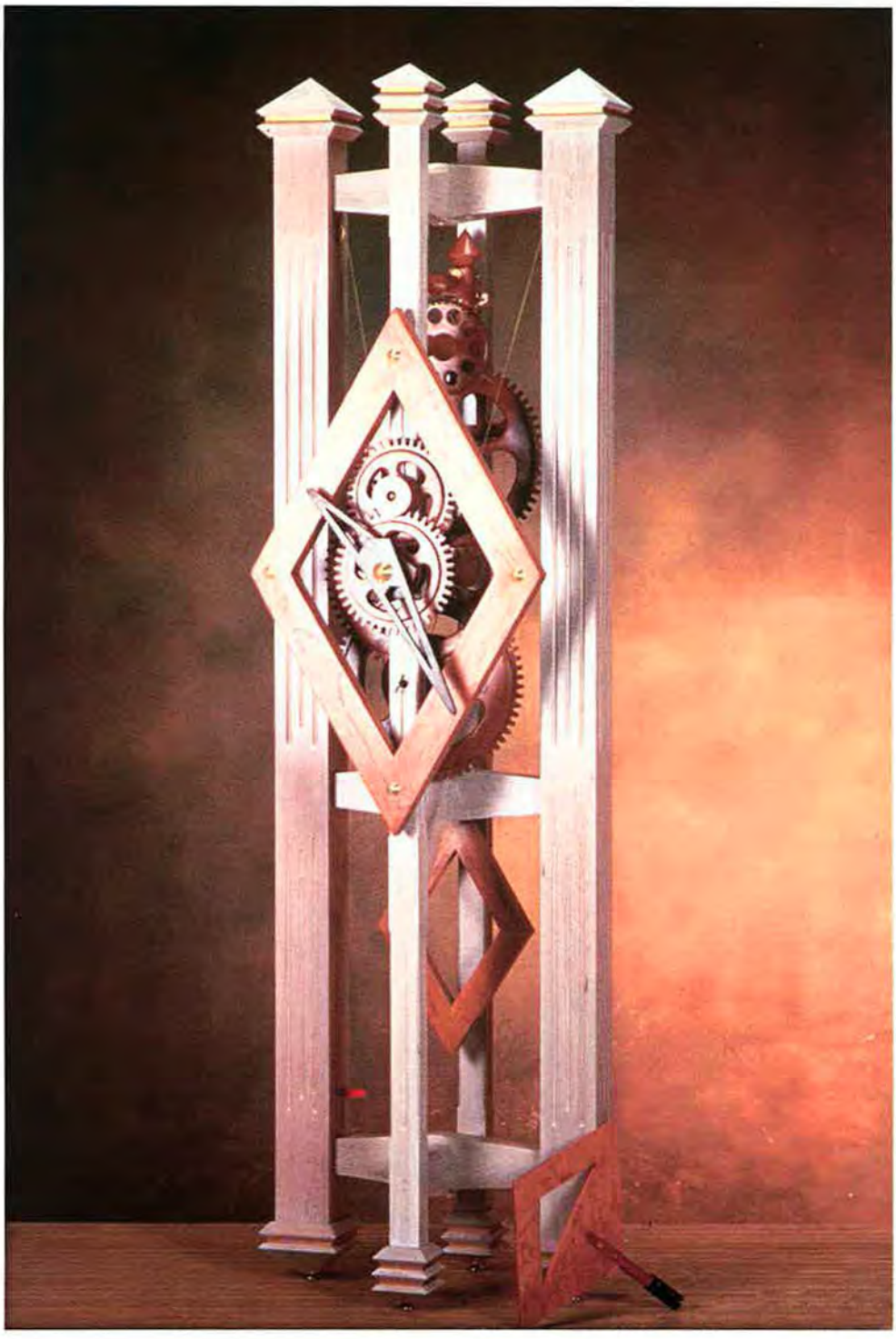
HOROLOGICAL TIMES

October 1998



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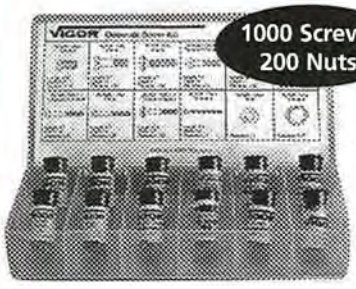

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SPECIAL INTEREST

COVER

This month's cover feature is a Pillars Clock by Michael Kuyt (see page 10). *Photos by Jim Oliver.*

President's Message

By David A. Christianson

The Area Representatives Committee is a Standing Committee that has not been very active the past several years. It was initially charged to be a link between AWI and its membership, and for a number of years, members of the Board of Directors were assigned areas around the country. They were your Area Representatives. However, since many the Directors were not in their assigned areas, little communication developed.

This year, areas were assigned and an Area Representative was chosen within each area, with Ashley Womble of Georgia as chairman. All representatives are very active within AWI and their local chapters; all are highly regarded professionals; and all are knowledgeable about AWI. Their mission is to give each member direct access to AWI. If you have questions, problems, concerns, suggestions, and/or ideas for AWI, let your Area Representative know. He or she will take a personal interest in what you need, want, or desire.

With an Area Representative in each geographic area of the country, we also have the opportunity to learn firsthand how AWI is doing with its members and if we are heading in the direction the members want us to head.

The Area Representatives will be active in helping to keep and recruit new members as well as working directly with current chapters, inactive chapters, and potential chapters.

For more information on your Area Representative, see both the Affiliate Chapter column on page 42 and the map on page 43.

Executive Director's Message

By William J. Ewbank

In this month's issue of *Horological Times*, we are again breaking new ground with the content of the magazine. We will be printing, in its entirety, the report of the new Strategic Planning Committee over the next three months. This report is the product of some dedicated effort on the part of not only the five members of the committee, but the members of the Board and AWI staff who participated in the committee's research and deliberations. The committee's report provoked so much discussion and interest at the annual Board meeting that it struck us as a good idea to share it with the entire membership and readership of *Horological Times*.

The committee has concluded that AWI is "above all else, an educational institution." If that is the case, then the need for a continuing, rigorous, self-study mechanism becomes paramount. Human institutions, by their nature, are like living creatures, ever changing to meet new challenges and changes in their environment. Without an institutional bias toward self-analysis and examination, and without the commitment to change as circumstances warrant; human institutions tend to wither. Put simply, if you see an unmoving, static institution; check its pulse. It may well be dead.

You may not agree with all the committee's conclusions. You may even get a little angry at a few of its observations. (I must confess that I winced at one or two lines myself.) However, I hope that you all agree that your interest in how AWI works has become stimulated and that the debate that is certain to be triggered by this process is bound to be interesting. Read, enjoy, and if you feel the writing urge; drop a line to the editor.

As I reported last month, we expect annual dues statements to be mailed during the first few days of October. This year, the statements will include a check-off box in the bottom right-hand corner. If you wish to be included in a national referral directory for watchmakers and clockmakers, you MUST CHECK THE YES BOX. Look for it.

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Questions & Answers

Question

I would like any information you could give me on the pictured watch.

The size is 54.7 mm. The only markings on the movement are dial side "HC20092."

The watch is cylinder escapement and key wind from the front or back. The hand is hour only and set by pushing the hand (no setting mechanism). Dial marked "Breguet et fils."

John Ingram, Oklahoma City, OK

Answer

In the later part of the eighteenth century, A.L. Breguet designed and perfected his souscription watch. It was designed to be a high-grade watch at a lower cost. It featured a single hand and widely spaced minute marks on the dial so the wearer could tell the time accurately using the single hour hand. They were typically cased in a silver case frame (with coin edge) and with a gold crystal bezel and gold back.

His watches varied somewhat in finished design because the watches were made individually by many different individuals in his shop. But each was executed in the highest quality. Mr. Breguet respected his workmen—he called them "artists" and they repaid the respect by giving their very best work.

Although the designs of his souscription watches varied somewhat between makers. (He kept a model of his original design so his artists could copy it, ensuring a degree of uniformity.) Breguet insisted on simplicity of design and symmetry.

Although your watch closely resembles the soucescription design, several deviations cause me to question its origin:

1) Daniels states that all souscription watches wind through the dial accessed through a hole in the hand's hub. Yours appears to have a winding arbor in the hand's hub, but I cannot find reference to these watches winding from the back.

2) Daniels also states that all souscription watches had the parachute suspension form of shock-resistant balance cap (endstone). Yours appears to have a steel balance cap.

3) Breguet insisted on symmetry yet the two dial screws (on either side of the barrel) are not symmetrical, neither is the second wheel bridge and its opposing balance bridge, either in design or in placement.

4) Daniels shows the various styles of hands used by Breguet (Figure 3). None have the diamond shape on them that yours has.

5) Daniels also states that all Breguet souscription watches were signed on the main plate and numbered. Yours is not.

Having read Daniels' definitive work on Breguet and studying the numerous examples illustrated in this work, I doubt that Breguet would have let this watch out of his shop, if it had indeed been made by one of his artists.

Continued on page 56.

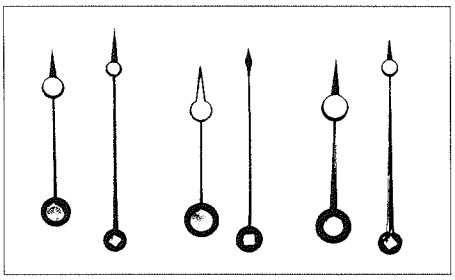


Figure 3.

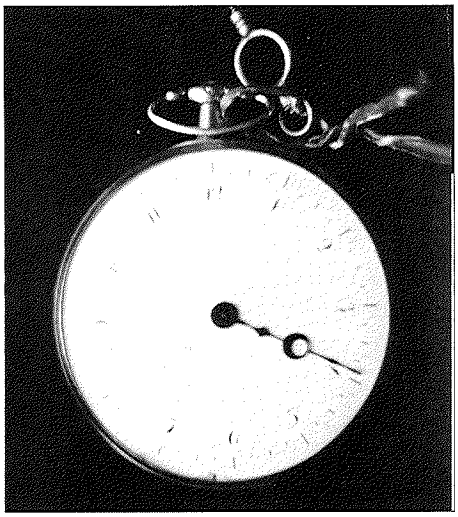


Figure 1.

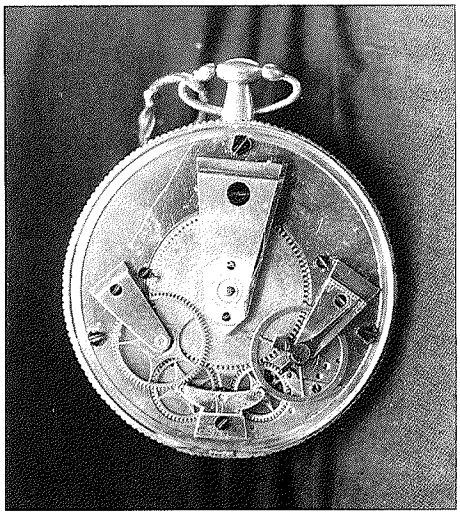


Figure 2.

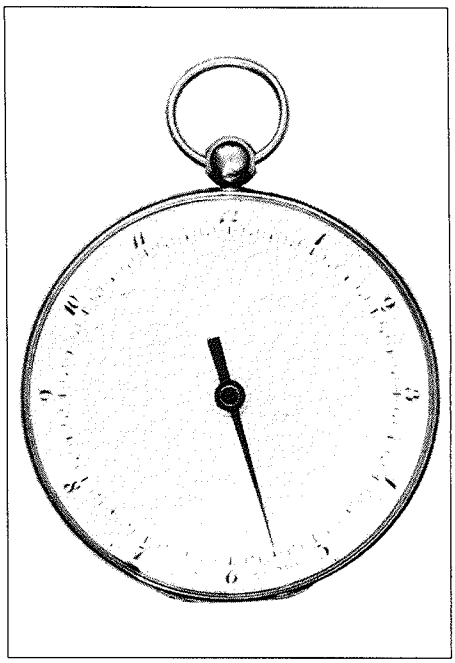


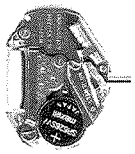
Figure 4.

Tips on ordering Miyota Movements

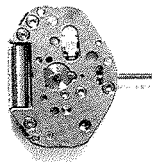
Some models of Miyota brand watch movements do not have caliber numbers on them, neither printed nor stamped. While it is inconceivable that one of the world's largest manufacturers of watch movements does not know better, it is true. This makes ordering the correct replacement movement, or parts for these models very difficult. Here are pictures and descriptions that should be helpful in identifying your unmarked Miyota movement. If you have an unmarked Miyota movement that uses their popular 6¾ x 8 mvt as a base, then compare it to the functions and thickness below to determine which model you have.

For the latest in movements ask for our September movement listing. This is the list of over 450 movements in stock with prices. Now includes TMX. We print this twice a year to provide a useful guide for availability and pricing.

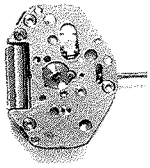
6¾ x 8 ligne (15.3 x 17.8mm), Non-sweep, or sweep only



Back view

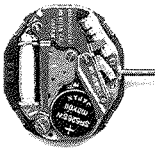


MIY 2025
6¾ x 8 ligne, 3.15mm thick
Non-sweep
Hands - 70/120



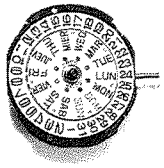
MIY 2035
6¾ x 8 ligne, 3.15mm thick
Sweep
Hands - 70/120/20

6¾ x 8 ligne (16.3 x 17.8mm), Sweep with date or day-date



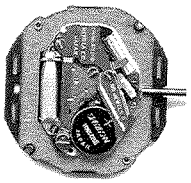
Back view

MIY 2015
6¾ x 8 ligne, 4.15mm thick
Sweep, Date at 3
Hands - 70/120/17

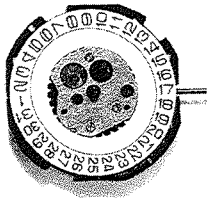


MIY 2005
6¾ x 8 ligne 4.15mm thick
Sweep Day & Date at 3
Hands - 70/120/17

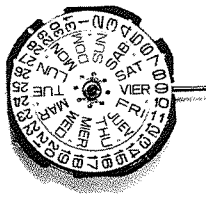
10½ ligne (22.6 x 22.0mm), Sweep with date or day-date



Back view



MIY 2115
10½ ligne, 4.15mm thick
Sweep, Date at 3 or 6
Hands - 70/120/16



MIY 2105
10½ ligne, 4.15mm thick
Sweep, Day & Date at 3
Hands - 70/120/16

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Working Paper Dials

Question

Please give some pointers on cutting and installing paper dials. How do you cut out circular dials?

Answer

It is not very satisfactory to cut out a paper dial with scissors. Likewise cutting to a good fit in a recessed dial pan can be a problem, as is locating the winding holes.

A commercial dial cutter is available and reportedly works nicely. Years ago I made up a trammel-like cutter that works somewhat like the commercial tool. Measure the size needed, set up your cutter, and test on a sheet of paper. For the real dial, strike a short line in the dial center from the 12-6 markers. Again from the 3-9 markers strike another short line. This will be the pivot point for the cutter. It's best to lay the dial on a piece of poster card as a dial backup.

Take a scrap piece of the dial stock and test your cement. Some types of glue will pass through the paper and cause the print to bleed, or leave a stain. Be sure you have your dial upright and cement it in place.

When the cement has cured, hold the dial to the light so that the winding holes are visible. Use a sharp thin blade knife and cut out the holes from the front side. Cut down with a shearing stroke against the metal of the dial pan. This makes clean holes in perfect position.

You can obtain brass grommets for the center hole and winding holes. This protects the dial from "key tracks" that often leave dark smudges in the hole area.

Staining Dials and Bluing Hands

Question

Is it possible to restore the blue to old clock hands? Can a new paper dial be stained for an antique appearance?

Answer

My tenure in industry dealt with lots of blue and black oxide-treated parts. This is a very beautiful finish, but believe me, it's not an art that can be easily practiced in our trade. The fumes will destroy everything in your shop.

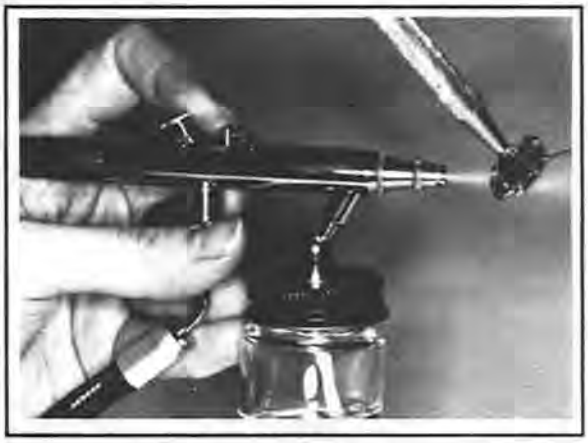
Most sporting goods stores carry a small container of material called Perma Blue. It is made for touch-up on tools and firearms, and available in liquid or paste form. The paste is easier to use for our purpose. Follow the directions and it does a pretty good job on steel hands, and other steel pieces.

Dial stain may be a little more tricky. This takes practice, so save some edge scraps for experimentation. I hear reports on several types of stain: coffee, tea, oil, dirty water, and various wood and fabric stains. Some stains are water mixed, while others use alcohol or other solvents.

My experience in this facet of clockmaking has been less than highly successful. It's best to first stain the dial, press it between blotter paper until dry, and then cut to size.

I prefer to purchase a dial printed on stained paper stock, or swap some jobs with a person who enjoys this class of work. That will make both of us happy.

CLEANING SYSTEMS FOR THE SERIOUS WATCHMAKER



Zantech's **Quartz Clean** and **Plasticlean** aerosols have revolutionized the movement cleaning process by safely dissolving dry oils and other contaminents without disassembly of the gear train. Now take the next step in movement cleaning with our compressor system. The unique dual trigger action of the spray gun is capable of spraying dry filtered air as well as the cleaning solutions. **No more need for expensive disposable air cans.** The compressor is foot-switch activated and quiet enough for a retail environment. The cost of cleaning one movement with the compressor system averages ***only 10 cents per movement!***! Discover the Quartz Clean compressor system and reduce cleaning time ***to seconds.***

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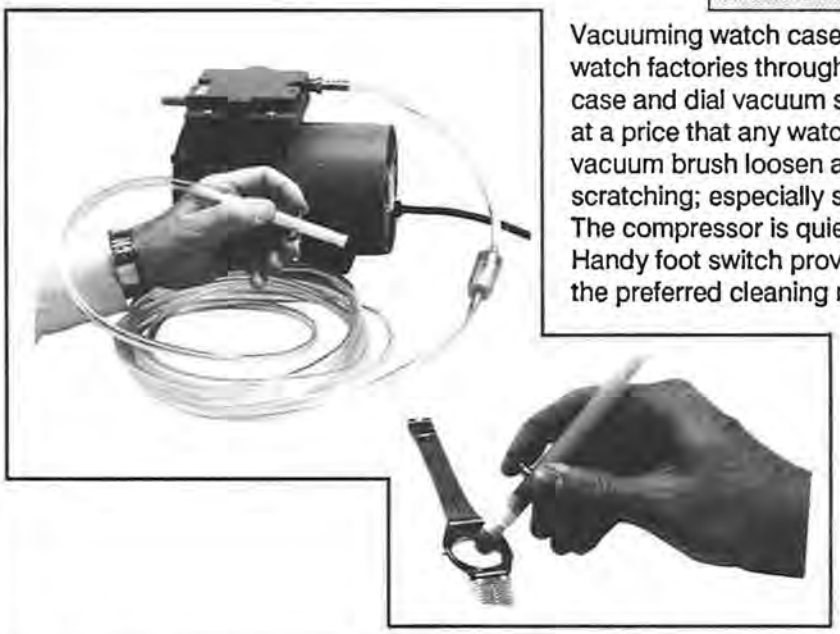
Quartz Clean Airbrush Compressor Kits

QC-150C (Compressor **NOT** included).....$175.95
QC-650C $389.95
(Quiet Compressor & AC foot Switch Included)

WATCH CASE VACUUM SYSTEM



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Many years ago, Rayovac produced a special battery for the "Pulsar" LED watches that were marketed by Hamilton. This was the "S03" (355) battery and it was 15.5 x 4.8 mm. It has been discontinued and, as you can see on pages 46 and 47 of your new *BNS* booklet, there is no battery currently available that has the same dimensions. I have successfully substituted the "S05" which measures 11.6 x 5.4 mm. While the diameter is considerably less than the original, it works quite well. In the event you find a Pulsar with a case which requires a thinner battery, use the "S07".

I talked with Mr. David Wilberg of Rayovac about the Pulsar LED problem. He gave the additional suggestion of fitting a rubber washer around each "S05" battery to give assurance that they will remain centered in their compartments and thereby maintain proper electrical contact. These washers could be purchased at a local hardware store or easily made from suitable nonconductive material.

Recently a local jewelry store had a request for an "A76" battery. The service technicians quickly found this number listed in the new *BNS* booklet; they then noticed that the footnote in that section (alkaline) said "Not recommended for watches unless specified by manufacturer. See Section IV for preferred substitution." They erroneously interpreted this to mean that this was not a watch battery; the intent of the footnote is to recommend that the alkaline battery be replaced with a silver-oxide of the same dimensions. Many times alkaline batteries are supplied by the manufacturer of less-expensive watches only because of their low cost. The silver-oxide battery will produce current for a much longer period of time, its voltage is more constant, and its shelf life is better than that of an alkaline battery.

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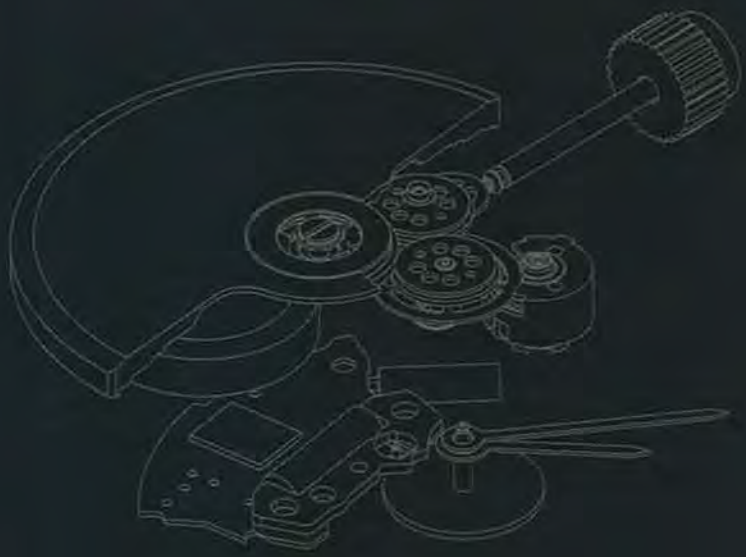

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Pillars

By Michael Kuyt

"Pillars" is a weight-driven wooden gear clock that stands 88 inches tall, weighs nearly 300 pounds and has gears (wheels) 15 inches in diameter. The pendulum is suspended on .010 inch diameter stainless steel wire and appears to float through the air as the clock runs. All wood components are solid cherry. The frame is stained white as opposed to being painted, allowing the beauty of the grain to show through. Accents are polished brass and gold leaf. The escapement is a modified Graham dead beat and the clock is driven by two 25-pound weights that run hidden inside the large pillars.

The architectural themes, geometric shapes, and white color of the frame contrast the darker wood tones of the working mechanical parts. The movement, therefore, stands out and becomes the focal point of the sculpture while the white frame integrates visually into the structure and decor of its surroundings. Typical functional and esthetic features no longer hold to conventional norms.

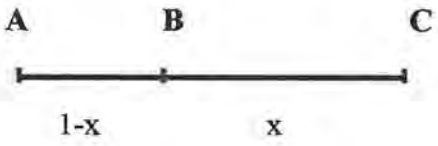
During the industrial revolution, mechanical devices were manufactured that allowed us more free time with which we could appreciate traditional art. Then, with the influence of modern artists such as Wendell Castle, functional furniture such as clocks, gained acceptance as a legitimate art form. Now we have the opportunity to go a step further in defining what constitutes art. We are starting to see more instances of the normally hidden mechanical parts of a device such as in a watch or clock become the main artistic and aesthetic theme of the piece.

Golden Section

A number of the prominent visual features of "Pillars" are based on the proportion known as Golden Section. The width to length ratio of the dial, pendulum bob, and winding key for example are exactly golden section or 1 to .61804... . For centuries, even millennia, this proportion, sometimes called Golden Mean or the Divine Proportion,

has been considered by architects, artists, and composers to be the most pleasing to our senses. The Parthenon's front elevation, height to width is Golden Section. Leonardo da Vinci used it either by design or by default in his drawings. The lengths of related phrases or movements of music by Beethoven, Bella Bartok, and others have been shown to be exactly Golden Section. Furthermore, it occurs naturally in the world around us in truly stunning creations.

It can be defined mathematically several ways. Perhaps the most direct would be to consider a straight line AC with a point B in between. When AB/BC = BC/AC, you have Golden Section.



If you consider the length AC to equal one unit of measurement and x to be the length of BC, then;

$$\frac{1-x}{x} = \frac{x}{1}$$

Deriving the numeric value for Golden Section using the quadratic equation is done as follows:

$$\frac{1-X}{X} = \frac{X}{1}$$

$$X^2 = 1-X$$

$$1X^2 + 1X-1 = 0 \qquad (ax^2 + bx + c = 0)$$

$$\frac{-1 \pm \sqrt{1 - (-4)}}{2} \qquad \left(\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right)$$

$$\frac{-1}{2} \pm \frac{\sqrt{5}}{2}$$

$$-.5 \pm 1.11804$$

.61804 (X must be positive)

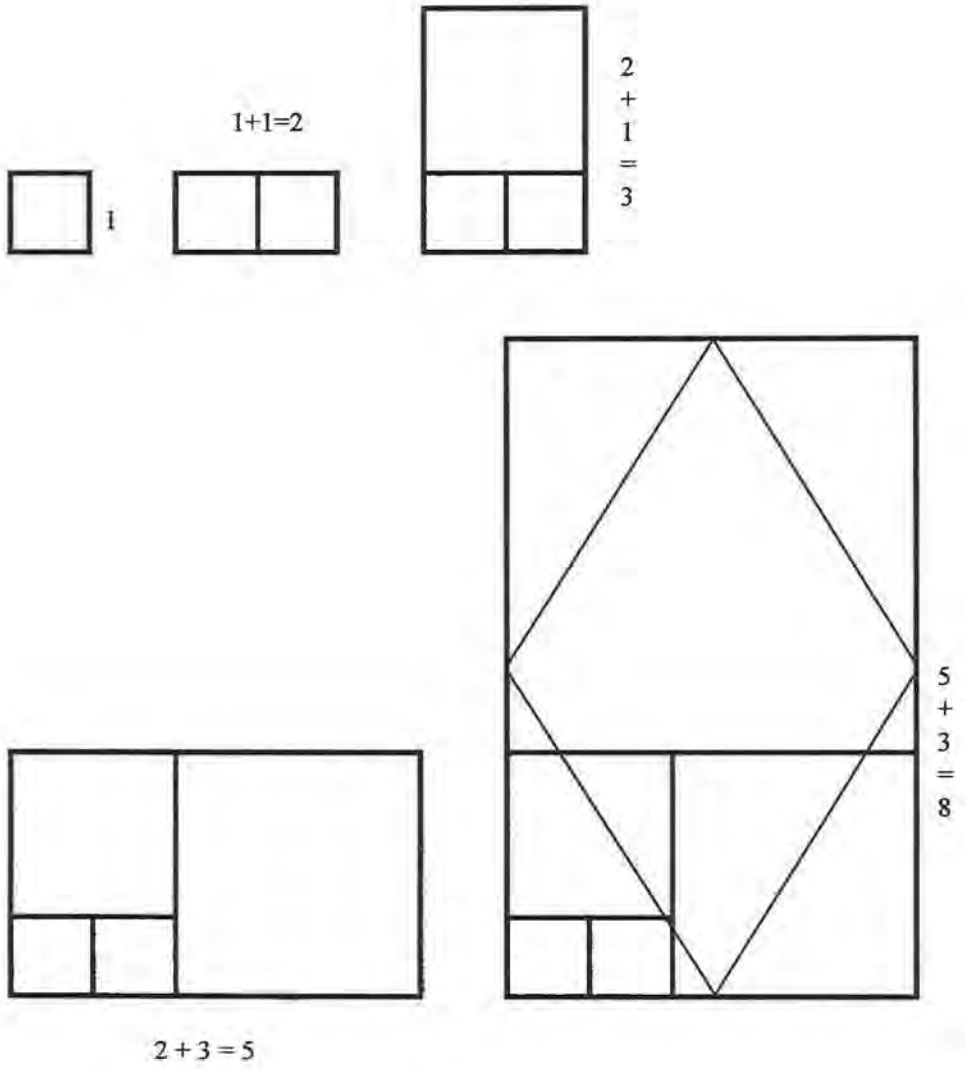
Golden Section is closely related to the following Fibonacci series of numbers based on integers. If you make a list of numbers starting with 0 and 1, and every new number is the sum of the previous two, it looks like this: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, etc. The first few groups of two numbers in this list when divided by each other don't work so well, but very quickly you find that any two sequential numbers when divided into each other is very close to being Golden Section or .61804. As an example, 21 divided by 34 equals .61765 or 233 divided by 377 is .61803![1]

The ancient users of Golden Section may have derived these numbers through a simple geometric process. If you begin with a square and define the length of the sides as 1 unit and then lengthen it by a distance equal to its height, you have a rectangle with dimensions 1 by 2. If you take the longer side of the rectangle and add that dimension to its height, you now have a rectangle 2 by 3. Take the longer side of that and add it to the width and you have 3 by 5. Add its 5 dimension to the 3 and you have 5 by 8. If you continue this a number of times, you will get very close to the Golden Section proportion.

The shape of the dial for "Pillars" is shown inside the resulting Golden Section rectangle. (See illustration on page 12.)

Windmills

My interest in large wooden gear devices began as a boy when my dad told me stories of the windmills in his native Holland. He told of wooden gears up to 8 feet in diameter and 300 years old that were still turning and doing the work they were originally designed to do. The gears were sometimes set on fire and then put out to create



carbon that would serve as a natural lubricant. When the wind was brisk, some of these mills could generate upwards of 300 horsepower! The large turning blades of the propeller were a force to be reckoned with and it was advisable to stand well clear. In our world of fast changing technology, where your computer is obsolete a year after you buy it, I find it fascinating that these wooden works devices have endured so long and are still hard at work today.

As a young man I decided to study clocks and took the clockmaking course offered by The American Watchmakers Institute in Cincinnati. With the help of excellent instructors I learned a great deal about horology, clock theory, and design. I now own and operate a small clock repair shop in Rochester, New York. I have had the privilege of restoring two tower clocks, a large Seth Thomas built in 1905 which is located in the Sibley Building on Main Street in Rochester and an "A" frame by Reeves and Company built in 1849 for the City Hall of Canandaigua, New York. The large massive gears and skeleton format of tower clocks is consistent with my particular interests in clockmaking and it was a real privilege to work with and learn from those historic pieces.

The Gears (Wheels)

The gear teeth on "Pillars" are true epicycloids. A custom-written computer program allows me to plot out 10 times actual size the profile of teeth based on various criteria such as gear ratios and pitch circles, etc. With the help of an optical comparitor, cutting knives are precision ground to the correct scale.

The moisture content of the wood used is carefully monitored. The ideal and most stable moisture content for furniture to be used in most of the United States is approximately 8%. In Florida and some South East States the ideal number is around 11% and for the Arizona-New Mexico region, it is about 6% . The moisture content of wood can be determined by taking a small sample and quickly and accurately weighing it before any moisture exchange takes place. Then it should be placed in an oven

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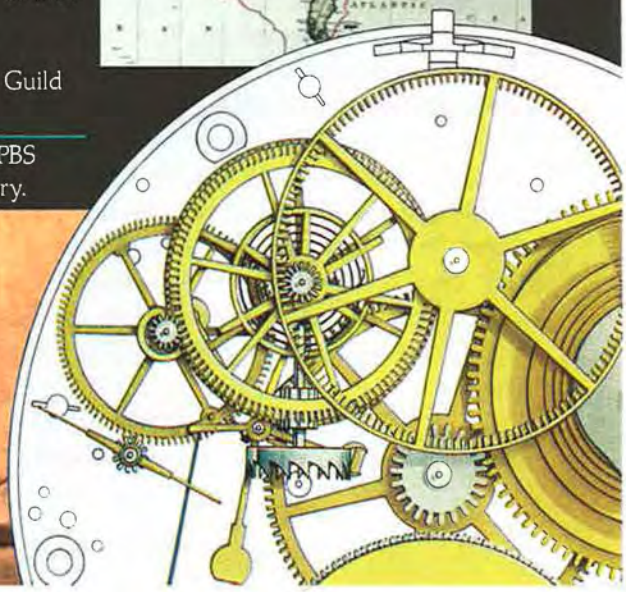

at between 214 and 221 degrees. Within 48 hours, most species will be completely dry. Remove the piece and quickly weigh it before it absorbs any moisture from the surrounding air. The moisture content is then calculated as follows:

$$\frac{\text{starting weight - dry weight}}{\text{dry weight}} \times 100 = \%\text{ of moisture content}$$

I am now using quartersawn cherry for the gears because it expands and contracts across its grain half as much as plain sawn with moisture changes. The coefficients for dimensional change in black cherry per 1% moisture change within the 6% to 14 % range are as follows:

> For tangential or across the width of plain-sawn boards it is .00248".
> For radial or across the width of quartersawn boards it is .00126".[2]

The gears are made up of many wedge-shaped pieces of wood arranged in a circle. Each tooth has equal strength since the wood grain runs radially out from the center all the way around. Two wooden flanges sandwich the core tooth layer for added strength and stability.

In addition to aliphatic glue (yellow wood glue), epoxy is used on some of the many pieces that make up the wheels. Aliphatic glue dries by giving off water which is absorbed by the wood causing a small amount of swelling and movement in the structure. Epoxy dries without any moisture exchange. It is a self-contained chemical process, the only significant by-product being heat. All wheels are carefully balanced after finishing.

Ball Bearings

A combination of ball bearings, brass bushings, and Teflon-impregnated cintered bronze bushings are used depending on the application. I am very grateful to Ron Pierik, a mechanical engineer, for his input and recommendations relating to bearing selection. The arbors that run in the bearings are steel and are machined on a Sherline lathe.

Ball bearings are not often found in clocks. Laurie Penman, well-known author and expert in the field of clock design, indicated that ball bearings may not be well suited for clock mechanisms. There are so many contact points where the numerous balls touch the races, and at very slow speeds and low torque, bushings are probably a better choice. In the vast majority of applications, I believe that he is correct. However, I have difficulty resolving that widely held view with data that resulted from some simple experiments done in my shop with very large and heavy wheels.

I devised a method of imparting an impulse of measured and repeatable force to one of the large wheels from one of my clocks. When running on shielded ball bearings with a lightweight lubricant, the wheels would consistently rotate 5 to 6 times as far as with bushings. The ratio between distance of rotation on ball bearings versus bushings seemed to be constant even when the experiment was conducted using a range of amounts of impulse imparted and at relatively slow speeds. My experiments were limited in scope. Further research needs to be done to determine at what point in clock design ball bearings would be preferential to bushings.

Features

The wood turnings are done on a full-size machinists lathe by John Crombe, a mold maker and good friend of mine. The profiles of the turnings consist of straight lines and sharp angles and the compound slide of the machinists lathe provides the accuracy required for the turnings to properly complement the angular aesthetic design considerations of the rest of the clock.

The clock runs for three days on a winding and is wound by a large cherry key. A red wooden flag pops out of the lower part of the right pillar when the weights are nearing the bottom of their travel as a reminder to the owner that the clock should be wound. A green flag near the top of the same pillar indicates that the clock is fully wound and prevents overwinding.

A knurled brass disc is turned for precision beat adjustments. Regulation is done from the top of the pendulum assembly by turning tuning pegs normally found in a viola. The pegs draw up the wires that the pendulum bob is suspended from to make the clock run faster or can be turned to let wire out to make it run slower.

The escapement is a Graham dead beat with the only exception being the shape of the escape wheel "teeth." They are half-round pins instead of points of teeth on a wheel. The round shape of the pins contribute somewhat to the impulse along with the impulse surface of the pallets and in this way combines a little bit of a "Brocot" type action into the escapement. The pallets are individually adjustable and the verge runs on an adjustable bushing for depthing.

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2. Forest Products Laboratory, *Wood Engineering Handbook*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, pps. 14-2, 14-7, 14-14.

Movement Bank Donations

The AWI ELM Charitable Trust provides assistance with hard-to-find replacement parts for vintage watches. When a member needs a replacement part and is not able to locate one through their normal sources, the Movement Bank/ Material Search Network often is able to help.

The need is first faxed to the participants in the Material Search process to see if they can supply a new part. If no source is found we then search through the vintage movements that have been donated to the Movement Bank for a usable spare part. A nominal fee of $5.00 for each Material Search requested is charged to cover the costs involved. The fee is waived if a vintage watch movement is donated for each part requested. The movement should be substantially complete.

Your contributions of movements to the Movement Bank will insure continuation of this service for present and future craftsmen. Donations are tax deductible.

Letters to the Editor

All letters to the editor must be signed and bear the address and telephone number of the writer. Your address and telephone number will not be published without your permission. AWI reserves the right to edit letters for length and content. All letters should be concerning the Institute and/or issues specific to the field of horology. Please send your letter via: E-mail: Bill@awi-net.org; Fax (513) 367-1414 or mail to Horological Times, *"Letters to the Editor," 701 Enterprise Drive, Harrison, OH 45030.*

Dear Editor:

It's time to lay the law down about those who call themselves "Watch and Clock Makers" instead of an "engineer," "technician," or "repair specialist."

Every jewelry store that has a bench in it where someone tunes up or overhauls timepieces does not have a MAKER of timepieces. I've met very few actual makers of timepieces, throughout my travels here and abroad, who work as jounneypersons and independents, let alone for a jeweler. It irks me to no end that these persons say they're an actual timepiece maker who can actually make a wrist, pocket watch, or clock from scratch without buying the parts to construct them.

My father-in-law was a real watchmaker who built wrist and pocket watch movements as well as clock movements from scratch, making his own parts besides doing repairs, tune-ups, and overhauls of same. I used to help him.

Today, it irks me when I acquire an ancient or vintage timepiece and these so-called "watch/clockmakers" tell me that they cannot put the piece into running condition because parts are no longer available for fusee or chain-driven movements. When I ask, "Can't you make the needed parts?" All have said, "No." If they tout themselves as makers, they are either all liars and need to redesignate their titles.

Feivel Shiman Gedalia
Chicago, IL

The use of the job title "watchmaker" or "clockmaker" has become so widespread that they have become generic terms for professional repairers and technicians. It may be a little harsh to describe everyone who wears the label as a liar. It is accurate to state that only a small minority of self-described watchmakers and clockmakers are capable of making vintage parts or even an entire movement from scratch. It is also accurate to state that this is only a small part of the available business.

One accurate measure of a watchmaker's or clockmaker's abilities should be whether he has earned a certification title from AWI. Certainly an AWI Certified Master should have the expertise. Even then, a professional who has made a specialty of restoration or conservation work on vintage pieces may be most suitable for your needs.

William J. Ewbank
Editor-in-Chief

Dear Editor:

In response to Peter W. Eckel's article "Material Matters" in the August, 1998, *Horological Times*. He has hit a sensitive nerve involving parts availability. Many companies are doing what he says, "One Source Availability," for parts and service.

If I can continue the analogy, in 1948 I joined RCA Service Company as an antenna and set-up technician dealing with the then leading TV set. The set was sold by a dealer, and the purchaser had to buy a one-year

service contract that included an antenna installation and set-up of the TV set.

After setting up the TV and adjusting it to specs, we installed the antenna in an appropriate place to get reliable reception. The contract covered the usual replacement of parts needed, the readjustment and cleaning during the year. This was a form of product control. The company did this to protect the product from itinerant dealers and amateurs who might degrade the product.

Knowledge of TV servicing at that time was mostly limited to factory personnel until later, when education became more available. Today, service technicians would consider what we were doing in those days as Mr. Spock once said: "Stone knives and bear skins," as compared to today's computer chip technology.

Alton A. DuBois, Jr.
Queensbury, NY

Technology drives innovation drives marketing drives sales. Mr. DuBois' television repair job of the late 40s no longer exists. The watchmaking trade has seen a similar revolution in the introduction of electronic quartz timekeeping. Yet somehow, the watchmaker survives with much the same equipment and job description, albeit in smaller numbers.

We face discriminatory practices on parts availability on the part of certain manufacturers, allegedly to protect the product. How do we reconcile the excuse of product protection, which has some validity, with the need for access by the skilled independent watchmaker? The key lies in demonstrating the education and expertise of those who are truly qualified to work on high-grade timepieces.

William J. Ewbank
Editor-in-Chief

Dear Editor:

I'm interested in many more comments from readers on setting prices for clock repairs. I am a recent retiree who started my new clock repair business in June of this year. The setting of prices seemed to involve a number of factors that I will try to explain if the readers will bear with me.

I am in a northeastern Ohio town of 13,000 with no fewer than eight antique shops on the main street where our shop is located. The local rag featured an article and picture of the start-up on its business page and I sent fifty cards and pictures to selected people in the area who seemed likely to own, and have the means to have an antique clock repaired. Other than a cute, well-done, carefully placed sign on the front of the store, that is all we have done to announce the business.

As in Jack Kurdzionak's letter, my first step was to decide how much I needed to net a week to supplement my retirement check. I worked out the final hourly shop rate with my business partner who owns an engraving business in the shop where I am located. I started out at $15 an hour and in the first two weeks went to $20 and then $25. My partner advised me on doubling the cost of parts, once again as in Jack's letter. At this point with my skills in clock repair, I'm allowing four hours to disassemble, clean, rebush, and assemble. This would include a modest clean-up on the case and bezel. I add an additional hour for a striking clock and another hour for a chimer. Platform escapements get yet another hour. I do a rough estimate on any case. We require a $10 deposit on all repairs left for work. I do not charge for advice or estimates. House calls are a flat $25 which covers the first hour, port to port, local area only. Further calls are an extra fifty cents per mile.

So far it seems to be right for our area. I have 12 clocks in the shop waiting for repair and am scheduled up through October. Eventually I think the hourly rate will be a thing of the past and I will simply charge a flat rate of $100 to $150, depending on the function of the clock. With this price set-up, cuckoo clocks could price themselves out of repairs. However, in just the short time I have been working at this, I've learned that people are very different. Some will place little value on a fine clock and prefer to replace it with a pretty "quartz-movement-special" while others will be absolutely in love with "Uncle Charlie's homemade special" and insist on its repair, no matter what the cost. I've learned to honor the customer's point of view, gently try to inform and give some rudimentary horological education, and, above all, treat their clock as invaluable.

Dick Whitmore
Ravenna, OH

Have you ever noticed that the letters we receive from members asking for assistance in business matters usually contain some pretty valuable little nuggets of business advice! In Mr. Whitmore's case, please note the last paragraph where he reaffirms the old adage that, "The customer is always right." I suspect that this has gone a long way toward assuring the success of his start-up business.

Also note that this story shows Mr. Whitmore's understanding of his own market area. What is successful in Ravenna, Ohio, may work in Manhattan, Kansas, and utterly flop on Manhattan Island, New York. The watchmaker and clockmaker need to follow certain basic rules of thumb, as Mr. Whitmore did, but you must also fit the rules to match your own situation as Mr. Whitmore relates.

Keep those letters on business matters coming. So far, each one has a good story to share with the readers.

William J. Ewbank
Editor-in-Chief

Oro Logics II: The Aurum Perspectives

Peter J. Kinberger,
Goldsmith

When looking for ring mandrels to purchase, one often finds that there is a disparity between one mandrel to the next in how a ring size is read. Added to this, is the fact that finger gauges have a propensity to differ from many mandrels.

Many jewelers will attempt to overcome the problem by attempting to compensate when sizing rings. The usual technique is sizing a ring slightly smaller than the size on the mandrel.

Some will find seeming compatibility between ring gauges and mandrels but a check of each gauge with each and every size marked on the mandrel reveals a growing disparity in the larger size calibrations.

Custom goldsmiths will attempt to find a published table of ring sizes and more often than not will find that there is a disparity at this point as well.

Many will ask their tool companies why such disparities exist, and end up finding that the tool company, often times, does not have an adequate answer or may have no answer at all. This problem may be just as much a mystery to the tool company as it is to the inquiring jeweler.

A jeweler looking at both ring gauges and mandrels will often find that they are stamped "U.S. Standard." This implies that there is an apparent standard that these items follow, but more often than not these differ as well.

Published tables tout the expression "Standard U.S. Sizes," but in comparing different published tables an even wider disparity is found.

At this point most jewelers would just "let a sleeping dog lie" and pursue the problem no further. It is now time to wake up that "sleeping dog" and get some answers.

The Problem's Origins

During the 1960s and 1970s a major attempt was made to convert the real U.S. Standard to a metric standard. The U.S. Standard is based on inch fractions.

Mandrels made in Germany and other countries, for U.S. consumption, represented metric interpretations of the U.S. Standard and were stamped as U.S. Standard. Machinists in these other countries used tools and equipment calibrated in millimeters to produce American-type mandrels.

Different countries used different metric interpretations to produce these mandrels. Each country had a different metric standard.

Mandrels were and are still made in America and combined with imports that have no country stamped on them. Therefore, real problems are created for the jewelry industry.

Most ring gauges in use today are not true U.S. Standard, although many are frequently stamped that way. These generally follow metric interpretations of the U.S. Standard. Many of these are purported to be made in America but their real origin may be suspect, due to the fact that they do not conform to American-made mandrels that closely follow the true U.S. Standard.

Looking at Tables

The process of eliminating variant tables begins by looking at numbers, specifically those that represent the inner diameter of various ring sizes. The primary concern when looking at numbers is to find a definitive pattern or equidistant measurements expressed in millimeters or inches. Inner diameters are very important, as other calculations are based on these numbers. Ring circumferences and ring blank lengths find their basis for calculation on measurements of inner diameters.

The evidence of an equidistant pattern is established in this example: the ring size 5 has a metric inside diameter of 15.6 mm while size 6 is 16.4 mm, subtracting the size 5 number from

the size 6 number yields a 0.8 mm difference. When 0.8 mm is added to 16.4 mm, the sum is 17.2 mm; 17.2 mm should be the next size up from size 6 on the scale, which is size 7. This represents an equidistance of 0.8 mm between the whole sizes, therefore 0.8 mm is the significant numeric factor by which whole sizes are distanced on the inner diameter scale.

To express the same example in inches: a size 5 would be .618" and a size 6 would be .650". Subtracting size 5 from size 6 yields a .032" difference. This distance when added to the size 6 number should yield the next size on the scale. Size 7 would be .682".

Both the 0.8 mm and the .032" differences can be further divided into eight equal parts representing fractional ring sizes in eighths, quarters, and halves.

Of all existing tables, two are known to exemplify equidistant measurements. The U.S. Standard and the German metric interpretation of that standard. The first equidistant example mentioned came from German metric tables, while the second example in inches came from the U.S. Standard.

These two tables are in direct conflict with each other, and it is evident when inner diameter numbers are multiplied by 3.14159 (Pi) to arrive at inside circumferences.

According to the German metric tables, a size 1 would be 39.0 mm while size 13 would be 69.1 mm. The noted difference between these two numbers is 30.1 mm.

The American system starts at 39.10 mm for size 1 while size 13 is 69.74 mm. The difference of 30.64 mm between these two numbers is noted.

The difference of the German and American systems are .10 mm at size 1. This has the appearance of being somewhat minuscule. The difference between the two systems at size 13 is not so minor in that a .64 mm difference becomes apparent and reflects a quarter size difference, or better.

As expressed earlier, the difference between size 1 and size 13 in the German system is 30.1 mm while in the American system the same is 30.64 mm. The total difference of .54 mm has to be absorbed in the length of mandrels from size 1 to size 13 that are manufactured for U.S. consumption. Most mandrels stop at size 15 or size 16, thus reflecting even greater disparities. Ring Gauges and finger sizers are equally as affected as ring mandrels.

Ring mandrels made from the German system will be shorter and not as wide as those made under the American system. A visual comparison of the two different mandrels will readily reveal these anomalies.

Extant mandrels from other interpretive systems only add to the confusion and have enjoyed a somewhat limited distribution in the United States while the German

and American varieties have pretty much overwhelmed the jewelry industry.

Other international interpretations of the U.S. Standard create even greater disparities.

Embracing Systems

Now that the problem of variant ring sizing systems has been explained to a degree, it is important to be able to select a system that will provide consistency in the quality of jewelry work.

The inch-fraction system of the U.S. Standard originated in the United States for American craftsmen. Its basis is founded in an equidistant measurement pattern, as mentioned earlier. This has been the preferred system of jewelers trained in the U.S.

Metric system interpretation of the U.S. Standard as is now currently used and accepted in Germany and other countries also finds its basis in an equidistant measurement pattern and has been the preferred system of jewelers trained in Europe. At this point, this system cannot be called the U.S. Standard and this writer and goldsmith believes that the usage of the term "EuroAmerican Standard" or E.A. Standard for short, would be the most appropriate means of distinquishing this system.

In order to embrace either system, one must be certain that all measuring devices such as mandrels, finger gauges, ring sizers, and the like should be precisely compatible as a set.

Tool manufacturers and suppliers should ascertain if they are supplying compatible gauges, sizers, and mandrels; and adjust their inventories to comply with these delineations, embracing one or the other system or both with an appropriate identifying feature. They should check all items stamped U.S. Standard to determine which standard is actually being followed. Unstamped items should at least be identified in sales descriptions.

The jeweler that utilizes these products should push manufacturers and suppliers towards these delineations and should ascertain for themselves the compatibility of measuring devices in their own shops.

If a jeweler sells a product to another jeweler or to the public, it should be made clear which system of measurement is used by his or her shop.

All jewelers should be able to have two complete sets of measuring devices, one in the U.S. Standard and the other in the EuroAmerican. The consuming public needs to know that their ring is going to fit correctly. Over the years this goldsmith has heard many complaints from the public that many jewelers "couldn't get their ring size right!" The major culprit behind this loss of consumer confidence is the conflict of measuring systems. That a jeweler has brought this problem under control, is a good selling point that indicates an in-store initiative to provide the best services to the consumer.

Again a jeweler must press his or her suppliers into correcting this problem. Because it is stamped U.S. Standard does not mean that it is.

Further Problems

Many repairmen may not see the importance in the accuracy of correct measurement due to the fact that a concept was once held by those teaching repair that an eighth-size plus or minus tolerance is allowable.

The smaller that a finger is, the more noticeable this tolerance becomes, according to this writer's observations over the course of years. Clients will even request an eighth size smaller or larger and it often works to their satisfaction.

The eighth-size judgment call should be left to the client, and the repairman should size the ring absolutely correctly without relying on tolerances. In high-speed situations where massive amounts of ring sizings are encountered, these tolerances are almost unavoidable but accuracy should be maintained as close as is possible under difficult situations.

In jewelry-making environments, whether custom or commercial, accuracy is of paramount concern. Features added to ring shanks derive measurements from other measurements in construction and laborious measurements work to the end of a perfected creation.

An in-metal master pattern or model leaves very little room for error in its creation. Since a master pattern will have a mold or a die created from it, concerns such as shrinkage have to be factored into the measurements and this includes ring sizes. Wax patterns require the same type of precision. Strong reliance is placed on accurate measuring devices.

For a custom goldsmith, silversmith, or platinumsmith, precision is extremely important due to the fact that many pieces are customer specific and rings are made in such a way as to be certain that even the very appearance of a sizing seam does not occur at the bottom of a shank where rings are traditionally sized. The bottom of such shanks will be solid due to the fact that correct sizing has been factored into the design and that any necessary seam is almost always at the top of a ring or that a precise portion of the ring has been cut away to accept the addition of another feature of design. One of the primary reasons for this is that a custom jeweler has to stay beyond reproach with his clientele. It could easily be said that the ring was not made especially for the custom client but was ordered and then sized to fit. This very doubt can jeopardize a custom jeweler's reputation.

A custom jeweler who works in wax must be equally as conscientious as one that works in metal. The wax must be precisely the customer's size with shrinkage accounted for. In both of the above instances, rings should not have to be cut down or sized up.

The Use of Ring Size Tables

Ring size tables are tools that are as equally important as all other ring size measuring devices. The tables that one chooses to use should also be compatible with mandrels, gauges, and sizers.

Many tables are published but are unusable, inaccurate, or do not follow the equidistant rule as established earlier in this article.

Ring blank lengths are calculated from ring size measurements. In order to hand make an eternity ring, one must know the exact length of rolled stock to use or order, so that when it is bent into a circle, the ends are joined, ring is rounded, and should be the specific size needed. When hand making an eternity ring it is easier to measure and make stone placement marks in the metal while the rolled stock is flat. Then when it is bent and joined, precise holes can be drilled through these marks and the holes be precisely distanced from one another.

There are many other reasons for being certain of precise ring blank lengths. This writer has encountered many custom goldsmiths who have wondered why their charts cause them to end up short and invariably have to resort to calculation to determine proper lengths of ring stock. Correct ring tables calibrated with proper measuring devices make easy work of determining the correct ring blank lengths to use in a project.

One of the problems associated with the use of these tables is finding the correct table. Ring blank tables are often detached from ring size tables and when published together they often are found to be incompatible. To compound the problem, the true U.S. Standard table is virtually nowhere to be found, even in the U.S. Bureau of Standards. The Euro-American tables are found in bits and pieces, or incomplete.

In an effort to make the tables available for "Oro Logics II" readers, these tables have now been calculated and will be made available in the next issue of *Horological Times*. An explanation of the calculations will be published along with them. This will be the first time that the exhaustive U.S. Standard and the EuroAmerican Standard Tables will be published together in any publication. These should conform to the measuring devices commonly available through American tool suppliers.

These reconstructions required several thousand individual calculations in order to make them available, and few would have known that this would be required to provide you with a tool to make life easier behind the bench.

Due to the length of these tables it may be necessary to split them up between the next issue and the one following.

Until then, try to get your suppliers to provide compatible measuring tools!

Robert D. Porter, CMW

How to Make a Winding Pinion and Clutch

Part 8
Cutting the Winding Pinion Clutch Face

We completed the cutting of the pinion teeth in Part 7. Figure 45 pictures a 70-degree commercial cutter at work cutting the ten clutch teeth. The bottom of the cutter is on the horizontal centerline of the pinion as illustrated in Figure 46. The knurled knob of the top slide, pictured in Figure 47, was used to feed the cutter through the clutch at a 6.8 degree angle to give the clutch-locking face a keystone profile, thereby assuring full contact between the clutch faces of the winding and clutch pinions. Figure 48 also illustrates the tooling arrangement being used to cut the clutch teeth. The torsion drive is loosely supported at mid-length with the left hand while cutting the clutch teeth.

The formula for figuring the slide rest feed angle setting for cutting first order clutch teeth is:

The tangent of $\frac{180°}{\text{teeth in clutch}}$ x the cotangent of the cutter angle = the sine of the feed angle so,

180° divided by 10 (teeth in clutch) equals 18°.
The tangent of 18° is .32492 (from a calculator).
The cutter angle is 70°.
The cotangent of 70° is .36397.
(First find the tangent of 70° (2.74748) and divide into 1 to get the cotangent of 70° = .36397.)

The tangent of 18° (.32492) times the cotangent of 70° (.36397) equals .11826, which is the sine of the feed angle.
.11826 is the sine of 6.79°, and is the slide rest setting.

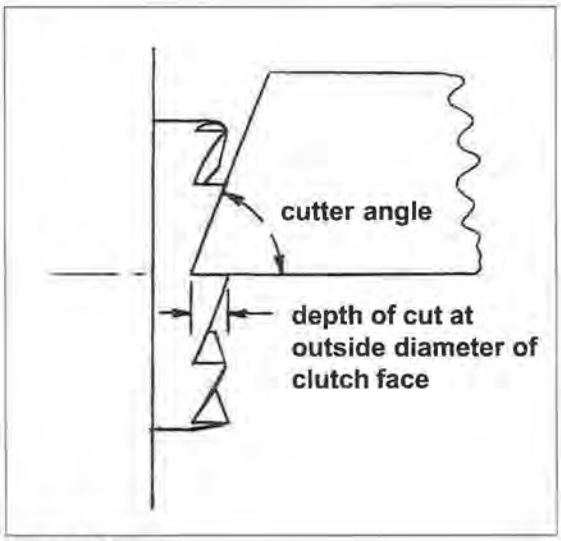

Figure 46.

Figure 45.

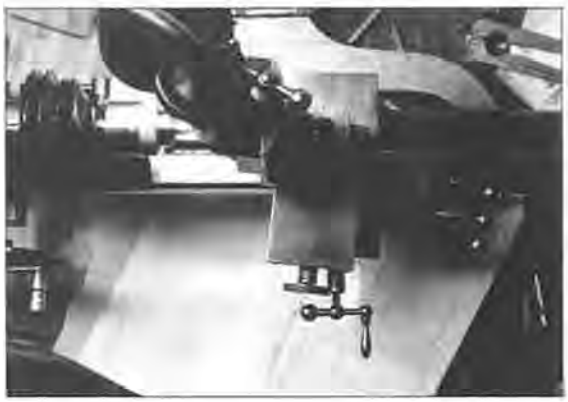

Figure 47.

CHART 50A

SLIDE REST ANGLE SETTING FOR CUTTING CLUTCH TEETH
AND DEPTH OF CUT FACTORS FOR 3- AND 2-WAY SLIDE REST
(clutch face diameter times factor equals depth of cut from corner touch-off)

CUTTER 60°	**NUMBER OF TEETH IN CLUTCH**								
	8	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
SET ANGLE DEGREES =	***13.8***	***12.1***	***10.8***	***9.8***	***8.9***	***8.2***	***7.6***	***7.1***	***6.6***
3-WAY DIA. TIMES	.2390	.2101	.1876	.1695	.1545	.1423	.1317	.1227	.1148
2-WAY DIA. TIMES	.2462	.2149	.1909	.1720	.1564	.1437	.1329	.1237	.1155

CUTTER 70°	**NUMBER OF TEETH IN CLUTCH**								
	8	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
SET ANGLE DEGREES =	***8.7***	***7.6***	***6.8***	***6.1***	***5.6***	***5.2***	***4.8***	***4.4***	***4.2***
3-WAY DIA. TIMES	.1507	.1324	.1182	.1068	.0974	.0898	.0832	.0774	.0724
2-WAY DIA. TIMES	.1525	.1336	.1191	.1074	.0979	.0901	.0834	.0776	.0726

CUTTER 80°	**NUMBER OF TEETH IN CLUTCH**								
	8	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
SET ANGLE DEGREES =	***4.2***	***3.7***	***3.3***	***3.0***	***2.7***	***2.5***	***2.3***	***2.2***	***2.0***
3-WAY DIA. TIMES	.0731	.0642	.0572	.0518	.0473	.0434	.0403	.0375	.0351
2-WAY DIA. TIMES	.0733	.0643	.0573	.0519	.0473	.0435	.0403	.0375	.0351

To determine the depth of cut for any other cutter angle: Multiply the diameter of the clutch face by the sine of the set angle for a three-way slide rest, and by the tangent of the set angle for a two-way slide rest.

Figure 48.

Depth of Cut

To determine how far to advance the cutter to the left into the stock, we multiply the diameter of the clutch face (3.48 mm) by the sine of the 6.79 degree slide rest angle setting (.11826) which gives us .41 mm (.0162") from radial "touch off" of the cutter with the *corner* of the clutch face using a three-way slide rest as shown in Figures 49 and 50.

We will also look at a practical way to use a two-way slide rest to cut clutch teeth in Part 9. Chart 50A (page 23) has the angle setting and depth-of-cut factors for 60-, 70-, and 80-degree cutters for both types of slide rest.

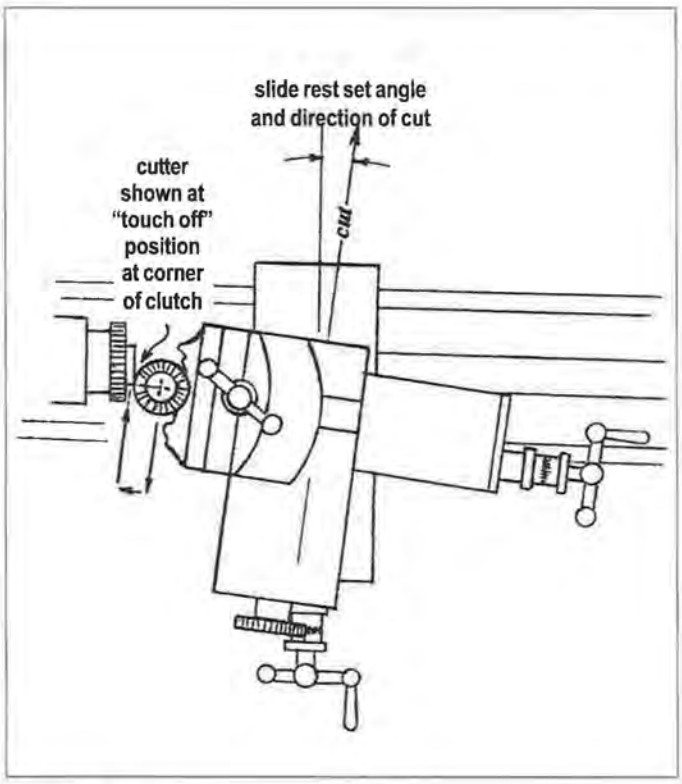

Figure 49.

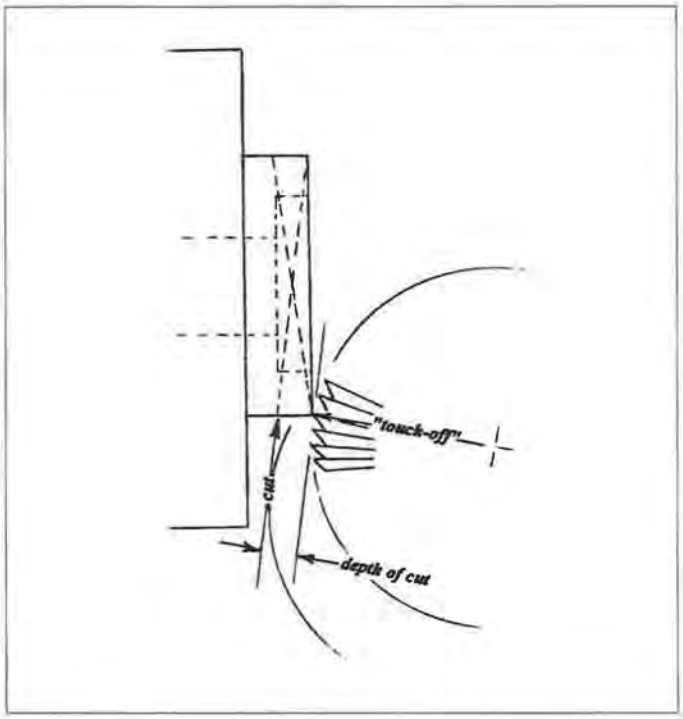

Figure 50.

SEEKING PROSPECTIVE CANDIDATES FOR THE AWI BOARD OF DIRECTORS

The committee involved with securing candidates to run for the AWI Board of Directors is seeking recommendations from the membership. If you plan to suggest a possible candidate, please send that individual's name and background to: Deborah Varjabedian, Chairman; Nominations for Board of Directors Committee; AWI Headquarters; 701 Enterprise Drive; Harrison, Ohio 45030.

Each recommendation will be carefully considered by the committee. Candidates will be selected on the basis of their past local association or AWI experience, geographical location, present job status, horological experience, and willingness to serve.

Recommendations must be received before December 31, 1998 for them to be considered for the 1999 election.

The Puzzle

By Tom Button

Being a beginning student in watchmaking at OSU - Okmulgee one of the first skills we learned was how to file. No problem right! After all, we all know how to file. Nevertheless, to file flat—no rounded corners, no rounded centers—just takes some concentration and your time. Right? Boy was I wrong.

Our instructor, Wit Jarochowski, gave us a little puzzle to do (see Figure 1). We were to pick four of the six shapes and make them. Of course, we did have our tolerances that we had to worry about, a +/- .15 mm. Also, we had to use the beginning and ending shapes but could select two of the four remaining pieces. Starting with a good piece of brass, the first thing I did was to square the sides. The first piece I started with would be simple (see Figure 2). I knew I could saw a straight line and could mark my lines with some accuracy, so I started. I cut my first piece at 12.1 mm in length and made my diagonal cuts to the 3 mm mark, leaving 2 mm on one side and approximately 2.15 mm on the other side, knowing I could file down to the exact dimension later.

After cutting and filing, the shape was starting to look like it should. This was going to be easy! I finished this section by filing down to the right dimensions. Time to start the second piece, and the obvious choice was the one that fits the first piece. I wanted to see how well my pieces would fit together, so I started by cutting the point (Figure 3), and it looked like it should fit fairly well after I finished the edges.

Now to cut the semicircle (this piece was still part of a longer piece of brass). I found the center line of the brass and set my dividers at 5 mm and made sure that I would come to within 1 mm of the sides; with that done I scribed the arch. After cutting the arch, I proceeded to file as flat as possible. With a little too much filing I ended with one side less then the 12 mm as called for in the plan. Oh well, junk this piece. Following the same procedures as listed above, I again cut a second piece, only this time I cut the arch first, leaving the piece long enough to make minor correction. I found it was really difficult to file flat on such a small (1 mm) section.

After getting the arch cut, I remembered a motto we have in our room, it's "LOOK, LOOK, LOOK, THINK." After doing that it dawned on me that the arch was probably the hardest part to do, so I decided to do the connecting piece. If they did not fit it would be a waste of time to do the ends.

Following the same steps, I found the center line and made sure I had 1 mm on each side and scribed my arch. Cutting it went quite smoothly and I got a good fit between the pieces. It was still difficult to file flat on such a small section, the 1 mm between the edge and arch. (I never did get a flat area filed as I kept rolling the file on the corners.)

Now I got a fit with my arch and cut the end section on this piece (see Figure 4). To my surprise. it came out better than expected. All I needed to do now was to cut the final piece (see

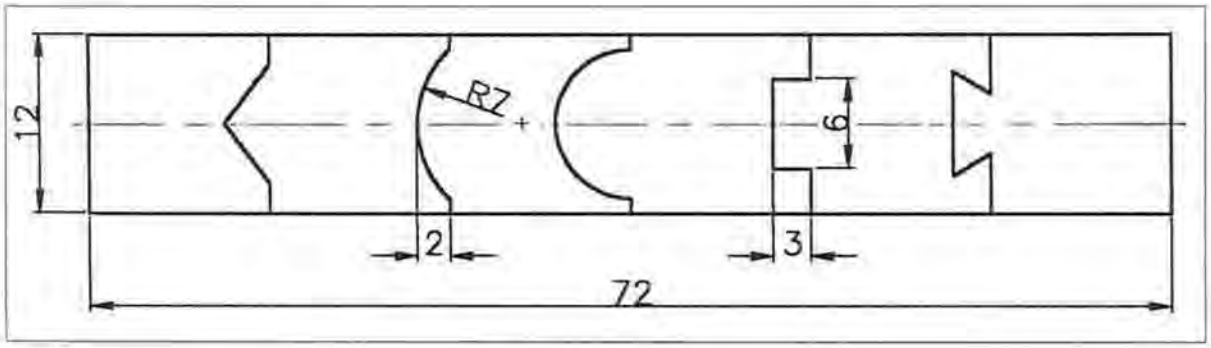

Figure 1.

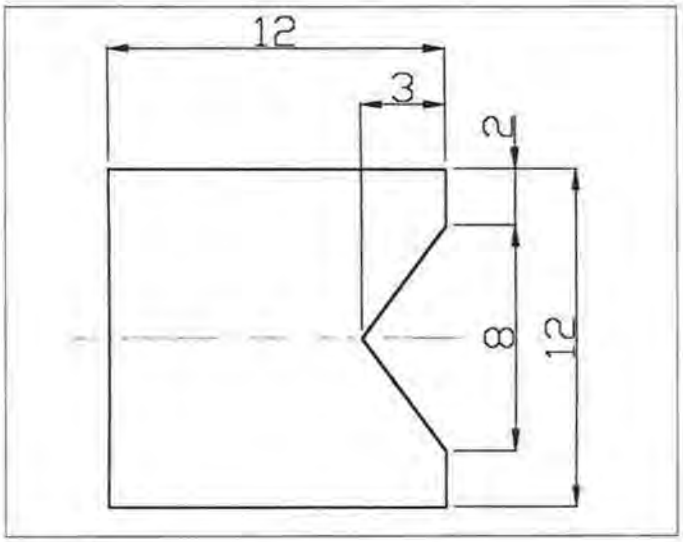

Figure 2.

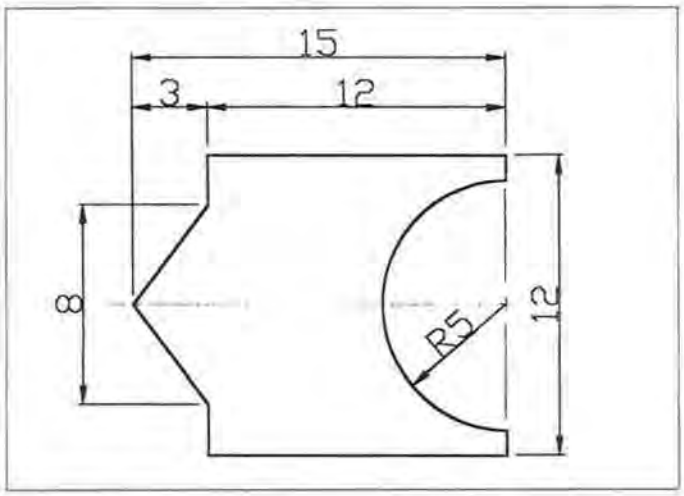

Figure 3.

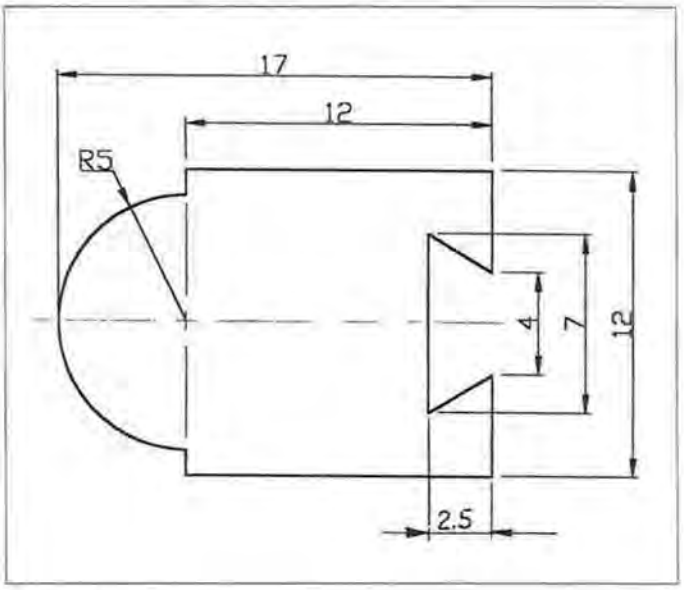

Figure 4.

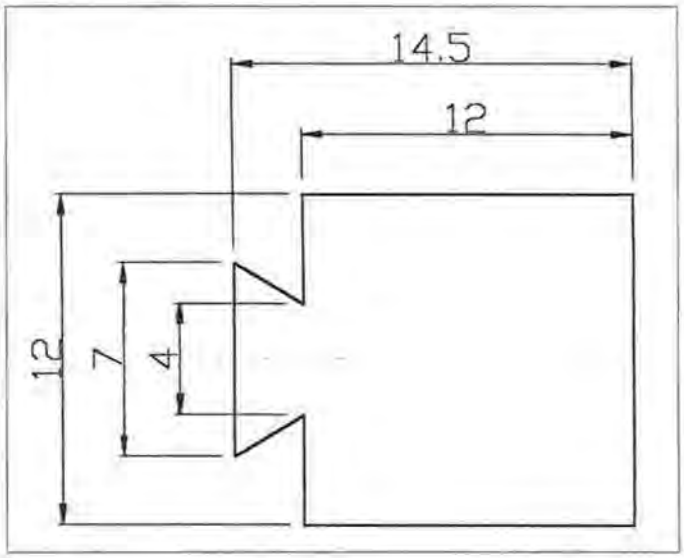

Figure 5.

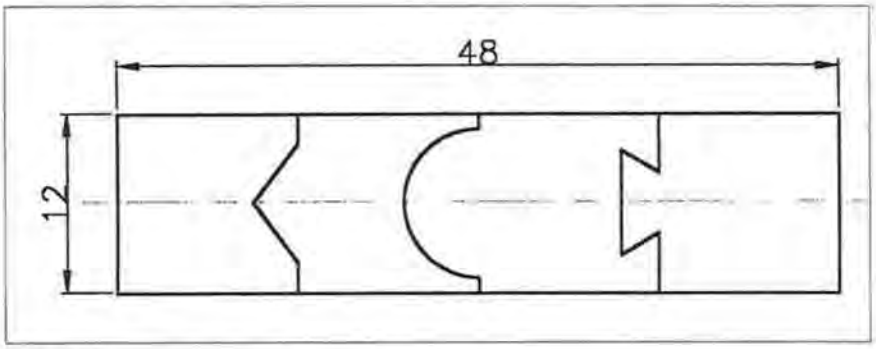

Figure 6.

Figure 5). I think that in just cutting this piece out, I had more problems than expected. It seems I could not get the sides proportional and it took three tries before I got it, but it did fit nicely.

Now all that was left was to fine tune all the pieces so they would fit together as best they could. That was no easy task, being very aware of the dimensions with which I had to work. It turned out that I had to make the first piece again, but after all was said and done my puzzle turned out to be pretty good (see Figure 6). I still missed my overall length. I was at 48.2 mm instead of 48.0 mm. (I was still off on the second piece.)

Now they tell me next semester that we will make a "perfect cube" from a round piece of stock, and that it will be harder than the puzzle. Oh boy, I can hardly wait.

Technically Watches

Pocket Watches and Their Maintenance
Part 5
Mainsprings (Continued)

Figure 1 is a graph showing the run down curve of a 16-size Hamilton Dynavar mainspring which is made from their new alloy developed in the early 1950s. The base of the graph shows the number of turns that the mainspring is wound. The left vertical end of the graph shows the torque of the mainspring for each turn and quarter turn of winding. This particular mainspring allowed a winding of almost eight turns. When fully wound, it delivered a power of 365 gram-mm. As the mainspring unwinds during the rundown period, the curve drops off, which indicates that the mainspring is delivering less and less force. The force of the mainspring drops off drastically on the last turn just before being completely run down.

The power curve on this graph was gotten by the use of a dynamometer which is a laboratory instrument used to test the torque of mainsprings.

The Power of a Mainspring

The strength of a mainspring is affected by changing its thickness, width, and length. Changing the thickness of a mainspring affects its strength more than changing the width or length. When we change the thickness of a mainspring, the strength is changed as the cube of the thickness or (T^3). If we double the thickness of a mainspring, it will be eight times stronger. For example, if we take a mainspring that has a thickness of .20 mm, this thickness cubed would be .20 x .20 x .20 or .008 mm. If we double the thickness of the mainspring, we would have .40 x .40 x .40 or .064. Therefore,

$$\frac{.064}{.008} = 8 = 8 \text{ times stronger.}$$

If the thickness is decreased .01 mm from .20 mm to .19 mm, the following decrease in the power of the mainspring should occur:

$$\frac{.19 \times .19 \times .19 = .006859}{.20 \times .20 \times .20 = .008} = .857375 \text{ or } 85.7375\%$$

decrease in power. This points out how critical it is to have the thickness of the mainspring correct.

The Width of a Mainspring

Changing the width of a mainspring without changing the thickness or length changes the power in direct proportion. If we make the mainspring one-half as wide, it will have one-half as much power. If the mainspring is made twice as wide without changing its thickness or length, the power will be twice as much.

The Length of a Mainspring

Changing the length of a mainspring changes its power in inverse proportion; that is, if we make a mainspring one-half as long without changing the thickness or width, its power will be twice as much. On the other hand, if a mainspring is selected that is twice as long without changing the width or thickness, the power will be one-half as much.

The Proper Mainspring Length

The mainspring for a given barrel should be of such a length that it fills a certain amount of the available space in the barrel; otherwise, the spring may not run the watch for the maximum number of hours on a full winding. For a maximum length of run, the mainspring should occupy one-half of the available area in the barrel whether it is run down or wound up fully. The barrel arbor occupies part of the inside area of the barrel. The diameter of the barrel arbor is usually made about one-third the inside diameter of the barrel. This can vary slightly with different makers.

Figure 2 shows how the available inside barrel area is divided into two equal areas. Area A is occupied when the mainspring is completely run down. When the mainspring is fully wound around the barrel arbor, it will occupy area B, which is one-half of the available area as is area A. This condition allows the maximum turns of winding; thus, the maximum number of hours of running on a full winding. View C, Figure 2 shows the barrel arbor.

Figure 3 shows a mainspring barrel which has a mainspring that is in a rundown position in the barrel. This mainspring is the correct length to occupy one-half of the available area in the barrel. A mainspring situated in this position in the barrel usually has from eleven to thirteen coils. The number of coils would depend on the thickness of the mainspring. A thin mainspring might have thirteen coils, whereas a thicker spring might have eleven or twelve coils.

Figure 4 shows the same mainspring and barrel that is shown in Figure 3. In this illustration, the mainspring is wound fully around the arbor. In this case, the mainspring also occupies one-half of the available area. Note that there are more coils when the mainspring is wound fully compared to when the mainspring is run down. A mainspring rule that applies to this situation is: The number of turns of the barrel is equal to the difference between the number of coils of the spring in the wound up and run down position. If a mainspring has 12 coils when run down and 20 coils when fully wound, then the barrel should make eight turns on a complete winding.

If a mainspring occupies more or less than one-half of the available area, the barrel will not have the maximum number of turns on a complete winding. If the mainspring is too short, it will become wound too soon which will cause it to run down early. On the other hand, if the mainspring is too long, it will become wound too soon because of less available space in the barrel; therefore, the barrel will make fewer turns on a full winding.

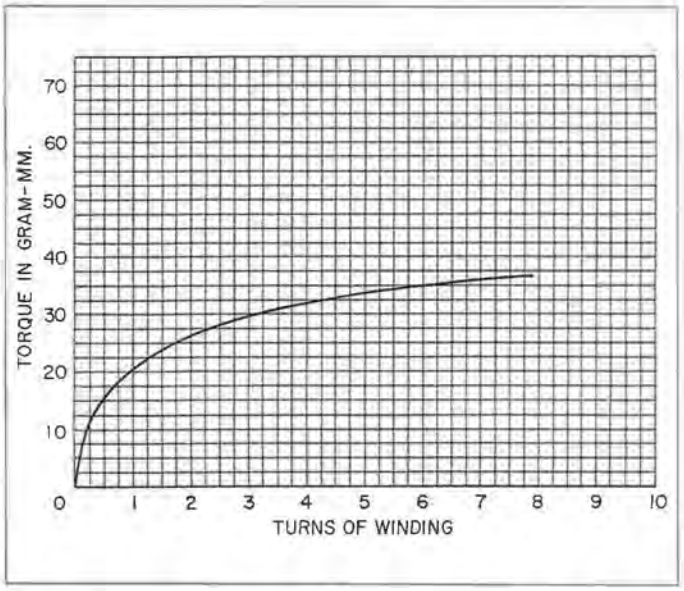

Figure 1.

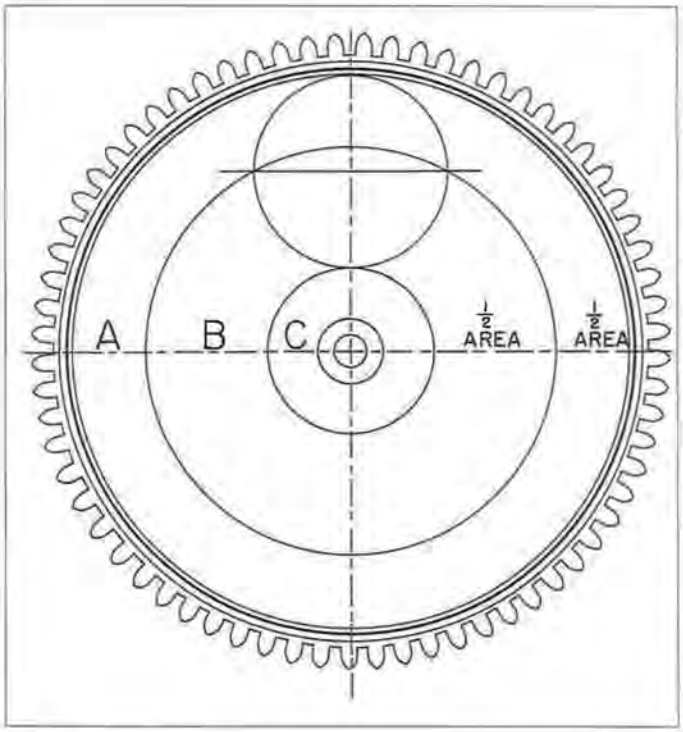

Figure 2.

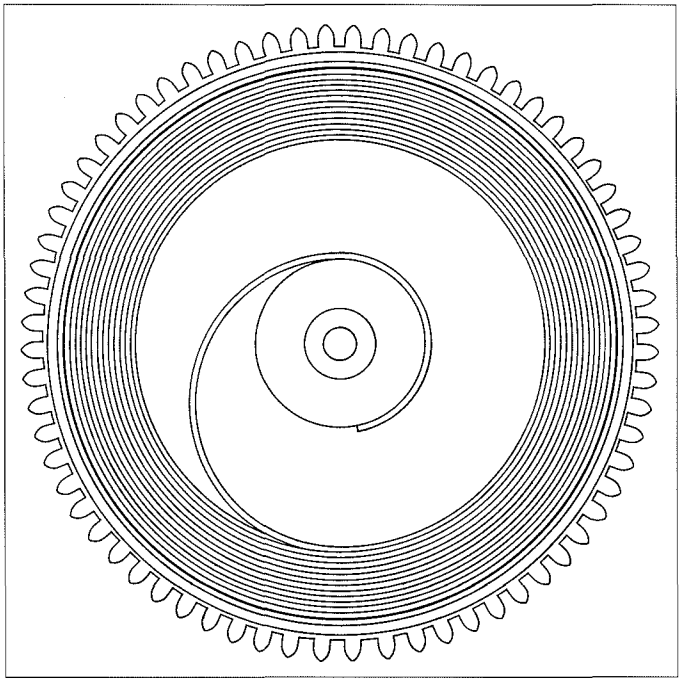

Figure 3.

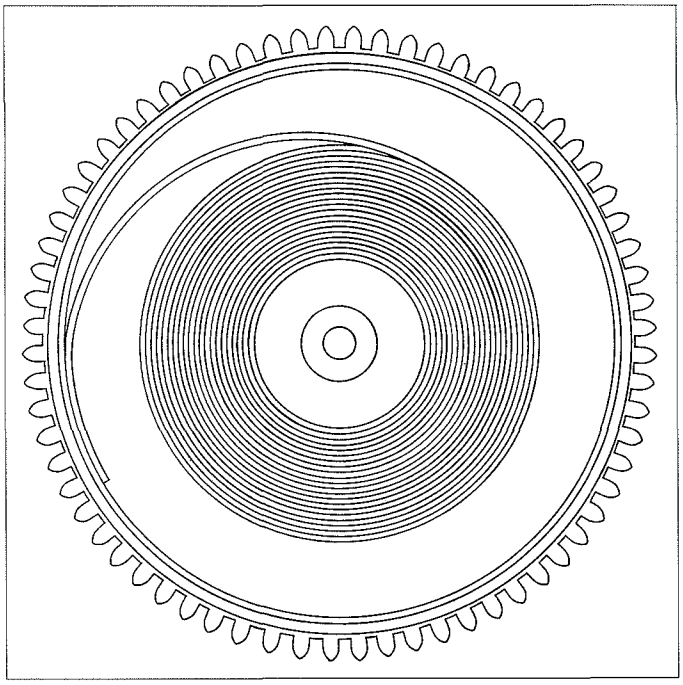

Figure 4.

Calculating for the Proper Mainspring Length

The following method can be used to calculate for the correct length mainspring that will occupy one-half of the available area in the barrel. The following formula is used:

$$L = \frac{\pi \times (R^2 - r^2)}{2 \times T}$$

When: L = Length of mainspring
R = Inside radius of barrel

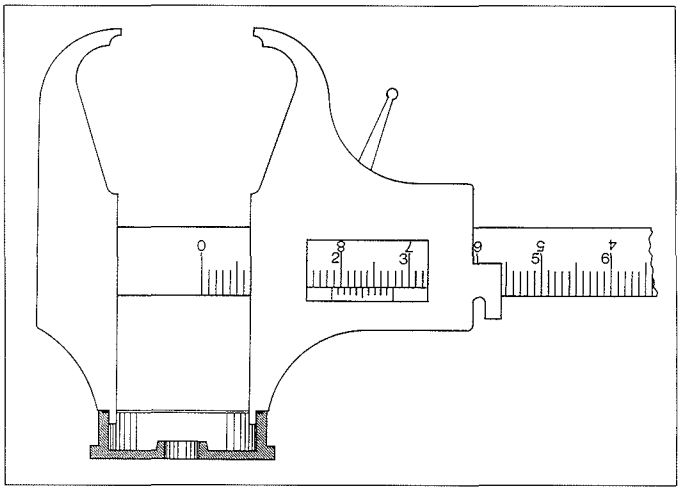

Figure 5.

r = Radius of barrel arbor
T = Thickness of mainspring
π = Pi or 3.1416

The following is an example of using the formula when calculating the length of a mainspring.

Suppose we have a 16-size watch that has a mainspring which is too short to run the watch for the required number of hours. The mainspring does not take up one-half of the available area in the barrel. To calculate for the correct length of mainspring, first measure the inside diameter of the barrel. This can be done as shown in Figure 5. A Boley-style vernier caliper is shown being used for this purpose. When using this style of gauge to make inside measurements, the width of both jaws of the caliper must be added to the actual reading for a correct measurement.

Usually, the width of each jaw is 1.00 mm. Let's say the inside diameter of the barrel is 16.00 mm.

Next, we measure the diameter of the barrel arbor hub. Let's say the arbor hub measures 5.00 mm. Now determine the thickness of the mainspring and we find that it is .16 mm thick.

Now, we have the necessary measurements to calculate the length of the new mainspring.

Barrel inside diameter = 16.00
Barrel radius = 8.00
Arbor diameter = 5.00
Arbor radius = 2.50
Mainspring thickness = .16

Using the formula:

$$\text{Length} = \frac{3.1416 \times (8.00^2 - 2.5^2)}{2 \times .16}$$

$$\text{Length} = \frac{3.1416 \times (64 - 6.25)}{.32} = 566.96 \text{ mm}$$

$$\text{Length in inches} = \frac{566.96 \text{ mm}}{25.4} = 22.32 \text{ inches}$$

Second Formula for Calculating the Length

Another formula that can be used to calculate the length of a mainspring is as follows:

$$L = \frac{(B + A) \times (B - A)}{64.6 \times T}$$

When: A = Diameter of arbor
B = Inside diameter of barrel
T = Thickness of mainspring
L Length of mainspring

Substituting dimensions for the letters in the formula, we will have:

A = 6.00
B = 18.00
T = .18

Using the formula:

$$L = \frac{(18.00 + 6.00) \times (18.00 - 6.00)}{64.6 \times T}$$

$$L = \frac{24.00 \times 12.00}{11.628} = 24.7678 \text{ inches}$$

Length in millimeters can be gotten by multiplying inches x 25.4.
Length in millimeters = 24.7678 x 25.4 = 629.10 mm.

Width of a Mainspring

Figure 6 shows how the vernier caliper is used to measure the depth of a mainspring barrel to determine the proper width for its mainspring. The measurement is taken

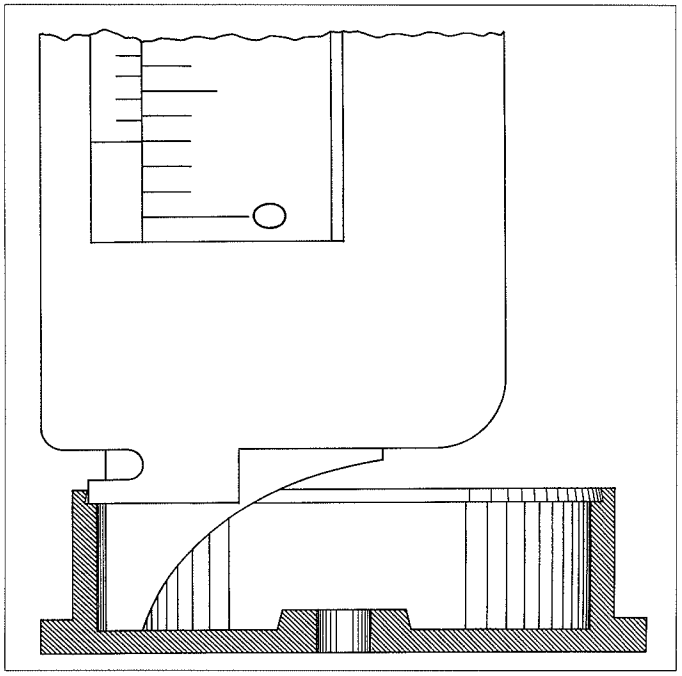

Figure 6.

from the seat for the cover to the bottom of the barrel. If the under side of the cover is recessed, the measurement taken will be the width for the mainspring. If the cover is flat and not recessed, then .15 mm should be subtracted from the measurement to obtain the correct width for the mainspring for a pocket watch, and .10 mm should be subtracted from the measurement if the mainspring is for a wrist watch.

Pocket Watches and Their Maintenance will continue.

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Joseph Bulova School of Watchmaking. "Mainspring Barrel Assembly," *Training Manual Unit Number 9A.* Tenth Edition, New York, 1972, p. 211.

Levin, Louis and Samuel. *Practical Benchwork for Horologists.* Los Angeles, California: Louis Levin and Son, Inc., 1950, pp. 166-167.

Sandsteel Mainspring Manual, Catalog Number 25, no date, p.15.

The late Henry Fried and Ben Matz, AWI's adjunct historian were friends for many years who shared an interest in chess. In 1971, Mr. Fried made as a gift for his friend, a miniature pocket portable chess set. The set is unique in that it was made from a watchmakers metal stock entirely with watchmakers tools, including lathe and fine files. Mr. Matz has donated the set to the AWI Education, Library and Museum Trust for display at the museum in the AWI national headquarters building. The photo above shows Mr. Matz presenting the chess set to Bill Ewbank, AWI Executive Director at the annual Board Meeting in June.

AWI Material Search

EDITOR'S NOTE: This column is designed to work in conjunction with the AWI Movement Bank. If you can supply any of the items listed here, please send details to the Material Search Network. **Do not send the items to AWI.** Members requesting these items will be advised of their availability and will contact you directly.

1N1 LeCoultre 846 cannon pinion, 2.15 mm.

1N2 Meicer (Swiss) 9x13L staff and center wheel.

1N3 Dueber Grand, 17 jewel, size 14, serial #1976442, hairspring and collet or complete balance.

1N8 Hamilton 940, 18's, 21 jewel, serial #452.803, 2-piece pallet fork with conical pivots for single roller, part #96.

1N9 Waltham 92, 18's, Vanguard 23 jewel, serial #18130655, pallet fork with conical pivots for double roller, square back part #1715, round back part #1715A.

1N10 IWC 75 fourth wheel.

If you can supply any of these items, please contact: AWI Material Search Network, AWI Headquarters, 701 Enterprise Drive, Harrison, OH 45030; Phone (513) 367-9800; Fax (513) 367-1414.

Bulletin Board

NEW REQUESTS

ETIC Quartz Watch Testing Equipment
Donald Yax, Howell, MI, is seeking an operator's manual or instructions for operating an ETIC Model 340.525 662 Stabilwatch, an ETIC Model 340-610 or 644 Speedy Trim MK1, an ETIC Switch Box 340-612, and an ETIC Microphone 340-608 32 KH.

DYNA MYTE 2200 Milling Machine
Charles Mazzone, Sandwich, MA, is looking for a source for parts and repairs for a DYNA MYTE 2200 three-axis CNC milling machine. The machine was manufactured by Dyna Electronics, Inc., formerly of Sunnyvale, CA. He is also seeking a copy of the operating and programming manual for this machine.

RESPONSES

At press time, no responses were received for publication.

ITEMS STILL NEEDED

Bulova Shelf Clock
Gaetan Demers, Lawrence, MA, needs to know the beat rate of a Bulova shelf clock. The clock is battery operated with a mechanical Japanese movement. This clock has Westminster chimes.

C & E Marshall Material Cabinet Charts
Michael Okagaki, San Francisco, CA, is looking for two material charts for a C & E Marshall Material Cabinet. The wooden cabinet has 10 drawers, circa 1920s. The Marco System Number is not known, but the rest of the system covers older Swiss material, 4 to 10½ ligne.

He needs a material chart for Setting Levers and Screws, Drawer #4, 160 clear top boxes in a wooden drawer. This drawer appears to contain an assortment of 160 types of setting levers and screws for Swiss watches, roughly 4 to 10½ ligne.

The other chart is for the Setting Bridges, Drawer #7, 160 clear top boxes in a wooden drawer. This drawer appears to contain an assortment of 160 types of setting bridges for Swiss watches, roughly 4 to 10½ ligne.

Vigor TC2000A Timing Machine
Sergio Lotenschtein, Honolulu, HI, is seeking an owner's manual for a Vigor TC2000A mechanical and quartz timing machine.

Portescap Ultrasonic Cleaner Rc-4
R.L. D'Avignon, Syracuse, NY, is seeking a schematic for a Portescap US Ultrasonic Cleaner, Model Rc-4. If anyone has this schematic, AWI will make a copy for Mr. D'Avignon, retain one for our technical files, and return the original.

Material Matters

By Peter W. Eckel

Everywhere I look people are talking and reading about this being the information age and that the future rests with the *information superhighway*. Is this true for our industry? I think the answer lies somewhere between of course and why not. However, the information itself doesn't necessarily have to be new to be valuable. Let me explain.

At the risk of dating myself again, if you must know I'm 39, I remember the advent of the digital watch craze. You remember that time don't you? The 357 and the 386 were the only cells worth worrying about and the end of the analog watch was all but certain. You could throw out your *Bestfit* books because no one would ever buy anything but a digital again. The more things change the more they remain the same! The analog watch is still supreme.

I would like to talk about the old and the new in horology and more specifically the *information not so super highway*. Let's see a show of hands, how many of you still have a set of *Bestfit* books around your shop? How many are unidentifiable because the covers have been torn off from more years of wear than you care to admit. I thought so. Well I have bad news and I have good news. The bad news is the fact that the parent company of Bestfit, Vigor and before that B. Jadow & Sons, is gone. The good news is they were bought by Grobet USA, the people who used to bring you Quickfit. They have made a new commitment to the watch industry as a supplier of watch material.

So here's something old and something new from those people. The old *Bestfit #111* and *Bestfit #111A* books are back in print and are available from your material house. I do have to warn you though, these are the originals and have not been updated. If you work on a fair number of mechanicals, especially chronographs and timers, these books are still a great resource. The new item from Bestfit is their latest release of the MATSYS, which is the software used by your material house to catalog parts. It is all based on what used to be called the "300 System," where each material house received cards for each new caliber and each part was assigned a number. What was and is great about this system is that all set bridges, for example, share a prefix of #445 with the rest of the number looking like this #445/276. You've probably seen numbers like this on the material you receive and every watch that takes the same set bridge will have the same number referenced.

What good is all this wonderful, if seemingly useless, information I've just given you? Well, if you have a personal computer and it has a CD (compact disc) drive, at least 70 or 80 megabytes of free hard drive space, at least 16 megabytes of RAM, and preferably Windows 95 ® you too can converse in material speak. By the way, if all that was too confusing do what everyone else does, find a patient six-year-old to explain it to you. I know what you're thinking, part numbers and interchangeability is the material persons' problem not mine. WRONG! Just think of all the stuff you have around your shop, the extra Seiko crown you ordered for that rush job that you didn't use or the extra stem that is labeled with only that movement's caliber even though it may fit twelve other calibers you see everyday. Ah Ha, you suddenly may have a way of using some of that stuff instead of ordering it again from your faithful material house. Wait a minute, I forgot I want you to do that. Oh well, another mistake made by a rookie journalist.

A couple of other advantages come to mind also. Imagine you are working on what one of my favorite customers euphemistically refers to as a "fine timepiece," and you are trying your best to explain to the hapless material person on the other end of the phone which wheel you need. You know the one, it's in the date section of the watch and it just went flying into the Bermuda Triangle around your bench. You know what it looked like and where it goes in the watch but the material person is staring, glassy eyed, at a screen with part names and numbers but usually no pictures. If you have the same information in front of you that we do, you can narrow it down to one or two possibilities before you call and together we can figure it out. Also, those boxes upon boxes of nicely organized junk movements you have at your disposal become much more valuable because you can find what movement interchanges with yours for the particular part you need.

This system is not necessarily for everyone, but it

does have listings for most Swiss quartz and mechanicals, Hattori movement and case parts, and Omega movement and casing, along with Citizen movement and casing parts. The one thing that is lacking is old Bulova so you'll have to keep the old books for that and one caution: this system is by no means complete but it can be added to and it is the most comprehensive thing going. Again, if you have any further questions you can contact me or your local material house.

Two other information items to pass along, the Germanow-Simon Machine Company or, as everyone knows them, G.S. has just issued a new comprehensive catalog for their complete crystal line. They have incorporated a very useful tact for listing crystals, even crystals that are not in production at this time are listed with a small telephone icon to alert you that the availability may be in doubt. They have also included their line of case closers, optics, and we welcome back the G.S. UV adhesive bottle with the pinpoint applicator. If you are having trouble applying ultraviolet cement, this is a wonderful solution. Be advised though this is the bottle only and you have to put your own glue in it.

Not to be outdone, American Perfit has also issued their new catalog with up-to-date listings of their glass fancy crystals and of course their Stella line of plastics. They are also showing an expanded line of the old Military-style MX crystals in unfinished form that work well for the new retro and fashion watches. And some more good news, they are again stocking the Geneva and Mi-Emp glass pocket watch crystals. Ask your material house to reorder these if you still want them because so far the demand is lagging.

I'd like to take a moment before I close to thank these companies and companies like Newall for their re-energized commitment to horology and I invite everyone to keep me up to date with information about their new products so that I might pass that information on to my readers, both of you. You can reach me c/o Wm. S. McCaw Co., 1722 Madison Ave., Toledo, Ohio 43624 or e-mail to mccawco@worldnet.att.net.

Next time, I'll be delving into "old parts" and what to do with them and about them at the suggestion of one of those two readers, Mr. Hans Weber of the Watchmakers Association of New Jersey, who was kind enough to drop me a line a few months ago.

Take care and remember, material matters.

Jack Kurdzionak

From the Workshop

Four Square and Four Years Ago

The square portion of a winding arbor in a clock can be badly worn from many years of use and abuse. Indiana's Dave Carlson relates the following. A customer brought in a 30-hour kitchen clock with badly rounded winding arbors. I squared off the arbors for the next smaller key size, but I was concerned that it would happen again based on the very soft steel in the arbors.

My solution was to case harden the winding arbors. The winding square is heated to a cherry red color and then dipped in a case hardening powder. The arbor is then reheated to a cherry red for one minute and quenched in water. This process forms an extremely hard surface skin that is very resistant to wear. The process can be repeated and the reheat done longer for an even thicker skin. For my needs it was only necessary to do it once. The clock was inspected recently after four years in the field and the arbor is A-OK.

MSC Tool Supply (1-800-645-7270) sells a brand of case hardening powder known as "Kasenit" and its catalog number is 00263012. Donald DeCarle gives two case hardening formulas on page 304 of his *Watch and Clock Encyclopedia*.

Toss Those Old Clock Keys

Whenever a clock comes to John Kurdzionak of Stoneham, Massachusetts, he always asks to see the key or keys that are used to wind the clock. Many times the keys used for winding the clock are worn internally, are the incorrect size, or both. These situations call for the clockmaker to fit and supply a brand new, closely fitting key. Worn or oversize clock keys can round the squares of winding arbors every time the clock is wound. Many of the old keys brought in with the clock are steel and oversize. This combination can be a disaster for an old American clock with very soft winding arbors. A new brass key, properly fit, will not cause damage to the arbor and will prevent the kind of wear that Dave Carlson has had to repair.

A 60-Second Solution

You need a pin punch to push a pin out of something. It might be one of those .7 mm pins used in the links of a Movado bracelet watch.

Whatever pin you are pushing out, the staking tool punches just won't do. The tips of all of the flat punches are tapered and they will not push the pin very far before the tapered end of the punch prevents the punch from entering the hole any further. You can make a very good pin punch in a minute or so and make it just the right size. Select a piece of blue steel pivot wire that is the correct diameter for the job at hand. Push it into a flat-faced staking tool punch so that it just fits in with a bit of side clearance. You do not want it jammed into the end of the punch. Cut off the pivot wire so that the length of wire protruding from the end of the punch is long enough to do the job but not longer than is necessary. That keeps it from bending. Flatten the tip of the wire with a stone and you have a custom-made pin punch in less than a minute. If it bends or breaks, no harm is done as you can remove the stub from the punch and make another.

Jack Kurdzionak

Cotter Pins for Watch Bracelets

I don't know what else to call these pins that attach watch bracelet links together and attach the bracelets to the cases. These cotter pins are made from a length of stainless steel folded over itself. The open end is expanded slightly to provide some friction to hold the pin in the bracelet. You have seen these pins in watches costing as little as $10 to watches costing $500. They are only a problem when you need one. They do break, they do fall out of a worn bracelet, and they do get lost when you are sizing a bracelet. Nothing else seems to work as well as one of these cotter pins. A screw won't work as there are no threads in the hole. A solid pin, riveted into the bracelet, can work but the time required for its fabrication and finishing can make a

bracelet repair very unprofitable. Finally something has been done for us at the bench. These cotter pins are now available in a multi-bottle assortment from some of our advertisers.

They range in length from 6.5 mm to 18.0 mm in .5 mm increments. They can be used to replace broken and missing pins of the same type. These bracelets can now be repaired in a few minutes with no custom fitting of pins. Measure the width of the bracelet in millimeters and select a pin .5 mm to 1.0 mm smaller than the width of the bracelet. This allows both ends of the cotter pin to be recessed. These pins are installed by pushing them into the bracelet links. The small end of the pin is inserted first and the pin is either pushed or driven into place. The expanded head of the pin is driven in so that the expanded head of the pin is recessed just below the surface of the link.

In addition, they can also be used to replace screws that hold bracelet links to each other or the entire bracelet to the case. It is not unusual for the internal threads of watch bracelet links to be so damaged they will no longer securely hold a bracelet screw in place. These cotter pins can be driven into the link as a replacement for a screw. The expanded tip will hold the pin securely in place. Since the cotter pins are stainless steel, they will not corrode in the bracelet. If you can't find them please contact me by phone at (781) 438-6977 or e-mail at <watchmakerl @juno.com> for the name of a supplier.

Jack Kurdzionak

A Practical Course in Clock Repair

Alarm Mechanism

John P. Kenyon, CMC

Even though mechanical clock mechanisms vary in shape, size, and function, similar theories underlie the operation of them all. Alarm mechanisms were developed by clockmakers using a basic design theory that was familiar to them. This carry-over of principles from one mechanism to another exposes an elementary parallelism in an otherwise befuddling variation of technologies.

Usually, low-priced alarm clocks are not accepted for repair. The replacement cost does not warrant the time required to service them; however, an understanding of the construction and adjustment of these simple mechanisms will familiarize the trainee with fundamentals of some of the more complex horological mechanisms.

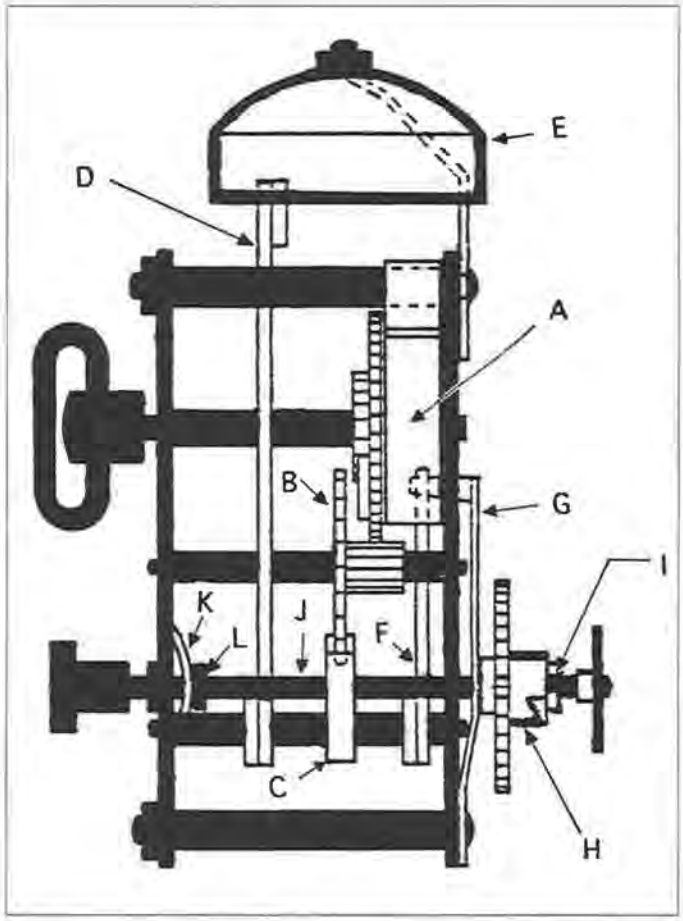


Figure 1. Alarm Mechanism

Design

Figure 1 illustrates the alarm mechanism of a typical alarm clock. (A) indicates the alarm spring, (B) the escape wheel, (C) the lever (of recoil design), (D) the hammer, (E) the bell, (F) the hammer locking arm, (G) the hammer locking arm spring, (H) the cam wheel, (I) the camming finger (pin), (J) the alarm set-arbor, (K) a friction spring to hold the set-arbor in set position, and (L) a collar to hold tension on the friction spring.

Operation

The cam wheel (H) controls the ringing of the alarm bell. It has the same number of teeth as the hour wheel and is geared with the minute pinion (not shown); therefore, it makes two revolutions every 24 hours. It turns freely on the alarm set-arbor (J). When setting the alarm, the camming finger (I) forces the cam wheel (H) inward (to the left in Figure 1) to hold the hammer locking spring (G) under tension, with its tab-end in the path of the hammer locking arm (F), to lock the hammer (D). As the clock runs, the cam wheel (H) turns, while the set-arbor (J) remains stationary, due to the tension of friction spring (K) until the lip on the cam wheel (H)

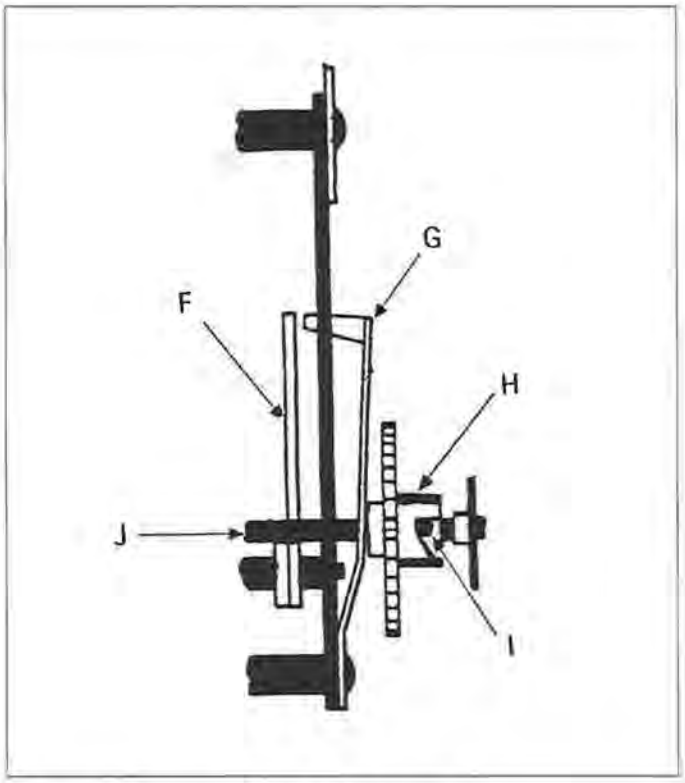
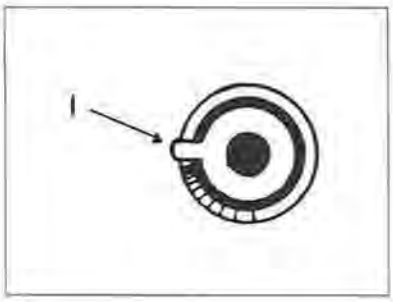


Figure 2. Cut-away of Alarm Mechanism

Figure 3. Cam Wheel



moves past the edge of the camming finger (I). When this occurs, the cam wheel (H) moves away (to the right) under the tension of the hammer locking spring (G) and out of the path of the hammer locking arm (F) freeing the hammer (D) and escapement to ring the alarm bell (E) as shown in Figure 2. Figure 3 illustrates the position of the cam wheel and the camming finger just prior to alarm activation, as in Figure 1.

Maintenance and Adjustment

Customary maintenance (pivots, pivot holes, etc.) procedures comply with those that are standard to the industry for making routine clock movement repairs. The tension of friction spring (K) should be only sufficient to prevent the set-arbor (J) from turning with the cam wheel (H). It is adjusted by shifting the collar (L) on the set-arbor. When installing hands, the alarm hand should be fitted first; then, the set-arbor is turned slowly until the cam wheel moves into position to activate the alarm. Install the hour and minute hands to indicate the time shown by the alarm hand on the alarm dial. To test, wind the alarm spring, set the alarm hand to an exact hour and turn the center arbor until the alarm activates. Preferably, it will ring right on the mark, and never more than five minutes before or after the hour. If it activates outside of this tolerance, hold the center arbor stationary and shift the minute hand in the direction required for correction. Check the hour hand when making the test to ascertain that it is on the hour marker with the minute hand.

Cleaning and Lubrication

Cleaning and lubrication procedures are the same as those routinely used for pivot holes and other surfaces in clock work. The alarm pallets should be lubricated with clock oil where they contact the escape wheel. The friction surface between friction spring (K) and collar (L) should also be lubricated.

Next time, I will discuss the design of a pendulum clock movement.

Report of the AWI Strategic Planning Committee

Editor's note: The Strategic Planning Committee was appointed by President Charles Cleves after the annual Board Meeting in June, 1997. The committee includes five members chosen to represent a broad spectrum of membership and who each has academic and professional backgrounds in addition to their present skills as watchmakers and clockmakers. The members include Dewey Clark, Maryland; Roy Hovey, Kentucky; Jerry Faier, Missouri; Mark Butterworth, Iowa; and Raymond Flood, Minnesota.

The committee produced a series of reports that caused a great deal of comment, excitement, and introspection among the Board of Directors, delegates, and members who attended the annual Board meeting this year. The reports are considered to be of sufficient importance to be shared with the entire membership. The reports will continue in the November and December issues of HT. *These reports have been redacted for length.*

Mission of the AWI Strategic Planning Committee

The mission of the AWI Strategic Planning Committee is to assist the AWI President and Executive Director in the introduction of established organizational growth and change processes to AWI.

This will be accomplished by using standard strategic planning techniques (analyzing the current state of AWI; determining the environment in which it exists; identifying services and niches that can be provided by AWI; proposing organizational and operational priorities for the Board's consideration). The committee will report its deliberations to the President and Executive Director of AWI who will submit those reports to the AWI Board of Directors for their consideration.

State of the American Watchmakers-Clockmakers Institute as of January 15, 1998

Since organizational growth implies change; the first step in the process is to determine what is AWI today. A description of AWI as it is today will serve as a baseline by which to measure future change; and it will also yield insight into what areas may be desirable to change and how to structure the change process.

The committee framed its deliberations by asking the following four questions:

- What is AWI?
- What is the environment in which AWI exists?
- What are the threats and opportunities for AWI?
- What are the resources available to AWI?

This report will be structured using these questions. It is important to note that the findings reported here are based on consensual anecdotal observations. In other words, the group agreed to these observations; but these observations are not supported by scientific data. In fact, the committee was consistently faced by the lack of data available for decision making within AWI. While this will be discussed later in the report; the committee feels the FIRST priority for AWI should be to develop data management and reporting systems that can be used in daily management-level decision making.

What is AWI?

The Culture:

The Membership. The culture of AWI shares many characteristics with organizations that represent competitive and entrepreneurial businesses. Unlike many professional organizations, AWI uses a volunteer structure to operate and deliver services. This combination presents some unique challenges that can be effectively managed.

The constituents of AWI are watch and clockmakers interested in the development of their manual skills. Until fairly recently, only professional watchmakers were fully welcomed within the organization. Clockmakers complain of a lack of services and of feeling like unwelcome stepchildren in some respects. Non-professional horologists are viewed in some quarters with disdain.

These constituents are generally older (suspected average age of AWI membership is over 50 years); and many of the professionals are making less money than they would like. This results in some financial insecurity which helps to explain some of the negative feelings and suspicions directed toward the non-professional members of AWI.

It also results in a culture that is marked by knowledge-protective behaviors. Many members are unwilling to share their knowledge and experience because they perceive it will dilute their competitive edge.

On the other hand, the older average age of the membership is reflected in the personal maturity of many members and their strong desire to learn. These are learners who do not delude themselves when they attend classes. They are highly motivated learners who critically evaluate their efforts; and who use the available instructional time effectively. These are also the general characteristics of adult learners.

In addition, many members, particularly the non-professional members, are financially stable and are not driven by concerns that drive young adults (buying a house, bringing up children, etc.)

Certainly, there is a small, but critical, cadre of members who strongly believe in sharing their time and knowledge. These individuals can be found on the Board, as contributors to the *Horological Times* (*HT*), on committees, and as instructors.

Governance. Since the Board of Directors must come from the membership, it will come as no surprise that many of these traits impact upon the culture of the Board. While there is great personal maturity in the members of the Board which is strongly reflected in the ability of each Board member to work with those with whom he/she strongly disagrees; the knowledge-protective behavior of watch and clockmakers is reflected in somewhat secretive decision making.

Perhaps it is this aspect that has resulted in the Board becoming viewed as a political battleground, which operates with a patronage system. While there is strong evidence this is changing, it is not surprising that a knowledge-protective culture like watch and clockmaking would result in a governance system in which personal alliances were established and maintained on the basis of "deal making." However, the Board seems to have become aware that this approach results in unnecessary tensions as well as projects and services that result in costs out of proportion to their benefit.

This may help to explain why a percentage of the membership feel their participation in the volunteer and governance activities of AWI is unwelcome. While "patronage" may ensure allegiance to the patron, by definition it excludes open participation.

Staff. As is typical of a volunteer-run organization, the paid staff of AWI is quite small. Until recently, the Executive Director was responsible for managing the office, providing technical assistance to members, managing the financial affairs of the organization, and planning the future directions of the organization. Until recently, the Executive Director was chosen more for his/her experience in the trade than for organizational and financial management experience.

Today, AWI has an Executive Director with extensive managerial experience, but no trade experience. AWI also has a Technical Director highly respected in the field, as well as a Finance Director fully qualified in financial management. The Technical Director is the ONLY paid horologist on AWI staff. (*Editor's Note: A graduate student from the AWI Academy was added to the staff in June 1998.*)

The office staff is extremely long tenured, committed to AWI, and energetic. They are a steadfast staff

Continued on page 50.

We Want You!

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Dennis Warner

Affiliate Chapter Report

This year there is a concerted effort to build membership and affiliate chapters throughout the United States and the world. This goal has been set by President David Christianson and your Board of Directors. With the cooperation of existing Affiliate Chapters, Area Representatives, the New Chapter Development Committee and the Membership Committee a stronger and more active organization will be realized.

The following chairpersons have been appointed to unify the efforts to build this organization:

Area Representatives
Ashley Womble, Georgia

New Chapter Development Committee
Alice Carpenter, North Carolina

Membership Committee
Terry Kurdzionak, Massachusetts

Information has to be funneled to these people through AWI Headquarters so they can work together for you. That information will come from input by existing chapters, perspective chapters, members and perspective members. AWI needs to hear from you. What problems are you having with AWI service? Where do you want AWI to be in the future? Do you want an AWI Affiliate Chapter in your area? Do you need help with membership? Let us know.

Each chairperson has committee members who will assist. Members were selected from all regions of the country so diversified interests could be met. Look over the list.

AWI wants you to know that all these people are out there for you. They are dedicated to AWI and you. They are working toward a single goal of making AWI available to as many people as possible. Contact: AWI Headquarters at 1-513-367-9800.

Area Representatives

Ashley Womble - Chairman	GA, SC, AL, TN
Mark Baker	MI, IN, OH, KY, WV
Alice B. Carpenter	NC, VA
Dewey Clark	International
Gary Crighton	So. CA, NV
Jim Door	WA, OR, AK, HI
Henry Frystak	NJ, NY
F. Martell Grover	ID, WY, MT, UT
Greg Hostetter	MN, ND, SD, NE
Tamara Houk	IL, WI
Jack Kurdzionak	MA, New England
Chip Lim	No. CA
Bill Miller	AZ, NM
Robert D. Porter	MO, IA, AR
Daniel Spath	MD, DE, PA
Deborah Varjabedian	FL
Dennis Warner	CO, KS, Kansas City, MO
Sue Ann Wysong	TX, LA, OK, MS

New Chapter Development

Alice Carpenter - Chairperson
Deborah Varjabedian
Paul Wadsworth
Jim Williams

Membership

Terry Kurdzionak - Chairperson
Mark Baker
Gearold E. Gull
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Dewey Clark
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Glen Arm, MD 21057
Phone: 410-592-3617

Repeater, Petite and Grande Sonnerie Clocks

George Graham Bracket Clock, Part 36

Leo A. Jaroslaw

Introduction

In Part 35 we reassembled the movement to the point where we are ready to install the dial.

37.8. Install the dial (Figures 36.1, 36.2).

37.8.1. Rotate chime/silent dial arbor (shown in Figure 36.1 but not numbered) so that the chime/silent actuator pin (2) is in the 12 o'clock position.

Note: This is the silent position.

37.8.2. Install chime/silent pointer (also shown but not numbered) in the silent position.

37.8.2.1. Pin pointer.

37.8.3. Place the chime/silent lock lever (12) (Figure 36.3) in the locked position.

Note: In locked, the hook on the end of the chime lock lever extension (14) is engaged with the quarter rack lock pin (13) securing the quarter rack (15).

37.9. Repeat steps 37.8.1. through 37.8.3 with the strike/silent components.

37.10. Install the dial. (Figures 36.1, 36.2, 36.3).

37.10.1. Guide the actuator pins (2) and (5) into the slots of both lock levers (chime (12) Figure 36.3; strike (16) Figure 33.5, *Horological Times*, June 1998, page 39).

37.10.2. Guide the dial posts into their respective holes in the front plate.

37.10.3. Pin the top two posts.

Note: On this clock only the top two posts extend through the front plate in order to be pinned. The lower two are short (about the thickness of the front plate) without pin holes to clear the spring barrels.

38. Install hour strike bell (Figure 36.4).

Note: The hour strike bell is mounted on a bell post (shown but not numbered in Figure 36.4). The bell post is then attached with one screw to the back plate as shown.

38.1. Temporarily install minute hand.

38.1.1. Rotate minute hand until the hour is struck.

Note: This is to determine the hour strike point. If necessary, partially wind the strike train.

38.1.2. Count the hour struck.

38.1.3. Install and pin hands.

Note: Hour hand per strike count; minute hand on 12.

38.2. Adjust strike bell hammer as necessary.

39. Install bell stack (50) (Figures 36.5, 36.6).

39.1. Guide bell stack mount (shown in Figure 36.5 - 36.6, view A but not numbered) into the keystone slot in the front plate, and the rectangular slot in the back plate (Figure 36.6, view B).

39.2. Attach back of bell stack mount to the back plate with one screw as shown in Figure 36.4.

39.3. Check each quarter strike hammer in its relation to the bell for position and sound.

39.3.1. Adjust as necessary.

39.4. Check operation of the quarter strike through an hour or two.

Note: Rotate minute hand manually, stopping at each quarter, listening and observing the run through of the scale.

39.4.1. Adjust as necessary.

39.5. Shift bell control lever from 8-bell to 1-bell.

39.5.1. Again check operation of the quarter strike through several hours.

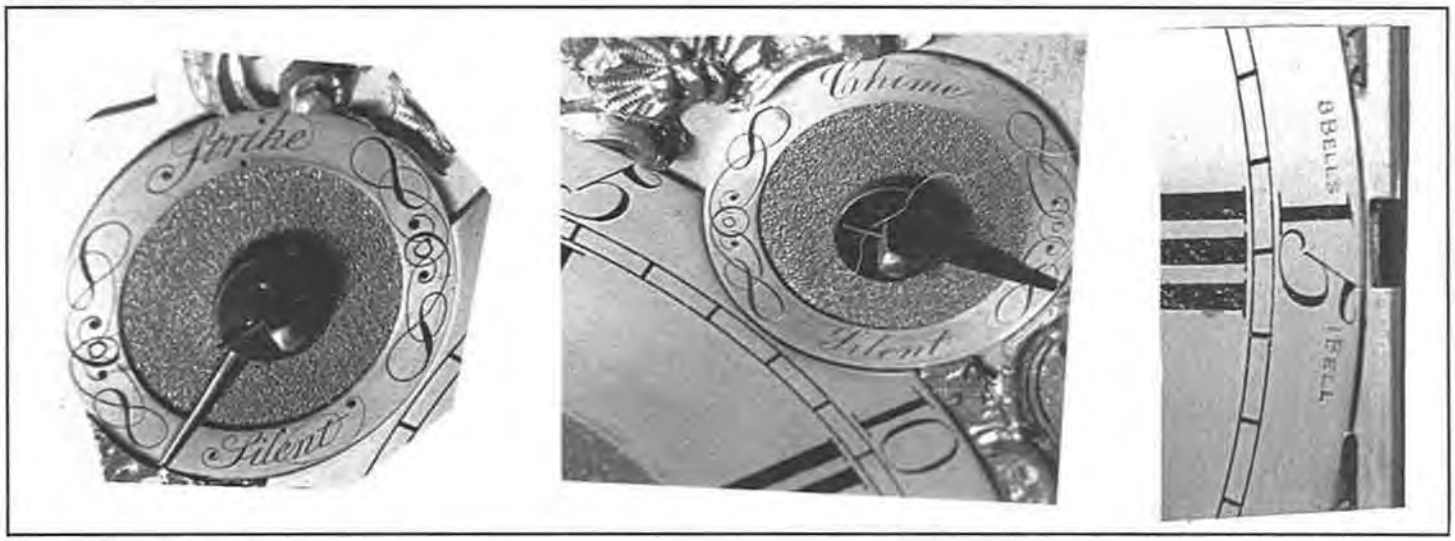
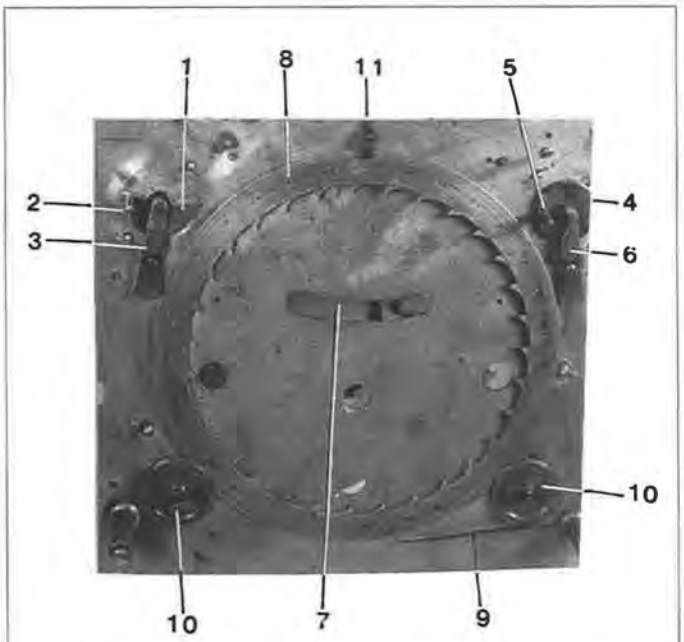
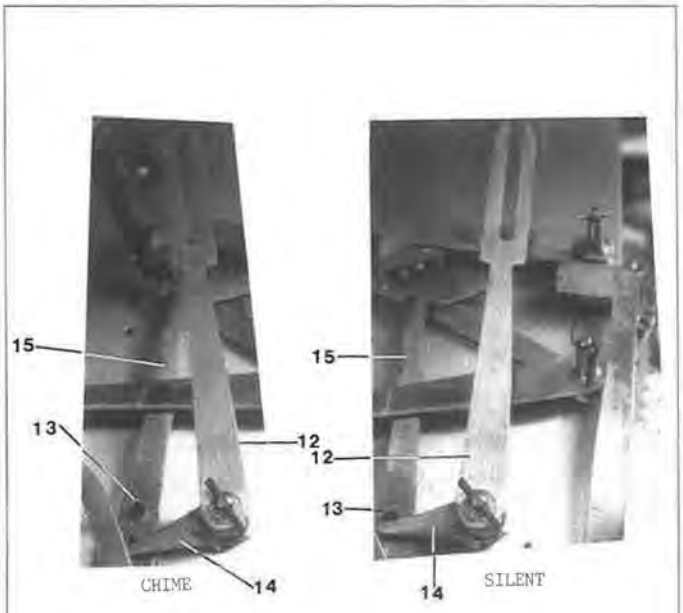


Figure 36.1. The Dial Controls



1 Chime/Silent Actuator
2 Chime/Silent Actuator Pin
3 Chime/Silent Actuator Cock
4 Strike/Silent Actuator
5 Strike/Silent Actuator Pin
6 Strike/Silent Actuator Cock
7 False Pendulum Slot
8 Calendar Ring
9 Calendar Ring Spring
10 Brass Calendar Wheel
11 Calendar Cock

Figure 36.2. Back Of Dial



12 Chime/Silent Lock Lever
13 Quarter Rack Lock Pin
14 Chime Lock Lever Ext.
15 Quarter Rack

Figure 36.3. Chime/Silent Lock Lever

Note: Only the first bell should be striking. The first bell has two pins side by side on the cylinder. It may be necessary to bend the #1 hammer tail so that it is tripped in both the 1-bell and 8-bell modes.

This completes the reassembly of the movement.

40. Mount and test movement on a test stand.

40.1. Fully wind all three trains.

40.2. Check and reset beat as required.

40.2.1. Operate and check all controls. Readjust as necessary.

Figure 36.4. Movement Hold-Down Brackets

Note: During the test, pay particular attention to both sets of bells and their operation. Once the movement is back in the case they are practically inaccessible for readjustment.

41. Prepare movement for mounting in the case.

41.1. Remove bell stack and its mount from the movement.

41.1.1. Set bell stack aside carefully.

CAUTION: THE BELLS IN THE STACK HAVE BEEN CAREFULLY LINED UP AND THE HAMMERS ADJUSTED TO THEM. ANY SHIFTING OR BENDING OF THE BELLS ON THEIR POSTS WOULD BE DIFFICULT TO CORRECT WITHOUT REMOVING THE MOVEMENT FROM THE CASE.

Note: The hour strike bell can remain on the movement. It clears the rear door on movement installation.

42. Install movement in the case.

42.1. Tilt back and lift movement.

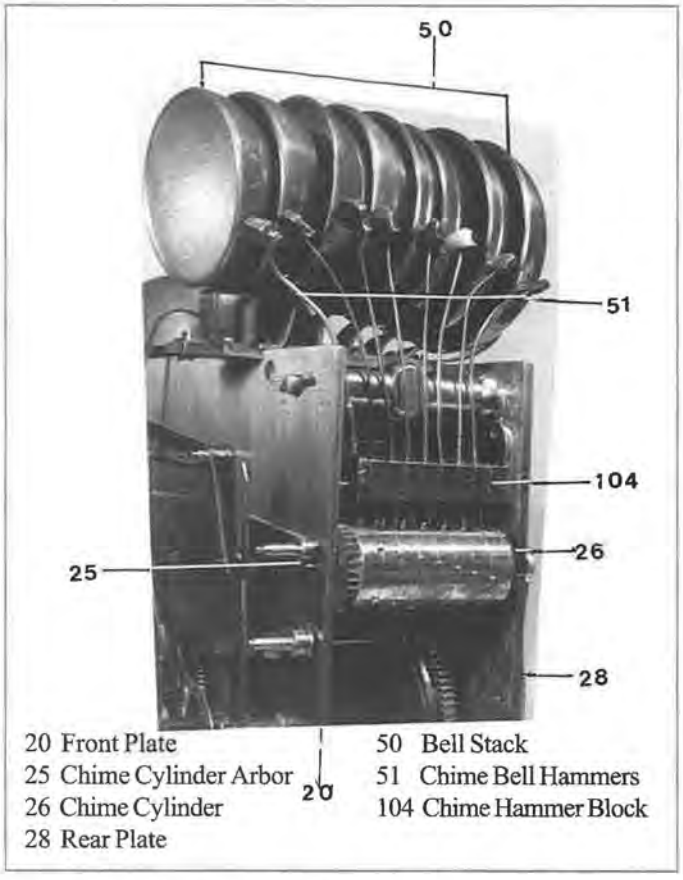


Figure 36.5. Quarter Strike Components

42.1.1. Place tilted movement through the rear door, onto the wooden platform on the bottom of the case.

42.1.2. Center the movement so that the dial lines up with the cutout in the front of the case.

42.1.3. Tip movement upright.

42.1.4. Push movement forward with the dial entering the cutout.

42.2. Install movement hold-down brackets (Figure 36.4. shown but not numbered).

Note: One is mounted between the upper right side of the back plate and the right side of the case. The other is mounted on the lower left side of the back plate and the left side of the case. It may be necessary to shift the movement slightly to line up the screw holes.

View A

View B

Figure 36.6. Bell Stack Mounting

43. Install bell stack.

43.1. Insert the stack into the case by tilting the stack to the right until bell 8 clears the rear door.

CAUTION: MAKE SURE THAT NONE OF THE BELLS GET CAUGHT OR HUNG UP IN THIS PROCEDURE.

43.2. Upright the stack and guide the front of the mount into the keystone cutout in the front plate.

Note: It may be necessary to pull the stack back slightly against the #8 bell in order for the mount to enter the keystone. The bell can spring enough for this.

43.2.1. Guide the rear end of the bell stack mount into the rectangular cutout in the rear plate.

43.2.2. Push the stack forward until it seats.

43.2.3. Secure the stack with the one screw (Figure 36.4).

This completes the casing of the movement.

44. Test run the completed clock.

44.1. Check and correct for level.

44.2. Check and correct beat and timing as necessary.

44.3. Complete test run as per your usual practice.

This completes Part 36, and the series on the BARKLEY & COLLEY (GEORGE GRAHAM) Bracket Clock. In Part 37, we will start a series on carriage clock alarm, repeat, normal strike, and petite/grande sonnerie systems.

In Search of the Best Watch Lubricants

Part 3

By Gary Crighton

Gary Crighton of Los Angeles shares with us a series of experiments in his quest for the best watch oils. This month's article is the third in this series.

The author's opinions of specific brands of equipment and lubricants are strictly his own and should not be considered as an endorsement by the American Watchmakers-Clockmakers Institute of the products mentioned.

Like Rodney Dangerfield, the barrel and mainspring don't get any respect. This is really sad because while most people think of the balance and escapement as the heart of the watch, the barrel and mainspring is the engine, the power source for the escapement. As previously mentioned, it was about five years ago when I made a concerted effort to concentrate on the high-grade watches, both quartz and mechanical. At that time I telephoned virtually every major service center in the USA, including Audemars Piguet, IWC, Rolex, and Patek Philippe, etc., to find out what oils and greases they were using. Except for Rolex, they all told me not to lubricate the mainspring as it is self-lubricating due to its pretreated dry Teflon coating. Rolex, by the way, recommended the Olyt grease, which is a molybdenum bisulfide-based lubricant.

That was then and this is now. If you buy a barrel complete (or work on a watch that hasn't been serviced by anyone since it left the factory) from any of the above mentioned companies, including the SMH group - Omega, Longines, etc. - and open it up, you will see that none of them rely on that dry Teflon coating any more.

I am not surprised that they changed their tune as Witschi makes a beautiful little machine, which can easily measure the torque/force/slipping ratio as the mainspring unwinds in the barrel. One can then graphically see from the print out what works and what doesn't. I don't have access to this machine, and I am sure that it is not cheap, but it is surely a worthwhile investment for any watch manufacturer aspiring to the high end.

While I don't know what the factories are using today to lubricate their mainsprings (it appears to be a thick oil), I do know what they are using to lubricate the barrel wall in order to ensure correct braking of the bridle for automatic watches. I'll write more about that later.

There are a number of criteria that one can use to see which is the best way to go (i.e. dry, thin oil, or grease). These are the criteria that I have used over the past five years to evaluate mainspring lubricants.

1. Balance amplitude - unlike the previous tests, I only concerned myself with the DU position in order to keep things simple and consistent.
2. Examining the mainspring after extensive use, usually one to two years, to see whether it still had a uniform film of lubricant over its entire surface.
3. Examining the mainspring for any signs of wear.

Here are the results of five years worth of experiments:

1. Three lubricants consistently gave me the best balance amplitude. The Moebius 9415, Moebius 8141, and the Cuypers grease. The balance amplitude criteria were determined mainly by the use of a Rolex ladies caliber 2135 as I find this movement to be very sensitive to any change. Unless everything is in excellent condition and the lubrication is correctly done, it won't achieve good amplitude. The above mentioned lubricants produced virtually identical results. This was an easy experiment to do. Two weeks after a complete overhaul all I had to do was pop out the barrel and mainspring, clean them and apply the new lubricant, pop it back in and give the watch two weeks to run in and then measure the balance amplitude. After a few times of doing this, I realized that the barrel and mainspring only needed about two to three days running in before it delivered optimum results. This speeded up the process somewhat. There were two results that were a little puzzling to me.

a) To my touch, I couldn't feel the difference between the D5 and the 8141, yet the D5 consistently produced a balance amplitude of approximately 15 to 20 degrees less than the 8141.

b) I thought that the PML stem grease would work well as a mainspring lubricant because I really like this grease for other applications, yet it produced the lowest balance amplitude, even lower than the dry Teflon coated mainspring. These two things were a real surprise to me.

2. Most of the lubricants provided a reasonably

even film on the mainspring except for the Moebius 8200 and other thin oils like that.

3. This part of the experiment proved to me conclusively that leaving the mainspring dry is a bad idea, dry Teflon coating or not. After a year's worth of work a mainspring that has been left dry looks terrible. Not only is the smooth polished surface all scratched up, but it also has the appearance of skid marks on it, indicating that the mainspring is not winding and unwinding smoothly and evenly, resulting in an uneven delivery of power to the escapement. When the mainspring is lubricated with a graphite or molybdenum bisulfide-based lubricant (such as Olyt grease) it tends to have a similar appearance to the above, but with fewer skid marks. No wonder Rolex no longer uses it to lubricate the mainspring, although it does appear that they are still using it for the barrel wall of their automatic watches.

The Moebius 9415, 8141, and the Cuypers grease gave virtually identical results. So which one is my choice? No contest here, I use the 8141 for a number of reasons. First, it is a lot cheaper than the 9415 and second, experience has shown me that it is best to wind the mainspring into the mainspring winder dry. This keeps the mainspring free of dust and dirt, and your mainspring winders clean. With the 8141 it is very easy to lubricate the mainspring once it has been put into the barrel, regardless of whether it is a regular mainspring or one for an automatic watch.

Before I discuss my method and the amount of oil that I recommend, I am backtracking a little to the lubrication of the barrel wall for correct braking of the mainspring bridle. Thanks to Fahd Younes of Perfect Timing, I was able to get the Chronogreas P. This is a specialty grease recommended by ETA in the technical information sheet on the Valjoux/ETA 7750. This is what virtually every major watch factory in Switzerland is using today. Open any brand new barrel complete from virtually any Swiss factory and this is what you'll see on the barrel wall. As mentioned above, the only factory that I am aware of who is not using this grease is Rolex. This is by far the best grease for this application and it works equally well on the ultra thin calibers to the robust calibers like the ETA 7750 and the Zenith 400/Rolex 4030. It also works equally well on those barrels that have a Teflon coating such as the IWC 8541. Now for the bad news, this product doesn't seem to be available to independent watchmakers, neither here nor in Switzerland, only to the watch manufacturers. Well, don't just sit there, get onto your FAX machines (e-mail will also do nicely) and find out why this grease is not available to the watchmakers. The Swiss seem to be conscientious about training watchmakers (through the ETA and WOSTEP training programs, etc.) so that consumers can get the best from their products. Doesn't this fall into the same category? In the meantime, the next best thing is the Moebius 8217 (Glissalube 20). This is not as good as the Chronogreas, but for most calibers it gives reasonably consistent results.

Finally, we come down to the actual oiling of the mainspring. As an aside I highly recommend taking the mainspring out of the barrel for automatic watches in order to ensure that it is thoroughly clean before putting it back; also, it is not possible to place the braking grease on the barrel wall with the mainspring in place. The braking grease should be put sparingly in three places on the barrel wall prior to the fitting of the mainspring. For manual watches the mainspring should be cleaned outside the barrel as well. Wipe it with a clean, dry watch tissue and re-insert it into the barrel while it is still dry (it is so messy trying to insert a previously lubricated mainspring). After the mainspring is in the barrel. I apply the lubricant using a large yellow oiler with a medium size drop of oil. I adjust the size of the drop according to the surface area that needs to be coated so that a longer higher mainspring will get a little more and a shorter lower one will get less. I then put it in four places on top of the mainspring, being very careful not to lubricate the bridle as this will interfere with the action of the braking grease, thereby reducing the power reserve of the watch. I then use a second drop, the same size as the first, and put it in two places on the floor of the barrel. Lastly, I smear the flat part of the oiler against the first (and if possible) second coils of the center of the mainspring. Whatever you do, *do not over oil* as it will leak out of the barrel and go into both the dial and watch trains, mix with the oils that are already there, and then interfere with the watch's reliability.

Using these methods not only produces consistent and reliable balance amplitude, but also when I open up a barrel after two or three years of continuous use the mainspring has an even coating of oil over its entire surface, and it still looks smooth and shiny, virtually like new. If you have any doubts about the age or condition of the mainspring, do not hesitate to replace it with a new one.

Report of the AWI Strategic Planning Committee
Continued from page 41.

who has always worked under extremely difficult conditions to provide excellent member services. However, the staff is severely limited in their knowledge of modern computer applications. They know enough to use applications needed for their jobs; but they cannot be expected to generate improvements needed to provide adequate decision-making data.

Services

Education. Above all else, AWI is an educational organization. It provides training via correspondence courses, travelling bench courses, seminars at AWI and it operates a full-time watchmaking Academy at AWI.

In addition, through the Research and Education Council, AWI serves as the coordinator for schools that offer full-time instruction in watch and clockmaking. This coordination extends to working with WOSTEP in improving horological training in the U.S.

Perhaps because of its history, AWI's courses and services for clockmakers are not as well developed as the services provided for watchmakers. The watch classroom is currently utilized 100%, while the clock classroom is virtually unused. In addition, the clock courses that AWI offers rarely get delivered.

Certification. Separate but strongly related to AWI's education activities is the certification program. AWI provides certification to specified standards in watchmaking, clockmaking, and repair of quartz timepieces. The certification program consists of well-designed written and practical tests that discriminate between skilled and unskilled craftsmen.

Horological Times. Another form of education is delivered through AWI's journal, *Horological Times*. This monthly publication delivers articles that cover novel repair procedures, basic instruction, technical information of broad interest to the membership, and information about the repair of new products.

Technical Services. In addition to educational activities, AWI provides technical assistance to individual horologists. For the price of a letter or phone call, the staff of AWI will search the files to provide whatever technical information a repairman may need. In the event the question cannot be answered by material on file, the staff will contact the appropriate manufacturer. If the question involves a unique repair question, the staff will forward the request for assistance to volunteers who will work with the repairman to resolve the difficulty.

While each of these core service areas is quite strong, it is difficult to define a unified structure. For example, both the education program and the certification program should not DEFINE the educational activities of AWI, it is impossible to determine where each certification skill is taught in the education programs. Even within the educational offerings, with a few notable exceptions, there does not appear to be any relationship between one bench course and another.

With offerings as diverse and complex as those attempted by AWI, this lack of structure may well result in important skills "falling between the cracks." While the development of independent courses is consistent with the entrepreneurial nature of AWI members and volunteers, it can lead to duplication of efforts and inconsistencies that consume limited financial and human resources.

AWI Business

In addition to providing member services, AWI has features that more closely resemble a business. AWI operates a publishing business (books and *Horological Times*), operates a full-time watchmaking Academy and sells AWI memorabilia. AWI has also recently constructed a good studio facility for the production of videotapes, which AWI sells.

In addition, the certification tests and the bench courses offered could rightly be viewed as products that AWI has to sell.

AWI obtains virtually all of its income from four sources. Endowment income from the James Dodson Perpetuation Fund provides 50% of AWI's operating income. Member dues account for 25%, educational activities (training and certification) account for 15%, while advertising in the *Horological Times* accounts for 10%.

This suggests that AWI is a "weak" business. While there is no shortage of money to fund AWI, only 50% of AWI's income is derived from "products" it "sells." Either AWI is doing a poor job of marketing itself or there is no demand for what AWI has to offer.

This is not surprising, given the state of AWI's financial management system. Until very recently, AWI did not have the benefit of a full-time financial manager on staff. As a result, it is very difficult to identify AWI's profit and cost centers, or to determine where indirect costs can be reduced. The lack of fiscal controls, which allowed virtually any individual to encumber AWI, and which did not provide oversight of spending practices, is outdated. While such fiscal management may have been appropriate in the early days of AWI, such a relaxed approach will not serve AWI in an environment in which fiscal resources are limited and competition for membership is great.

A modern fiscal management system would yield data by which the Executive Director and Board of Directors can identify activities which increase income; those that cost too much in relationship to the benefit obtained; areas of overhead costs that could be reduced; etc.

(Next Month: The Environment in Which AWI Operates; Resources Available to AWI; Threats and Opportunities.)

AWI Academy of Watchmaking Accepting Applications

The American Watchmakers-Clockmakers Institute is accepting applications for their 1999-2000 Academy of Watchmaking.

The Academy features a 45-week program in watchmaking which is designed to accept students with no experience and train them for an entry level position. The program is scheduled to start July 12, 1999 with graduation scheduled for June 9, 2000.

The cost of the program is $7,750. Scholarship monies may be available to qualified students. Successful completion of an entrance examination will be required. Individuals who are interested in attending the Academy of Watchmaking should contact AWI Headquarters for an application. Testing will be conducted between January 1 and April 1, 1999. For further information contact:

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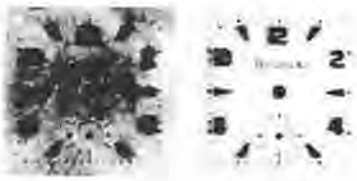

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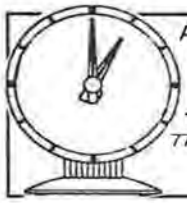

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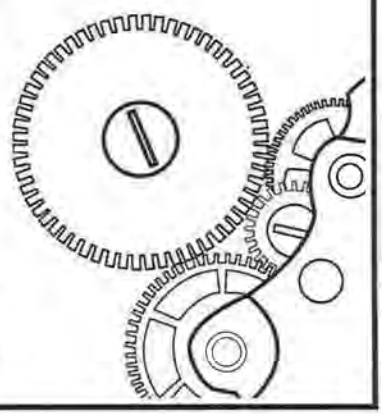

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WANTED: Paying high prices for chronograph and high grade watches, movements, dials, cases, & parts. Dean Sarnelle, 25 W. Beverley St., Staunton, VA 24401, phone & fax (540) 885-6064.

ATTENTION RETIRED WATCHMAKERS Call us before you sell your parts, tools, and watches. We have helped over 70 watchmakes in the last two years to dispose of their accumulations. When you're really ready to sell, we're ready to buy! Phone (813) 327-3306 or cell #813-434-4136. Ask for Jeff or Nancy.

We pay 97% of market for karat gold scrap (any amount)! Also, buy filings, gold fill, sweeps, silver, platinum! Immediate 24-hour payment return mail! Ship insured/registered mail to: AMERICAN METALS COMPANY, 253 King St., Dept. HT, Charleston, SC 29401. Established 1960. Phone (803) 722-2073.

TOP BUYERS OF WATCHMAKERS TOOLS, MATERIALS, EQUIPMENT, ETC. We travel for prompt settlement. Retirements and estate specialists. Please call Tom Mister at (757) 426-1155, Fax (757) 426-3133; e-mail: dashto@erols.com. View all lists at http://www.erols.com/dashto/

Buying pocket watches, cases and parts. Need Am. msp. & staff sets - crystals. Bob Niemeyer, 19844 S. SR 116, Spencerville, OH 45887; Phone (419) 647-4818.

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BUYER OF WATCHMAKING TOOLS, MATERIALS, ACCUMULATIONS
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Top Midwest buyer of old movements, cases, crystals, dials, etc. is also buying running wrist and pocket watches, by the piece or collection. I'll travel or pay shipping. Cash settlement. Call Mike Bailey at (847) 741-1289 or write to P.O. Box 531, Elgin, IL 60121. *4 BUYOUTS LAST MONTH FROM THIS AD!*

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- Diamonds - all shapes, sizes, colors & chipped
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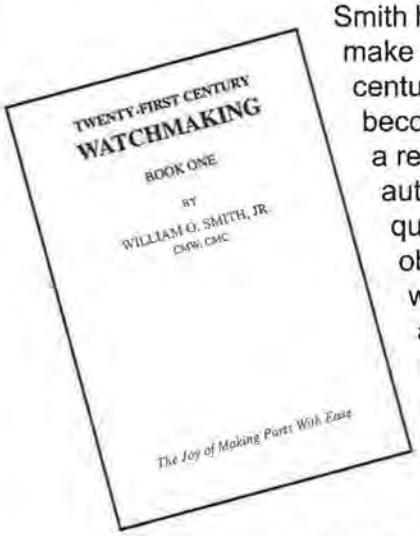
Twenty-First Century Watchmaking

By William O. Smith, Jr., CMW, CMC, FAWI



Smith has developed a method that will enable the watchmaker to successfully make many of the replacement parts required to restore fine watches in the 21st century. Using this method and very few inexpensive tools, the watchmaker will become proficient at custom making most flat metal parts required to complete a restoration. The purpose of this book is to cover in detail the methods the author has developed during a lifetime at the bench, methods which are the quickest, easiest and least expensive way of making high-grade parts for obsolete mechanical watches. Those who become involved in the process will find it to be fascinating, enjoyable and financially rewarding. The author's skill as a craftsman, teacher and author, along with excellent photography and line drawings, combine to make the development of the skills required to make these parts from raw material a challenging yet realistic goal to attain. The reader will truly develop what the author refers to as "The Joy of Making Parts with Ease". **$45.00**

Contact AWI Headquarters, 701 Enterprise Drive, Harrison, OH 45030
Phone 513-367-9800 Fax 513-367-1414

Questions & Answers

Continued from page 4

Having said all this, there is a possibility that I am wrong; after all I'm not a Breguet expert nor even pretend to be... . I'm a researcher and am offering this opinion from my research. To give full value to your request, I'm sending a copy of this response (with photos) to Mr. Daniels in the hopes that he might comment himself, and am publishing this response in the *Horological Times* in the hopes that others with greater knowledge than myself might comment.

David A. Christianson

Figure 5.

MISSOURI

The May 1998 meeting of the Metro St. Louis Watch & Clockmakers Association, featured Don Ott demonstrating a method to make gold "nuggets" by pouring molten gold into the end of a stack of wet broom straws. Looking on, left to right, is Barry Smith Jr., Margie Thomae, Gene Bertram, Gerald Thomae, Roger Butler, Herbert Brune (President), and David Grayson (Vice President). Also attending, but not shown, were Helen Ott, Tim Carpenter, Bert and Carolyn Scism, and Bob and Lu Porter.

Programs about watch, clock, or jewelry making and repair are presented on the First Thursday of the month at 7:00 P.M. We are currently meeting at the Casa Blanca restaurant at #16 Terminal Drive, St. Louis Regional Airport in Bethalto, Illinois.

You are invited to enjoy a fine meal and an interesting program with our group. For more information, if you live in Illinois, call Don Ott at (618) 254-5666, and in Missouri, call Bert Scism at (314) 928-1037, or Bob Porter at (314) 839-3205.

Don Ott demonstrating a method of making gold nuggets.

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AWI Bench Courses

To register for Bench Courses, please mail, fax or e-mail your registration and payment information to: **AWI Central, 701 Enterprise Drive, Harrison, OH 45030. Phone (513)367-9800, Fax (513) 367-1414, E-Mail: Educate@awi-net.org** PLEASE NOTE: Registrations are limited and will be selected by the earliest date received. Please include a check or your Visa or Mastercard number, card expiration date, signature and phone number. Registrations cannot be taken by phone. All registration fee checks and charges are processed immediately upon receipt. ***DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE COURSE.*** • Indicates Bench Courses held in conjunction with a convention.

DATE	CLASS	INSTRUCTOR	LOCATION	FEE
OCTOBER 1998				
• 9	Clock Wheel & Barrel Repair	Ron Iverson	Eagan, MN	$ 65.00
• 11-12	Antique Clock Restoration	David Christianson	Eagan, MN	$130.00
17-18	Cuckoo Clock Repair	Jim Williams	Austin, TX	$130.00
24-25	Introduction to Watch/Clockmakers Lathe	Roy Hovey	St. Louis, MO	$142.00
NOVEMBER 1998				
14-17	Phase I-Watchmakers Lathe/Clockmakers Micro Lathe	Roy Hovey	Fairfax, VA	$350.00

AWI Project Extend

AWI's continuing Education Program offers one-week and two-week classes in various phases of watch & clock repair techniques. Work alongside recognized leaders in the field of horology. See how they handle the everyday situations we all encounter. All Project Extend classes are held in AWI's training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you! ***DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE CLASS.*** To register for these courses, please mail, fax or e-mail your registration and payment information to: **AWI Central, 701 Enterprise Drive, Harrison, OH 45030. Phone (513) 367-9800, Fax (513) 367-1414, E-Mail: Educate@awi-net.org.** Please include a check or your Visa or Mastercard number, card expiration date, signature and phone number. Registrations cannot be taken by phone. All registration fee checks and charges are processed immediately upon receipt.

DATE	CLASS	INSTRUCTOR	FEE
APRIL 1999			
7-9	ETA Products	Remy Waelchli	$150.00
12-16	Advanced Quartz Watch Repair	Chip Lim	$250.00
19-23	Repair of the Bulova Accutron	Henry Frystak	$250.00
MAY 1999			
3-8	Phase IV - Wheel Cutting Operations for Watchmakers	Roy Hovey	$480.00
12-14	Shop Management	Fred Burckhardt	$150.00
JUNE 1999			
1-4	CEWT & CMEW Examinations	Jim Lubic	Exam Fee
7-11	CW & CMW Examinations	Jim Lubic	Exam Fee

PROJECT EXTEND WATCH CLASSES

DATE	CLASS	INSTRUCTOR	FEE
OCTOBER 1998			
5-9	American Pocket Watch Repair	Jim Lubic	$250.00
12-16	Hairspring Vibrating & Timing Adjustments	Jim Lubic/Hal Herman	$250.00
26-30	Automatic Winding Mechanisms	Jim Lubic	$250.00
NOVEMBER 1998			
2-6	Calendar Mechanisms	Jim Lubic	$250.00
30-Dec. 4	21st Century Watchmaking	Jim Lubic	$250.00
JANUARY 1999			
19-22	Cross Slide for Watchmakers	Roy Hovey	$240.00
25-Feb.6	Lathe Operations for Watchmakers (12-day)	Roy Hovey	$780.00
FEBRUARY 1999			
8-12	Advanced Turning Between Centers	Ron DeCorte	$250.00
22-26	Chronograph Repair	Jim Lubic/Tamara Houk	$250.00
MARCH 1999			
8-12	Basic Electronics & Meter Reading	TBA	$250.00

PROJECT EXTEND CLOCK CLASSES

DATE	CLASS	INSTRUCTOR	FEE
OCTOBER 1998			
5-9	Organize Your Work Habits for Success	Robert Ockenden	$250.00
12-16	Clock Repair Operations	David Carlson	$250.00
NOVEMBER 1998			
2-6	French Clock Repair	Ron Iverson	$250.00