move the hands, they can sense with their fingers if the cannon pinion friction is satisfactory. A clean, lubricated cannon pinion with satisfactory friction will need no adjustment. Those that are too loose or too tight will need to be adjusted.

The traditional cannon pinion (part ref. 240) that is fitted to the watch's center pinion can be quickly adjusted for more or less friction by using a few simple tools and some common-sense watchmaking practices. I utilize a collection of smoothing broaches, a few pin vices, and a Bergeon (ref.31001) pusher and stump set fitted to my Horia 4mm jewelry tool, Figures 2, 3. For a cannon pinion that is too tight, I support the cannon pinion in a pin vise and insert a smooth tapered broach into the cannon pinion while simultaneously twisting the broach to open the cannon pinion slightly. Then I install the cannon pinion and test it for friction. If it is still too tight, then I repeat the procedure until the correct friction is attained. For closed-end cannon pinions, where the broach cannot be passed through the cannon pinion, I have other smooth broaches with shortened tips that serve the same purpose.

For loose cannon pinions, I squeeze the cannon pinion with the Bergeon tool to make the opening slightly smaller, Figure 2. The Horia jewelry tool applies precise pressure on the cannon pinion while the broach inside the cannon pinion limits how much the cannon pinion is closed, Figures 2, 3. Please note: the Bergeon drawing shows a tapered cutting broach being

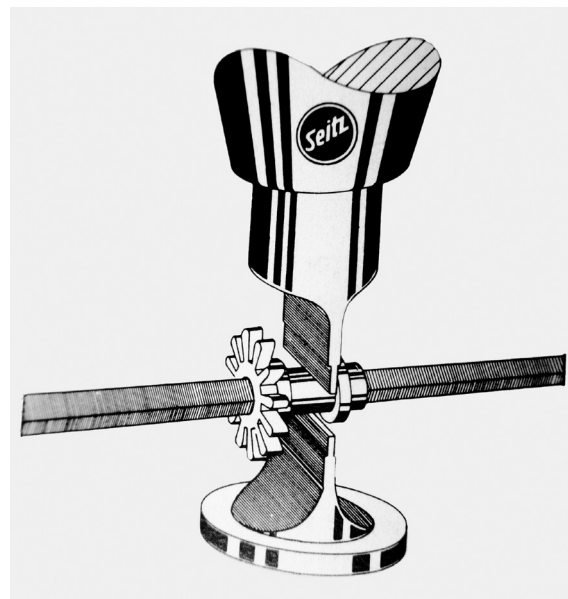


Fig. 2. An illustration of a Seitz jewelry tool.



Fig. 3. Bergeon pusher and stump set, fitted to a Horia 4mm jewelry tool.

used to support the cannon pinion. I do not use a cutting broach because it can remove metal from the inside of the cannon pinion when all that is needed is to move the metal slightly to adjust the friction. The smoothing broach provides support without removing any metal. Once metal is removed, it cannot be replaced. Metal that is moved slightly can be moved again if necessary. The cannon pinion can be tested for proper friction and the procedure can be repeated if further adjustment is needed.

Collaboration Leads to Restoration

West Dean Students Bring Black Forest Clock Back to Life

By James Sprague

For some, the arts of furniture making and horology might not seem to go together.

Two students at the West Dean College of Arts and Conservation in West Dean, United Kingdom, however, have shown that a marriage of both specialties can lead to some impressive results.

The students, clock student Mikey Martin and furniture student Sam Matthews, found themselves joining forces in April, when the school received a cuckoo clock, circa 1860, which had been made by renowned Black Forest clockmaker Johann Baptist Beha.

Beha introduced many innovations in cuckoo clock construction, including being the first to fit his cuckoo clocks with musical movements and the first to make Black Forest wall and shelf cuckoo clocks with spring-wound movements (instead of the wooden plate movements previously used). Beha was also the first to adopt the English fusee system to his clocks and the first to put a cuckoo mechanism into a *Bahnhäusle*-style clock case.

The clock Martin and Matthews found themselves teaming on was a Black Forest, spring driven, eight-day cuckoo clock which sounded the hours and half-hours on a gong and bellows. No visible maker's mark was found on the clock, but the presence of twin fusees, the *Bahnhäusle* case, and the style of the movement told them the clock was one of Beha's.

The Clock's Description

The case, constructed of Scots pine, includes decorative carvings of oak. The circular wooden dial attached to the case has carved Roman numerals of bone, along with an ivy-carved dial center and the original hands of ivy-carved bone.

The movement of the clock is comprised of a wooden frame and wooden plates, most likely beech, with two at the back and one at the front, accompanied by brass bushings set into the wood. The trains are mounted in separate back plates, which are held in place with pins at the top and slots at the bottom. There are also threaded steel bars running through the frame, and plates at the front, to provide structural support for the movement.

Atop the movement is a hand-painted wooden cuckoo bird, behind a pair of pinned doors above the dial, and flanked by leather bellows and wooden whistles adorned with marbled paper, mounted on either side of the movement. An anchor recoil escapement is mounted in a steel cock at the back, with an adjustable brass plate screwed into the front. The pendulum is a lead weight, encased in brass with a flat brass pendulum rod.

The clock's going train consists of a going barrel, a fusee with great wheel, an intermediate wheel, a third wheel with lantern pinion, and an escape wheel with lantern pinion. The pallets are formed from a steel strip, with a brass stop-iron mounted on the front plate. The motion work of the clock is a minute wheel with two pins, which trigger the hour and half-hour striking, and a pinned reverse wheel mounted against a boat spring, which drives the hour wheel. The hands are held in place with two nuts which are threaded onto the end of the minute wheel pipe.

Finally, the clock's count wheel-regulated striking train consists of a driving barrel, a fusee with great wheel, a pinwheel with 10 pins, gathering wheel with lantern pinion, a locking lever control cam warn wheel with lantern pinion, and fly with lantern pinion. The hammer strikes a gong on the back of the inside case, while one lever maneuvers the cuckoo bird through the doors while also operating one bellow. Another lever, meanwhile, pitches the bird forward, opening its beak and raising its wings, while triggering the other bellow. Both the bird stand and gong hammer have brass wires wrapped around them, acting as springs and providing an easily adjustable amount of return force. The arbors for the lifting levers, which control the cuckoo mechanism, are held in place, in cutouts, in the side of the plate with brass nails.

The Clock's Condition

The duo had their work cut out for them, as the condition of the clock when they received it was quite poor. There were several breakages on the front carving of the clock, including a missing section at the bottom right and a large crack in the top center, which had

been repaired with a nail. Four of the decorative struts on the clock had also detached, and the dial had two of the original bone numerals missing, and other numerals reattached with glue.

The clock's movement itself had distortion of the wood, leading to several fissures in the wooden frame, along with several pins missing and almost every latch broken or bent out of alignment with their eyes.

There was evidence of wear from the barrels inside the movement, while the pallet arbor bearings and pallets themselves were also worn, and the escapement had been repositioned to spread the wear to a new surface.

In the clock's going train, a modern replacement mainspring was likely overdriving the clock, and had broken at a sharp angle at around 150mm from the inside out. There was also visible wear to lantern pinions on both the intermediate and escape arbors, and wear to the escape pinion which was likely the result of improper meshing.

Significant wear was also visible to the center wheel back pivot, and the galling on the barrel arbor back pivot surface. Also existing was a casting error on the hour wheel pipe, and a slot cut into the threaded square at the end of the minute wheel pipe.

The striking train was in generally good condition, with some slight wear to the lantern pinion trundles on the gathering wheel, warn wheel and fly. The fly had also been bent back at the corners to increase drag, and the fly spring repositioned so the arbor was on the other side.

Finally, regarding the cuckoo function of the clock, much of the bird's paint was faded or chipped, and a small strip of card or wood had cracked across the birds back. The wire which would connect the beak to the mechanism was lost, with the end of the wire broken off inside the beak. The bellows, meanwhile, had split leather in the creases, one bellow sounding weakly while the other didn't sound at all, and prior repair attempts with masking tape had reopened. The decorative marbled paper, on the whistles, was also peeling.

The Clock's Restoration

Both Martin and Matthews had their roles to play in the restoration of the clock, while also keeping in mind the goal of conserving as much of the original material of the clock as possible. To do this, they used noninvasive cleaning techniques, such as using parafin and a stiff-bristled brush to clean the metal com-

ponents of the clock, while paying attention to any of the historical patina of the clock.

They proceeded to replace the going train mainspring with a 38 x 0.40 x 2000 x 50mm spring, leading to no running issues to the going train.

They also bushed the center-back bearing, along with the front and back bearings for the pallets. They took care to make the front bearing repositionable, and to have the optimum distance between the pallets and escape wheel. They cleaned the bearings with pegwood: and wire wool, as well as HOD3 and HOD4 watchmaker's oil.

The trundles on the escape pinion required replacement, so they removed the top cap by driving a shaped wedge of brass between the top cap and the hub of the pinion, levering slightly in each division until the cap popped off.

Unfortunately, during this process, several of the trundles broke off inside the hub of the pinion, requiring them to remove and rebuild the entire hub. They used blued pivot steel to replace the trundles, with the replacement parts press-fit into place. The duo used a pivot file and burnisher to remove galling from the great wheel arbor, and proceeded to add a new staple to the top block of the pendulum to make it more secure. They also repositioned several of the levers controlling the cuckoo bird.

When it came to the cuckoo bird and the bellows, it became quite intricate for the students. After trying unsuccessfully to drill a small hole in the back of the bird's beak, and insert a piece of steel wire, they proceeded to use epoxy to fix some of the blued pivot steel to the wood. It resulted in the beak now functioning properly. The damaged strip of paper across the birds back could not be reattached, but they kept the piece just in case. Luckily, this spot on the bird is hardly visible when the clock is functioning, and replacing the strip is a future option. The dirt which had built up on the bird's paint job was removed with a cotton bud, which had been soaked in a minimal amount of acetone, and in turn revealed the bird's original colors.

Finally, the students tackled the bellows, which revealed more extensive damage than previously estimated after the masking tape was removed. Both bellows would need replaced.

Bellow tops were originally weighted with loose gypsum gravel, which required consolidation before work continued on the bellows. The pair achieved this by injecting a 10% Paraloid B-72 Shelsol A100 mass



Fig. 1. Mikey Martin (left) and Sam Matthews (right) put their respective talents in clocks and furniture conservation, respectively, to bring a nineteenth century Black Forest cuckoo clock back to life.



Fig. 2. The clock's pinions and cuckoo bird, during the restoration process.

concentration solution to the gypsum, then covering the area with acid-free paper. They then reglued the original marbled paper on top. They removed the leather bellows carefully, to preserve as much of the original material as possible, and to use them as templates to mark out replacement bellows.

Hide glue was then used to adhere the replacement leather to the wooden base, and the marbled paper was glued back on with fish glue. With both those glues soluble in water, they can easily be removed, and the water-based fish glue allowed for the marbled paper to be saturated and, in turn, flexible. After that work was completed, the bellows both function well and will continue to improve as the creases in the leather settle.

Where the furniture making aspect really came into play was with the regluing of snapped carvings; replacing broken carved sections of the clock with oak and traditional stains; eliminating glue spillage from previous repairs; replacing and coloring the lost veneer

on the lower back section of the clock; reattaching loose feet; re-waxing the body and carvings; and adjusting the doors to close correctly.

"My time working on this piece was enjoyable and I gained a lot of knowledge about this style of clocks," Matthews said in his review of the restoration. "The carvings were very beautiful and my attempts to replicate them went very well, with pleasing results. The look of the clock was greatly improved with the work I completed on it, and I am proud of what I achieved." Final touches were a staple being added to provide support for the lifting wire of the bird, which had become loose; new pins made to hold the left-hand bellows and whistle in place; and as much of the original marbled paper scraps saved and positioned to cover as much of the bare wood as it could.

Sources:

1. Mikey Martin, *Conservation of Clocks Condition Report and Treatment Proposal*.
2. Sam Matthews, *Conservation of Furniture and Related Objects Condition Report and Treatment Proposal*.

James Sprague, is the office manager for AWCI and managing editor for *Horological Times*.



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Tourneau-Bucherer Opens Adjoining Rolex and Tudor Boutiques in NYC

Watch retailer Tourneau-Bucherer has opened a new Rolex boutique and the first-ever Tudor boutique in the US. In New York City's trendy Meatpacking District, the two boutiques are side by side at 29-35 9th Avenue. Each boutique has its own entrance but are connected inside in the 4,000-square-foot space. This is the seventh Rolex boutique in the US operated by Tourneau.

Tourneau's CEO, Ira Melnitsky, said that opening the adjoining boutiques is "a move that is an exciting part of Tourneau's growth and will provide an environment that suits this landmark district in both design and experience," and called the new boutiques "a testament to the longstanding partnership between Rolex, Tudor, and Tourneau."

Tudor's recently released Black Bay Fifty-Eight Bronze "Boutique Edition" will be sold exclusively in this location for now. A custom fixture in the



Tudor's Black Bay Fifty-Eight Bronze "Boutique Edition" watch, which will be sold exclusively at the New York City boutique for now.

boutique allows shoppers to take pictures of watches on their wrists.

The Switzerland-based Bucherer purchased Tourneau in 2018 to expand in the US market. Tourneau currently operates more than 30 locations in the US, while Bucherer runs 36 boutiques in Europe.

Source

<https://www.jckonline.com/editorial-article/tourneau-opens-tudor-and-rolex/>

Bulgari Uses Rare Metal in Its First Participation in Only Watch Auction

The Octo Finissimo Perpetual Calendar Tantalum, Bulgari's contribution to Only Watch, an auction that supports research into Duchenne muscular dystrophy, uses tantalum, a rare metal that is highly corrosion resistant, biocompatible (not toxic, injurious, or physiologically reactive with living tissue), twice as heavy as steel, and twice as hard as titanium. The metal is not easy to machine: a tantalum case takes four times longer to produce than a gold case. The movement is self-winding and drives the indications of the hours and minutes, retrograde date, day, month, and retrograde leap year; it has a 60-hour power reserve.

Bulgari is not the first watch manufacturer to use tantalum. Others include Audemars Piguet and F. P. Journe. However, the hardness of the metal is a deterrent to its use in watchmaking.



The back of the Bulgari Octo Finissimo Perpetual Calendar. The case and crown are made of tantalum.

Sources

<https://www.europastar.com/time-keeper/1004092959-bulgari-a-unique-octo-finissimo-in-tantalum-for.html>

<https://www.onlywatch.com/bvlgari>

Bulova and Omega in Space

August was the 50th anniversary of Apollo 15's mission, when commander David Scott, the seventh man to walk on the moon and the first to drive the Lunar Rover, wore a Bulova chronograph.

The Lunar Pilot watch had a crucial function: it tracked time so that no one ran out of oxygen, water, or battery power in the portable life-support-system backpack. It was designed to perform accurately under extreme pressures, changing atmospheric conditions, fluctuating temperatures, and gravitational shifts. It also backed up the on-board timers for the critical reentry into the Earth's atmosphere.

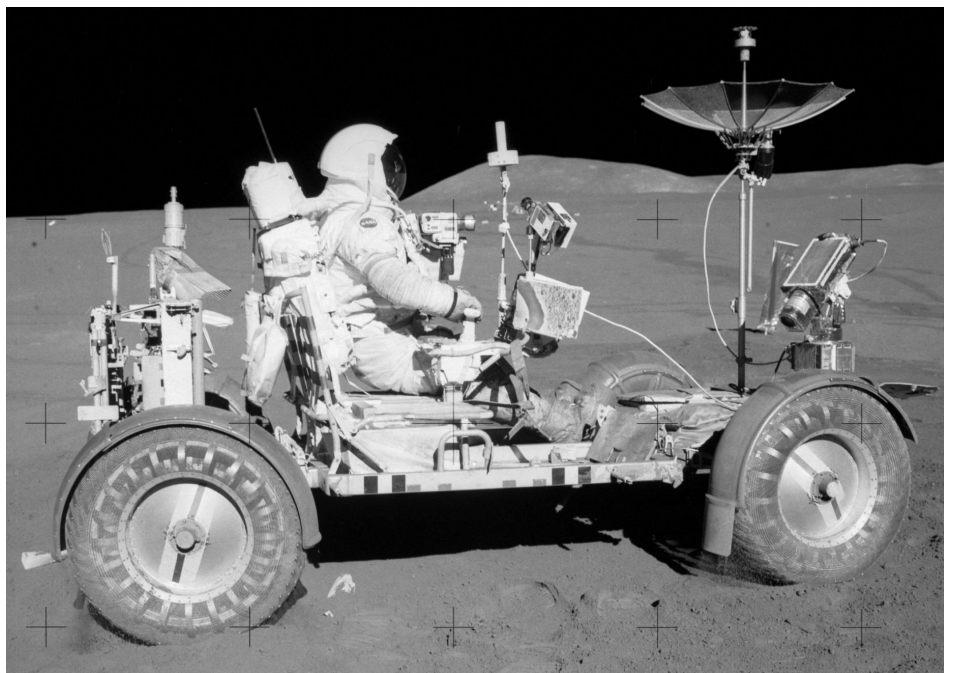
The collaboration between NASA and Bulova began in the 1950s when NASA saw the need for Bulova's proven expertise in engineering and timekeeping. The collaboration continued for the next three decades, as NASA utilized Bulova's innovative Accutron tuning fork movement.

Bulova has produced a commemorative anniversary watch, the 50th Anniversary Lunar Pilot Limited Edition.

More recently, a different kind of space exploration took place when Jeff Bezos, his brother, former NASA hopeful Wally Funk, and a paying passenger were launched into space (actually, they did not leave the Earth's atmosphere). Omega donated Speedmasters for the mission with casebacks engraved with the wearer's name, the flight number, and the feather insignia of Blue Origin, the space flight enterprise funded by Bezos.



Bulova's 50th Anniversary Lunar Pilot Limited Edition watch is a replica of the original watch worn by Commander Scott, updated with a special 45mm titanium grade-5 case and gold-tone accents and pushers.



Commander David Scott driving the Moon Rover in 1971.

Sources

<https://www.watchpro.com/bulova-sends-1971-moon-rover-timepiece-for-a-second-spin/>
https://www.hodinkee.com/articles/omega-speedmasters-head-to-space-jeff-bezos-wally-funk?utm_source=Editorial%20Newsletter%20Weekly&utm_medium=email&utm_campaign=HODINKEE%20Weekly%20%7C%2007%2F23%2F2021&_kx=BgV03zHsrKH_D7vL78fHiyeyF15Km0mh-rAep4S_oxo%3D.UHTEkW

Jaquet Droz Takes the Skeleton Movement to the Max

The new Grande Seconde Skelet-One Tourbillon by Jaquet Droz pushes the skeleton movement to the extreme, using the minimum amount of material to gain the maximum amount of rigidity and light. “The skeleton structure focuses on straight lines, angles, modernity, and perfect symmetry...”

The tourbillon cage follows the geometry of the skeleton movement, with a triple cross shape which, once a minute, aligns perfectly with its bridges,” according to *WorldTempus*.

It is housed in a red-gold 41mm case that offers a complete view of the movement. The red-gold 18 karat skeletonized oscillating weight, visible from the back yet invisible from the dial, provides the Skelet-One Tourbillon with a seven-day power reserve.



The Grande Seconde Skelet-One Tourbillon (left-front; right-back).

Sources

<http://en.worldtempus.com/article/watches/trends-and-style/jaquet-droz-grande-seconde-skelet-one-tourbillon-30342.html>

<https://www.jaquet-droz.com/en/jaquet-droz-press-room>

In Summary

The FTC Votes to Enforce Right to Repair Laws

The Federal Trade Commission (FTC) voted unanimously to enforce laws around the Right to Repair, which will allow US consumers to repair their own electronic and automotive devices.

Right to Repair has been a sticky subject. However, the FTC's commitment to enforce both federal antitrust laws and an important law concerning consumer warranties—the Magnuson Moss Warranty Act—when it comes to personal device repairs is evident in this recent 5-0 vote. In a report to Congress in May, the FTC complained of issues such as the unavailability of parts, manuals, and diagnostic software/

tools, and steering consumers to manufacturers' repair networks.

Sources

<https://www.wired.com/story/ftc-votes-to-enforce-right-to-repair/>

https://www.ftc.gov/system/files/documents/reports/nixing-fix-ftc-report-congress-repair-restrictions/nixing_the_fix_report_final_5521_630pm-508_002.pdf

Imagination Show in Neuchâtel Postponed

The organizers of watch show Imagination, which was to take place in Neuchâtel September 1-6, 2021, have announced the cancellation of this year's event due to a family bereavement.

The organizers will concentrate their efforts on 2022, stating, “Our conviction remains. Faith in the distinctive values that make this

Imagination exhibition so particular: first of all, the legitimacy of Neuchâtel, a historical homeland of Swiss watchmaking which, apart from the fantastic surroundings of its lakeside city, is at the world's heart of the watchmaking sector. Secondly, the unwavering vocation of being an event that is particularly conducive to independent brands, which are sometimes deprived of a deserved exposure. An event also open to the public, to institutions in charge of passing on watchmaking knowledge, and cultural outreach.”

Details for the 2022 edition of Imagination will be announced as soon as possible.

Source

<https://www.europastar.com/time-business/1004092964-neuchatel-s-watch-show-imagination-postponed-to.html>

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Horological Society of New York (HSNY)

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HSNY Shares Findings from British Watchmaking Survey

The Horological Society of New York (HSNY), in July, shared the findings of a watch and clockmaking industry survey conducted by its partner, the Alliance of the British Watch and Clock Makers, which provided a positive outlook regarding the industries in Britain.

The Bellwether Survey, the first-ever conducted of the British watch and clockmaking industries, found that more than 100 watch and clockmaking brands are producing more than a million watches per year, while contributing to the further development of the British supply chain.

The survey examined various sizes of British horological companies, from microbrands to multi-million pound businesses.

Alistair Audsley, co-founding director of the Alliance of the British Watch and Clock Makers, said while the results show the horological industry in Britain to be at an early stage, “we have exciting potential. Britain is most definitely back!”

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Director of Public Relations: Carolina Navarro · carolina@hs-ny.org

Capital Area Watchmaker and Clockmaker Guild (CAWCG)

Central Texas Affiliate Chapter - American Watchmakers-Clockmakers Institute (AWCI), www.cawcg.org

The program for July's meeting was presented by Terry Waldron, who detailed the origin and development of the pendulum and hairspring mechanisms. The meeting was held at the guild's usual meeting place, Pok-e-Jo's in Austin, Texas.

Dennis Warner provided the guild information about Stanley McMahan of Paris Junior College in Paris Texas, and how he is wanting to establish a guild or affiliate chapter in that area. The topic of providing some seed money, if McMahan and his group move forward with becoming an affiliate chapter or guild, was also discussed. The general feeling, though no official motion was made, was positive to helping McMahan establish a chapter.

The guild also held its annual auction at the United Methodist Church in Liberty Hill, Texas.

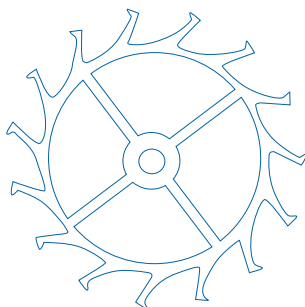
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*Archie B. Perkins
Robert D. Porter
Antoine Simonin
*William O. Smith, Jr.
*Milton C. Stevens
Dennis Warner
*Marvin E. Whitney

*Deceased

American Watchmakers- Clockmakers Institute

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This is a great opportunity to...

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- Tour our facility, including our state-of-the-art classroom
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- Let us know what you think

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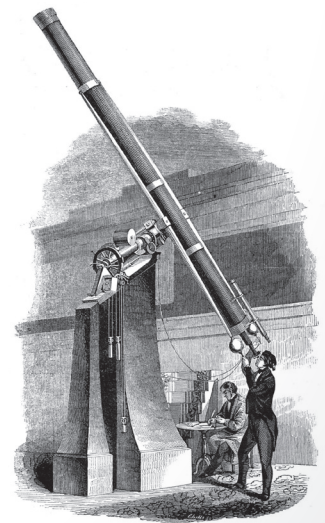
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