

# HOROLOGICAL TIMES™



AMERICAN WATCHMAKERS-  
CLOCKMAKERS INSTITUTE

January 2013

ADVANCING THE ART, SCIENCE & BUSINESS OF HOROLOGY



## 2012 – The Year in Review – 2013 Technical Articles

*Clockmaking - The Tools*

*Special Watch Service Aids*

*A Simple Tip and Tool for Adjusting Ceramic Bracelets*

*The First Hydro-Mechanical Wristwatch*

*The Watchmaker's Diary*

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MANUEL YAZIJIAN, CMW21



I trust you've had an enjoyable and festive season with your family and loved ones; now let's start an exciting new year. My preceding two messages concerned proper business planning, methods of enjoying your practice, the state of the industry in general, and to a certain degree, spare parts. It would be quite safe to say that,

without access to the required spare parts, practicing after-sales-service is a futile task. It is important to note that some of the world's most successful watch brands have pathways in place for independent watchmakers to obtain spare parts, pending on training and tooling, among other criteria. More information on this model is available.

This month's message however, is geared specifically to those who are watchmakers, certified or not, working for companies of various types and sizes.

With the increased production of Swiss mechanical watches since the early 1990s, we find ourselves with an abundance of watches that require service and this will be so for some time to come. Unlike quartz watches, which were easy to repair and quite often easier to simply replace, mechanical movements, mostly automatic winding in nature, require complete service to exacting standards.

Having said this, you may come across workshop managers who are not understanding of these specific requirements. Their message quite often is that of pushing work out as quickly as possible, even if the mechanism is not repaired to the standards you learned while in the educational stage of your career. Some of your manager's goals may be to lower your standard of workmanship to satisfy lower market prices, to increase productivity, or to simply perform substandard workmanship because that's the only standard they've known.

You are now faced with a dilemma. Do you lower your standards because this employer affords you an employment, perhaps health care insurance and paid holidays, etc.? It's a tough situation to be in, especially if you have dependents. Don't feel singled out; there are many who have traveled down this path before you. They also had to make this difficult decision whether to lower their standards to keep their employment. After all, work seems to be plenty and customers can't really tell what was done inside the watch as long as the case and bracelet are polished and refinished.

What can be the consequences of such a practice? One of the main ones is that your employer, seeing that you have agreed to lower your standards, will be tempted to

press you even more to take shortcuts until the product is truly abysmal in quality. In the eyes of your employer, and to a certain extent, the client, you will be seen as the person to blame for poor quality work and therefore, a higher comeback rate.

What happens now? You have traded your standards, your reputation and self-respect for someone who has little regard for this profession. How long will it be before you look for other employers (or customers) who truly admire and understand the art and science of watch repair? How long before you lose the precious art and skills you have painstakingly acquired?

If you are forced to practice shoddy workmanship for whatever reason, feel free to document these events and contact the Ethics Committee at the following email address: [ethicscomm@awci.com](mailto:ethicscomm@awci.com). You may also contact me directly. This practice will be documented and investigated by the Ethics Committee and your matter will be dealt with in the utmost of confidence.

I end this month's message with the cartoon below which our Vice President, Wesley Grau, shared with me. This was given to him by one of his former watchmaking instructors. I find it summarizes the state of the watch repair industry. Notice the publication date—1956. Not much has changed since then.



Feel free to contact me by e-mail to see how AWCI can be of assistance to you: [myazijian@gmail.com](mailto:myazijian@gmail.com)

*As always, keep your skills honed, your standards very high, your attitude professional, your tools and equipment in great condition and your workshops clean and organized; you never know who may come by to pay you a visit.*

BY JAMES E. LUBIC, CMW21



As we reflect back on what we've accomplished in 2012, we see a year where we're all still fighting through a tough economy. However, the key words here are "still fighting," because we're definitely charging ahead. We're determined to come through this period as a stronger organization that is better positioned to help lead the U.S. horology industry because we see signs of good things ahead. Many luxury watch brands reported sales increases of 25-30% last year—a phenomenal jump. And many of our clockmakers report long waiting lists for repairs. In addition, AWCI has seen many successes this past year that point to a bright future for both AWCI and the industry.

## What were these successes?

### Industry has Taken More Interest in AWCI

We now have over 30 Industry Advisory Board (IAB) members actively assisting us and contributing their time, ideas and funds to AWCI projects.

### Brand-Specific Continuing Education

For the first time, the AWCI Academy of Watchmaking began offering brand-specific courses. Last year, courses were offered on calibers for two luxury brands.

### Standing-Room Only at Trade Show Demonstrations

Tom Schomaker, AWCI's Watchmaking Instructor, gave a series of 1-hour demonstrations to jewelry industry attendees at the JCK show in Las Vegas. Many were standing room only, and we continue to sell DVD's from the show in our Online Store.

### New Website Launched in Early 2012

We're now getting 8,000 visitors a month (the old site was 5,000 tops). The best part is, we have over 1,550 members participating in our Membership Directory, and these listings have had over 96,000 clicks in the past year. Make sure you have a listing to get in on these free business leads.

### Attendance Up 56% at our Convention in Denver

People came from all over the country and this was the first time an entire class of watchmaking students attended. Thanks for coming, OSUIT students!

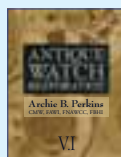
Stephen Forsey of Greubel Forsey was our Keynote Speaker, and the book signing by Archie Perkins was a huge success. In fact this new release of *Antique Watch Restoration, Vol. 1* has been one of the fastest-sellers we've ever published, so get your copy soon!

Lastly, there are two thoughts I want to leave you with for the year to come:

- Be sure to get an annual physical—remember, your business relies on you.
- And please thank the advertisers in the *HT* when you have a chance. They make it possible for us to bring this magazine to you every month.

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# Special Watch Service Aids-Part 1

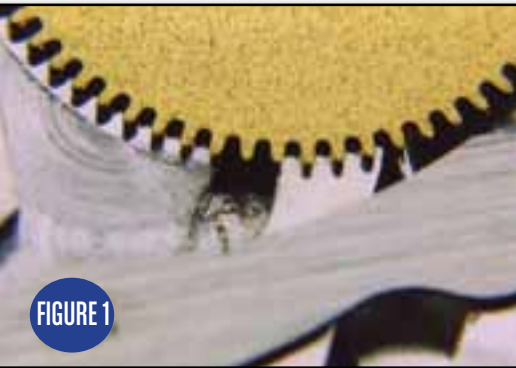


FIGURE 1

In this example of a Rolex caliber 3035, Figure 1 shows a scarred plate. This is an example of damage I have seen in this caliber movement many times in the past. A lever pivots at one end with a strong spring creating pressure at the opposing end of the lever. On the end, a small, round, pierced jewel revolves on its post as it rides up a cam. As it rolls off the precipice, the cam is driven forward instantly due to the spring pressure and the calendar date ring is jumped to the next position.

Prior to removing the lever and jewel, it seems the common practice has been to relieve the spring tension and then remove the cam wheel. A sharp screw drive or tweezers were used in the case to pry against the spring pressure to move the lever. Even done with extreme caution, scratches can occur.



FIGURE 2

In order to prevent damage and provide proper clearance for the cam removal, I turned and ground a small brass rod to the shape as shown in Figures 2 and 3. Be sure to use safety goggles during grinding operations. The diame-



FIGURE 3

ter of the rod tip should be larger than the distance between the lever and the milled recess wall. One side of the tip was filed or ground down to fit between the

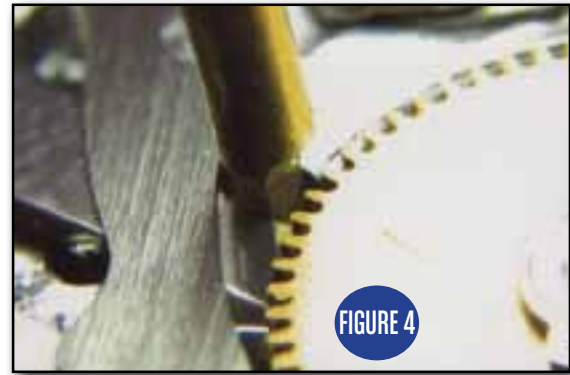


FIGURE 4

lever and recess wall creating a “D” shape. At 90° from that flat, another flat was filed which prevents the tool from turning due to spring pressure while at its apex, shown in Figure 4. With the jewel clear from the cam, both the cam wheel and the jewel can be safely removed, as demonstrated in Figure 5.



FIGURE 5

The principle can be easily understood in Figure 6. (Note: I have given dimensions for the tool used on

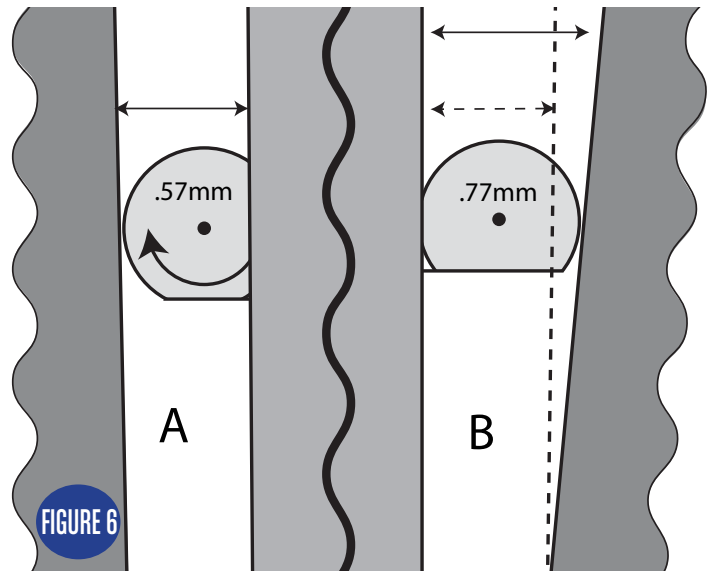


FIGURE 6

# Special Watch Service Aids part 1

BY DALE LADUE, CMW21



FIGURE 7

caliber 3035. This tool may work for other calibers, but may not be applicable in all cases. You may need to make size adjustments when using on other calibers.) View A shows the tool inserted and View B shows the tool held in position with the corresponding increased distance between the lever and the wall recess. This tool can be made using polycarbonate rod, or as in this case, Delrin®. I made the second tool from a 1/8" Delrin rod and the tip was turned down, as previously explained, to the proper diameter as shown in Figure 7. The forward tips of the two tools are shown, as well as the complete tools in Figures 8 and 9.

Another simple tool I use is a brass rod that has its end tapered to a point that has been bent over to form a tiny hook, of sorts. The tip has been ground flat like a screwdriver blade as shown in Figure 10. The tip allows easy scratch-free release of shock absorber

springs. The tip is inserted between the jewel housing and spring arm as shown in Figure 11. The spring arm can then be pushed or pulled out from under the retaining lip of the housing.



FIGURE 10

*In Part 2 of this series I shall demonstrate a self-made fixture that will aid in assembly of the Rolex caliber 3035 automatic mechanism.*

FIGURE 8: A close-up photograph of a brass rod with a bent tip being used on a watch mechanism.



FIGURE 8



FIGURE 9



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7131 Perri Lane Brooklyn, NY 11234 

BY JACK KURDZIONAK, CW21, FAWCI

## From The Workshop

Last November's article discussed fitting pallet arbors. December's article was a year's end interlude, and now we have the continuation of our discussion on pallet topics.

To begin, please let me digress a bit to a time about eight years ago when I was working with a team of highly-skilled watchmakers as we helped design the then new, CW21 exam. We were working with an ETA 2824-2 movement that displayed excessive amplitude. The amplitude was so great that it caused the roller jewel to knock against the opposite side of the pallet fork causing erratic timekeeping.

My immediate thought, based on too many years of experience, was there was an excess amount of power being delivered to the escapement. Either the watch had an excessively strong mainspring, or there was some fault with the bridle not slipping smoothly inside the barrel. One member of the team, a highly-respected and skilled watchmaker employed by a major watch factory, suggested that we examine the escapement under a microscope to check the locking of the escape wheel teeth on the pallet faces. Sure enough, his suggestion directed us to the source of the problem. The escape wheel teeth were not locking on the locking faces of the pallet stones. They were striking the impulse planes of both pallets causing the escapement to deliver too much power to the balance result-

ing in excessive amplitude. Did this watchmaker sabotage this watch movement to exemplify the fault? No, it was as received from the factory. We exchanged the pallet fork, then the escape wheel, and finally the pallet fork and escape wheel. Nothing solved the problem. The escapement would not lock properly no matter which parts we replaced. The solution to this fault involved old-fashioned watchmaking skills. The pallet stones needed adjustment so they would properly lock the escape wheel teeth.

The old watchmaking textbooks recommend using an alcohol lamp to heat a pallet fork warmer when pallet stones need adjustments. Aside from the inherent danger of utilizing an open flame in the shop, the old pallet warmers were cumbersome to use and the heat difficult to control. Each adjustment needed to be checked and often redone, sometimes many times, to get the stones just right. Additionally, it was all too easy to overheat the shellac or discolor the pallet fork. A much easier, albeit more expensive, method uses the Bergeon (Ref. 2229-03) (Figure 1) escapement tester in conjunction with the Bergeon (Ref. 30460) electric heater (Figure 2) to adjust the pallet stones, as shown in the accompanying photos. The escapement tester holds the pallet fork in a mini-clamping device while the electric heater brings the entire unit to a temperature that softens the shellac just enough to move the stones. The dial indicator on the escapement tester displays the relative displacement of the pallet stone. With this device, the watchmaker can adjust the pallet stones just the right amount on the first try.

The escapement tester is simple to use, but does involve a new skill set for the watchmaker. The mini-clamp has two forks, one on each side with two tines to clamp the pallet fork to the base. One fork is for adjusting the entry pallet while the other is for adjusting the exit pallet. Two holes in the base of the tool accommodate the pallet arbor while the clamp holds the pallet in position. The brass D-shaped upright



Figure 1: Bergeon escapement tester (Ref. 2229-03).



Figure 2: Bergeon electric heater (Ref. 30460) to adjust the pallet stones.



Figure 3: The pallet stone adjustment.

BY JACK KURDZIONAK, CW21, FAWCI

pin senses the position of the pallet stone and displays that measurement on the dial indicator gauge. The side lead screw pushes a moveable arm against the pallet frame right behind the stone. See the accompanying photo (Figure 3) which will explain this setup far better than I am able to with words. Place the escapement tester on the electric heater. Once the shellac is softened, push the stone in or out with a small tool. The needle on the dial will move clockwise (stone moved out) or counter clockwise (stone moved in). Move the stone two or three units on the dial indicator, cool the pallet, and test the pallet for proper locking so that it appears as in the photo (Figure 4). Very often, that small adjustment will solve the locking problem.

I have had a conversation with the technical director of a quality watch manufacturer in which I asked what causes this problem. He did not know for certain, but he speculated that the center distance tolerance between the pallet arbor and escape wheel arbor might be the source of the problem. In the future, I hope to experiment further by substituting a new, fully-jeweled pillar plate to see if that will remedy the escape-

ment without modifying any other escapement parts.

At one time, I believed some traditional watch repair skill sets had become obsolete. I thought escapement matching was for vintage and antique movements only. I assumed modern mechanical escapements were perfect. That thinking certainly was faulty. In the past year, I have checked hundreds of escapements on current production, Swiss made, mechanical movements to find a substantial number (about one in twenty) need a pallet stone adjustment. Watchmakers still need to understand escapements and know when they need repair. The Twenty-First Century Watchmaker will still need that skill set. ♦

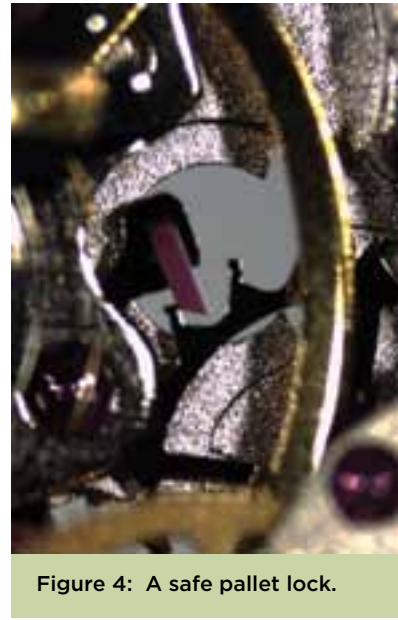


Figure 4: A safe pallet lock.

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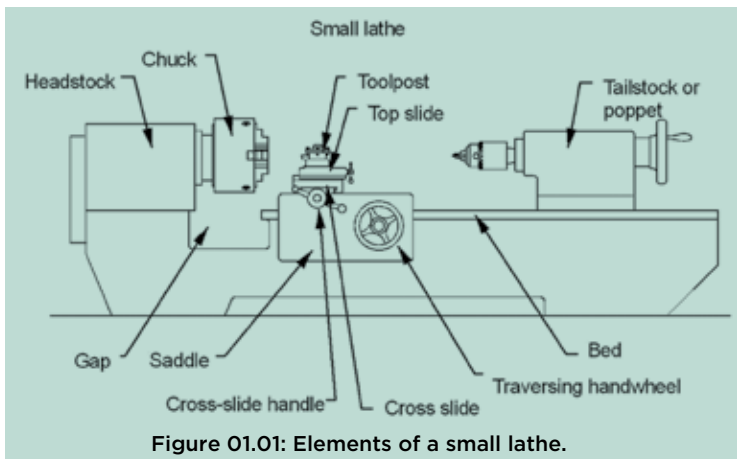
LEADING SWISS PRODUCTS

# Clockmaking— The Tools

Last month I expanded my introduction to the articles on designing clocks that appeared previously in *Horological Times* from February through October, 2010. Now I would like to parallel that with a series on the tools needed, how to make some of them, and some examples of their use. The first discussion is on a machine—the lathe.

## The Center Lathe

This lathe (often called an Engineer's lathe in the States) has a headstock (see Figure 01.01 for the names of the parts). It also has a tailstock to carry a center and an adjustable cross-slide. Larger models often have another slide mounted on the cross-slide, and logically enough, this is called the top-slide. If a watch or clockmaker's lathe has a tailstock and a compound slide added, it is a virtual center lathe and I will not bother to differentiate between such a lathe and a lathe **bought** as a center lathe. It is the function rather than the title which is important.



Most center lathes are also fitted with a saddle that is advanced with a lead screw, although several Swiss models were made with a saddle that is locked in position and moved manually without any accurate means of relocating them after moving. This is inconvenient, but it still remains a center lathe in my eyes, and since the lead screw is only needed for turning long cylinders, screw cutting and powered feed (advancing the cutting tool), it can carry out almost all operations that a clockmaker or repairer requires.

Figure.01.01 is labelled “small lathe” and the height of the center of the chuck above the bed would be about

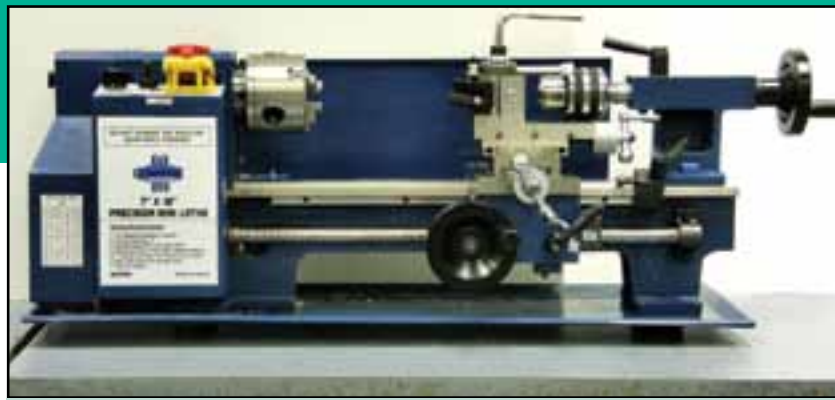


Figure 01.02: A 7 x 12 mini lathe.

90 mm to 100 mm, which means that it will “swing” a work piece of 180 mm to 200 mm over the bed; typically a Myford or a South Bend. I used a Myford for years, but it is too large for much of the work that a clockmaker does. Additionally, parts of the machine obscure small pieces of work.

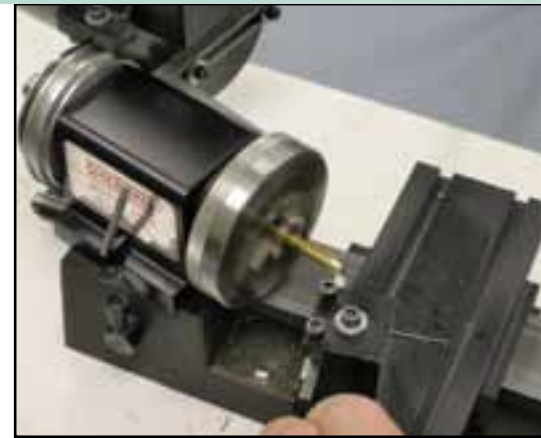


Figure 01.03. Another mini-lathe by Sherline.

Figures.01.02 and 01.03 are smaller lathes (mini-lathes) and are about half the size of the small lathe. Typical models are the Sherline, Unimat and the Chinese 7 x 12 lathes (a 7” swing and 12” length). These are perfectly capable of carrying out the operations needed to make clock parts with the exception of gear-cutting a wide range of gear sizes. The size is too small to allow the attachment of a dividing engine (a device for rotating the work through one tooth space at a time). However, the Sherline has a digital device that is compact and allows the lathe to cut gear teeth.

## What Lathe to Use

Center lathes can be classified by their ability to produce accurate work. Precision lathes are generally capable of producing cylinders 300 mm long with a taper of less than 0.00025 mm. They are rarely seen in a clockmaker's workshop. Toolmakers' lathes should produce 300 mm cylinders with less than 0.0025 mm taper.

Workshop lathes (this is the lathe generally found in an engineering workshop), are capable of 300 mm cylinders with less than 0.025 mm taper. Mini-lathes (hobby lathes) are not usually expected to do better than a 25 mm long cylinder with a 0.05 mm taper, and when you consider the length of cylindrical work normally needed in making a clock or watch part, this is quite good enough.

# Clockmaking—The Tools

BY LAURIE PENMAN

There are other criteria that are taken into account, but the production of a true cylinder is sufficient to classify the various types of lathes. When buying a lathe always try to obtain a statement of its accuracy in terms of the ability to produce a true cylinder. Many dealers in the past have interpreted the term “precision” to mean small, and consequently, what is described as a precision lathe turns out to be a hobbyist’s lathe. A useful clue is the price. Precision lathes run into five or six figures in U.S. dollars! A good hobbyist’s lathe is \$500 to \$700.

There are a number of very useful mini-lathes. The 7 x 12 and the Sherline are shown because I have used them, but there are several suppliers of the Chinese-manufactured 7 x 12, with slightly different specifications and very little real difference other than the suppliers’ names, the prices, and the attachments that can be bought. My present lathe is one of these and it has proved very useful (Figure 01.02). Despite the original advertisement which claimed it to be a precision lathe, it obviously is not. It does not even meet commercial workshop standards, but then it does not need to meet these criteria.



Figure 01.04 The 7 x 12 lathe with a modification to the tool post height.

The most critical error is that of centering. The tool tip and

the center line of the tail stock must match the center line of the headstock or bad work (and broken drills) will be the result.

## Tool Material

There are very many materials used for cutting tools in engineering. There is rarely any need to employ anything more exotic than High Speed Steel (HSS) bits for the work that we do, because the speed of the work surface past the cutting edge is less than the safe limit.

## Safe Limiting Cutting Speed

Cutting almost any material develops heat, and if too much heat is passed onto the cutting tool, the edge is weakened and will crumble. You will find cutting speeds quoted in reference books like the *Machinery Handbook*. The rate at which the tool is advanced also affects the

heat and loading. You’ll find suggested rates for various tasks are listed, as well. However, powered traversing (moving the tool along a cutting path) requires greater lengths of tool movement than are needed so that the tool does not crash into the chuck or an already finished part of the work. The tool is generally advanced by hand.

The table below is for high carbon steel (drill rod), HSS and tungsten carbide tools. It assumes you are making light cuts, i.e. the tool does not remove more than about 3 mm from the diameter of the work at each pass.

	70/30	F/cutting	Mild	Drill	Cast
	Brass	Brass	Steel	Rod	Iron
Carbon steel	100	120	60	50	50 ft/min
High Speed (HSS)	400	500	150	120	80 ft/min
Tungsten carbide	1150	1300	300	250	250 ft/min

### Let me give an example of a typical job:

- Turning a collet or hub for a wheel from a free-cutting brass bar 10 mm diameter.
- The circumference of the bar is  $10 \times \pi = 31.42$  mm
- The safe cutting speed is 500 feet per minute = 12,700 mm per minute. Divide this by the circumference to give 404 revolutions per minute.
- If the turned portion is 5 mm long and the tool advances (traverses) at the rate of 0.1 mm per revolution, it will take 50 revolutions to turn the whole length of the machined portion, and at approximately 404 revs/min it will take about  $7\frac{1}{2}$  seconds.

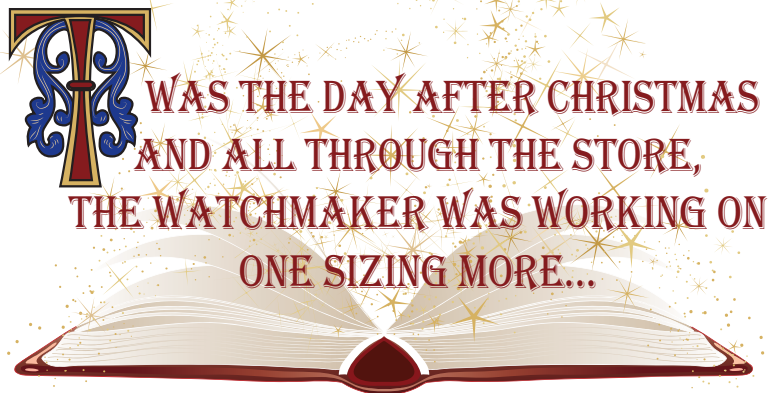
It really is not worth using tungsten carbide and running twice as fast unless you are setting up an automatic lathe to produce hundreds of collets. Manual traversing needs a “dwell” time at the beginning and end of each cut that is much greater than an automatic lathe would need.

HSS bits are rectangular in section and ground to nominal sizes, e.g.  $\frac{1}{2}$  inch, 12 mm,  $\frac{1}{4}$  inch, 6 mm, and so on. No special grinding wheels are needed since the normal use of a bench grinder is the sharpening of tool steel anyway, and the material is relatively cheap. Above all though, the fact that the bits come in closely-maintained standard sizes means that, if a straightforward tool post (not a tilting one) is used, a bit size can be chosen that, with careful grinding, will place the tip of the tool precisely on the chuck center line every time.

Figure 01.04 illustrates a modification that I carried out on my 7 x 12 so that the tool post was at the right height to present the top surface of a standard HSS bit on the center line of the chuck. The modification is simply a spacer made from a brass sheet that lifts the tool post the required amount. ♦

By Jordan Ficklin, CW21

# A Simple Tip and A Simple Tool For Adjusting Ceramic Bracelets



*Ceramic watches and watch bracelets are becoming extremely common. In the days following Christmas this year I adjusted a dozen of these. All of them, with one exception (a Dior with 0.85 mm hex nuts) were*

*assembled in the same fashion, using two-piece stainless steel friction pins with a cap (Figure 1).*

Ceramic is extremely hard and very brittle, so it is essential to use extreme care when removing the pins to avoid chipping the bracelet. To remove the pins you can follow the same procedure you would with most friction pin systems (see Figure 2). Secure the bracelet in a suitable support base with holes for the pins to fall through (Figure 3). Identify the end of the pin that is to be

removed (Figures 4 and 5). Locate a suitable tool which will fit through the hole and tap it out with a light touch. Be sure the pin removal tool only contacts the steel portion. Hammering on the ceramic portion will certainly chip the link.

Reassembly of the bracelet links is the reverse of disassembly, but completely installing the cap can be difficult. The bracelet pins are slightly recessed below the surface of the link as shown in Figure 6.

Because the pins are recessed below the surface of the link, you cannot properly secure the cap without supporting the pin. This can be difficult and require 3 or 4 hands to support everything if you don't have an appropriate equipment setup. If you have the complete Bergeon 6744 setup with the multi-use press, you can use the case cushion with a pin in the base support. If, like me, you only have the support piece, you can make a quick and easy support tool which will allow you to completely seat the cap on the pin.

The support piece (Figure 7) is quickly turned in the lathe so that the outside diameter of the base fits



Figure 3: Bergeon 6744 - Support for Bracelet Sizing Tool.



Figure 4: End with cap (remove pin by pushing on center of this side).



Figure 5: Opposite end of pin.



Figure 6: Pins are recessed below the surface of the link.



Figure 7: The support piece.



Figure 1: Bracelet pin system.



Figure 2: Pin removal.

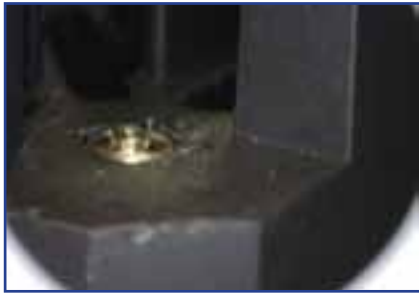


Figure 8: Support piece installed in base.



Figure 9: Bracelet sitting on support piece with pin to tighten cap onto the pin in base.

only given as a reference to show that the height of the base of the support piece should be the same as the height of the Bergeon tool, and the diameter should be the same as the hole in the support base. The protruding top portion needs to be about 0.5 mm high and a diameter of 1.6 mm has worked for all of the bracelets I have encountered so far. Your dimensions may need to be slightly smaller or larger depending on which support base you are using.

Now you're ready for the Watchmaker's Christmas in 2013... and all the ceramic bracelet joys the season might bring. ♦

securely into the support base and the step is just smaller than the diameter of the pins. (A dimensioned drawing is shown at the end of the article.) The support piece fits into the corner hole of the base and allows you to support the pin inside the link and securely tighten the cap onto the bracelet pin. (See Figures 8 and 9.)

In Figure 10 dimensions are

*A graduate of Lititz Watch Technicum, Jordan Ficklin, CW21, has been a watchmaker since 2001. He is now a member of the Board of Directors of AWCI. In addition to writing for the HT and serving as its Review Committee Chairman, he is the owner and principle contributor to watchmaking-blog.com. Jordan works for Beauchamp Jewelers in Albuquerque, New Mexico.*

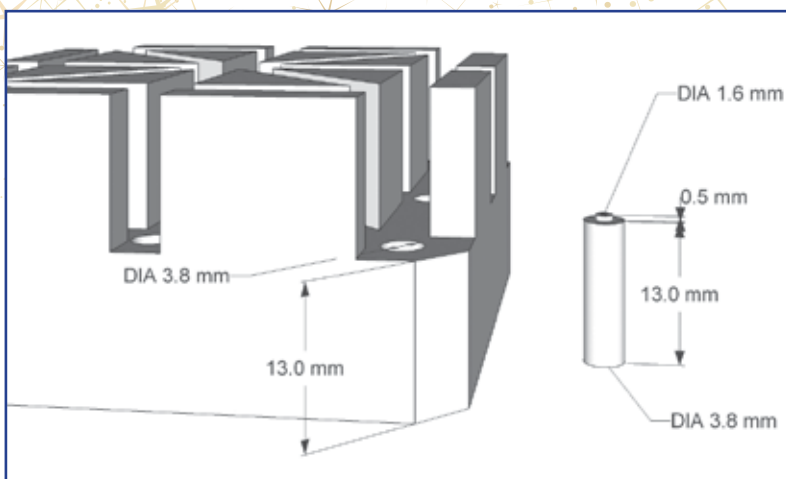


Figure 10: Simple support tool shown next to Bergeon 6744 for comparison.

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## Never a Dull Moment at the Minnesota Clockmakers Guild



Ellad Tadmor, Professor, presenting at the December, MCG Meeting on metal memory.

At their December meeting, this busy chapter invited Ellad Tadmor, Professor in the University of Minnesota Department of Aerospace Engineering and Mechanical Science to speak. He gave a fascinating presentation on what happens at the gross and molecular levels when metals break and fail. He also shared a stunning



Stunning example of memory returning to its original shape when heated in hot water.

example of memory returning to its original shape when heated in hot water.

The members also enjoyed a display of movements built in its Clock Building Class.

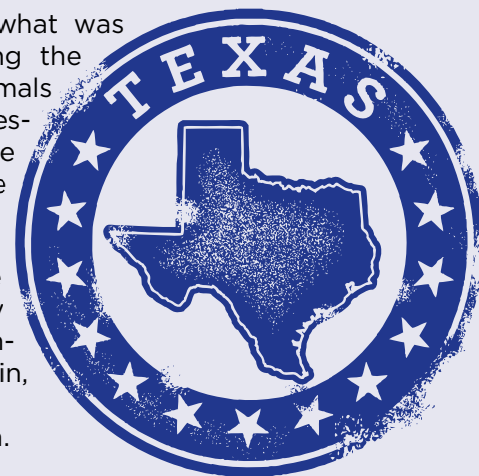
The group's January meeting included a visit to Schussler Creative. Here



A display of Clock Building Class movements, built by members, was shared with the group.

they began to see what was involved in producing the robotic animated animals that are used in restaurants, such as The Rainforest Café in the Mall of America.

If you would like to join this very active group, contact Dean Ziegenbein, 952-322-4776, dpz72@hotmail.com.



## Capital Area Watch & Clockmakers Guild

The next meeting of CAWCG will be on January 22, 2013 at Pok-E-Jo's Smokehouse, 2121 Parmer Lane (near Metric Blvd.), Austin, Texas. The meeting begins at 6:00 P.M. with everyone coming to enjoy a meal beginning at 5:00 P.M. Don't forget that dues for the new year need to be paid.

Our topic is "Valuation of Horological Properties," which will assist our members in understanding the complicated process of appraisals.

We look forward to seeing everyone for the first meeting of the new year! For more information contact: Jay Holloway at: 979-260-8734, jholloway@suddenlink.net

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## Hublot Offers New Alloys for Watchmaking and Jewelry

The Metallurgy department of the Hublot Manufacture in Nyon developed a range of new alloys which could revolutionize the characteristics of precious materials and may also pave the way for new alloys to be used in the high-tech industry. These were developed in collaboration with the EPFL, the Swiss Federal Institute of Technology Lausanne.

These alloys represent a “fusion” of 24-carat gold and the very latest in high-tech materials expertise. Almost three years of collaboration and research have gone into achieving this impressive result: a completely new type of noble gold, with patents pending and graded 18 carat by the Central Office for Precious Metals Control. Hublot’s 18-carat gold is the world’s first scratch-resistant gold, and is said to eliminate the age-old vulnerability of gold and its alloys.

Hardness is a measure of a material’s resistance to indentation; doubling a material’s hardness means doubling the force required to produce a given indentation. Whereas “standard” high-quality 18-carat gold can reach 400 on the Vickers hardness scale, Hublot gold has a hardness rating of almost 1000 Vickers (most hardened steels are up to 600 Vickers). This makes Hublot gold the hardest in the world, and by some margin: it can only really be “scratched” by diamond.

Components made from this material are produced using a complex process: boron carbide powder is formed by cold isostatic pressing in molds very close in shape to that of the finished part, e.g. watch cases, bracelets, bezels, etc. This ceramic, one of the hardest in existence, is also highly refractory: the pre-forms are then hardened at very high temperatures to create a rigid, porous structure without altering the shape. After this, molten liquid gold is injected under very high pressure. This operation is performed under inert gas pressure, at a sufficiently high temperature and pressure to ensure that the molten metal fills the



# Hublot Offers New Alloys for Watchmaking and Jewelry



pores in the ceramic, causing the two to “fuse” into a single new material.

The resulting 18-carat “Magic Gold” must, like other 18-carat alloys, be composed of 750 parts pure gold out of 1000, but the inclusion of ceramic makes this gold scratch-resistant, unlike traditional 18-carat gold. Hublot has now passed the experimental stage for its new gold and acquired the means to produce the new material entirely in its own facilities, thanks to a high-tech foundry. ♦



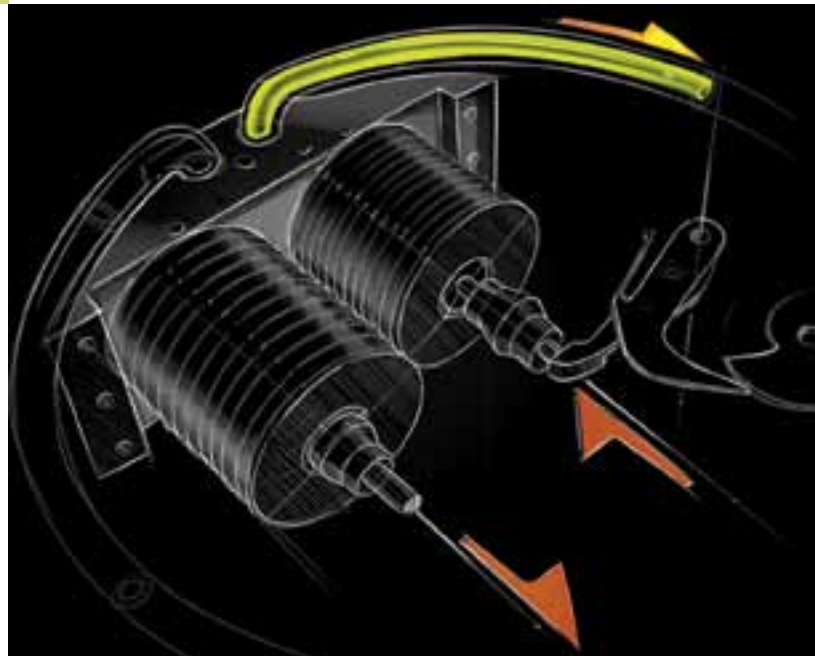
# The H1 Watch from HYT: The First Hydro-Mechanical Wristwatch

HYT has now combined mechanics and the power of water within a wristwatch. The company theme line or term for this unique form of watchmaking is: *The Hydro-Mechanical Horologists.*

## The Technology

Not since the water clocks of the pharaohs have the laws of gravity been overcome to transpose water as a form of energy for use in a portable watch. The idea for creating HYT's **H1 Wristwatch** was based on using two flexible reservoirs fixed to each end of a glass capillary around 11 cm in length. The capillary has a tiny internal diameter of just 1 mm, and through this, the time can be read.

Instead of flowing from rolling membranes, the fluids inside flow from high-strength, ultra-flexible bellows (a technology used by NASA). Each is driven by a piston to move the fluid inside the capillary. In one reservoir is a liquid filled with fluorescein, and in the other, a transparent viscous liquid. To keep these separate, the repulsive force of the molecules in the different liquids is employed, with a meniscus to mark the boundary between the two.



The two reservoirs are located at 06:00. While the first compresses, the second expands, and the other way around, resulting in the movement of the liquid in the capillary. As the hours go by, the fluorescent liquid advances. The meniscus, in the shape of a half-moon, marks the breaking point with the other fluid in the tube, indicating the time. At 18:00, the fluorescent liquid comes back to its original position, going backwards.

## The Watchmaking and Interface Challenges

Where does the watchmaking come in? A mechanical movement is used to activate the hydro system. The mechanical movement is situated in the upper part of the watch and propels a cam, which pushes the piston and activates the bellows.

Another challenge was to find an interface between the mechanical movement and the hydro system in a closed, waterproof circuit, a task further complicated by the limited space available to house them both. These had to be assembled separately to keep them independent, and then made to operate simultaneously. This turned out to be a highly delicate modular integration, which involved other constraints, such as the installation of the dial in two parts, through the sides.

# The H1 Watch from HYT: The First Hydro-Mechanical Wristwatch

## The Convergence of Different Worlds

While the basic idea was simple, realizing it was highly complex. There were two teams that worked together. On the watchmaking front were Jean-François Mojon and his supporting team at Chronode. Working on the fluid operation was Preciflex, the patent registration company created by the founders of HYT: Patrick Berdoz, Lucien Vouillamoz and Emmanuel Savioz. Supporting Preciflex was Helbling Technik, from the medical world, where fluid motion is used in certain treatments.

It was an incredible adventure that propelled two worlds, in principle at odds with each other, towards a new joint era—that in which a unique technology would rock not only watchmaking, but also medtech, because the pump system would lead the way for new applications in that field. Visit: [www.hytwatches.com](http://www.hytwatches.com) for more information.



## The Technical Data

**Movement:** Mechanical hand-wound, exclusive HYT caliber, 28,800 vph, 4 Hz, 35 jewels, bridges hand-chamfered and adorned with Côtes de Genève, rhodiumed bellows, 65-hour power reserve

**Functions:** Retrograde fluid hours, minutes, seconds

**Case:** Diameter: 48.8 mm, thickness: 17.9 mm, bead-blasted and satin brushed finish, rubber-clad screw-lock crown, screw-locked added lugs, metal dome at 06:00, cambered sapphire crystal with glare-proofed interior, screw-down sapphire back

**Dial:** Fluid hours, luminescent hands and hour-markers, regulator at 12:00, small seconds wheel at 09:30, power-reserve indicator at 02:30 ♦

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# The Watchmaker's Diary

## Bulova Caliber 12 EBACD with Micro Rotor

The question is not what is stopping this watch, but how did it ever work?

Interesting jobs always start with a customer walking through the door. This particular automatic watch was brought in having been "repaired" elsewhere and with the customer saying that while he was an active person the watch only worked when he wound it manually. He was also concerned with the awful "clunking" noise it was making. This is the type of job where we open the case with trepidation but look forward to the challenge of what we may find. Bulova Ambassador: Gents stainless steel, single piece case with two-piece stem. The silver dial is slightly blemished with full baton marking, date window at 3 o'clock, luminous minute and hour hands, and a sweeping seconds hand. It was all in all a very attractive early 1970s timepiece. After removing the crown and stem, I removed the glass then gently turned the case upside down to remove the movement. I have always liked watches that use the micro rotor and find the concept interesting. It allows for a much thinner automatic movement (overall height is just 4.60mm), including the date mechanism. I started to examine the movement. The fault was immediately obvious: the micro rotor could not turn a full 360° in either direction but was hitting the

center seconds bridge. As the rotor weight takes up 180° of 360° rotation, the remaining 35° of movement is not enough to turn the reduction gears. The "clunk" was the rotor weight hammering into the raised bridge. I thought this watch problem was interesting enough to take to our next WCA meeting and talk about in our technical discussion segment.

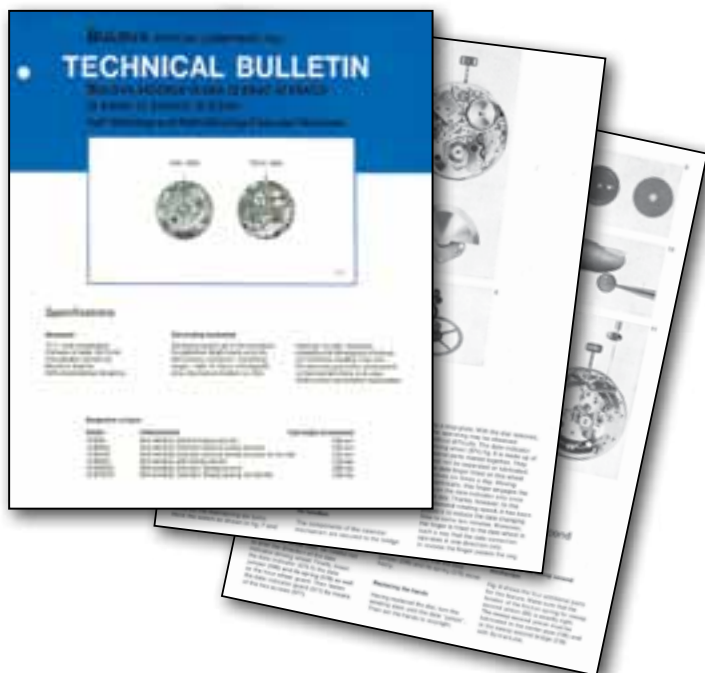


### What is the WCA?

The Watch & Clockmakers of Australia (WCA) is the trade association for horologists in that country. They have a similar mission and function to AWCI. We find some of their members also belong to AWCI and follow *Horological Times*. You can view their website at: [www.wca.org.au](http://www.wca.org.au)

### WCA Meeting June 20, 2012

The movement and the Heuer Technical Manual were passed around our assembled members. There were a number of questions regarding the history of the watch, of which I knew very little. The members participated in an interesting discussion which concluded with a consensus that the wrong rotor had been fitted at some stage. The rotor should have a cut away shoulder at the bottom to clear the center seconds bridge. Over the next few days I received phone calls, emails and technical sheets from our members with suggestions and advice, all greatly appreciated. I think the most promising is a suggestion that Bulova had two models: one had two hands, the other three, with a center second hand. This would explain the bridge and different rotors. Joe Santos from Christina's was able to help supply me with a driving wheel with cannon pinion and a new rotor assembly, and yes, the rotor does have a shoulder cut out on the underside and now swings



freely around the full 360°. The watch is generally straightforward when servicing, but be sure to remove the cannon pinion from the driving wheel to oil. If this is not done, excessive wear occurs and will result in a loose cannon pinion and consequently loss of drive. Care must then be taken in setting up the date indicator driving wheel. The date driving finger turns six times per day. The eccentric design means the finger will only be in position to drive the date wheel once per day.

## Date Indicator Driving Wheel

Some calibers have dots : stamped on the wheel and on the date wheel bridge ::: to assist in aligning the date mechanism correctly. The watch is now assembled and cased up, with the auto working once again and no horrible clunking noises. I did enjoy the challenges presented by this interesting watch. The Bulova caliber 12 EBACD and various other manufacturers including Buren used this caliber which was derived from the Heuer caliber 8510 chronograph. ♦

*A Reprint from The Watchmaker, a Publication of the Watch & Clockmakers of Australia*

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## CALL FOR CONFERENCE SPEAKERS

International Conference on Chronometry will be held in Montreux, Switzerland on **September 25 - 26, 2013**.

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- Function mechanisms and information transmission
- Additional mechanisms, traditional and contemporary complications
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- Wristwatch comfort
- Crowns, pushers and correctors
- Manufacturing and industrialization processes
- Tests, approvals and certifications

The official languages of the SSC Conference are French and English. The lectures will last 25 minutes, including 5 minutes for questions. They will also be published in the ICC 2013 Conference Proceedings.

**Abstract Submission:** Lecture proposals should include an abstract of around 150 to 200 words outlining the key aspects of the proposed presentation. The lecture's exact title, the speaker's name, and their professional contact information should be specified in the header.

**Deadline:** Submissions should be postmarked (if mailed) or e-mailed to the Société Suisse de Chronométrie (Swiss Society of Chronometry) by **February, 18, 2013**.

During the final selection process, the Scientific Committee will pay close attention to proposals that fulfill the SCC's aims to raise awareness with regard to watchmaking expertise. Applicants will be notified by April, 22, 2013 of acceptance. Instructions for writing the text to be published in the International Conference on Chronometry Proceedings will also be attached to the letter.

### Contact Information:

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# Stan's Komputer Korner

## How Safe is Your WiFi Setup?

There is a brute force program to test it (a "brute force program" is the simplest form of programming; an example would be a program that starts at 00001 and runs until it finds the right combination.) The program to test your WiFi is called Reaver and you can do a Google search to locate it. This program will let you know how safe your setup is. It can find your pass phrase in 2 to 10 hours and give you a report. From the report, you can determine what will lead to better safety. (This software can also be used maliciously by someone else to get into your system.) This is one of many similar programs available.

The first step I recommend to insure the safety of your system is to hide the SSID or name of your system. This will give outsiders one extra hurdle to overcome in an attack.

Another step is to delete phrases like, "Sent by my Verizon Smart Phone" or something similar at the end of all your messages sent from your phone. The steps to change this are:

1. Go to your phone E-MAIL.
2. Hit MENU and then ACCOUNT SETTINGS.
3. Way down in the Menu is ADD SIGNATURE.  
Either Uncheck this or you can Edit the signature to make it to your liking.

## USB Thumb Drives

I have read that pulling a USB thumb drive without doing a safe removal is no longer a problem if you

are using Windows 7 or later. You **do need** to make sure you are not writing to it as you pull it out. Reading from it is probably OK, but I would not push my luck. They can be instantly made useless and unrecoverable. I know folks that have just grabbed the drive for years and have gotten away with it, but if a problem occurs, it seems to always happen at the worst time.

## Unnecessary Programs

I had a program I did not want that was always there when I rebooted my machine. It used to be that you just went to the Start or Startup folder and deleted the offending program. The Start folder is a lot harder to find these days. It is now on the C drive under:

**C:\Users\*(Your Name)*\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup**

Once you get there you can add or delete programs that will start each time your computer is booted up. First, find the Subdirectory that holds the program you want to add. Then create a Shortcut to your program:

1. Right click on the (program) .exe.
2. One of the options is: CREATE A SHORTCUT.
3. Then copy or move the SHORTCUT (only) to the STARTUP directory.

Most programs will not work if moved somewhere else. It is quite possible you will find a bunch of programs there that you do not need. Loading them will slow down your computer and extend the boot time.

What did you get for Christmas? If it was a new computer, you need to look at the programs that are preinstalled. Most are not required and should be deleted. Several of them will only work for a short, specified time and then they want money to continue. To get rid of the programs you should go to your Control Panel and delete them.

### In Windows 7:

1. Click on the START button and the CONTROL PANEL is on the right panel.
2. Page down to PROGRAMS AND FEATURES. All your installed programs are here and you can decide what you want to keep or delete.

## iPad and Other Notebook Apps and Programs

My wife and I purchased an iPad together as a mutual present. It has a few preinstalled programs, but so far none of them seem to be junk programs. There are a lot of interesting apps for the iPad and here are highlights on some I've used or have read about.

### Various Evernote Apps

Evernote will take in most anything from a note to a picture and it can be displayed on any of your devices that has it installed. It has versions for Mac, PC, iPad, iPhones and Android devices. It synchronizes a document on all your devices. My daughter uses it on hers to take a picture of her shopping lists or "to do" lists.

Then the program Skitch comes into play. It allows you to use any input device to make changes, such as draw lines through any item that is purchased or finished. It draws arrows or objects easily on photos. They are both available at [Evernote.com](http://Evernote.com), as well as several others that are integrated together. Another good app to consider is Evernote Food.

Evernote is the program I am writing this on, so I have access to it everywhere until I finish. If you find an app that you really like, please let me know so I can make a list of them in a future column.

### Safety of Android vs. Apple Devices

How safe are the apps for your Android or Apple devices? Apple apps for the iPod, iPad and iPhone are released through Apple's app store. Apple does a pretty good review of them for safety before they are released. Apple devices that have unauthorized modifications can use other programs or apps.

Android devices, on the other hand, are open source. Anyone can write one and sell it or give it away. The best way to protect yourself in the Android world is to look carefully at the reviews and ratings before you install it in your device. You need to check more than one source. The web page you are getting it from is possibly not a good source of information.

### What Windows Version Do You Prefer?

If you have Windows 8 Pro on your new machine and you do not like it, you can step back

to Windows 7. The non-pro version will not do it. You would need to do a clean install with a Windows 7 disk. (Or use a Tech Net download if you signed up for it.) If you did purchase a Tech Net subscription for a year, you should review what is available now. MS Office Web Apps 2013 are now available. If you are using MS Skydrive, these apps are there to edit your files on that system. Microsoft Office Professional 2013 Pro is now available, as well.

### Limiting Your Internet Footprint

Do you use "In Private Browsing" to try to limit your Internet Footprint? It turns out that this does not do a very good job. A detailed look at your history file will show the web pages you visited are still there with a few letters dropped off. A normal look at history will not show it. This does not do much to hide your identity when you are on a website, either.

### Questions?

To submit your question to the author of this column, contact Stan Palen, 8283 Oak Wood Dr., King George, Virginia, 22485 or via e-mail to [spalen@crosslink.net](mailto:spalen@crosslink.net) or call 540-775-7027. Stan also has a web page at [www.stanpalen.com](http://www.stanpalen.com).



Stan is a watchmaker and retired from the Navy as a Supervisory General Engineer. He is also the associate editor of the *Apple II* section of the *Washington Apple Pie*, a computer user's group based in Washington, DC. ♦



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\*Actual rating found on Energizer.com

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

### 2013

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**April 8 - 12** - Advanced 21 Series – Caliber 3035

**May 13 - 17** - Advanced 21 Series – TBA

**June 17 - 21** - Advanced 21 Series – TBA

**July 22 - 26** - Advanced 21 Series – TBA

**August 19 - 23** - Advanced 21 Series – TBA

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- April 1 - 5** Modern Mechanical Chronograph (5 CEUs)
- May 6 - 10** Industry Class - (5 CEUs)
- June 10 - 14** Polishing & Refinishing (5 CEUs)

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### CW21 Exam Schedule - 2013

**Feb 4 - 7** AWCI Training Facility, Harrison, OH

**We are currently re-evaluating our examination schedule for the remainder of the year.**

**Please visit the [www.awci.com](http://www.awci.com) website for information on classes and exams.**

#### **SIGN UP EARLY!**

We reserve the right to cancel a class if there are less than six participants signed up 30 days prior to the first day of class, so we encourage you to wait before making travel or hotel arrangements until this deadline has passed. If in doubt, please contact Daniela Ott at 866-367-2924, ext. 303.

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

## The HT in 2012: Before the Year Gets Too Old, May We Be So Bold...



### July

Preparations for the Denver convention with lots of info before you go,

Plus a "What's New" section from different suppliers so you can always be a pro.



### January

Mr. DeCorte "Consecrated the Chronograph" as sheer perfection in Time,

While we explored how auction houses had evolved to auctions--Online.



### August

From watch lubricants to finding mysterious pivot holes (just for fun),

We avidly read more of those popular Q & A's from David Christianson.



### February

The new Roxer Natator showed how water-resistant watches will fare,

And our clockmakers got an in-depth look at Blackstone Manor Clock Repair.



### September

A new writer described restoring a Vacheron & Constantin heirloom pocket watch,

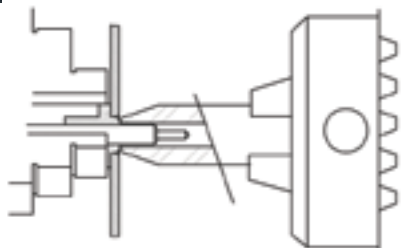
In "From the Workshop" a problem center tube made a movement less than top notch.



### March

We considered the fine candidates for our Board and all the votes to be made,

Then delved into Laurie Penman's text, "Riveting and Staking on the Lathe."



### April

Next we learned about repeaters, date wheel replacements and other repair feats,

Until we thought our knowledge of all things horological was truly complete.

### May-June

Then came the double issue that made you turn it the other way 'round,

Yet it was packed with fascinating reading that you couldn't put it down!



### October

Damage from Hurricane Katrina posed a watch restoration challenge for Mr. Fred White,

And you could schedule a Swatch Advanced21 Class that would certainly be topflight.



# The HT in 2012: Before the Year Gets Too Old, May We Be So Bold...

## November

Mr. Tope gave us insights into vintage chronograph plate repairs and what to do,

And we learned a “four-handed” pallet arbor replacement could really be done with two.



OK, this wasn't the traditional year-end wrap up that usually has you snoring,

C'mon, just admit— at least it wasn't boring!



## December

There were various articles on cleaning topics with lots to discuss and things to consider,

Then Rolex's invention of the divers' watch... so much to learn, so much to remember.

*This review was contributed anonymously (for obvious reasons).*

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# 2012 Horological Times Technical Index

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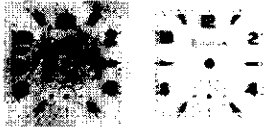
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