

# HOROLOGICAL TIMES™

ADVANCING THE ART, SCIENCE & BUSINESS OF HOROLOGY

April 2013



AMERICAN WATCHMAKERS-  
CLOCKMAKERS INSTITUTE

## **This Month's Focus: Solving the Timing Puzzle**

*The Effects of Endshake Adjustments on Timekeeping*

*Servicing Modern Automatic Watches*

*Introducing Tom's Tips*

*Clockmaking Tools, Part 4*

*Appraisal: How Much is this Worth?*



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#### EDITORIAL & EXECUTIVE OFFICES

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

#### Amy S. Dunn

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

#### Keith M. Rosser

Interim Executive Director  
Ext. 310 krosser@awci.com

#### Thomas D. Schomaker, CMW21

Watchmaking Instructor/  
Certification Coordinator  
Ext. 309 tschomaker@awci.com

#### Daniela Ott

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

#### Sandy Eichert

Art Director  
Ext. 302 seichert@awci.com

#### HOROLOGICAL TIMES ADVISORY COMMITTEE

Jordan Ficklin, CW21 : Chairman  
Ron Iverson, CMC  
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# a message from the president

MANUEL YAZIJIAN, CMW21



As you are reading this message, spring has already arrived and I hope you are enjoying the milder weather. This is a great chance to further engage in outdoor activities.

One of the main characteristics of a person involved in the field of horology is the posture many of us have to maintain, and that is of being seated and hunched over a desk/workbench. While there are several schools of thought of which may be the best position, which workbench height is the best or which chair is the most ideal, one thing is for sure, the human body is being asked to be in a certain position for a prolonged number of hours, e.g. eight hours a day. It appears, however, that the human body was designed to be physically active, judging from the number of joints we have.

While many of us pride ourselves on attaining that best balance wheel amplitude, best delta rate, best finish on a wheel pivot or a case and bracelet, yet how many of us think about the physical condition in which we are in? Since it is a generally accepted principle that, in order to produce good quality work, certain workshop conditions must be met, such as properly functioning tools and equipment, good lighting, clean environment, etc. How about the most important element in the equation? You!

Just like you properly maintain the rest of the tools and equipment for best performance, the human body requires regular maintenance and adjustment for continued best performance, so a well-balanced lifestyle is crucial.

There are many types of physical activities that you can embrace if you are just starting out. Start slow and steadily increase over time (it can be months) without overly exerting yourself. Stronger muscles are needed for proper function just as you need your sharp eyes and steady hands. Depending on your age and current physical fitness, you may want to begin with simple walking, hiking or swimming, among others. There are also the "eastern arts" such as yoga, Tai Chi and similar forms of gentle exercises which focus on overall health of body and mind. These types of activities will not only help with your physical fitness, but also with your mental alertness and focus. You can even incorporate some of these gentle exercises every day when you take a 15-minute break during work; you don't have to wait to go home or to the gym for a full-blown intense workout. Once you feel comfortable with one form of exercise then keep moving one level up.

In addition to being physically active, keep in mind that if you maintain a proper and healthy diet, it will help keep you fit for the life career you have chosen. Be sure to stay hydrated while at work by drinking enough water. The right quality and combination of fuel will only help enhance your performance in the journey of life.

In the end, exercise and physical activity are a great way to feel better, gain health and have fun. Just like you take good care of the customer's watches and clocks, so must you take the necessary time to take good care of yourselves.

*And 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.*

Manuel Yazijian  
[myazijian@gmail.com](mailto:myazijian@gmail.com)

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BY JORDAN FICKLIN, CW21

## A Systematic Investigation of the Effects of Endshake Adjustments on Timekeeping

The adjustment of endshakes in a wristwatch is extremely important, but perhaps not in the same ways in which you might imagine. Endshake is the amount of free movement that an arbor can travel along its axis between the bearing surfaces. Generally, as watchmakers we test endshake by taking the wheel with our tweezers and trying to move it up and down. We use a combination of feel and sight, combined with our experience, to assess the amount of movement. Obviously, every wheel in the watch needs to have freedom of movement. The complete absence of endshake will cause a resistance in the gear train and a reduction in amplitude or even cause the watch to come to a stop. Too much endshake may allow the pivot to come out of the jewel or allow the rim of the wheel to rub against an adjacent wheel or bridge. It is also possible for the wheels to no longer mesh with their pinion in one position or another. This article will attempt to show that, beyond the obvious problems (mentioned above) that come from the lack of freedom and/or correct divisions in the gear train and escapement, endshake has a negligible effect on timekeeping.

My hypothesis was: as endshakes increased the variation in rates between positions ( $\Delta$ ) would increase and amplitude would decrease due to a decrease in efficiency of power transfer.

To carry out this experiment I cleaned and adjusted a modern mechanical wristwatch movement and adjusted the endshakes from the barrel arbor through the escape wheel to the minimum amounts recommended by the manufacturer. Systematically I adjusted the jewels in the barrel bridge and train wheel bridge one at a time using a Horia tool. Only the jewels in the bridges were moved to avoid disturbing any more of the watch than necessary. The balance was left in place to remove all possibility of disturbing the hairspring. After each jewel was adjusted the actual endshake was confirmed with the vertical micrometer, recorded, and the rates were tested and recorded. Endshakes were adjusted from the minimum allowed

by the manufacturer to the maximum allowed by the manufacturer then adjusted to be much greater than the maximum amount allowed by the manufacturer. They were adjusted as far as was able without allowing any wheels to rub on each other or the plates or bridges. They were then all reduced to values approximately half of the minimum recommended by the manufacturer.

The endshake of the balance was not adjusted in this experiment. It is well known that too much endshake in the balance allows for deformation of the hairspring as the balance changes from one position to the next which will change timing results.

### To Effect the Changes in Endshake:

- The mainspring power was let down.
- The barrel bridge was removed, the oil circle on the jewel was examined to make sure it was not disturbed or contaminated.
- The barrel was removed and set aside.
- The train bridge was removed, the oil circles were examined for cleanliness.
- The endshake was adjusted using the horia tool. The size of pusher was carefully chosen so as to effectuate the minimum disturbance of the oil in the jewel.
- The oil circles were again observed for cleanliness before replacing the bridge.
- The bridge was secured with screws.
- With the barrel out of the watch, divisions were checked and endshakes checked to make sure there was no contact.
- The endshake was tested using traditional methods and confirmed with the vertical micrometer and recorded.
- The barrel and bridge were examined for cleanliness and re-installed on the movement.
- The watch was fully wound and allowed to run for a short time before the rates and amplitude were recorded in 6 positions.

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BY JOHN W. SAFRANEK

## Servicing Modern Automatic Watches

### Editor's Introduction

*This is a reprint of a 2007 article produced for the Chronometer Club Newsletter by Mr. Safranek. At that time, our current President, Manuel Yazijian, was the Watchmaking Instructor and Certification Coordinator for AWCI. He also served as President of the Chronometer Club.*

When a watchmaker is asked, "Do you always replace the battery when servicing a quartz watch?" most of us will respond, "Absolutely."

However, when asked, "Do you always replace the mainspring when performing complete service on an automatic watch?" The answer may intrigue you, just as it did the watchmakers in attendance [at the] seminar.

In an instructional style unique to Manuel Yazijian, AWCI's watchmaking instructor and certification coordinator, the answer to this baiting question is, "It depends."

The primary focus of this one-day seminar, a training normally conducted over five days, was on the power source for the automatic watch, its barrel and related componentry, and the "unspeakable things" that a watchmaker may inadvertently do to one of the most fundamental and easily underestimated components of a watch's ability to perform precision timekeeping – the proper "setup" of the automatic barrel. The importance of this knowledge is even more relevant with the existence of modern timing machines which enables one to verify not only the rate of the watch, but its overall "health," i.e., amplitude or motion.

This article will focus only on the highlights of the seminar. Inquiring readers seeking a more in-depth explanation of modern automatic service are encouraged to take the full five-day course offered regularly



from experience that for every service problem there are usually multiple ways to render a solution, and efficiency and effectiveness are one's chief consultants.

It is towards these ends that Mr. Yazijian has developed a flexible approach, predicated on reality-based experience, in choosing the depth and degree of service required by the power storage device within an automatic watch. This three-tiered solution process is aptly labeled:

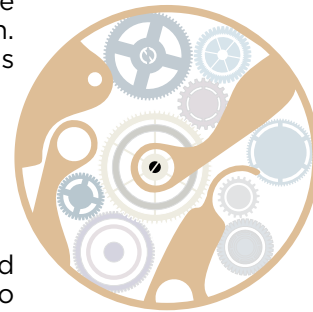
- A. The "Ideal"**
- B. The "Safe"**
- C. The "Risky"**

These courses of action are guided by several key factors, taken into consideration by the watchmaker at and prior to the point of service, and not necessarily in any order of importance:

- The factory guidelines for service (some specify new barrel complete)
- The age of the watch (modern vs. vintage)
- Wear and tear (mainplate and barrel bridge bushings/jewels, arbor, barrel bushings, mainspring bridle, barrel wall, barrel floor, barrel cap, etc.)
- The availability of parts (genuine, correct type, date of production, etc.)
- The ability to acquire and utilize the proper tool(s)

Other factors as guided by the watchmaker's judgment and experience. As we examine these approaches to servicing the barrel in the modern automatic watch, the guiding outcome principles must be kept in mind – that the automatic barrel and its components be "set up" properly with respect to:

1. Inspection for wear and repair/replacement as required.
2. Correct end and sideshakes, with adjustment as required.



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BY JACK KURDZIONAK, CW21, FAWCI

## Bookkeeping and Watch Repair

A few years ago, I had the good fortune to participate in an advanced watchmaking seminar at the *British Horological Institute* in the U.K. A large chain retailer of watches in England employed the other students in the class. Not only did I learn about escapements, but I also became more familiar with the operation of those retail jewelry stores. The jewelry stores in the chain were mostly High Street operations. Many cities and towns in England still have busy downtown retail districts with the better stores situated on High Street (something akin to what Main Street once was in the U.S.). In these stores, the sales department sells watches and jewelry on the street level floor while the repair department is on the second floor with the watchmakers out of sight of the customers. The various departments of the store operate semi-autonomously, each with its own budget and revenue targets. The sales department receives credit for all sales and the repair department receives credit for all repair revenue. Each department also has its own expense budget. Any cost relating to sales is taken from the sales department budget and any costs relating to repairs are taken from that department's budget.

If a new watch requires an adjustment to complete a sale, the repair department bills the sales department for the labor. The same is true when someone in the sales department decides to please a "good" customer with a complimentary service such as a bracelet sizing, case polishing, or battery replacement. If all proceeds according to the rules, the watchmaker makes the repair, bills the charge to the sales department and the customer gets a free service. The sales department pays for the repair. Nevertheless, as Hamlet observed, "Aye, there's the rub." In many cases, the sales person asks the watchmaker to make the repair at no charge because it will reduce the sales department income. Nevertheless, the watchmaker does not want to give away a repair, as it will reduce the department's income and bonus pool. The essence of the story is; there is no free lunch. Someone has to pay. In the British jewelry store, it will be the service department, the sales department or the customer.

One on-line chat room recently featured a conversation between watchmakers about giving away certain services. One question was, "If a customer came in for a battery and then asked for a link removal, should

the link removal be at no charge because this same watchmaker had worked on the bracelet in 2011?" To paraphrase Hamlet, "To charge or not to charge, that is the question" becomes "Who is paying for this service?" The major difference in this conversation as contrasted with the British example is, there is no sales department to charge for the repair. The only participants in this transaction are the watchmaker and the customer. The watchmaker increases his income by the amount of the labor charge if the customer pays. The watchmaker decreases his income by the amount of the labor charge if the watchmaker makes a gratis repair. The bookkeeping, although in this case, informal, is the same as in England. Someone needs to pay. All that matters is who. If the customer pays, the watchmaker earns. If the customer does not pay, the watchmaker loses. If the customer refuses to pay and the watchmaker refuses to work at no charge, both the watchmaker and the customer break even. Any good management book will tell you that if you aim to break even, *you lose*.

Compare, for example, what others industries do. Modern automotive dealers function the same way as the jewelry stores in England. Somebody must pay for the repair. In the case of auto stores there are, in fact, three departments: Sales, Service, and Parts. All three have sales goals, budgets, etc. There is also the manufacturer who can be billed and pay for warranty

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Many industries know this lesson and prosper by adhering to it, but it would appear from observing some in our industry that this lesson has not been learned by all. Would this be a good time to review your repair strategy from top to bottom? Are you capturing all costs, from hard costs like parts, to the costs of your own valuable time? If you are, and you find you are losing money, there's something terribly wrong. If you find you're breaking even, there's still something wrong. The profitable companies are the ones that make a decent profit on all phases of their repair services. ♦



# TOM'S TIPS



#1 in a series

## TIMING AND RATE ADJUSTMENT IN WATCH REPAIR: ANALYZE FIRST, ADJUST ONCE

**One of the most important tasks we do during the servicing of a watch is the timing process.** Watchmakers often see this as the “grand finale.” These results are an accumulation of the skilled craftsmanship put forth for a successful repair. We do tend, however, to over think and micro-manage these results to the point of inefficiency or substantial risk. When dealing with the average rate, there is a simple, logical and meaningful approach that will not only save you time, but will also lessen the potential risk when maneuvering around the sensitive oscillator (balance) area. Let’s analyze the example given here:

In order to adjust this one time, proceed as follows: Find the slowest rate (+5) and duplicate its position on the timing machine microphone (position: crown down) and re-adjust the rate to zero (0). If you were to do this, you would expect (in theory) to see these new results:

Position	Rate
1. DU	+8
2. DD	+9
3. CD	+5
4. CL	+7
5. CU	+11
+40 Average rate = + 8 (40 / 5 = 8)	

	Position	Rate
1.	DU	+3
2.	DD	+4
3.	CD	+0
4.	CL	+2
5.	CU	+6
+15 Average rate = + 3 (15 / 5 = 3)		

The same rule applies, even if the rates are negative. Look for the slowest rate, duplicate its position in the microphone, and re-adjust the rate to zero (0).

This should provide an adjustment you can rely on.

Tom Schomaker, CMW21, is the watchmaking instructor for the American Watchmakers-Clockmakers Institute (AWCI). He has received brand-specific training in the U.S. and Switzerland and has performed after-sales service for a Swiss manufacturer. AWCI is the U.S. trade association for watch repair and clock repair professionals. We provide numerous services for industry and host the nation's largest directory of watch and clock repair resources at [www.awci.com](http://www.awci.com)

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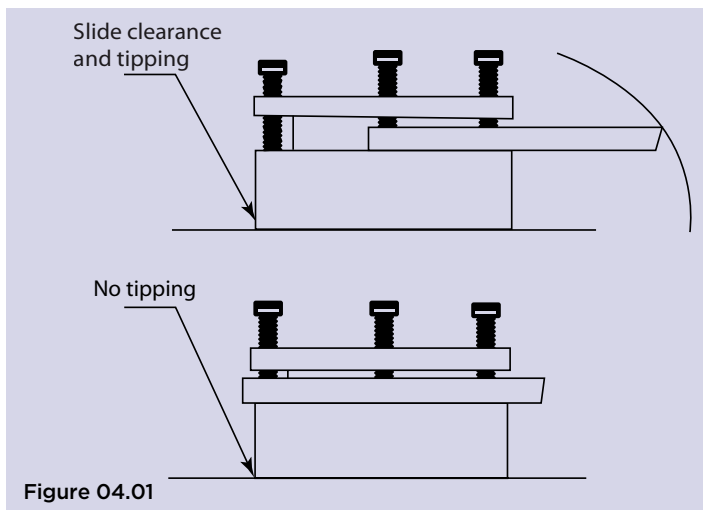
BY LAURIE PENMAN

## Clockmaking— The Tools, Part 4

There are four main reasons you might obtain a bad finish when turning a diameter:

1. The tool is in poor or bad condition (cutting edge or tip is worn, broken or badly shaped).
2. The tool is poorly supported and able to deflect or vibrate.
3. The tool is not on the center line of the lathe.
4. The work piece badly held or deflecting.

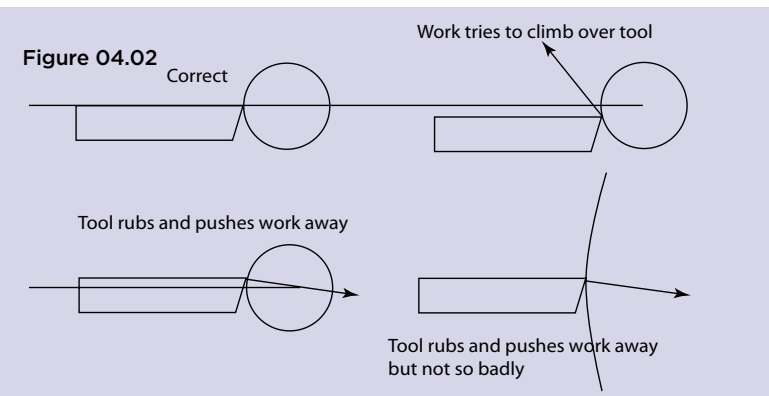
The correct form for a turning tool was described in the January issue and mention has also been made about keeping the overhang of the tool or the slide supporting the tool to a minimum. The reason for this is quite simple; if the tool is to be traversed along the work, it cannot be locked down solidly to the body of the lathe. There must be a small amount of space between the part of the lathe that is to move and the static body, and it is usually filled with oil or grease, both of which are compressible. That space is measured in thousandths of an inch or fortieths of a millimeter (0.025 mm). It may be half the thickness of a human hair, but the act of cutting metal puts pressure on the end of the tool and the distance of the cutting edge from the rigid support multiplies the space that allowed the slide to work. Figure 04.01 shows this space. The distance to the cutting edge is a lever—the greater the distance, the longer the lever and weaker the support for the tool will be. It will dig in, deflect, break free, dig in again and so on. We call it “chatter” because it makes a lot of noise, and leaves a terrible finish on the machined surface.



Keeping the distance of the cutting edge to the solid support short lessens the chance of chatter. Clamp-

ing a tool with a flat base to a surface that is not flat may also allow chatter. The third fault is fairly simple to explain: If the cutting edge of the tool is above the center of the lathe, the surface of the work will contact the tool below the cutting edge. If it is only a slight amount, or if the diameter of the work is large, it will probably not be noticeable, but the tool will lose its cutting edge more rapidly than if it was on center, or even slightly below. (See Figure 04.02).

The alternative, which is the cutting edge below center, alters the clearance angle or rake, and this increases the load on the tool and the friction and, of course, the wear. If it is a great deal below center, high pressure may be needed to persuade the tool to cut at all, placing strain on the machine and causing



parts of it to flex, creating chatter (Figure 04.03). I have rotated the tool until the point is on center line to show that when it is low the tool is attempting to cut with a negative rake (the opposite angle to a normal rake or clearance).

All in all, the machinist wants the cutting edge to be precisely on the center line and Figure 04.04 shows a little tool that helps to achieve this. It needs to be heavy enough for the machinist to “feel” when the tool tip is touching it, and the base should have a rebate so that the periphery contacts the slide and not the middle of the face.

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is unlikely to impinge on clockmaking it is simply a technical point.

# Canada's Master Watchmaker - Henry R. Playtner and The Canadian Horological Institute

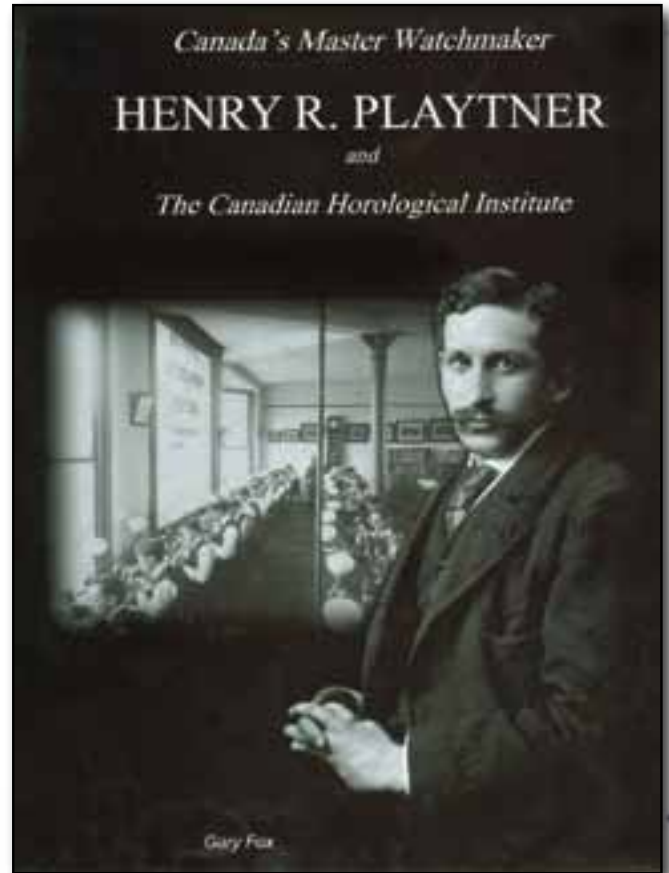
by Gary Fox

In late August of 1999, Gary Fox stumbled upon a unique collection of "large, hand-drawn technical drawings of watch wheels and pinions, pallet forks and roller tables, and pallets and escape wheels. There were also three hard-bound student notebooks with copious notes on watch repair" from a student in the Canadian Horological Institute (CHI). This led to 12 years of extensive original research and study of the Canadian Horological Institute. The resulting book brings to life in wonderful detail the story of the Institute and its brilliant founder and only instructor, Henry R. Playtner.

Mark Twain once said: "I never knew what became of all the unsuccessful shoemakers and blacksmiths until I got my watch fixed." It was this dismal state of watch repair and watch repair education in North America that led this twenty-six year old watchmaker to open what was to become one of the foremost watchmaking schools in the world, on a par with the other leading schools in Germany, Switzerland and the US. It was a scientific- and curriculum-based school built upon the European model. CHI was only the second formal school in North America (second only to Parson's Horological Institute, founded in

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The exacting standards within the curriculum are detailed, as are the requirements for the three levels of graduation. One of the chapters tells the personal story of Henry Playtner, himself, his work and his unrelenting study of mathematics, geometry and model making,



Playtner: He was 49 years old and leaves a wife and one son. He had not lived with his wife for sometime past and was alone with O'Donovan in the house at the time of the fire ... it's the general supposition that they had been drinking...

Charles's watch was likely lost in the fire. His wife and son came from Rochester, New York to attend the funeral.<sup>177</sup> Parker's son, Kent, was a veteran of World War I, worked as an advertising salesman in Rochester and later in Florida, and served as a church organist.<sup>178</sup> It is not known if he married and had any children. He died in 1964.

Warren Douglas Smith (28)  
Warren Douglas Doane Smith (Fig. 9-34) was born on December 3, 1883 in Truro, Nova Scotia, the son of Arthur H. Smith and his wife Ida Emma (Doone) Smith. Douglas (his preferred name) was the third of five children born to the couple; the others were Albert, Herbert, Florence and Helen. Arthur Smith was a jeweler by trade, and both Albert and Douglas followed in his footsteps.

Douglas enrolled at the Institute in 1902 and attended for two years. He modeled his A1 masterpiece watch (Fig. 9-35) on the 13-size Elgin Veritas movement.<sup>179</sup> The movement featured a lever escapement, 25 jewels, diamond-set nickel alloy plates and possibly a gold caseback. It was 10.0mm-thick and 40mm-dia. It was housed in a solid gold case that was presented to Smith by the Elgin Watch Company.

The watch case was engraved on the inner cover (Fig. 9-36):

Presented by the Elgin National Watch Co. To the Gen. Hon. Col. Cassin D. Fox For Peace COMPETITION Won By W. Douglas Smith A1 Elgin Graduate who constructed throughout, the accompanying finely adjusted 25 jewel Elgin VERITAS Master Movement of Watch Mechanism

Fig. 9-34. W. Douglas Doane Smith, 1902 (See Note by James Fox)

How extensive was this competition? It's hard to say, since Smith's watch was the only A1 masterpiece constructed between 1899 and 1911. Did other students try but fail? Did no-one else

Fig. 9-35. W. D. Smith Masterpiece A1-1811. Photo Courtesy of Jeff Stibbing

Fig. 9-36. Inscribed on Press Masterpiece A1-1811. Photo Courtesy of Jeff Stibbing

# How Much Is This Worth?

## An Overview of Value

The following article is a simple overview on how “value” is determined for formal appraisals and how the area’s most knowledgeable horologists may place themselves or their business in jeopardy if they are not a trained appraiser.

As professional horologists and enthusiastic collectors we are often asked what is the value or worth of an item. This seems to be an honest straightforward question, but where it leads one may be a dark and serious path.

Why is this dangerous? Yes, you are considered a knowledgeable person who can provide an estimate of value of an item. You feel good that they consider you capable of doing an appraisal so you respond with your best guess and go on your way. One day you find your “friend” has their attorney send you a letter and declares that you owe them \$\$\$\$.

What happened? Your friend purchased the item for the \$1,000 you stated for value. They returned home only to find their spouse upset that they brought such an item home. After many arguments, the item is sold for \$600. They lost \$400 and they feel you owe them the difference. By historic court cases, you find out to your amazement that they are correct. Again you ask, what happened?

Historic court cases have established the fact that people who hold themselves out to be appraisers to others may be liable for their mistakes in fair market value.

Let’s look into more data on **appraiser, appraisal and value.**

First we need to note that the U.S. Government established an organization to provide guidelines for appraisals. Their



written guidelines are called USPAP which stands for “Uniform Standards of Professional Appraisal Practice”.

USPAP defines an **appraiser** as: One who is expected to perform valuation service competently and in a manner that is independent, impartial and objective.

An **appraisal** in simple terms offers a reasoned opinion of a defined type of value as of a given time. USPAP defines it as: The act or process of developing an opinion of value; an opinion of value or of pertaining to appraising and related functions, such as appraisal practice or appraisal services.

USPAP defines **value** as: The monetary relationship between properties and those who buy, sell or use those properties. Most people think value is the amount of money one person is willing to pay for an item. This has truth but value is much more complicated than the simple view noted.

For the purpose of this periodical, we will not go into the aspects of being an **appraiser**. When someone is interested in doing appraisals and becoming a professional appraiser, they need to research the proper steps to follow this path.

Now let us look at appraisals. An **appraisal** must be numerically expressed as a specific amount, as a range of numbers, or as a relationship to a previous value opinion or numerical benchmark. It requires several things from the individual providing the appraisal. They must be impartial (without advocacy and unbiased), qualified to render an opinion of value, state the defined type of value, provide adequate description, a specific date of time and sup-



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## An Improved CW21 Exam Process is Coming

AWCI has been around for a long time, and at times, it appeared to have outlived its usefulness. One such phase was in the late nineties, where the educational offerings were scarce and the relevance of the certification was diminished.

That phase ended around 2004 when, under the leadership and active involvement of Jim Lubic, AWCI developed an improved certification program that found rapid acceptance in the professional circles. The CW21 certification was a significant departure in all aspects and within a couple of years, it significantly raised the skill level of watch service in America. During that time the educational offerings of AWCI went far to remedy the occasional weakness in one or the other area that became apparent typically when watchmakers prepared themselves to take the exam.

And this is where the AWCI instructors, first, Manuel Yazijian, and now Tom Schomaker, delivered an important contribution towards making the American Watchmaker more proficient, more productive and ultimately, more successful.

Three prominent watchmaking schools in the U.S. have chosen the CW21 certification as their performance benchmark. There are also hundreds of watchmakers already active in the profession who rely on their CW21 to signify their level of skill and knowledge to customers, employers, and brands. In short, the CW21 has turned out to be an overall success, and the main beneficiary of this success is the American Watchmaking Professional.

BY HERMAN MAYER, CW21,  
AWCI EDUCATION COMMITTEE CHAIRMAN



Some of the key people who helped develop the CW21 program. From left to right: Jim Lubic, Vince Schrader, Larry Blanchard and Herman Mayer.

The CW21 exam process has been running in its current form for about nine years now. I believe that it is high time for some maintenance work, and for that reason, we had decided to suspend the process for a few months. Our profession is subjected to dynamic changes, and these changes must be reflected in the certification or there is a risk that it becomes outdated.

Our members are the main stakeholders in this and we owe them an improved and well-maintained process. Let's remember that a strong certification benefits the watchmaking professional.

**Details: What Can Change, What Will Stay The Same?**

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The first pilot program for the CW21 program took place at Gem City College in Quincy, Illinois.