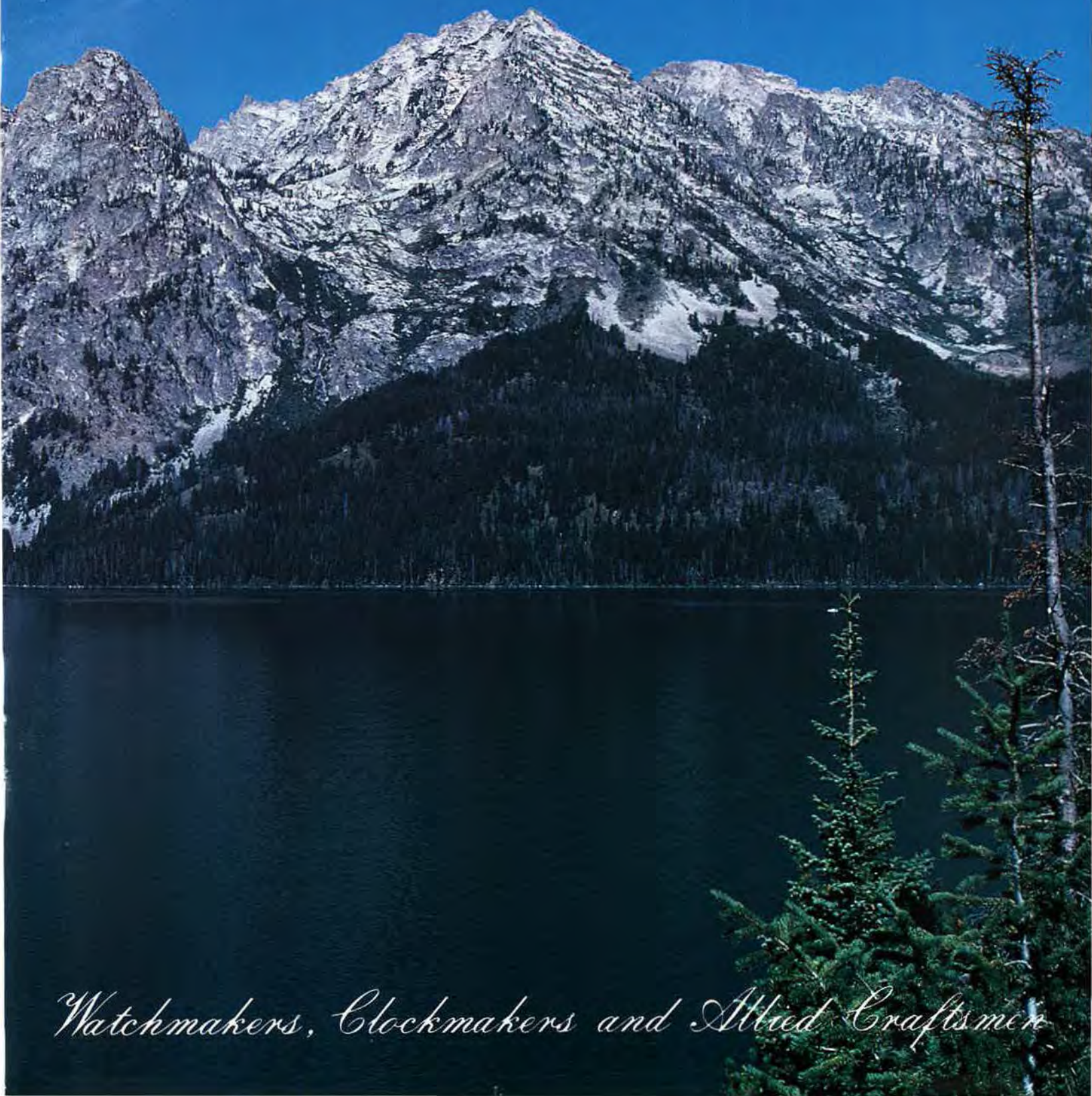


SEPTEMBER 1989

HOROLOGICAL TIMES™



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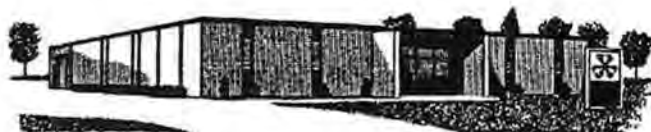
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President's Message



The consumer of today has many problems. He is bombarded right and left by ads, commercials, salespeople; each competing for his dollars. How can he choose how and where to spend his money wisely in the midst of this conflicting barrage?

It is especially difficult for the average consumer to select a repair service. The technology of the product is probably a mystery to him, whether it be an auto, washing machine or watch, and he must place his trust in the repairman. The media is full of stories of consumer fraud. How can we, as repairmen, engender this trust? Should we go that extra step, and possible expense, to assure the consumer that he is going to receive honest and competent service on his prized possession?

The answer is yes! Not only is it ethically correct, it is good business practice to project an image of competence and trust. How can we do this? First, by displaying and abiding by the AWI Code of Ethics that each of you agreed to abide by when becoming a member of AWI. (They are reprinted below in case you haven't looked at the back of your membership card lately.)

If you follow these simple rules, your customer need have no worries in placing his timepiece in your hands.

I wish to call your attention to rule #5, wherein we agree not to perform any unworkmanlike or unskilled repairs. Sadly, there are so-called "watchmakers" and "clockmakers" who are not skilled and cannot seem to find the time to take the training to acquire these skills. I realize that most of you do hone your skills whenever possible, but to those of you who are backsliding a bit, I strongly urge that you participate in our expanded training programs. Get your nose away from your bench for a couple of days and attend some of these workshops. Your customers will be the better for it, and so will your pocketbook.

A fair warranty policy also engenders confidence. I know that many customers expect too much from a warranty. Rust, abuse, and parts failure not connected with the original repair are expected to be covered by many. However, an explanation of exactly what the warranty covers at the time of delivery will give you some protection. The length of your warranty can vary, according to your preference, but I have found that a properly overhauled watch or clock should give good service for a year or more, and a one year warranty should pose few problems. It is a little unrealistic to expect a customer to pay for a second overhaul six or seven months later. A satisfied customer is worth more to you than the little expense you might incur in honoring your warranty to the limit.

As members of AWI, we owe it to our industry, our customers, and ourselves to uphold our high ethical standards.

AWI CODE OF ETHICS

I will not knowingly mislead, deceive or defraud the public.

I will not advertise in any manner that is untruthful or misleading.

I will not knowingly represent a timepiece to have been overhauled unless it has been properly cleaned, lubricated, and regulated.

I will not knowingly represent to the public that certain parts are required for a timepiece which are actually unnecessary in the repair to be performed.

I agree that it is unethical to perform repairs on timepieces in an unworkmanlike or unskilled manner.

I agree to conduct myself in my business life in such a manner as will reflect credit to myself, the American Watchmakers Institute, my fellow professionals, and the entire industry.

Robert F. Bishop

ON THE FRONT: A scene from Grand Teton National Park in Wyoming.
By Steve Hammond of Oshkosh, Wisconsin.

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UP FRONT

MOVEMENT BANK & MATERIAL SEARCH NETWORK

Effective now the new service offered by the Movement Bank & Material Search Network is available to all members. As older material becomes more difficult to obtain, this service should prove to be a valuable asset to AWI members. Here is how it works.

WHAT THE PROGRAM IS

The service is not offered to locate watch parts that are routinely available. It is meant to lend assistance after you have made a concerted effort to locate the part on your own.

HOW TO USE THE MOVEMENT BANK & MATERIAL SEARCH NETWORK

When you wish to use the service of this program, you must provide proper identification of the watch movement. The Bestfit Encyclopedia of Watch Material and the Bestfit Microfiche System, the Newall "Finger Print" System, or the Swartchild, Marshall System books all offer positive identification of most of the vintage watches, as do many other material house publications.

If you supply positive identification of the movement and the identification of the part/s by proper name or parts number, we can offer you reliable service. Be sure to give an accurate ligne or size measurement of the movement. If you give just one measurement, we will assume the movement is round.

If for some reason you cannot identify your movement, you will need to send large clear photos of the front and back of the movement. No Polaroid type prints please. Or place the movement on a photocopier and send a clear print of the front and back plates. Also provide any markings that appear on the dial, movement, and case, along with an accurate ligne or size measurement. **DO NOT SEND MOVEMENTS!**

When we know exactly what you need, we will fax our "want" list to the material distributors who are participating in the Material Network. We will then advise you of which distributors can supply the part/s you need. It will be up to you to make arrangements for the purchase of the part/s. If no one can supply your part/s, we will search the Movement Bank for a useable used part. If the Movement Bank cannot supply what you need, the *Horological Times* will list your need in the Material Search Network column. If after two consecutive listings the needs are not met, we will assume that the part/s are not available.

COSTS

A service fee of \$5 for each movement to be searched should accompany your request. If you include a useable vintage watch movement with your request as a donation to the Movement Bank, the service fee will not be required. (A vintage watch is one made before 1950 and one that is not commonly available; thus AS 976, AS 1012, Font. 120, Font. 60, AS 1187, AS 1194 and similarly abundant movements would not be considered in this category.)

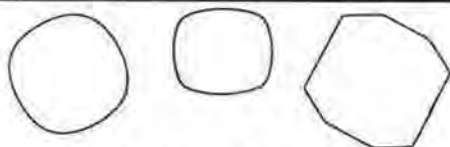
This fee will cover:

- the identification of your movement
- the fax service to distributors
- the Movement Bank search
- the listing of your needs in *Horological Times*.

If parts are supplied from the Movement Bank, they will be billed to you at current market price for these items.

AWI is anxious to help you with your material problems. Use the Movement Bank.

W-13



THE F-BLK-50 ASSORTMENT

BB-PERFIT introduces a line of tempered, flat top & bottom, blank glass crystals. Designed for today's thin watch, each of these fancy shaped crystals can be used for many different size bezels. If you have a grinder—you need this assortment.

F-BLK-50 assortment — 1/4 dozen each, 48 fancy shape sizes, (144 crystals) in labeled boxes.

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Bench Tips

SEND YOUR TIPS TO: Jingle Joe, AWI Central,
3700 Harrison Avenue, Cincinnati, Ohio 45211.



Joe Crooks

SUBSTITUTE FOR THE REAL THING

These two tips were sent to us from Tacoma members of the Washington Association by Jerry M. Fugich.

First tip: Many of us and the stores we do work for have lost the alarm springs found in inexpensive digital wristwatches. The price from supply houses for this part is at times higher than the cost of the customer's watch. An inexpensive replacement for that spring may be no farther than the catch tray of your work bench. The spring found within extra thin spring bars, when removed and cut to the proper length, makes an excellent substitute—and it only costs a few cents if you use a new spring bar for the spring, and nothing if a used one is used.

Second tip: Many of us still are using the B100 timing machine in our shops. If any of you have had the need to replace the ribbon in that machine, you know the cost is in the \$25-\$30 price range. A good replacement ribbon for the B100 can be found at your local stationery or computer store for about \$3.50. Ask for General Ribbon p/n IP416. This ribbon is used in an Okidata 80 printer.

These bench tips and many from the "old timers" were very helpful to many of us that are new to the trade. Why doesn't AWI publish a small booklet with the many excellent shop tips that were published in past issues of our

magazine? Those shop tips should be arranged according to categories such as tools, watches, clocks, jewelry, etc.

Jerry, your first tip has been used before, but because of your comments we are using it again for the new watchmakers. Someday I do plan to publish a book on "Bench Tips."

I don't recommend a spring bar spring for this alarm contact. It's too stiff and could damage the piezoelectric element if cut a tad long.

Order a coil of # 30 or 32 spring brass wire and make this spring contact in your lathe. It only takes a minute and looks like the original.

Chuck a small needle with the end of the spring brass wire in a chuck on your lathe and wind the brass around the needle at a SLOW speed, and—PRESTO!—you have a contact spring in less than one minute.

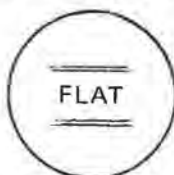
The substitute, General Ribbon instead of a factory replacement, will save the B100 watchmakers 90%. Isn't that nice? I hate to see any watchmaker gouged.

AWI



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THICKNESS: 1.0 - 1.1 MM
SIZES: 18.0 - 31.9 MM
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\$18.00 DOZEN ASSORTED

Assortment # MG 070 — Individually packed in total pieces of 70 pc. \$94.50

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Questions & Answers

Henry B. Fried, CMW, CMC, FAWI, FBHI, ★ FNAWCC



A Swiss Military Watch

Q I have been referred to you by a jeweler in the San Francisco area based upon your extensive knowledge and experience regarding a wide variety of timepieces. Recently I was given a watch that was owned by my grandfather. He was a watchmaker who grew up in Switzerland and came to the United States in the 1930s to establish his trade in Minneapolis. Upon his death, the watch I refer to was passed to me.

Initially, my intent upon receipt of the watch was to take it to a reputable jeweler in order to have its value determined for insurance purposes. However, the jeweler was not able to provide this information due to the fact that the watch is missing key information and/or markings that permit such an estimate. With this dilemma in mind, I was advised that you may have access to a library of data that could assist me in my efforts.

In the interest of providing you with the most accurate information at my disposal, I have begun by enclosing a selection of photographs which I hope will assist you in this matter. Regarding the background of the watch, it is my understanding that it was made in the family by my grandfather's brother who also resided in Switzerland. Even so, the family members I have spoken to regarding this seem unsure of this. My grandfather's name was Gygax and I believe that his family resided in the northwest region of Switzerland. He spoke French and German fluently.

If possible, could you please verify for me the true origin of the watch in addition to the manufacturer and date of manufacture if different from the date noted on the watch cover? This would assist me greatly in estimating the watch's



value and, as important, give me an historical perspective on an heirloom that means very much to me.

Your help would be very much appreciated.

Timothy L. Burke
San Francisco, CA

A I have examined the many fine photos you sent of your watch. Watches like yours were made in modest quantities in the last quarter of the 19th century. These were purchased by various members of a military corps in commemoration of service.

Yours appears to be for service to preserve the neutrality of the mother country Switzerland during the Franco-Prussian War. The female figure holding the sword and the Swiss square cross is

(Please turn to page 10)



Borel**SWISS
MADE**

No other replacement crown approaches Borel Crown in quality, looks or effectiveness. Borel Crowns are made by the top Swiss producer of crowns for new-watch production. Borel stocks the complete range of sizes, styles, types, tap sizes, post lengths, and tube openings. You'll find exactly the crown you need.

Newly updated Quartz Crown Asst.

Borel has assembled the 30 most common dustproof and waterproof types used on today's quartz watches, which require smaller sizes and taps. Includes diameters:

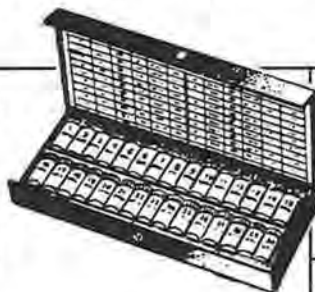
2.75, 3.00, 3.25, 3.50, 3.75 and

Taps 10, 11, 12 & 13

This new updated assortment includes a tap 13 size and more tap 12 crowns than previous assortment. 1 each yellow and white of 30 numbers. Total of 60 Crowns, in 28 bottle cabinet.

New 750/2 Asst. \$65

Dustproof Type



Diameter	Design	Tap 10	Tap 11	Tap 12	Tap 13
2.75mm	●	652/10	652/11		
3.00mm	●	656/10	656/11	656/12	
3.25mm	●	660/10	660/11	660/12	660/13
3.50mm	●	664/10	664/11	664/12	
3.50mm	●	666/10	666/11		

Waterproof Type



Diameter	Tube	Post	Design	Tap 10	Tap 11	Tap 12	Tap 13
3.00mm	1.60mm	Flush	●	756/10	756/11	756/12	
3.25mm	2.00mm	Flush	●	760/10	760/11		
3.50mm	2.00mm	Flush	●	764/10	764/11		
3.50mm	1.60mm	Flush	●	766/11	766/11	766/12	766/13
3.50mm	2.00mm	Flush	●	768/10	768/11	768/12	
3.75mm	1.60mm	Flush	●	770/10	770/11		

Japanese Style Crown Asst.



Borel has put together this unique assortment of crowns styled as those used on the popular Japanese brand watches: Seiko, Pulsar, Lorus and Citizens. Includes 45 numbers, most of which are the waterproof type with gasket, diameters from 2.5mm to 5.5mm. Total 90 crowns, 1 each of yellow and white of 45 numbers. Refills available in 60 bottle cabinets.

Some of the numbers in the assortment are:

J-506-2254 J-25N02 J-35E09 J-30E02 J-35M10 J-40M17
J-506-2614 J-40M32 J-45M30 J-50D05 J-35D03 J-35N57
J-506-2847 J-40M24 J-45D01 J-45W29 J-55M06

951/2 Asst. \$99

Borel

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National Order Desk - 1-800-333-4646

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Otto Frei - Jules Borel, P.O. Box 796, Oakland, CA 94604
National Order Desk - 1-800-772-3456

Borel

QUESTIONS & ANSWERS

(Continued from page 8)

that of Helvetia the symbol of Switzerland.

I do not know who Hans Herzog was but evidently he was the general of the army. C. Richard F. probably was the artist who created the high relief on the watch case.

The movement is typical Swiss of the 1870-1880 period and is of medium to high grade of the Neuchatelaïse area near the French border. It has the

16 jewels (rubies) and four gold settings. The hairspring is of the Breguet type with the last overcoil especially used to provide better and even timekeeping (isochronism). The term "Levees visibles" denotes that the escapement can be seen in action.

The movement is called a jeweled lever pin-set mechanism in which the fingernail depresses the pin at the figure III position to set the hands while turning the winding crown. Most often the cases were gun metal with no military significance. It is a hunting case with decorated bridges on the movement.

The term Biel is another name of Bienne, an important Swiss city.

As for value, we have a firm policy against rendering appraisal services. However, since you live in San Francisco, Southeby's Auction House will give you a fair appraisal.



Germanow-Simon Slashes Prices on all G-S Mineral Glass Round Crystal Sets

These are the same high quality Mineral Glass Crystals you and your customers have come to expect from G-S. They're not tempered glass as are some competitive crystals.

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(.040")

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20 dozen MG MINERAL GLASS
crystals 12.0 mm to 36.0 mm
(Complete Set) in cabinet

SET MG-10: ~~\$300~~ \$180

12 dozen MG MINERAL GLASS
crystals 12.0 mm to 26.4 mm
in drawer

SET MG-8: ~~\$280~~ \$120

8 dozen MG MINERAL GLASS
crystals 26.5 mm to 36.0 mm
in drawer

SET MG-5: ~~\$140~~ \$75

5 dozen MG MINERAL GLASS
crystals 26.5 mm to 32.5 mm
in drawer (Starter Set)

SET MG-3: ~~\$75~~ \$37⁵⁰

2 1/2 dozen MG MINERAL GLASS
crystals 12.0 mm to 14.9 mm
in drawer

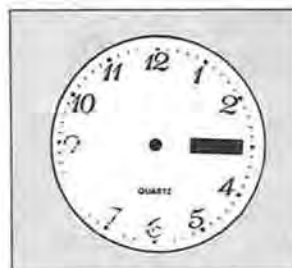


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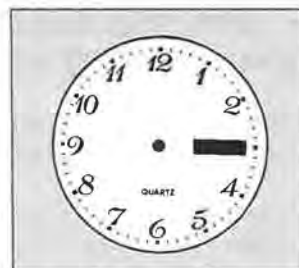
(Please turn to page 12)

Watch Dial Refinishing Transfers

This handy dial refinishing kit allows you to repair or customize old watch dials, making them look like new! Pick a suitable font style and size from the "Watch Dial Refinishing Transfer Sheet". Then with the supplied burnisher, simply rub off the desired transfer onto the damaged dial. With these few quick steps, you can salvage old watch dials or create customized dials. Save time and money by refinishing dials yourself.

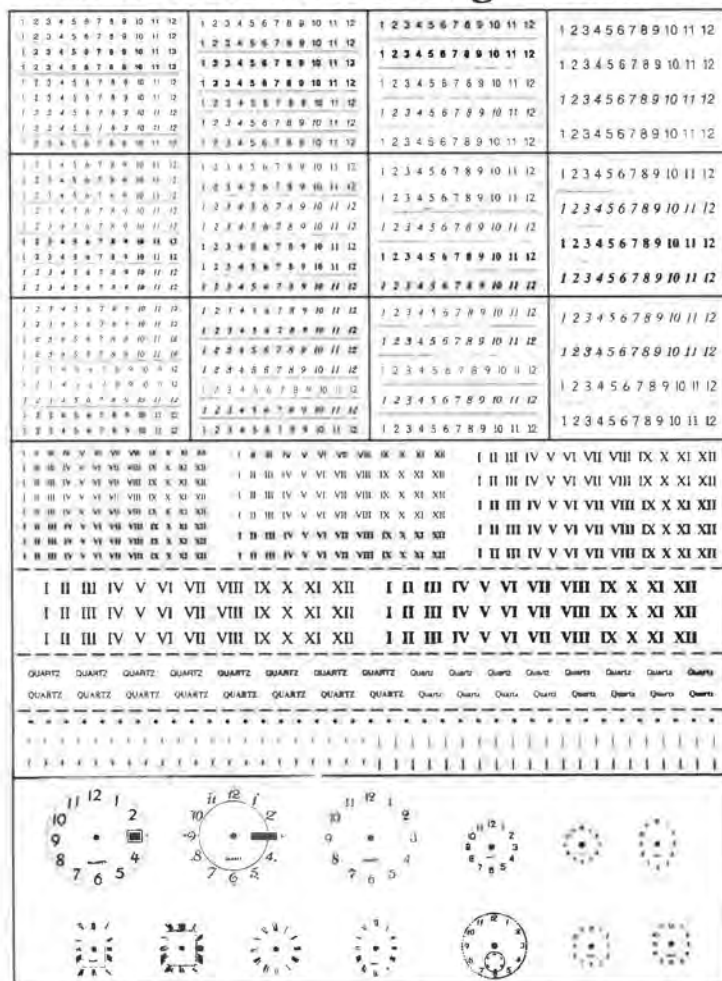


BEFORE
REFINISHING



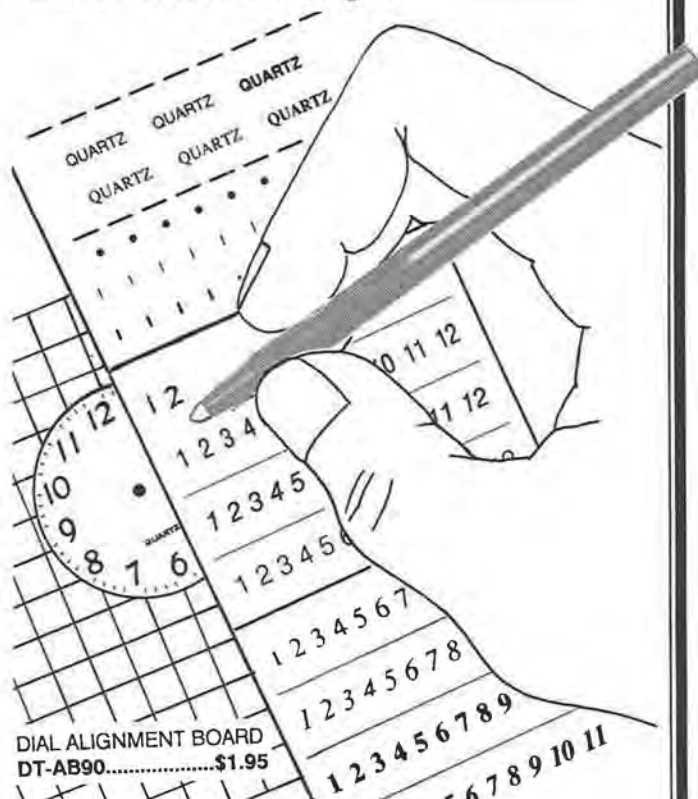
AFTER
REFINISHING

"Watch Dial Refinishing Transfers"



(ACTUAL SIZE 8" X 12") TRANSFER SHEET DT-9501\$14.95

- *Repair Damaged Dials
- *Refinish Old Dials
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QUESTIONS & ANSWERS

(Continued from page 10)

Q I would like some information concerning the following high grade pocket watch. The name is Urban Jurgensen & Sons Copenhagen, 19 ligne, serial number 9618, key wind, key set, two mainsprings and a sweep second hand with a small second hand indicating 1/5 seconds located in the "6" position. Without dismantling the movement, it appears to be around 31 jewels. Some cap jewels look to be set in pink gold settings. The case is a "Crescent Planet" 20/year double back and hinged bezel serial number 1887027.

I have enclosed two photos to help you.

Donald Ellis

North Little Rock, AR



A Your Urban Jurgensen watch appears to be a nice old movement, independent seconds with jump fifty seconds. The case appears to be much younger than the movement.

The movement also appears to be key wound and key set and fitted to a later movement made for a lever setting.

Urban Jurgensen operated out of Copenhagen and later from Switzerland. His products were very much sought after and he had a very high reputation. The first Urban was born in 1776 and died in 1830. Louis Urban was born in 1806 and died in 1867. It appears that he was the maker of the movement. The case is American.

All the Jurgensen watches—Swiss or Danish—were of solid gold European-Swiss made.

However, it is a nice watch, but without the gold (original case) its value and collectors' desirability is diminished. AWI has a firm policy against rendering appraisal services.

Henry B. Fried

A Referring to your letter in the June *Horological Times* to Joseph Brown of Sudbury, MA, I have the comet trademark. It was registered by Henri Jacot-Burmman of Bienne, Switzerland in 1881 for watches and separate pieces. He had lots of activity that year because he also won three first class certificates at Bienne. He was granted U.S. Patent No. 245,130 August 2, 1881 for a calendar watch. This is the same calendar dial that is illustrated for the back of Mr. Brown's watch, and I suspect that is what the "Brevete" refers to. In the patent he signs himself Jacot Burmann with no Henri and no hyphen.

I think he must have been an inventive type and was also respected by his peers. He was on the Jury of the National Exhibition in Zurich in 1883 and the same year was the Examiner for the Bienne School of Horology. In 1883 he had 21 watches at the Bienne Guarantee Office.

The firm was still listed as Jacot-Burmman in 1920.

Kathy Pritchard
Bethesda, MD



UNUSUAL WATCHES FROM THE 20s AND 30s

The period from 1920-1939 yielded many unusual and collectible watches. The following pictures represent some of these watches.

Figure 1 is a Rolex antimagnetic single button chronograph with pulsemeter. This watch has a heavy 18K yellow gold case with a hinged back. The button on the winding crown is for starting and stopping along with returning the hands to zero. These early high grade chronographs are very scarce.

Figure 2 shows another example of a 1920s Rolex chronograph. It is also a one-button chronograph, but instead of being through the crown, it is offset between the 1 and 2 o'clock positions. It has a white enamel dial with red and black

lettering. The case is very large, 18K yellow gold, with a hinged back. The reference number inside the back is 2021.

Figure 3 is a Rolex jump hour doctors watch. This model is named Prince Railway. Instead of having an hour hand like the rest of the doctors watches, it has a disc behind the dial with the hours on it. The case reference number is 4376. This particular case is 9K white and pink gold.

A very early Vacheron & Constantin wristwatch, approximately 1910, is depicted in Figure 4. It has a very unusual 18K yellow gold case. This was sold as a man's watch at that time. It was this design that led to the tonneau designs of the teens and twenties.



Figure 1



Figure 2



Figure 3



Figure 4

Figure 5 is a platinum Patek Philippe wristwatch from 1921. It has a very large hinged back and slightly curved case. These watches had a small 9-ligne movement with a very large dial. Some of these cases were 50mm or 2 inches long.

Figure 6 is a Movado polyplan. This watch was designed to fit the curve of the wrist. This 50mm-long case was one of the longer watches of the 1930s. The crown is at the 12 o'clock position. The movement is angular and full size. It is not the small round movements that are found in many other watches. This was perhaps the watch that inspired the Gruen curvex in the thirties.

Figure 7 is an extremely rare "chronoscope" by Vacheron & Constantin, circa 1930. The hour appears in the

window and the minutes are shown by the triangular-shaped marker in the outer ring. The case is 18K yellow gold.

A 1920s Audemars Piguet men's wristwatch is shown in Figure 8. It has a rectangular 18K white gold case. The triple date is shown through three apertures in the dial.

Figure 9 is a Patek Philippe men's fancy 18K yellow gold wristwatch. The watch was made in the 1920s, and is typical of the Art Deco period.

Figure 10 is a Cartier made by the European Watch and Clock Company, circa 1920. This watch has an 18K yellow gold case with a hinged front that opens to show the dial with Arabic numbers. When the case is closed, the black enamel numbers on the bezel cover up the other ones.



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12

Figure 11 is a men's Patek Philippe, tonneau-shaped wristwatch, circa 1917. It has an 18K yellow gold hinged back case.

Figure 12 is a men's cushion-shaped Vacheron & Constantin, circa 1930. This is another rare early one button chronograph.

The 1920s was a period for searching and discovering new ways to make a wristwatch. It was by this time that the manufacturers and retailers realized that the wristwatch was far more practical than the pocket watch. From the very complicated to the very bizarre, everything seemed to sell to some extent. There were those who preferred the standard round shape, but there were many who like the long rectangular or unusual Art Deco designs. The roaring twenties brought about many changes in fashion and jewelry. Fortunately, it carried over into the watches also. These 12 examples are just a small taste of what the early years have yielded to the collector's market.

TIME

On behalf of the trustees of the AWI-ELM Charitable Trust, I would like to take this opportunity to thank all of those who participated in this year's battery drive. There were 26 states, including Alaska, who sent in contributions. In all, slightly over 300 pounds of batteries were received. The proceeds from the sale of these batteries will be used for student loans.

The First Place winner this year was the Horological Society of New York. Second Place was Arizona, and Third went to Virginia.

Start now to collect used batteries for next year—which will be AWI's 30th anniversary. Remember, your contribution will help a needy student.

Fred S. Burckhardt
Secretary

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It's really surprising to hear that people have problems getting watch parts.

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SELF-WINDING WATCHES

Henry B. Fried, CMW, CMC, FAWI, FBHI, ★ FNAWCC



Novel Methods of Achieving Winding Efficiency

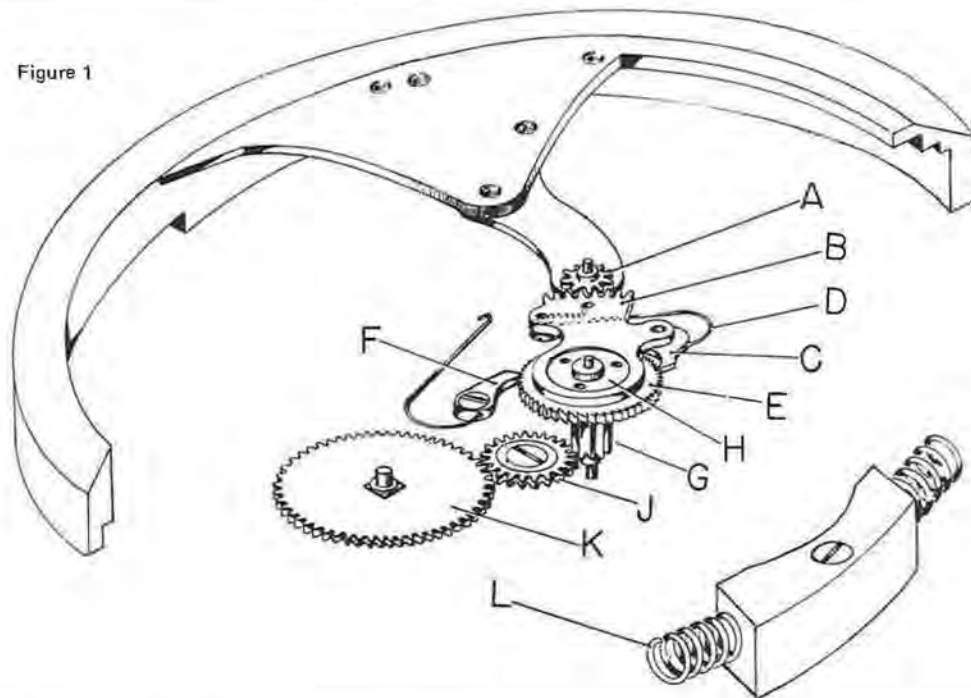
Figure 1 shows a system used in the LeCoultre model 481. Basically, it employs a pivoted pinion mounted solidly on the oscillating weight which is engaged with a toothed sector which winds up the mainspring through a train of wheels and pinions. In the LeCoultre self-winding mechanism (Figure 1), pinion (A) on the oscillating weight engages sector (B). The pawl (C) and a pawl spring (D) mounted on the sector move a ratchet (E) when the oscillating weight turns clockwise. When the weight turns counterclockwise, the click (F), attached to the movement plate, retains the ratchet (E) while the sector (B) and its pawl (C) skip back over the ratchet teeth of (E). The pinion (G) attached to the ratchet (E) turn the crown wheel and the mainspring ratchet (K). Note the oscillating weight swings only between the bumper springs (L).

(L). The conventional click is not used in this watch. The click (F) functions as the conventional click when the watch is manually wound.

The Revue self-winding watch produced by Thommen S.A. was another system which used a swinging weight. This weight, however, wound the mainspring regardless of which direction the weight moved. The motion of the swinging weight (A) was limited to traveling between the two bumper springs (J).

The action for this watch, shown in Figure 2, is as follows. The sector (C) will be moved by the pinion (B) in the counterclockwise direction shown by the arrow. Its pawl (E) will then engage the ratchet teeth of wheel (G), which is also mounted on arbor (K), and push this wheel around

Figure 1



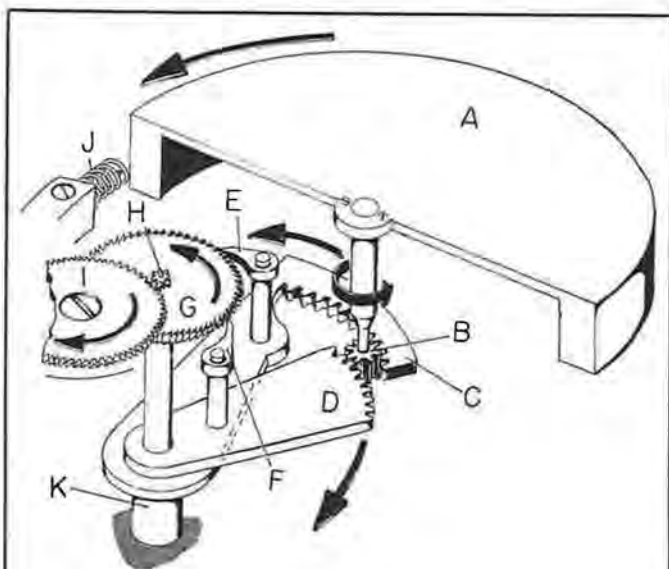


Figure 2. Principle of Revue automatic winding. Sector (C) and (D) straddle the oscillating weight pinion (B). When weight turns counterclockwise, click (E) on sector (B) pushes the intermediate ratchet wheel (G) upwards a few teeth.

for a short distance. During the same action, the pinion (H) mounted on wheel (G) enmeshes with the mainspring's ratchet wheel (I) and thus moves this around in the clockwise direction needed to wind up the mainspring. While pawl (E) is pushing the ratchet (D) around, the pawl (F) situated on sector (D) which moves in the opposite direction merely glides backwards over the tips of the ratchet teeth.

When the oscillating weight moves in the opposite direction, in the clockwise motion shown by the arrow in Figure 3, the pinion (B) turning with it, moves the sector (C) in the clockwise direction as well. Its pawl (E) will then move back over the tips of the ratchet teeth of wheel (H). However, sector (D) now moves in the counterclockwise

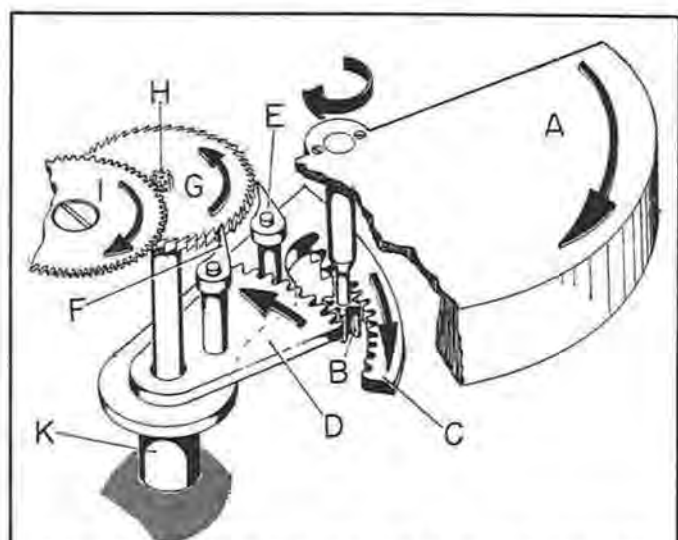


Figure 3. When oscillating weight (A) is reversed, pinion (B) causes sector (C) to move clockwise, and click (E) to skip over teeth of wheel (G) without winding; but click (F) on sector (D), moved in the opposite direction, takes over the job of winding the ratchet (G). Pinion (H) then winds up the mainspring ratchet wheel (I).

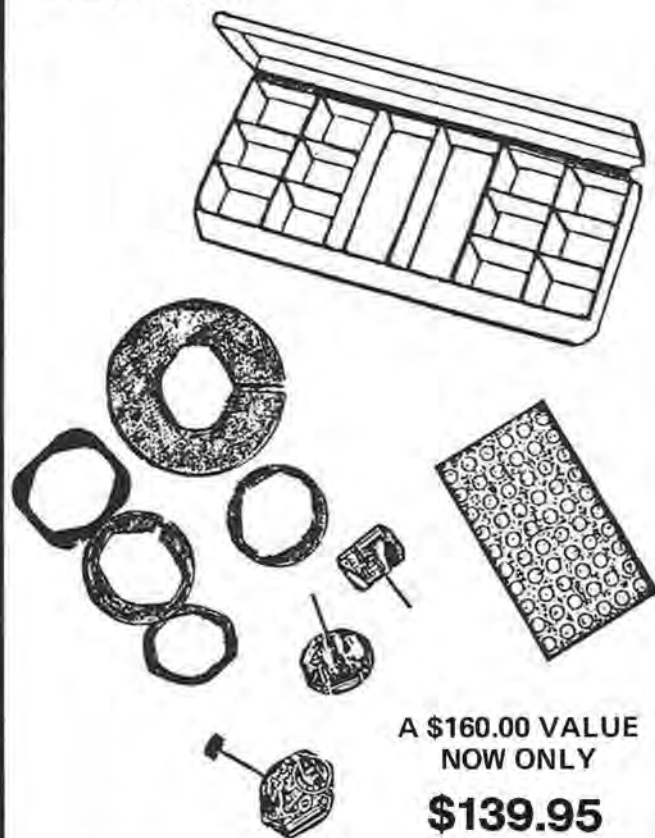
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direction. Its pawl (F) moves into engagement with the ratchet teeth of wheel (H) rotating in the counterclockwise direction. This enables pinion (H) to turn the mainspring ratchet wheel (I) clockwise, thus winding up the mainspring.

The mainspring may be manually wound, separately from the automatic device through the stem and crown. In actual practice, the ratchet pinion (pictured in Figures 2 and 3 as H) enmeshes clockwise with the crown wheel which is smaller in diameter than the mainspring ratchet wheel. This diminishes the wear on the pinion arbor of (H) when the watch is manually wound. To this end, the sectors (C) and (D) are made of beryllium bronze. Oscillating weights which wind in both directions reduce the violence associated with a free-swinging weight and its accompanying shocks to the bumper springs as well as relieving the strain on the oscillating weight axles and jars to the rest of the watch movement. Giving the oscillating weight some work to do instead of merely idling back reduces some of the speed of this return and adds to the life of the movement.

In comparing those watches which wind in either direction of the oscillating weight's fall with those watches whose oscillating weights wind in one direction only, some mention should be made of the number of weight actions needed to wind up their mainsprings one full turn. To this end, six different watches were examined, three in each category.

In watches which wind in both directions, the oscillating weight most often is restricted by bumper springs and is permitted to turn 360° in either direction continuously. Yet it was found that of the three examined, an average of 160 complete turns of the oscillating weight was needed to provide one full turn of the ratchet wheel, or one turn of the mainspring windup. Neither of the three examined required less than 150 complete turns nor more than 180 complete

turns. They represented the most popular makes of watches with this winding principle.

The watches which used bumper springs and also wound in one direction only were selected with one using a sector gear, another a cam-winding action, and another a simple device with the click on the oscillating weight pushing the loose oscillating weight gear around with each *forward* fall of the weight. Here the average movement of the weight fall needed was less than 100 thrusts. One was a little over 80 and the extreme just under 100. Yet these "falls" of the weight represented less than one half a turn of the oscillating weight fall. Since the two-way winders took a full turn and required an average of 160 turns, this then required about twice as much action to accomplish the same mission. However, it must also be borne in mind that the winding action of those watches which wind in one direction only did nothing on the return trip. Yet it points out the higher gear ratio of those watches which wind in only one direction.

In order for those one-way wind watches to operate with oscillating weights of the same weight, a jar was necessary to start their winding action, while the watches with unrestricted two-way winding and with a much lower gear ratio the winding action most often took place with little effort. However, the greater movement of the unrestricted oscillating weights are more prone to wear at their pivoting bearings. Of course, the use of heavy-duty jewels, beryllium bronze bearing, or a device used in the antique pedometer watches which employed a device to arrest the oscillating weight when the spring was sufficiently wound could prolong the life of the bearings and pivots of the automatic winding devices.

Another novel method of achieving a two-way winding is that used in the Ultra automatic watch made in Besancon, France. (A similar present-day version is found in the Seiko watch.) In this watch a combination of cam action, sliding

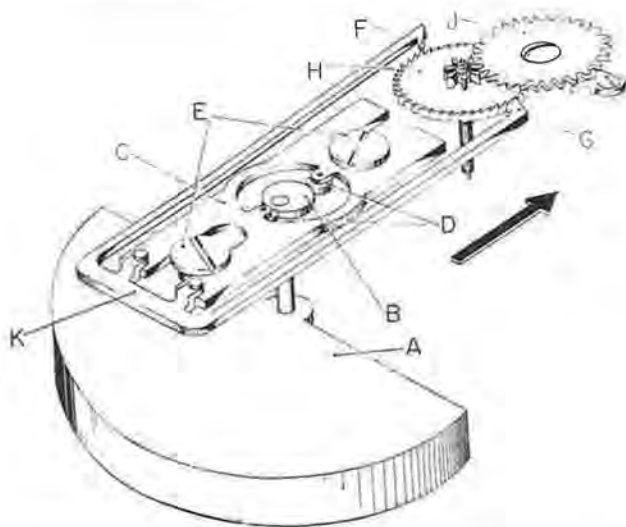


Figure 4. French watch Ultra has a device shown in the schematic above which uses cams, rollers, pawls and clicks plus sliding action to wind up ratchet (J). Oscillating weight (A) causes cam (B) to move upwards the plate (C). The claw-clicks (F) and (G) alternately skip past the ratchet teeth of wheel (H) while (G) pushes the wheel forward to wind up ratchet wheel (J).

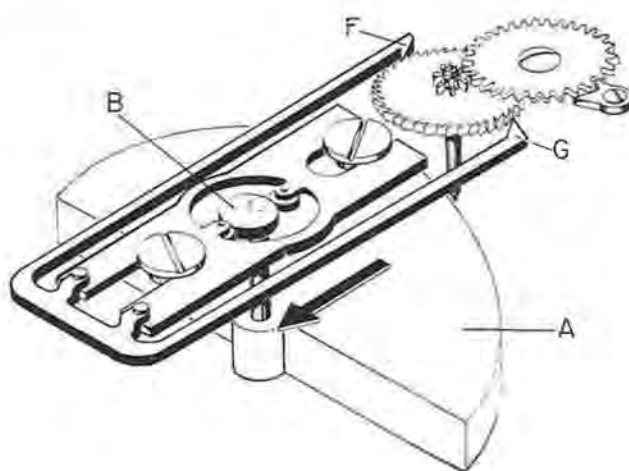


Figure 5. When oscillating weight (A) continues to move, cam (B), turning against the jeweled rollers, pushes the plate backwards. This causes the attached click (F) at the left to gather up the ratchet teeth of the intermediate ratchet wheel thus winding up the mainspring ratchet. In the meanwhile, the click (G) at the right, merely glides backward over the slanted teeth.

motion, ratchets, and springs are utilized to achieve the winding in both directions. The principle of this device is shown in Figures 4 and 5.

The oscillating weight (A) is able to turn 360° continuously in either direction. Attached to the oscillating weight is an eccentric modified heart cam (B). This cam has two jewel rollers (D) straddling it from opposite sides. These are pivoted and are set into a platform (C) which is slotted at both ends and fitted with shoulder screws (E) which permit the lateral or back-and-forth movement of the platform (C). Riveted to this platform is the U-shaped spring (K) with each of its wings terminating into the claw-like ends (F) and (G). These spring ends are shaped so that they fit into the shape of the ratchet teeth of wheel (H).

The action of this device takes place when the oscillating weight (A) turning in either direction causes the eccentric cam (B) to push the jewel rollers so that the platform (C) is moved upward in the direction of the arrow in Figure 4. The spring (K) attached to the platform (C) moves upward as well. Its long slender claws (G) and (F), moving upward against the edge of wheel (H), act differently from one another since they are situated diametrically opposite each other. (F), in the shape of a hook, glides forward over the tips of the ratchet teeth. However, (G) moves into these teeth and pushing forward moves the wheel (H) ahead a few teeth.

The pinion on wheel (H), enmeshed directly with the mainspring ratchet wheel (J) moves this around in the clockwise direction necessary to wind up the mainspring. In the same winding action, the wheel (H), turning counterclockwise, and the beak of (F) moving upward is pushed slightly aside by the passing teeth.

Figure 5 shows the action when the oscillating weight continues to turn (in either direction). Here the cam has caused the platform plate (C) to move backward guided in its slots by the shoulder screws (E). When the platform plate moves in this direction, the hook end (F) of the spring latches into one of the ratchet teeth of wheel (H), pulling it back in the counterclockwise direction. The pinion on this wheel is then able to turn the mainspring ratchet in the required clockwise direction, necessary to wind up the mainspring. In this action, the tip of spring end (G) is pushed aside by the teeth of wheel (H) as the wheel turns and this spring moves simultaneously backward.

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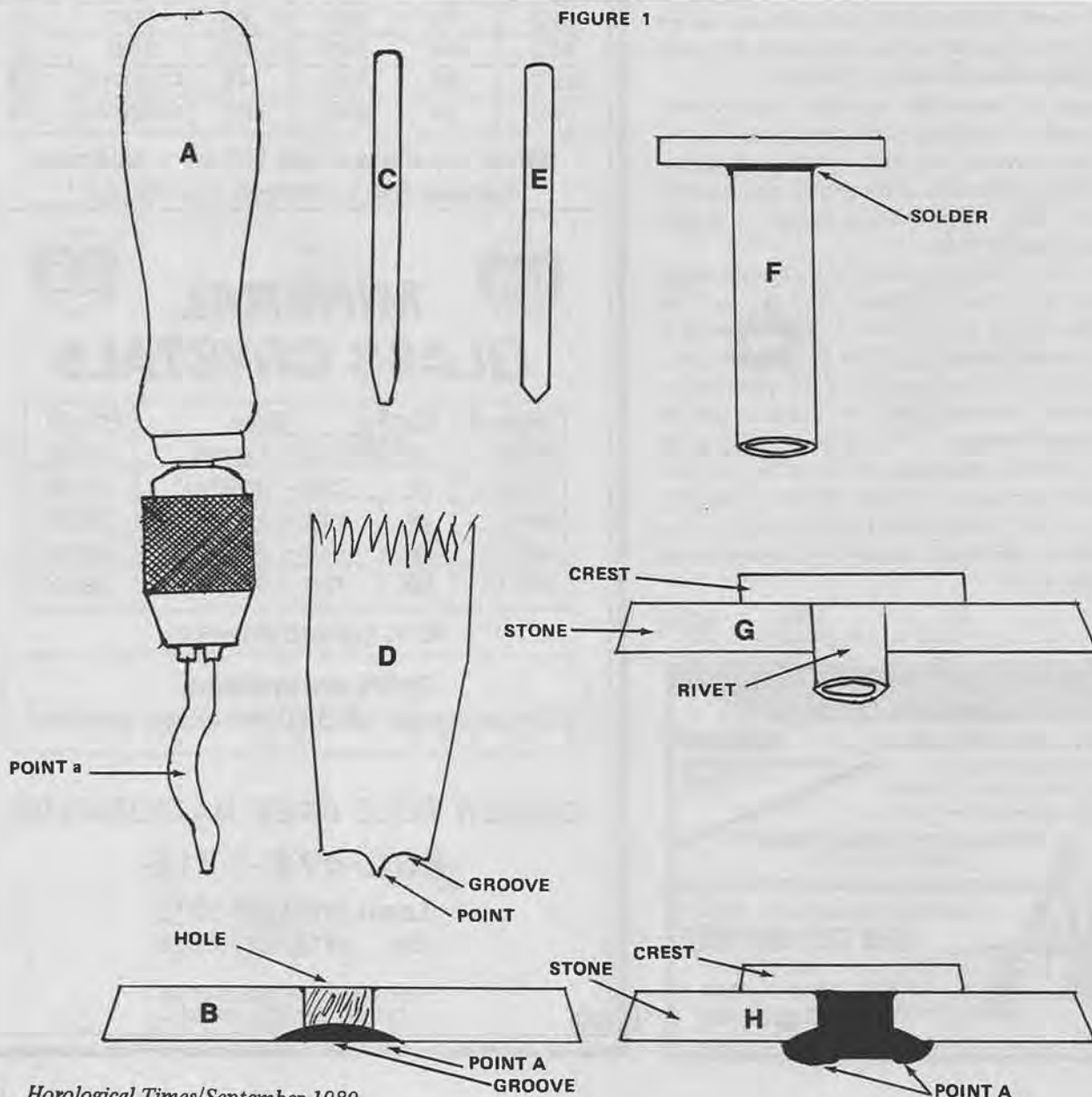


Attaching Signets and Emblems

In making jewelry repairs or handcrafting jewelry there will be a need for crests, emblems, or signets (initial letters) to be fastened to finger rings or other pieces of jewelry. When handcrafting jewelry it is your choice how to attach these things, but in repairing it usually is a matter of replacing with the same or similar attachment.

There are many ways of attaching, such as riveting, soft or hard soldering, and using glue or cement. Some are even hung with a jump ring. For finger rings without a stone where the signet or emblem is metal and is to be attached to a metal surface, it is usually done with solid rivets, but occasionally is just soft or hard soldered. In attaching these things

FIGURE 1



to a drilled stone usually tubular rivets are used. Other than the use of cement or glue these attachments require the use of heat and solder. There are, of course, emblems and initials that are attached with a screw to stones that are drilled for this type of installation.

Figure 1 shows a simple single tube type of installation for attaching a signet or emblem to a flat stone, and the tools needed to burnish the rivet. 1A shows a hand chuck vise with a burnishing punch at point a. C, D, and E show the end shapes of punches for spreading and burnishing the rivet tight. Although the rivets can be tightened by tapping them with a hammer, it is much safer to burnish them with the hand vise using hand pressure and twisting. Tapping with a hammer can cause breakage of the stone.

Often the hollow rivet is worn or damaged and needs to be replaced so a piece of tubing needs to be selected to fit snugly the hole in the stone. The old tube can be removed from the signet or crest by heating until the hard solder flows. Then remove it, or it can be removed by sawing, filing, or grinding it off. As the tubing that I use comes in three-inch lengths, I never cut it to length until after it is gold soldered to the crest or signet. The punches that I use are made from old staking punches that I have annealed, shaped, and then re-tempered.

Following will be a step-by-step instruction on how to repair and install an emblem, signet, or crest on a drilled stone with one hole. Most of these holes in stone for one tubular rivet are two millimeters in diameter, so a two-millimeter tube should be a snug fit.

STEP 1) Preclean the ring or piece of jewelry by pickling it in sulphuric acid pickle solution, or a commercial pickling chemical such as sparex. Then ultrasonically clean it in a soap and ammonia solution, or scrub it in the solution, then rinse and dry.

STEP 2) Remove the crest with the worn or damaged rivet and then remove the rivet from it. This can be done by either heating until the solder flows and removing it, or by sawing, filing, or grinding it off. These crests, emblems, or signets are usually karat gold with a nickel silver tube rivet gold soldered on it, so when you remove it you can replace it with a tube rivet identical to the original.

STEP 3) Replacing the rivet can be done by holding the correct size tubing in locking tweezers and fluxing the end to be soldered to the crest, then putting a small chip of gold solder on the end and apply heat until it flows. Next lay the crest face down on the asbestos heating pad and flux the place where the rivet should go. Holding the tubing in a vertical position with the locking tweezers, heat can be applied until the solder flows. Figure 1F shows the crest with the tube gold soldered to it.

STEP 4) The tube now can be cut off so it protrudes slightly through the stone leaving enough to allow for the spread that is necessary to make a tight rivet (see Figure 1G).

STEP 5) If the tube rivet is to be applied to a stone set ring, then a curved punch can be used in a hand vise, letting the end of the punch align properly in the rivet. This will allow the rivet to be burnished tightly against the stone as shown in Figure 1H. Figure 1D shows the shape of the bottom of the punch that will spread the rivet over the edge of the





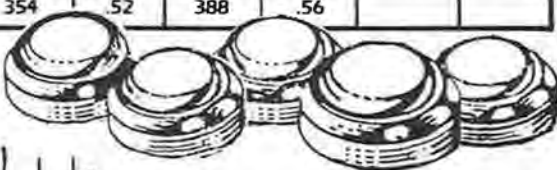
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325	.47	373	.56	399	.40
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hole in the stone and also flatten the outer edge of the rivet, making a neat rivet under the stone.

STEP 6) Figure 1B shows a side view of a drilled stone for use with a tube rivet. Point A shows a groove cut across the bottom of the hole. The purpose of this is to keep the crest from turning. After the rivet is burnished snugly, the crest should be checked to make sure it is straight; if not, it can be turned until it is. When it is straight, the edge of the burnished part of the rivet can be punched into the groove on each side of the rim of the rivet, using a screwdriver-shaped punch. The piece of jewelry should then be polished and cleaned to look as new as possible.

Another type of fastening used with stones is two tubular rivets on a crest for a stone with two holes drilled for this. This has a distinct advantage because the rivets need only to be burnished tight, and there is no danger of the stone turning. This type is harder to install or repair by replacing rivets because the alignment of the rivets on the crest is critical and must be in perfect alignment. The holes in the stone are much smaller than the one for a single tube rivet and requires smaller tubing. Other than that, the steps for installing are about the same, except the tool for burnishing the rivet can be a simple center punch (shown in Figure 1E) which will spread and tighten these smaller tube rivets.

On all-metal signet rings or flat metal surfaces, many times signets or crests are fastened with two holes in the background metal and solid wire rivets are gold soldered to the emblem. These are then put through the metal, cut to length, and riveted tight. There are several ways to rivet the solid rivets. One good way is to use a concave punch such as a beading tool (in fact, a beading tool can be used effectively if one large enough is available). The diameter should be about one-and-a-half the diameter of the solid rivet. With a punch and a small brass hammer these can be tapped to make a domed rivet. Or with a beading tool hand pressure while turning can burnish the rivet tight. One quick way that I have found is to put the concave punch in the flex-shaft tool, and exert pressure on the rivet while the flex-shaft tool rotates. This will burnish the rivet tight and neat. Always when burnishing use a small amount of lubricant on the end of the tool which will keep the metal from gaulding and prolong the life of the tool. I have found beeswax to be excellent for the lubricant.

Many initials or emblems are available for drilled stone finger rings that fasten with a screw. These emblems are usually karat gold with the screw back (female) made of nickel silver. It is made with a tube threaded on the inside and a finger extending out from each side that forms a base. These fingers are made for a standard drilled stone for this screw type attachment. The stone has a groove cut across the hole for these prongs to fit in when the emblem is placed on the stone. It is then only a matter of turning the stone over, starting the screw, and tightening it with a small screwdriver. This groove in the stone with the small prongs fitted into it keeps the emblem from turning. When these attachments get worn or the threads stripped out of the tube it is a small job to replace it. These are available from the findings distributor with two different size tubes and screws.

To remove the old one, I use two sets of tweezers, one pair to hold the emblem and the other to remove the old worn screw base while heating it until the solder flows. The

new one can be attached by placing the crest on the heat pad face down and fluxing the center where the attachment is to be placed, then applying heat until the flux turns frosty white. Grip the tube of the attachment in locking tweezers and heat; flux and flow a small chip of gold solder on the bottom. Hold it in place on the emblem and with a torch apply heat until the solder flows. Pickle to remove residue flux and any oxides, then burnish with a bronze wire brush wheel on the polishing motor. This is now ready to install. If everything is perfect, all that needs to be done is to put it into the stone, turn it over, start the screw, and tighten.

Unfortunately, most of the time the fit will not be perfect, so some adjustments will have to be made for the emblem to seat tightly on the stone. Sometimes the fingers on the attachment are a little large for the groove of the stone. Or maybe a little solder will keep this from properly seating in the groove. These can be seen after trying it out and tightening the screw snugly but not too tight. When the crest is removed, an indentation can usually be observed under magnification where the fit is too tight, so a little trimming is in order. This can be done with needle files, hand gravers, or even rotating burs or grinding wheels in the flex-shaft tool. After getting the center to seat tightly against the stone, the edge of the crest sometimes does not seat tight in one or more places. Usually with a couple of pairs of small pliers these edges can be bent down so that when the crest is again put in place and the screw tightened the crest will fit tightly all around against the stone. The ring should be polished (especially the crest) and cleaned, then dried. The screw should then be checked for tightness. Rarely does one of these screws work loose, but I usually place a drop of Aron Alpha® cement around the edge of the screw. This works its way under the edge of the screw, assuring that it will not loosen but if the crest has to be removed later it will cause no problem loosening it with a screwdriver.

Last but not least, crests, signets, and emblems can be fastened to any metal surface with solder (some are even fastened with glue or double-faced tape). Sometimes an emblem will warrant using hard (gold or silver) solder, while other times soft (lead base) solder is adequate. I have observed many class rings with the crest soft soldered on, as well as many inexpensive military silver rings with the emblem soft soldered on. The only difference in attaching these with hard or soft solder is that soft solder flows with a small amount of heat while hard solder requires heating the metal red hot, usually to get the hard solder to flow. In other crafts such as tinsmithing this type of application is called sweat soldering. The choice of soft or hard solder can be the finish or the melting point of the metal that the crest is made of, or the metal it is being attached to. Sometimes an emblem is required to be put on pewter which melts at a low point. Sometimes this can be done using soft solder. If it is to be attached to an electroplated surface when the metal is heated red hot to make hard solder flow, it can easily ruin the plated finish. Therefore, the logical application is to use soft solder which does not require enough heat to damage the finish.

Many rings with signets, emblems, or crests on stones come in for repair of a loose crest. Most of them that are tube type fastenings can be tightened by using one of the riveting punches shown in Figure 1. Using the bent punch can give a

more uniform rivet under the stone; when tight, the rivet can be tapped into the groove with the screwdriver-shaped end on the punch. As was explained in installing the tube after polishing, cleaning and drying a small amount of Aron Alpha cement around the edge of the rivet will even make a more secure job.

Although some of these replacements or repairs seem to be more than the article is worth (costwise), it probably doesn't seem that way to the customer, for reasons of his own. It is still my contention that customers are entitled to any service that they are willing to pay for, but a workman should not accept a job for repair unless he is sure that he can perform a satisfactory, durable, and attractive finished job.

In the next article we will discuss jump rings, spring rings, and catches.

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LUBRICATION

By Robert B. Little, CC

This article will discuss the basic need for lubrication, the types of lubrication utilized, and the applications of lubrication to the clock movement. There isn't a whole lot of information available about horological lubricants, but one can take the basic fundamentals that are available and use them to form their own conclusions. A lot of this information came from *Machinery's Handbook*, 23rd Edition. This is an excellent publication and should be studied for further information on the subject.

Lubricants, simply put, reduce friction between moving parts, reduce energy loss, and improve the efficiency of the mechanism while preventing excessive wear. Depending on the application, the lubricating agent can be recirculated, cooled, filtered and frequently changed as in an engine, or it can remain stationary as in clocks. As you can see, the problems facing lubricants in clocks are the duration of the period between cleaning and refreshing the supply, the steady increase of dirt contaminants, and the gradual decrease in the ability of the lubricant to perform.

When bearing surfaces interact, there are two main types of lubricant interaction with the surface: boundary and full film lubrication. Boundary lubrication occurs when two surfaces touch and rub together with a very thin film of oil between them. This mode of operation is acceptable only in very slow rotary or oscillating motion (as in clocks). These surfaces are typically manually greased or oiled. Full film lubrication would be experienced with forced lubrication systems where a film, for all practical purposes, completely separates both surfaces. Of course, a transition phase exists between the two distinct phases. For example, when an engine starts from rest it proceeds from boundary to thin film to full film lubrication at operating conditions.

The three basic types of wear experienced are abrasive wear where a harder metal will wear or cut away a softer metal, adhesive wear where one surface shears and pulls metal away at the point of adhesion, and pitting which is due to surface fatigue and failure. Pitting occurs most commonly on gear teeth and is minimized by running a harder pinion with a softer gear.

To deal with these problems, lubricants (most commonly oil) are employed. This lubricant is often composed of a base mineral oil with additives such as antioxidants, friction modifiers, color dyes, corrosion inhibitors, viscosity index improvers, odor masking agents, oiliness improvers, anti-foaming agents, extreme pressure additives, etc. Synthetic oils use a synthesized hydrocarbon or substitute such as silicon for the normal mineral oil. Synthetic lubricants are excellent due to their improved low temperature flow proper-

ties, excellent aging characteristics, and high flash point. However, they are more expensive.

Greases are oils with thickening or jelling agents added to give the oil body and to keep it in place. Some jelling agents such as carbon, graphite, molybdenum disulfide, and lead can add lubricating properties to the oil. Thickening agents such as metal-based soaps (for example, lithium and aluminum greases) add little lubricative ability to the oil. Thickening agents often slowly release the oil in time, and the grease's original rating or lubricative ability is lost. If you have ever seen a grease gun hanging in a garage with a coffee can under it to catch the dripping oil, you will realize that poor lubrication will result when the gun is used since mostly thickening agent and little oil will be applied. This grease should not be used and should be properly disposed.

Different greases with different thickening agents should not be mixed. If for instance two different metal-based greases are mixed, electrolytic corrosion and bearing failure would result. Sometimes a grease mixture could clot, get thinner or solidify, losing important properties. Although there are a few greases that can be mixed, the safe rule of thumb is always completely remove all old grease before adding the new.

Different thickeners are chosen for their own specific variable, such as solubility in water, consistency, texture, heat resistance, and melting point.

Metal surfaces coming in contact must be properly prepared to assist in good lubrication. A pitted or scored pivot or bushing must be properly cleaned, trued up and burnished, or surfaced to minimize metal-to-metal contact and wear. However, keep in mind that metals contacting must have microscopic "peaks and valleys" in the metal to maximize oil access to the contact zone of the metals where contact pressure is usually the greatest. Honed or burnished surfaces will "break in," wear and last much longer than two perfectly polished glass-like surfaces with no microscopic "ridges and valleys" in the same application.

Oils tend to be able to creep, and while this is good for lubricative properties, it can be bad in that it deters the oil from staying put. Modern clock plates have oil sinks or reservoirs in the plates to allow for and keep adequate oil supply. Dull and hazy brass, even though it is clean, will help the oil to weep away and after several weeks or months the sink will have the appearance of a hazy moon. For this reason the sink face must be polished. This can be done with a variable speed dremel tool, felt cone buff, and a minute amount of brass or semichrome polish. This only takes a few additional minutes and helps the oil to stay where it's sup-

posed to. The point here is not to polish the actual bearing surface which goes through the plate but to condition the oil reserve area on the face of the plate.

The oil, when applied to the plate in the operating position, must also resist the pull of gravity and running out. A proper viscosity oil in the bushing should contact the pivot and bushing for the full 360 degrees to avoid pulling out. The oil should not be so viscous that it won't travel completely through the plate. Oil which is too thick will also rob power instead of doing what it's supposed to do . . . decrease power loss. You can see that a light oil for a delicate watch mechanism would not stay in place and would run out of a normally worn barrel arbor pivot. At the other extreme, neither would you want to apply a fibrous axle grease to this spot because of the friction increase and the likelihood that it won't distribute well. Generally you want the lubricant to be viscous enough to provide a good film and minimize wear, but not so viscous that it starts taking power to overcome the lubricant itself. You would benefit from applying a little heavier oil in the bottom end of the clock than you would in the upper end. This isn't to say that you have to have several dozen types of oil around to do a good job. Two or three weights of oil will cover about everything. I use a good watch oil for delicate jewels and balance wheel platforms, and one of several of the good types of clock oils available for the bulk of the clock lubrication. I also use a slightly more bodied oil such as Breakfree (marketed by Duracell) for barrel arbor pivots and most of the American mantel and kitchen clock pivots, which usually have greater amounts of play. Be sure the oil is plastic compatible if used on plastic parts.

Mainsprings in clocks require a quality lubricant that will stay put. A solid lubricant such as graphite in a closed barrel will provide excellent lubrication. However, it is a messy proposition and isn't used very frequently. Grease or a heavier grade oil is most commonly used.

Of course, the spring and barrel (if used) must be freshly cleaned and in good shape. Dirty springs can be cleaned well with a 1" x 3" piece of fine Scotchbrite pad and WD-40, and then wiped dry. A grease can be evenly and easily applied by extending the spring, applying a thin bead to one side with an accordion-type dispenser or syringe, letting it coil back up, extending it again, and then going over it once or twice with a small piece of cloth.

There are quite a few high quality lubricants available for mainspring lubrication. The best way that I have to pick one is to choose a lubricant that stays put, lasts, and allows a smooth letdown. Some heavier greases on lighter springs will cause the coils to "grab" on winding and letdown. In that situation a lighter bodied grease or perhaps a viscous oil would be in order. On 31-day clocks that have springs that seem about 50 feet long, Triflow (by Thompson and Formby) is good because you can partially wind the spring, then apply the Triflow and then finish winding and avoid the mess of wrestling around with a prelubricated spring. Triflow has Teflon™ (by Dupont) and provides for a smooth even letdown by such a long spring, maintaining power all the way. Silicon grease works very well on 400-day clock mainsprings, and you don't have to worry about the oil separating and losing power. I also use Moebius and Novostar greases and have been very pleased with their performances.

Surfaces such as gear teeth and pinion leaves must not be lubricated in the clock. In this case the lubricant, over time, would be more detrimental from the fine dust and dirt it would collect than from what would be gained from the

(Please turn to page 47)

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SETTING QUARTZ WATCHES

The task of setting quartz watches occurs many times each day. This is especially true in LCD watches since these need resetting after each battery change. When the battery is out of the watch, the display will be "blank" as shown in Figures 1 and 2. The job of resetting is ours. We certainly don't want to return a watch to a customer without first setting it. Of course, in rare cases we might be tempted to ask the customer to help us reset their watch, especially if we don't know how to set it. However, many customers don't know how to set their quartz watch and may have lost their instructions, so they must depend on us.

Setting an analog watch is generally very simple; however, LCD watches and/or a combination of analog and LCD may present a problem. Being that there are so many methods of setting watches, it seems like the watch designers stay up late at night trying to figure out how to design their particular watch so that it will set just a little differently than their competitors. This difference is sometimes warranted because of their different mode features. Also the number of pusher buttons creates a difference. In addition, there is a desire to allow a crown to have several functions and thus activate several mode features. Some of the pushers can be eliminated if a fewer do more. All of these combinations automatically create a nonuniversal system. Added to the above reasons, company A may want to use the upper right pusher for a certain function and company B may use this pusher for a different one.

QUARTZ SETTING DIRECTORY

Several years ago AWI published a list prepared from information supplied by the manufacturers of quartz watches. I put these 8½"x11" sheets into a three-ring binder and it was a valuable aid in learning to set certain quartz watches. It contained factory instructions for both LED and LCD watches.

It is important to keep a copy of setting instructions on all quartz watches which may present a future problem in setting. It is hard to remember all combinations and some can be difficult without this written reference as a guide. We should keep handy our own setting directory.

GENERAL SETTING INFORMATION

Obviously, it would take a book of possibly 200 pages in fine print to list each company and model showing just the setting procedures. The intent of this article today is to show general methods on "how to set quartz" and the need for keeping instructions on quartz setting procedures, at least on all models that set in an unusual matter. It is helpful to add to this list, because new watches come across our bench that may be different enough to take too much of our precious time to relearn the setting procedure.

In this article we will discuss some general information on setting procedures, without mentioning any watch brand. Our information will vary according to the number of pushers, etc. in LCD watches and the functions of the stem and crown in analog watches. This article is for general information only and gives suggestions that might be tried.

SETTING ANALOG WATCHES

Most analog watches have a crown, and setting is accomplished by pulling the crown out and then turning the crown to set (Figure 3, position 3). If it is a day and date model, the crown may have an in-between position. In this half-out position, position 2 in Figure 3, the day and date may be set by turning clockwise and/or counterclockwise.

It is important to remember to *first* set the time hands by turning crown until hands pass 12 o'clock and the day and date *advances*, and *then* set to correct time. This will allow the day and date to change at midnight and not at noon.

ELECTRONIC SET

A few watches, both ladies' and men's, are electronically set. They are set by pulling the crown out and giving a light spin to the crown. The hands will advance automatically and will probably stop at exactly one hour from the time that we stopped the spin. This can put a slight error in setting, so it is best to stop the hands (generally by reversing the crown) a few minutes before the correct setting time. Then we can finish the advancing, to set, by slowly turning the crown one click at a time. Some watches allow setting in both directions,

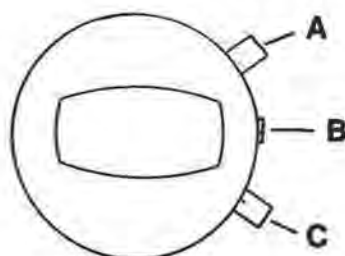


Figure 1

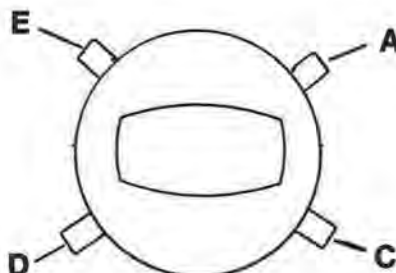


Figure 2

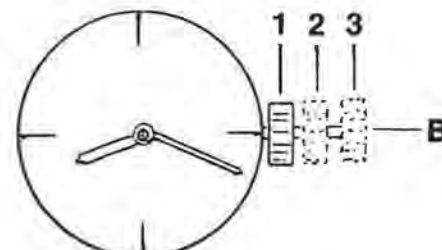


Figure 3

and some only in the clockwise direction. *NOTE: If a watch comes in for a battery and you notice it does not set, replace the battery first. This might be an electronic set watch, and these will not set when the battery is low.*

SETTING LCD QUARTZ

As we know after a battery change, LCD watches need to be reset. First, we should observe the printing on the dial. If we see the words set or lock, we will probably push that pusher button first. Then something will flash (probably the seconds), and we can set the watch by pushing another pusher.

Let's suppose there is no information printed on the dial, and let's assume the watch has pushers as shown in Figure 1. Note A and C are command pushers. B is a set pusher, and it is flush with the case and requires a pen point or pin to set the watch. This type is easy to figure out. Simply push B and release. (Do not hold button IN. Be sure to release it.) Push in and release this set button as many times as necessary until the desired display appears. Then push the command button A or C until the proper change is accomplished. Notice that either A or C will probably be the nightlight pusher, and the other one is the command button. Let's say that A is the nightlight, therefore C will be the command button.

Figure 2 shows a different LCD watch which has four push buttons. Since there is no flush set button, we must assume that one of these four buttons will be the set button. Since one of these is a light button, we can readily find and eliminate it. Generally, a nightlight button will not be the set button.

Let's say that we found that button E is our nightlight button. Let's push on A, C, and D until we find which of these is our set button. We will know when we have found it, because the display will start to flash, or the colon—or something—will start to flash. Actually, the seconds will probably flash. If nothing happens when we push on each of these buttons, we must backtrack and push again on each one, but this time we need to hold the button for about five seconds. Some of the better watches have this delay feature as a safeguard against the possibility of the wearer accidentally bumping the watch and striking the button. To set this watch it may be necessary to push two buttons at the same time to activate this setting mode.

Looking at Figure 2 again, let's say we have pushed button A and the seconds are flashing. Now let's push button C and the seconds return to zero. That's good. Now that we have set the seconds to zero we can proceed to set the minutes. Now we need to experiment. If we push button A again it may return to NON-SET. (In other words, it may shut off our setting procedure.) Then we need to start over, and when we get this far again we know that button D must be the one to advance us to the minutes, hours, etc. (Gee . . . this sounds complicated, but it really isn't. Just a few tries will generally result in figuring out what the manufacturer had in mind for us to do.)

(Please turn to page 33)



Figure 4

NEW!

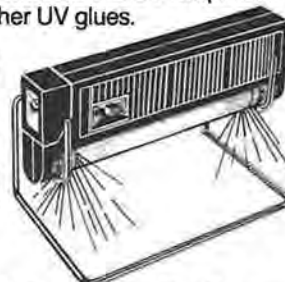
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A. NEW REQUESTS

ORGAN CLOCK

Jerry Vilicich, San Pedro, CA, was instrumental in producing the AWI video tape on the Atmos clock. This tape has helped a great many people. Now Mr. Vilicich is looking for some help. If you have an organ clock similar to the one shown, he would appreciate photos or sketches to help with the following problem. Mr. Vilicich writes:

This clock is missing several parts. First, on the left side the locking cam wheel to the organ train is missing. Second, locking cam that fits on top of this locking cam wheel is missing. Also, on the front organ side something is missing from the locking lever; most likely a hammer of some type that triggers the organ play.

We have a pretty good idea of how it is supposed to work, but we could use some help; photos would be great.



KESTENMAN BROS.

Jim Stanley of Ft. Wayne, IN recalls that the firm making Kestenmade products (Kestenman Bros.) was purchased by another firm. We have no record of this in our files. Can anyone advise us who may have purchased this firm?

BARHILL CLOCK CO.

Greg Hostetter, Rochester, MN, is seeking information on the Barhill Clock Co. We would appreciate hearing from anyone who has such information.

FULTON & WATCHCRAFT CRYSTALS

James Hernick, Frankenmuth, MI, has numerous crystals from Fulton & Watchcraft, but doesn't have any type of index or catalog for them. AWI has nothing in its files either. If you have such an index or catalog, please contact AWI Central so we can make arrangements to copy it.

HADDON CLOCK MOTOR

Harold Thompson of Owatonna, MN asks: Does anyone have specs for the novelty Haddon clocks of the 1940s? It looks as if the style "C" Synchron motor will work, but I would like to have a chart showing the rotation and RPM of the old Haddon motors.

REBUILDING SWINGER PIVOT

The second request Harold Thompson has is for information (instructions) for rebuilding the pivot on Ansonia Swinger clocks. He believes that the pivot point to dial center is critical.

B. RESPONSES

Due to an early deadline and vacation conflict, responses will be published in the next issue.

C. ITEMS STILL NEEDED

CLEAR NON-YELLOWING LACQUER

An AWI member in Florida, who specializes in the manufacture and restoration of clocks, is seeking recommendations from clockmakers who have found a lacquer that is clear, one that will not yellow. AWI will compile a list of those products recommended and make it available to anyone interested.

ORIGINAL PULSAR BY HAMILTON

A frequent request at AWI Central is one for spare parts and service for the original LED Pulsar watch which was manufactured and marketed by the Hamilton Watch Company of Lancaster, PA.

SANDOZ WATCHES

For several years, AWI has been seeking an agent in the United States for Sandoz Watch spare parts and service. Our several requests to Sandoz Watches, Cie Sandoz, Chaux-de-Fonds, Switzerland always met with the same response: "At the present time there is no U.S. agent." Our most recent request to this address was returned with indications that the firm no longer exists, at least at this address. If anyone can supply information about Sandoz Watches, and who might be contacted for spare parts and information, a number of members would greatly appreciate it.

DO YOU HAVE INFORMATION REGARDING THIS MONTH'S REQUESTS?

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Antique Watch Restoration

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PART XLV

THE ECCENTRIC METHOD OF MAKING FLY CUTTERS FOR WHEELS AND PINIONS

This material on making fly cutters is based on a method developed by Mr. Ted McDuffie of Sarasota, Florida. I appreciate his permission to use his ideas in this material. Although this basic method of making fly cutters is shown in Goodrich's lathe book and Levin's book, Mr. McDuffie has further developed and perfected the method to a point where it is most valuable to the watchmaker who makes gears.

A fly cutter is usually thought of as being a cutter which is used only for cutting brass gears, but a fly cutter made with this method is also excellent for cutting steel wheels and pinions if it is made correctly, hardened correctly,

and used correctly. These cutters are strong enough to cut pinions full depth in one pass. Resharpening the cutter does not change its profile. Also, the cutter can be used over and over again for years. When cutting brass gears with this type of cutter, it is turned quite fast, but when cutting steel wheels or pinions, the cutter is turned very slowly and is fed through the material very slowly. Also to assist the cutter in cutting, some cutting oil should be used on the work. When making or using these cutters, it is very important that everything be mounted very solidly; otherwise, the surface produced will not be smooth like it should be.

Figures 1 and 2 show the arrangement used for making fly cutters using the eccentric method. Figure 1 shows a top view of the arrangement and Figure 2 shows a side view of the arrangement. The radius tool, which is used to form the profile of the fly cutter, is held in a special tool holder that fits into the tool post of the slide rest. A hole is drilled at a 15 degree angle in the tool holder for holding the radius tool in the correct position in the holder. The hole does not go all the way through the holder to allow for a seat for the end of the radius tool. The tool holder has been sawed through the center of the hole so the hole can be closed on the radius tool to hold it solid. An Allen head screw is used through the side of the tool holder to tighten the radius tool in its hole in the holder. The end of the radius tool is ground off at a 60 degree angle to form the cutting edge. Note: By varying the angle on the end of the radius tool, it will cut different radii. When making radius tools for the holder, about one-third of the length of the blank can be turned down to different diameters for making tools which will cut different radii to match the curved addenda of wheel and pinion teeth. The radius tools are usually made from 5/32 inch water hardening drill rod which is about 3/4 inch long.

When using the radius tool to make a fly cutter, the blank cutter is held in an off center cross hole in an arbor chuck (see Figures 1 and 2). The cross hole in the arbor chuck is usually drilled enough off center so the edge of the cutter blank will be on center with the center of the arbor chuck. This is done so that when the fly cutter is made, there will be relief on the cutter. The more the hole is drilled off center, the more relief the fly cutter will have. A cutter that is made by this eccentric method is held in an arbor chuck which is drilled on center when using the cutter to cut a gear. By making the cutter in an off center hole and using it in a

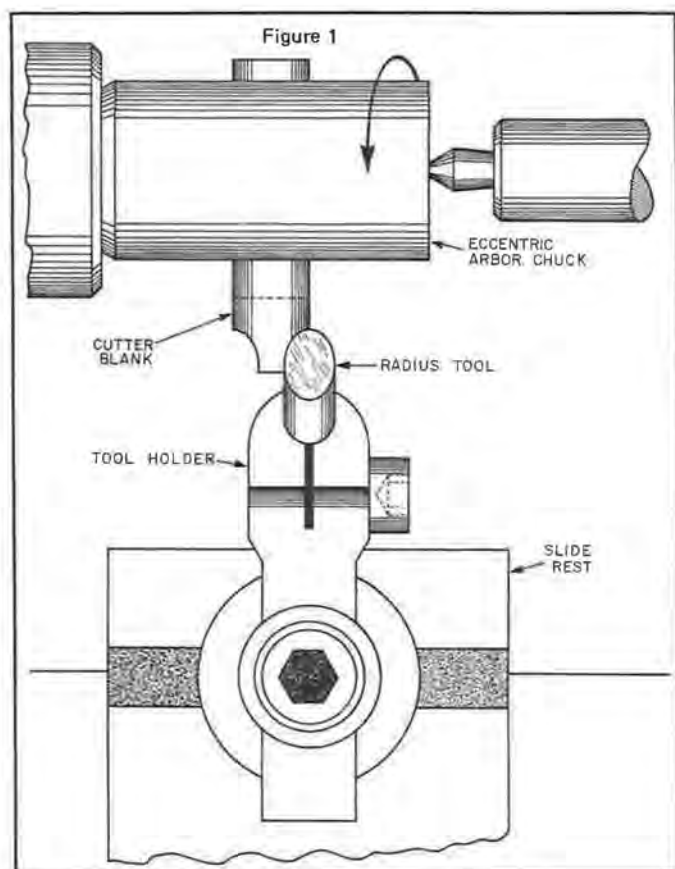
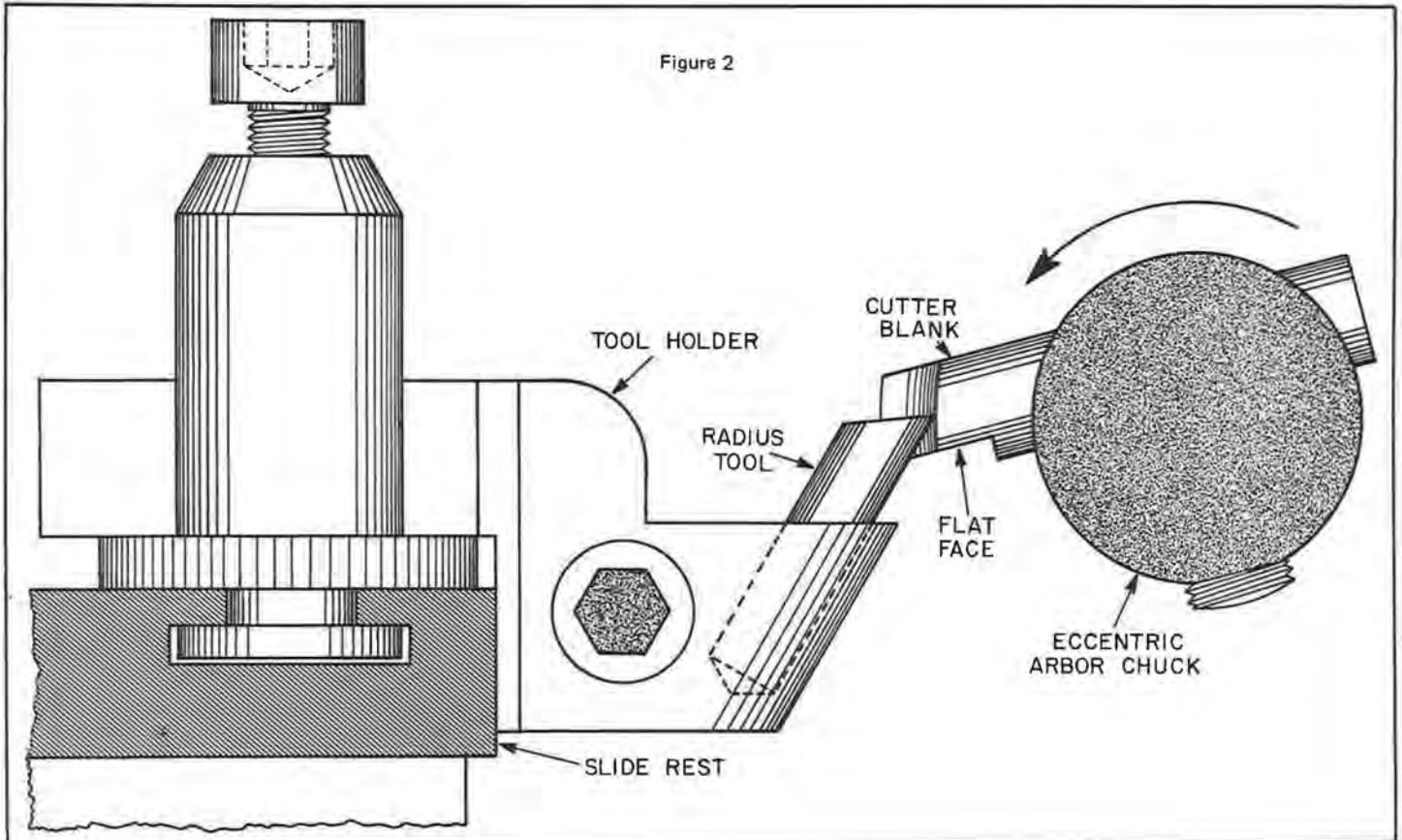


Figure 2



centered hole, the cutter will have increased relief on its cutting edges. When forming a fly cutter, the end of the eccentric arbor chuck is supported with a male center in the tail-stock of the lathe as shown. An Allen head set screw is used to hold the cutter blank in the arbor chuck.

The slide rest used when making fly cutters should be one that can be set at any angle without changing its ability to face the end of the blank square with the body of the blank without resetting the slide rest. In other words, the slide rest must be capable of turning an angle in one direction and facing squarely in the other direction without resetting the slides. One slide rest that will meet these requirements is the Moseley slide rest. The Moseley slide rest has two swivels, one which is below both slides which allows both slides to swivel on the base. The top slide can also be swiveled on the lower slide. This design allows a hole to be taper turned and the end of the rod faced flat without changing the slide rest setting.

In order to use other slide rests for making fly cutters, Mr. McDuffie has made up a special shoe for the lathe bed which has an extension for the slide rest to fit onto so the base and bottom slide will be parallel to the lathe bed. This special shoe is shown in Figure 3. When this shoe is used, the top part of the slide rest is swiveled 180 degrees from a normal working position. This allows the top slide to be operated across the lathe bed as the bottom slide is operated lengthwise of the bed. With the slide rest in this position, a fly cutter can be taper cut and the end of the cutter faced square without changing the angular setting of the slide rest.

Figure 4 shows the different tool holders and their radius tools used for making fly cutters. Views A and B show the side view and top view of the main radius tool holder. In order to have different diameter tools for this holder for cutting different radii, the ends of the tools can be turned to different diameters for one-third to one-half of their lengths.

Another method of holding very small radius tools is shown in Views C and D, Figure 4. This method was used in the Elgin Watchmakers College. The holder for the radius can be made from a piece of square brass or soft steel bar stock. The hole for the radius tool is drilled at a 15 to 20 degree angle three-fourths of the way through the bar as shown. The bar is held in the drill vise on the drill press table for drilling. After the hole has been drilled, then the radius tool bit is soft

Figure 3

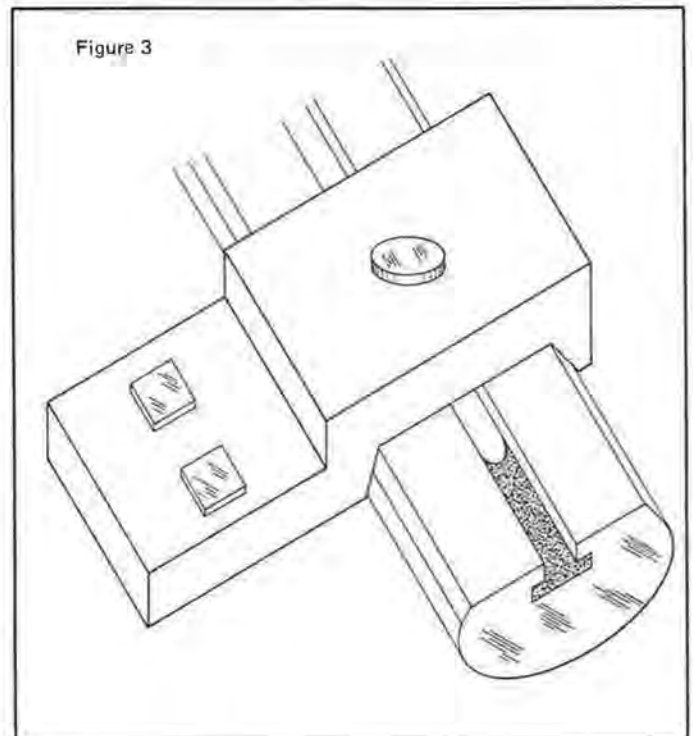
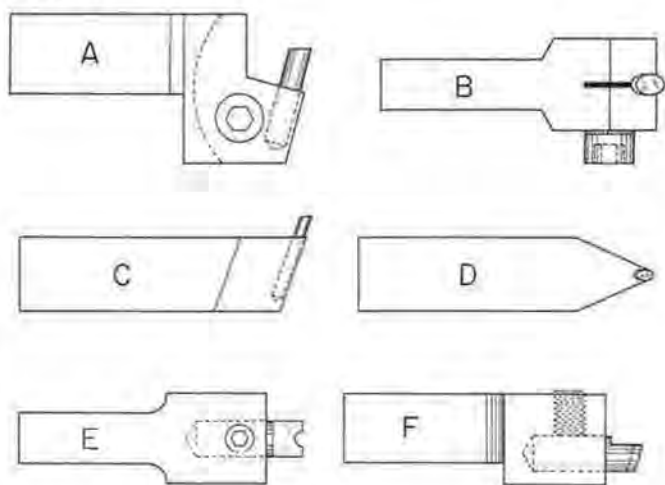


Figure 4

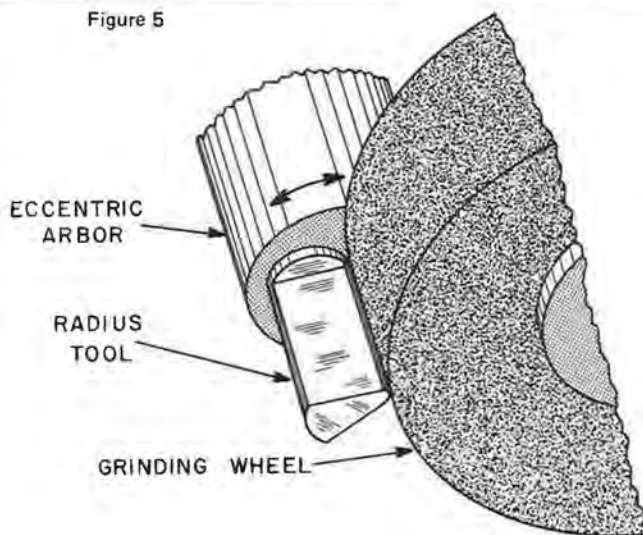


soldered into its hole, then the excess metal is removed around the cutter without disturbing the cutter. Note: The beveled sides of the bar can be done before the hole is drilled. One good feature of this radius tool holder is that different sized carbide or high speed steel drill rods can be used for making radius tools. When carbide rods are used, instead of drilling a hole for the rod, a "V" groove can be made in the end of the holder and the carbide rod hard soldered or brazed into place. With this style of holder, there is no limit on the diameter of the radius tool that can be made and used.

Another type of radius tool and holder is shown in Views E and F, Figure 4. This radius tool has a concave in the center of its end for rounding the end of fly cutters as they are made. This holder has a hole drilled in its end for the concaved radius tool. An Allen head set screw is used to hold the radius tool in place.

Another method that can be used for making assorted sized radius turning tools is shown in Figure 5. This method was developed by Mr. McDuffie. To use this method, first an eccentric arbor is made by drilling an off center hole in the end of the arbor that will fit the radius tool stock. The hole should be drilled almost one-half the diameter of the cutter stock off center. An Allen set screw is used to hold the rod in position in its hole in the arbor. The radius tool blank is made by filing or grinding a 15 degree wedge shape on the end of the blank. Then the blank is fastened in the eccentric arbor for grinding a radius on the edge of the wedge. Note: A fine India wheel is recommended for grinding the radius. The blank can be turned in its hole so the edge of the blank is closer or further from center which allows different radii to be ground on its edge. The closer the edge of the blank is to center, the smaller the radius and the further the edge of the blank is from center, the larger the radius. The eccentric arbor can be a piece of drill rod. In this case, the arbor when being used can be held and turned in a "V" block while the grinding is being done. The grinding wheel can be held in the lathe headstock. A good "V" block arrangement is a Levin saw table which has a large "V" notch in the table. This table fits in a solid hand rest and is adjustable up and down. If one has a spindle from a chuck holding tailstock, then the eccentric arbor can be made from a lathe arbor chuck and held in the tailstock spindle. Then the spindle is turned in the "V" notch of the saw table. Another method is to use an arbor chuck for making the eccentric arbor. Hold this in the lathe

Figure 5



headstock or chuck holding tailstock and hold the grinding wheel in the pivot polisher or tool post grinder.

Figure 6 shows one of the wedge shaped radius tools being used to make a concaved radius tool. Note: The wedge shaped radius tool is also used to form other fly cutters used to make wheels and pinions. The wedge shaped radius tool is held in the main tool holder while the blank is held in the eccentric arbor chuck. A flat face has been filed or ground on the side of the blank which is nearest the lathe center. Then, as the arbor is revolved in the direction of the arrow, the radius tool is passed across the end of the blank a few times to shape the end of the blank. The radius tool is centered with the blank and then fed into the blank to form the concaved radius in the end of the blank to form the finished concaved radius tool. These radius tools are hardened and left dead hard. When hardening these tools, the tool is first warmed over the flame and then placed in powdered boric acid to get a uniform coating on its surface. Then the tool is reheated uniformly to a medium cherry red and then quenched end first into a jar of water. When this is done, the powdered boric acid will shed off leaving a clean surface on the tool. After this, the tool should be tested for hardness with an old fine file. If the tool is hard, the file will not bite into the surface of the tool.

Figure 6

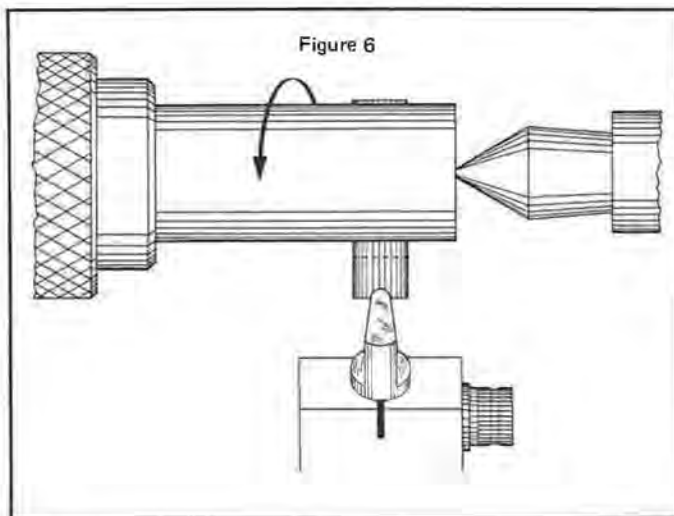


Figure 7 shows how the concaved radius tool is used to round the end of a fly cutter when it is being made. Usually this is done after the sides of the fly cutter have been correctly formed.

Figure 8 shows a method used when making a fly cutter for cutting a pinion. Suppose one needs to make a pinion for a mechanism which has the following specifications:

Pinion = 6 leaves
 Meshing wheel = 60 teeth
 Ratio = 10:1
 Module = .85
 Pinion pitch = 60° or 2.67 mm
 Thickness of leaf = 20° or .89 mm
 Width of space = 40° or 1.78 mm
 Radius on pinion leaf = .89 mm (Profile C)
 Height of addendum = .725 mm
 Pinion core diameter = 2.28 mm
 Pinion core radius = 1.14 mm
 Pitch diameter of pinion = 5.10
 Pitch radius of pinion = 2.55 mm
 Outside diameter of pinion = 6.55
 Outside radius of pinion = 3.275 mm
 fc = 2.64 (the corrected factor for 6 leaf pinion and 60 tooth wheel)

View A, Figure 8 shows a cutter fitted to the space between two pinion leaves which shows that the length of the cutter below the pitch circle should be 1.41 mm. To find this figure, one would calculate the core diameter of the pinion and subtract one-half of this diameter from the pitch radius of the pinion. In other words, the length of the cutter below the pitch circle equals the pitch radius minus the core radius.

TO FIND LENGTH AND WIDTH OF CUTTER

To find the core radius, use the following formula:

$$\text{Core Radius} = \frac{(z' - fc - 2 \times s)}{2} \times m$$

Substituting figures:

$$\text{Core Radius} = \frac{(6 - 2.64 - 2 \times .34) \times .85}{2} = \frac{2.28}{2} = 1.14$$

$$\text{Length of cutter below pitch circle} = \frac{(\text{Pitch Diameter})}{2} - \text{Core Radius} =$$

$$\frac{5.10}{2} - 1.14 = 2.55 - 1.14 = 1.41 \text{ mm}$$

$$\begin{aligned} \text{Total length of cutter} &= \\ 1.41 + \text{addendum} &= 1.41 + .725 = 2.13 \text{ mm} \end{aligned}$$

The width of cutter at pitch circle equals 2/3 of the pitch (Pitch = 2.67).

$$\text{Width of cutter} = \frac{2}{3} \times 2.67 = \frac{2 \times 2.67}{3} = 1.78$$

For gear calculations, please refer to "Antique Watch Restoration" Part XLIII, *Horological Times*, July 1989.

MAKING THE FLY CUTTER

To make the fly cutter, the following procedure is used. The radius tool is selected. In this case, the radius on the pinion leaf equals the width of the leaf which is .89 mm. Therefore, the diameter of the radius tool should be two times the radius or 1.78 mm. The radius tool is now placed

SHOP TALK

(Continued from page 27)

SETTING ANALOG - DIGITAL QUARTZ

The analog digital watch is shown in Figure 4. This is the hardest type to reset especially if the analog seconds are to be synchronized with the seconds on the LCD portion of the watch. We probably will need to experiment. Many analog digitals will set by first pulling the crown all the way out and then turning the crown to set. Some push in to change modes. Some pull out halfway and then set the LCD portion by turning the crown. Some models turn both ways to set, and some only turn one way to advance one feature (maybe the day and the other way for the date), etc.

You have probably noticed that the watch shown in Figure 4 does not have a crown so it must be set by the pushers. We are going to experiment. However, many of these watches would probably have some key instructions on the dial that would help us. At any rate, let's say it doesn't. Let's push C just because it's close to the LCD display and see what happens. The seconds are flashing. So let's push D. This set the seconds to zero. Now we push C again and the mode changed to minutes. Push D again and the minutes advance (set). We continued this process and set the rest of the LCD and when we finished the whole LCD display was flashing. Now if we push and hold pusher button A in we find that the analog (hands) are turning.

I like the old saying "When all else fails, read the directions." But if we don't have any directions, we need to experiment and make some good guesses.

TMB

AUCTION

The Watchmakers Association of Ohio will sponsor an auction on Sunday, October 15, 1989. It will be held at the American Legion Hall, Southway Post 144, 3253 South High St., Columbus, Ohio. The auction will begin at 1:00 P.M. Sandwiches and soft drinks will be available. Admission will be \$1.00 per adult to help cover hall rental.

Auction items include: watchmaker's tools, benches, bench lamps, clocks, clock cases, watches, watch and clock parts, jewelry repair tools, ring sizers, electric soldering machines, air compressors, and just about anything connected with the trade.

Any item you wish to sell should be brought with you the day of the sale. Bring these items early so that potential bidders will be able to look them over prior to sale time. The hall will be open at 9:30 A.M.

For additional information, contact: Karl Farnlacher, 1404 Neva Dr., Dayton, Ohio 45414; phone (513) 275-3172.

Figure 7

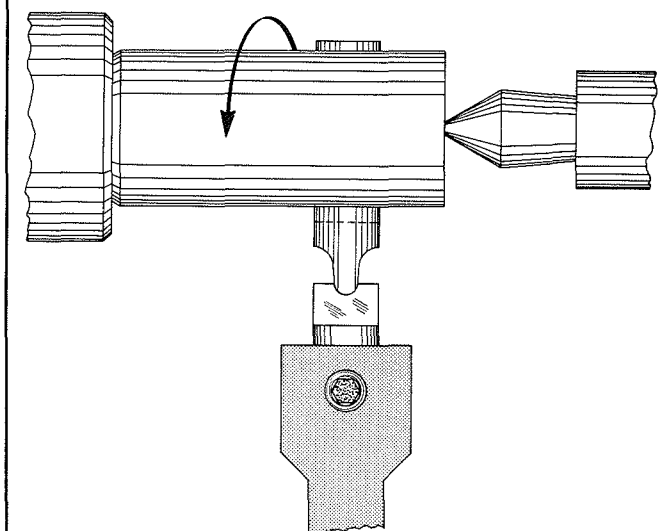
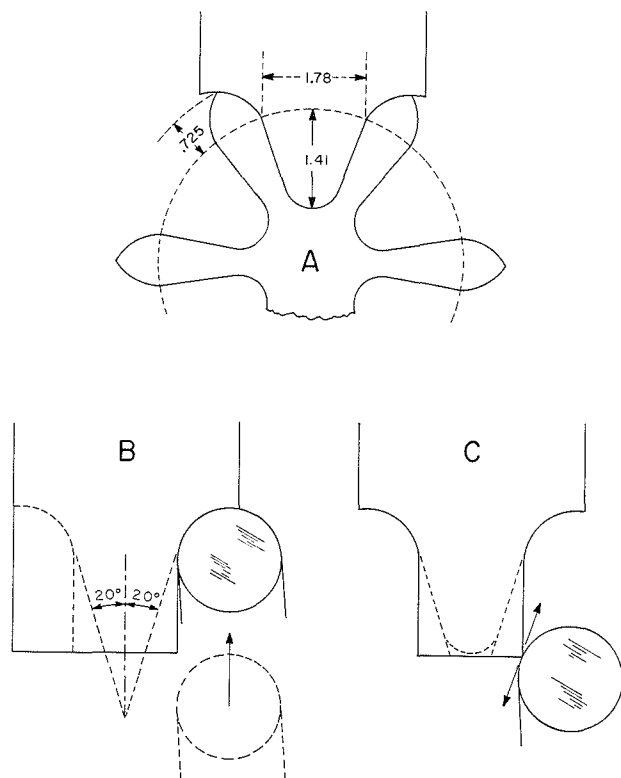


Figure 8



into its holder. Then a fly cutter blank is prepared by filing or grinding a flat surface at one end to form the cutting face for the fly cutter. The width of the flat surface should be sufficient to cover the cutting surface of the finished cutter. The length of the flat surface can extend past the cutting surface 2 or 3 millimeters. Next, the cutter blank is placed in the eccentric arbor chuck. The flat surface of the blank should face the center of the arbor chuck. Before starting to make the fly cutter, be sure that the slide rest swivel is set on zero. Also make sure that the radius tool is sharp and smooth and the cutting face is set the same height as the lathe center. Also make sure the radius tool is tight in its holder and the fly cutter blank is tight in the eccentric arbor chuck.

The following method is used to actually form the fly cutter. (Note: When making the fly cutter, the eccentric arbor chuck holding the cutter blank should be turning at 800 to 1000 revolutions per minute.) First, turn one side of the cutter as shown in View B, Figure 8. The micrometer dial on the lead screw of the cross slide is used to measure the depth of cut. The micrometer dial on the longitudinal slide can also be used for measuring the amount of material removed from the side of the blank. This can also be checked with a micrometer. For example, if the width of the cutter is to be 1.78 mm and the diameter of the cutter stock is 4.00 mm, then the difference between the two measurements is 2.22. This means that one-half of this amount or 1.11 mm is removed from each side of the cutter. Therefore, by subtracting 1.11 from 4.00 mm, we would have a thickness of 2.89 when the correct amount has been removed from one side of the blank. Now the radius tool is moved to the other side of the blank and material is removed to the same depth until the blank has the correct thickness (1.78).

Next, the slide rest is swiveled to one side one-half of the angular space between two pinion leaves, which in this case is one-half of 40 degrees or 20 degrees. Then the excess material is turned from one side of the cutter blank as shown in View C, Figure 8. Then the slide rest is swiveled 20 degrees to the opposite side of the zero mark and the excess material is turned from the other side of the cutter

blank. Note: When turning away this excess material, do not remove any material from the already formed curved shoulder of the cutter. Just remove the excess material until the angular side of the cutter blends into the curved portion of the cutter.

Now the end of the cutter is formed. If the fly cutter is to cut a pinion with a flat bottom, then the end of the cutter is faced square with the radius tool, but if the cutter is to cut a rounded bottom, then the end of the cutter is made rounded with the concave radius tool as shown in Figure 7. After the cutter has been formed, then it is hardened but not tempered. After this, the face of the cutter should be ground flat and smooth to sharpen the cutter. Note: This same method is used to make fly cutters for cutting wheels. This method can also be used when making a fly cutter to fit an old sample wheel or pinion.

When using the fly cutter to cut steel pinions, the cutter should turn between 300 and 500 revolutions per minute and the feed of the cutter through the material should be very slow and steady. Note: The speed and feed will vary with the depth of cut being taken. Cutting oil should be used to lubricate the cutter and the steel being cut.

When using the fly cutter for cutting brass gears, the speed of the cutter can be much faster. The fly cutter will cut brass very well at speeds of 1500 to 2000 revolutions per minute and the cutter can be fed through the material at a faster rate than for steel.

"Antique Watch Restoration" will continue next month.

TIMES

FORUM

The FORUM is a column devoted to the discussion and debate of horological piffle, practices, and problems. Comments can be controversial, but should always remain within the bounds of good taste. Responses should be sent to: AWI FORUM, P.O. Box 11011, Cincinnati, OH 45211.

Ralph Geiger
CMW, CMC, CEWS, CMBHI

COMMENTS ABOUT HANDLING "FAKES"

I will repair any fake or inexpensive watch that comes in, if I can get the parts needed. I charge the same price to fix these watches as I charge to fix better grade watches. I have been surprised at the number of customers who are willing to pay to have inexpensive watches repaired.

Ivan Ronjoin

Before doing *any* work on the watch, I tell the customer that their watch is not genuine. Most of the customers already know this. I like to confirm it with them. I will install batteries while they wait. If the watch works, great! If not, I return the watch to the customer. If the watch comes in for a partial repair (stem, crown, crystal), I make a notation on the repair ticket that the watch is not genuine and have the customer initial the notation. I also state that I will not be responsible if the watch stops running. Before ordering parts, I let the watch run for a few days. If the watch runs, I proceed with the repair; if not, I return the watch unrepaired.

As long as the watchmaker or sales clerk makes it known to the customer that the watch is not genuine, there should be no problem with repairs. I do not get involved with movement repairs for these watches—it's usually not worth the time.

Laurie Cusher

First of all, fake watches don't bite. I treat them on an individual basis. I always tell the owner that their watch is not genuine. I try to open the watch in front of the customer (rather than taking it into the back room) so that there can be no question of me making a switch. If after seeing the movement the owner is still not convinced the watch is a fake, I politely turn them away.

A fake watch must be in *really* good condition before I will take it in, and I get an acknowledgement from the customer—in writing—that they are aware the watch is not genuine. Most of the fakes get turned away, but I use discretion and will repair the ones that look reasonably well made.

I have some thoughts on the public image of the modern watch repairer. The public tends to view us as individuals with unusual patience, dexterity, and temperament. There is an air of craziness about us. You have to admit, there is something a little absurd (but beautiful) about the act of turning a tiny precise balance staff. Let's face it—watch and clock repair is unusual and attracts mostly unusual people.

Robert Mohr

MORE ABOUT IMAGE

The modern watch repairer is a professional business person. We should look, act, and dress accordingly.

It is not what you do, but the way you do it that counts.

A modern jeweler has more access to the business community than does a watchmaker. Why? Because the former has the image of owner/operator, and the latter has the image of an employee buried in his work.

My suggestion to all watch and clock repair people is to devote some time to community affairs where you will meet and mix with other business professionals. Take on the air of a business person and technical consultant. You will improve your business and enhance your stature and image.

The public seems to respect business people who are not only knowledgeable, but appear to be what they are. If you look the part, the role will be yours.

Alfred Dickinson

I got a lot of comments about "The Devil's Advocate" at the Board of Directors meeting in June. A couple of people said they got pretty hot about it when they first read it. One even picked up the phone (glad I was out—Ha!). Some people take their horology pretty seriously. Some want to project an image of being master craftsmen. Others want to be seen as business professionals. Either way, they want the public to know that they are very good at what they do, and that doing it well is their primary concern.

The question of image is a personal one, but inasmuch as AWI represents the interests of all horologists and can help to project a specific image of horologists, it is also a group question. Perhaps the questions should be re-stated asking: Is there an image of the modern horologist that could be publicized and be fair to both the eccentric artist who fabricates parts for an important restoration and the pragmatic business professional who favors contemporary timepieces and straightforward repairs?

WATCHMAKERS—CLOCKMAKERS

AWI is interested in timepieces that have been made or are being made by its members. We would like to obtain photographs and/or video tapes of finished horologia and of the processes used prior to completion. If necessary, we will attempt to provide assistance with the photography. Please contact AWI Central.

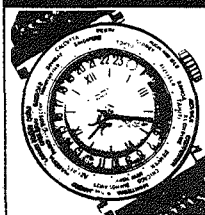
Plans are also being made to have an exhibition of handmade timepieces at the 1990 AWI Annual Meeting. Please let us know if you have something you would be willing to display. We are also hoping to have a display of specialized work and unusual components made by our members. A display of restorations of antique timepieces and antique horological tools and machinery is also being considered. This will be a media event, so let's show the world what we can do.

R.G.

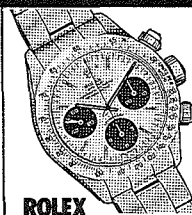
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TIMES

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Replacing Clock Teeth*

by

John R. Plewes
CMC

Damaged, bent or broken teeth in clocks usually occur when the movement is dropped, something heavy falls upon it, or when a mainspring breaks. Escape gear teeth, being relatively fragile, are easily bent by the careless use of pliers or a screwdriver during adjustment, but this can usually be rectified without replacing the tooth. The methods of replacing teeth in gears, going barrels, and wooden gears differ somewhat and so are best dealt with separately.

BRASS GEAR TOOTH REPLACEMENT

The basic idea of replacing one or more teeth in brass gears is to file a slot in the rim of the gear, soft solder a tight fitting insert into it, and to cut or file new teeth in the insert. The insert should be somewhat thicker than the gear itself, so as to allow for slight misalignments and clean up.

Replacing a single tooth calls for a slot as shown in Figure 1b. The broken tooth is first filed flat and then a parallel-sided slot is carefully filed midway between the two adjacent teeth. The slot should be approximately 0.01 inch wider than the original tooth and as deep as is feasible without unduly weakening the rim of the gear. Cut and file a suitable small piece of brass, about 1½ times as thick as the gear, and press it into the slot, as in Figure 1c. Little or no light should show between the slot and the insert because a good firm fit all round is mandatory. Any tendency towards a loose fit can be tuned out by carefully hammering the insert sideways on an anvil. This will expand it slightly and firm up its fit.

When a good press fit is obtained, and only then, apply a small amount of resin flux and soft solder the joint. This is best done by holding a clean, hot iron underneath the insert and apply a very small amount of resin-cored soft solder to the topside as soon as heating allows it to melt. Remember that only the solder in the joint does any real work and that all excess solder will have to be removed. Soft solder is best looked upon as a kind of adhesive filler; it is not structurally strong in its own right. For this reason, the wide joint shown in Figure 1d would fail in time. The solder on one side would compress, leaving a gap at the other side and the tooth would loosen. A brass-to-brass contact is essential in all tooth replacement jobs.

File down the top of the insert until it is only slightly longer than the other teeth and then file off the excess brass and solder from each side of the gear. The insert is now carefully filed to the shape of the other teeth. I prefer to do this with the gear resting horizontally on a wooden block which has a cutout for the arbor. This method gives good visibility and permits filing from both sides; a knife pattern needle file works well. Care must be taken to keep the file vertical, and only a small amount of brass should be removed between frequent examinations for symmetry. Shaping the new tooth in this manner, by eye, is good training. There is no real requirement for a template.

If, say, five or so teeth are to be replaced, fit an insert as shown in Figure 1a, using the procedures given above. When several teeth are involved, it is worth making a template. Clamp a scrap of tinned steel from a can alongside, say, nine good teeth of the gear, and closely scribe their outlines on the steel. Now carefully file out the top halves of two teeth at each end and then clamp the template alongside the gear with the two partial teeth aligned with the sound teeth at each end, that is at P and Q in Figure 1a. The new teeth are now filed out of both the template and the gear to the line scribed on the template. It is as well to leave a little leeway on the scribed line and to remove the template and finish the teeth by eye. The length of each new tooth can be checked by rocking a 6-inch steel rule across it onto the tips of neighboring teeth and then comparing the amount of seesaw with that of sound teeth. An accurate check, diametrically across the whole gear, can then be made with a caliper.

Check that the repaired gear is agreeable to driving the next pinion, without any sign of jamming, by mounting up the two arbors concerned between the clock plates. See that the new teeth drive smoothly and have adequate backlash. A final touch up with a fine file may be necessary should any sign of binding be apparent.

GOING BARREL TOOTH REPLACEMENT

A breaking mainspring is the most frequent cause of broken teeth in a barrel. Usually not more than two teeth have to be replaced, although a third may well need a gentle tap

with a punch to straighten it up again. The total damage generally includes a spurred barrel hook, a loose barrel cover, and a bent no. 2 arbor. However, the teeth are the biggest repair job.

Some people replace a broken tooth with a small steel screw, on the end of which they file a couple of small flats to approximate the shape of a tooth. This, or its perpetrator, is a creature which should not have been born, for such a screw is weak, narrow, and hard on the pinion it drives. Such a lash-up has to be removed before it gives way and causes even more damage. As mainsprings always involve considerable force, a sound repair is essential.

Allowing for structural differences, a tooth can be replaced in a going barrel in much the same way as in a gear, and it will be about as strong as the original. The tooth is first filed flat and a neat, parallel-sided slot is cut on the site, as shown in Figure 2a. The slot will be deep enough to break through somewhat into the inside of the barrel. An insert is then cut out and fitted firmly in place, as in Figure 2b. Although it intrudes, the insert will not interfere with the main-spring because its coils are held off by the barrel bushing.

Before finally installing the insert, make sure that the inside of the barrel is very clean in order to avoid soldering problems.

Many barrels are soft soldered to their gears, and in order not to disturb this important joint, it is as well to hold the lower half of the barrel in the vise, using two small shims of wood to prevent heat loss. Flux the insert and apply a small torch flame to them inside the barrel. As soon as the heat allows, apply a small amount of resin-cored soft solder to the outside of the inserts. When the solder runs through, withdraw the flame and allow plenty of time for it to cool. A torch is used here because it is faster; an iron being slower, would be more likely to melt the whole barrel/gear joint before the insert area was hot enough to solder.

When the barrel is cool, remove all flux residues, file off all surplus solder and brass, and then carefully file the insert to shape. Assemble the barrel and its arbor and fit it, along with the no. 2 arbor, between the clock plates. Check that the new tooth (or teeth) meshes correctly, without binding, and that backlash is adequate. As with the gear tooth above, when this repair is properly carried out, close inspection should be required to discover its presence. As with clock

Figure 1

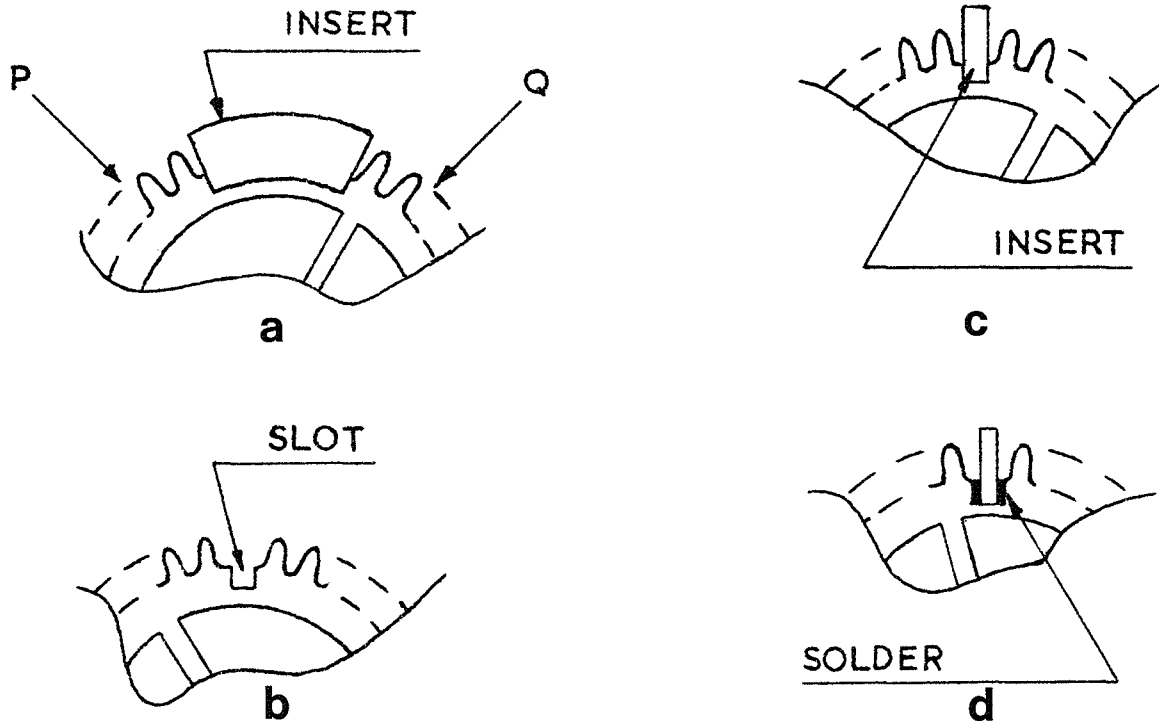
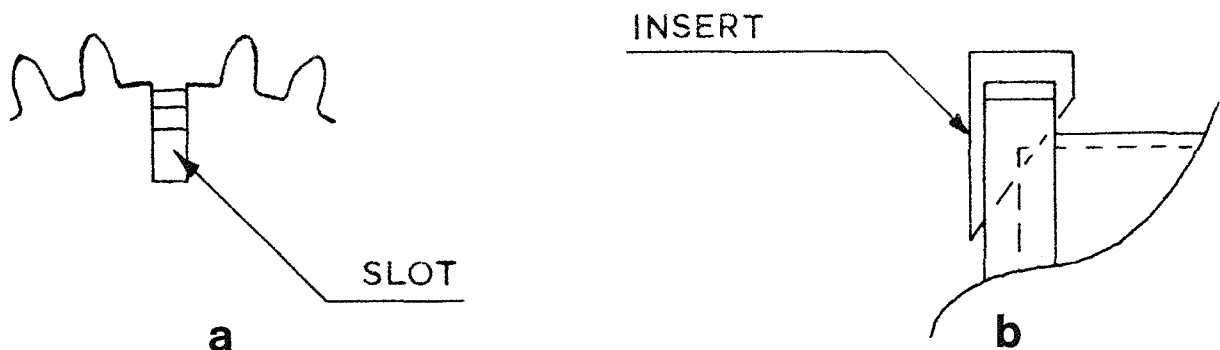


Figure 2



hands and other brass components, silver soldering would anneal the brass and render it too soft for its intended use.

WOODEN GEAR TOOTH REPLACEMENT

Wooden teeth can be replaced in the same manner as already given for brass teeth, with glue being used instead of solder. The new tooth will be strongest if its grain runs radially and epoxy resin is used to bond it in place. This is a perfectly sound method which should, to some extent, appeal to traditionalists.

An alternative method, particularly when several teeth are involved, is to use epoxy resin for the teeth themselves, and the resulting teeth will be somewhat stronger than the originals.

A mold is necessary to cast such new teeth and this is readily made by firmly kneading a small blob of flexible, rubbery modelling clay around several sound teeth (Figure 3). When a good impression has been obtained, cut away one side of the mold, as shown by the shaded area in Figure 3a.

Make sure that the area to be repaired is free of all oil, wax or grease and remove any loose splinters or wood fragments. As a key for each new tooth, cut out a slot in the gear and set the mold in place as shown in Figure 3b in which the point T indicates where a new tooth will form. Ensure that the mold hugs the gear closely, clamping it lightly when necessary to avoid leaks.

If it is desired to match, stain the new tooth or teeth. The epoxy can be loaded with a small amount of fine sawdust. The sawdust must be fine and must not contain any small

shavings or fibers. Trial and error will determine the proportions of resin to sawdust, but with epoxy strength is not really a problem in this application.

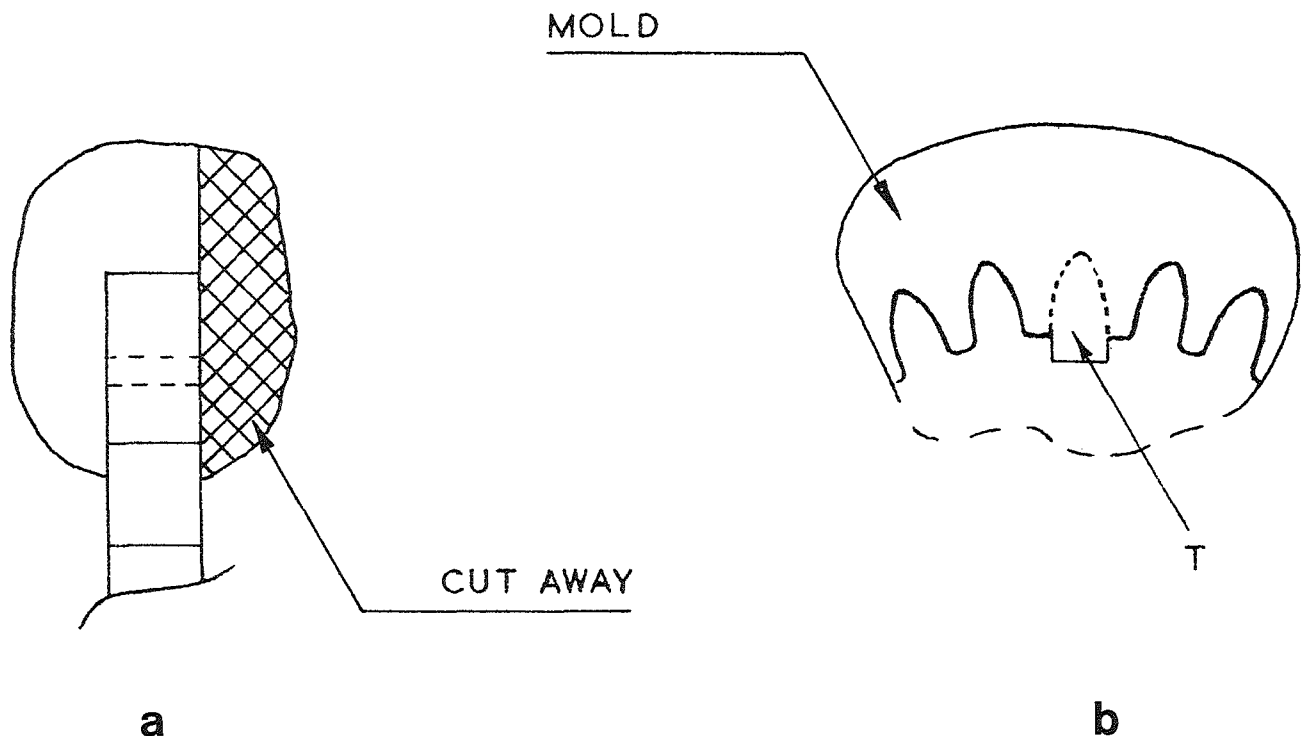
Where loading and mixing are involved, five-minute epoxy sets up too quickly for comfort, so it is best to use a resin with a longer setting time, say of an hour or so. The resin mix is applied to area T in Figure 3 with a toothpick, which can also be used to prick any small bubbles as they rise to the surface. The surface, when set, should be slightly convex, that is somewhat above the surface of the gear. This is achieved by adding a little more resin before it sets up. This will also take care of any small shrinkage or leakage during setting. Leave the mold in place until the resin is fully cured; this usually takes a day or so.

After curing is complete, remove the mold carefully and file off any surplus resin so that both sides of the gear are flat. Smooth the new tooth with fine open grain sandpaper and then test the gear in the movement, trimming it where necessary. The new tooth can then be stained to match its companions. It is feasible to repair wooden pinions along similar lines.

A point to remember about wooden movements is that they should be wound in a continuous motion, that is by means of a crank or a steady pull on a cable. If a key is used to wind such clocks, its jerky stop-and-go action puts considerably more stress on the wooden teeth and can cause them to break.

TIME

Figure 3



ROCK QUARRY et tu

Fred S. Burckhardt



Who Needs Money?

All my life I've tried to live by the saying "The want of money is the root of all evil!" It hasn't been easy trying to stay poor. In fact, this is the reason I got into this business. Many years ago I knew a watchmaker who was always complaining about not being able to make a living. It seemed the harder he worked the less money he made. It sounded just like what I was looking for, so I've been fixing watches ever since.

Of course, it hasn't been as easy as it may sound, because this philosophy brings forth several other problems. For example, try to explain to a customer that you can't repair their timepiece because you would have to charge them too much and you can't afford to make that much profit. So what if they look at you kind of funny and turn you in to the mental health clinic? You have to learn how to stand by your principles or you'll get lost in the shuffle and probably become wealthy.

Another problem is with the government. They keep on raising the minimum wage so whether you like it or not, you'll be making more money. But this has its good side, too; at least the welfare department doesn't call or stop by as often. Who needs them, anyway? I still get CARE packages from Europe.

I must admit, there have been times when I've received some tempting offers—well-paying jobs—but, thank goodness, I've turned them down. One was for a ticket taker at the local cinema for about twice the money. It was during the holiday

season which meant I would have to watch "It's a Wonderful Life" four hundred times. I figured I could sit at home and watch it on the TV five hundred times.

Another offer was from the highway department. It was to keep the interstate clear of tumbleweeds. It would have been an exciting job because you have to run into the traffic, catch the tumbleweed, and run back out. No need to say you have to be fast, especially if it's heavy with 18 wheelers.

The last offer I had was from a battery company. They just got finished with a survey and found that their packaging was easier to open than the other brands. They were looking for somebody to design a more difficult type package as this was very embarrassing because of their standing in the industry.

All in all, things aren't that bad. Money isn't everything. It can only buy you all the things you ever wanted. Other than that, what good is it? We had a real nice vacation costing very little. We spent four nights sleeping in the car parked on the lot at the new Holiday Inn.

The other night I answered the phone and it was some guy from an aluminum siding company. Lucky me, our house was selected to receive free siding. The only cost would be the transportation and labor, which only amounted to about eleven thousand dollars. Sounded like a good deal to me, but when he asked me what I did for a living he hung up the phone. (I wonder how they were going to nail that to the brick walls . . . ?)

WIB



Marvin E. Whitney, CMW, CMC, FAWI

PIONEER-ELGIN AIRCRAFT CLOCK

TYPE 757B and TYPE 757BH

This clock was made by Elgin for Pioneer Instrument, a division of the Bendix Aviation Corporation, Bendix, New Jersey. Both names appeared on the dial and the identification plate on the back of the case. The Pioneer-Elgin Type 757B is shown in Figure 1 and Type 757BH is shown in Figure 2. The movement was Elgin's 22 size, 7 jewel, 8-day, grade number 562 (Figure 3), the same model used by Elgin in their aircraft clocks, namely A-11, AN 5743-1, AN 5743-L1A, and AN 5743-1A. The AN 2 1/4 inch case, hands and dial configurations were also identical.

Both of these types were identical except that on Type 757BH (identified by the addition of an "H" on the basic type number) an extra pair of red hands, mounted on a

slightly domed plastic crystal was superimposed over the clock's regular flat crystal (Figure 4). A snap-split wire ring secured it in place (Figure 5). This aided the pilot in checking the duration of his flight.

At the time of take-off, by turning the hexagonal-shaped knob, the red hands were set over the regular clock hands. During flight, the regular clock hands continued to move clockwise, while the red hands remained in their original set position. At the completion of the flight, by noting the difference between the time indicated by the red hands and the regular clock hands, the pilot was able to determine the actual duration of flight.



Figure 1. Dial view Pioneer-Elgin Aircraft Clock Type 757B.



Figure 2. Dial view Pioneer-Elgin Aircraft Clock Type 757BH.



Figure 3 (top left). Movement view of Elgin's 22 size, 7 jewel, 8-day, Grade 562 Aircraft Clock. Note the spring loaded double sweep second wheel which prevents any backlash in the rotation of the sweep second hand.



Figure 4 (top right). The "time of flight" crystal and red hands which was fitted over the clock's regular flat crystal.

Figure 5 (at the right). Two types of crystal retaining rings used in aircraft clocks. The split-snap wire ring on the left is the type most widely used and is the type used in these two clocks. The one on the far right is a threaded ring which is screwed into the bezel and down against the crystal. Two notches, diametrically opposite of each other, permit the insertion of a spanner type wrench to replace/remove the retaining ring. A pair of 6-inch machinist dividers with the points slightly ground off makes an excellent crystal retainer ring too.



TWES

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TWES

TAPS, DRILLS & DIES

ROBERT D. PORTER, CMW



Tap and die work is fun and profitable, *if* you have enough information to work with. Figures 1, 2 and 3 show three different tap and die sets used for horological repair work. The sets shown in Figures 2 and 3 have taps and matching dies. Figure 1 illustrates a set containing taps only. All are for 60 degree thread work. None of the sets shown list the recommended tap drill size, a brilliant marketing strategy undoubtedly designed to maintain these tools in a like new, unused condition.

The set shown in Figure 1 is a good example because the only useful information given on the data sheet in the lid of the set is the metric diameter of the taps. No pitch values or tap drill sizes are shown. Fortunately, enough useful information was found in a watch tool catalog to make it possible to calculate the corresponding tap drill sizes for this set. The taps are of first class quality.

The chart in the tap and die set shown in Figure 2 provides slightly more information because the tap diameter and the pitch is shown making it possible to calculate tap drill size. The Figure 5 metric thread chart contains infor-

mation pertinent to this set and the one shown in Figure 1.

Figure 3 shows an old tap and die set. The only useful value given is the number of threads per inch. Two values are needed to determine tap drill size:

1. The thread diameter.
2. The thread pitch (or number of threads per inch, from which we can determine the pitch value by dividing the threads per inch into 1. $1/tpi = \text{pitch}$).

These two values will allow us to calculate the tap drill size for any 60 degree tap by using the following formula:

$$\begin{aligned} &\text{The thread diameter} \\ &\text{minus} - (1.299 \times \text{Pitch} \times \text{Percentage of thread}) \\ &\text{equals} = \text{Tap drill size} \end{aligned}$$

The tap drill size determines the percentage of thread left in the hole after tapping. 60 or 75 percent threads are recommended for most horological repair work (Figure 4).

The Figure 5 chart contains information for most metric screw thread sizes used by watch and clockmakers.

Figure 1



Figure 2



Figure 3



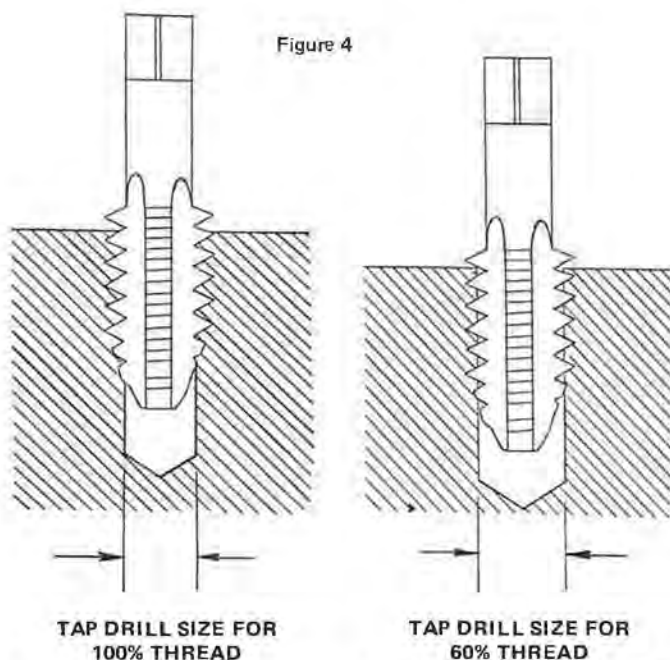


Figure 4

The illustrations above show how the tap drill size determines the percentage of thread left in the tapped hole.

The sketch on the left shows a 100% thread, which is prone to break taps in tough material.

The right hand sketch shows how a 60 or 75% thread is achieved by using a slightly larger drill, which is recommended to prevent tap breakage and interference problems while providing adequate strength for most horological applications.

TAP MARKING

Figures 6 and 7 illustrate the differences between metric and inch tap markings.

The metric tap shown in Figure 6 is easily understood. M stands for metric, 1 is the major (largest) diameter of the tap, and 0.25 is the pitch of the thread which is the distance from a position on the thread form to a like position on the next thread measured along the thread axis.

The inch tap markings shown in Figure 7 can be confusing if you are used to working with metric threads predominantly (or vice versa). Here's why: 1/4 stands for the major diameter of the tap, 20 stands for the number of threads per inch. The actual pitch value is obtained by dividing the number of threads per inch into 1. 1/20 equals 0.050", which is the pitch value for this example.

PITCH GAGES

Figure 8 shows a metric screw pitch gage which has leaves ground with the 60 degree thread form of a different pitch on each leaf.

Figure 9 illustrates how the metric screw pitch gage is used to determine the pitch of a thread on a clock. This pitch information, along with the diameter of the thread, can be used to make or order a hand nut for the clock, for example. Some thread sizes are unique to a particular manufacturer and are not easily duplicated.

An inch screw pitch gage is illustrated in Figure 10. As mentioned above, the pitch markings, from 4 to 84 on the leaves of this example, mean the number of threads per inch. The actual pitch value is found by dividing the number of threads per inch into 1.

Figure 11 is a chart for commonly used inch screw threads, including calculated and available tap drill sizes.

Figure 5

THREAD DIAMETER, PITCH AND SUGGESTED TAP DRILL SIZE

THREAD DIAMETER		PITCH		CALCULATED TAP DRILL (60% THD.)		AVAIL. DRILL	EQUIV. SIZE
mm	inch	mm	inch	mm	inch		
0.30	0.0118	0.075	0.0030	0.24	0.0094	—	—
0.35	0.0138	0.075	0.0030	0.29	0.0114	—	—
0.40	0.0157	0.10	0.0039	0.32	0.0126	—	—
0.45	0.0177	0.10	0.0039	0.37	0.0146	79	0.0145
0.50	0.0197	0.125	0.0049	0.40	0.0157	1/64	0.0156
0.55	0.0217	0.125	0.0049	0.45	0.0177	77	0.0180
0.60	0.0236	0.15	0.0059	0.48	0.0189	77	0.0180
0.65	0.0256	0.15	0.0059	0.53	0.0209	75	0.0210
0.70	0.0276	0.175	0.0069	0.57	0.0224	75	0.0210
0.75	0.0295	0.175	0.0069	0.61	0.0240	73	0.0240
0.80	0.0315	0.20	0.0079	0.64	0.0252	72	0.0250
0.85	0.0335	0.20	0.0079	0.70	0.0276	71	0.0260
0.90	0.0354	0.22	0.0089	0.73	0.0285	70	0.0280
0.95	0.0374	0.225	0.0089	0.77	0.0303	69	0.0292
1.00	0.0394	0.25	0.0098	0.81	0.0318	1/32	0.0312
1.05	0.0413	0.25	0.0098	0.86	0.0339	66	0.0330
1.10	0.0433	0.25	0.0098	0.91	0.0358	65	0.0350
1.20	0.0472	0.25	0.0098	1.00	0.0394	61	0.0390
1.30	0.0512	0.30	0.0118	1.07	0.0421	58	0.0420
1.40	0.0551	0.30	0.0118	1.17	0.0461	57	0.0430
1.50	0.0591	0.35	0.0138	1.26	0.0484	3/64	0.0469
1.60	0.0630	0.35	0.0138	1.33	0.0523	55	0.0520
1.70	0.0669	0.35	0.0138	1.43	0.0562	54	0.0554
1.80	0.0709	0.35	0.0138	1.53	0.0602	53	0.0595
2.00	0.0787	0.40	0.0157	1.69	0.0665	52	0.0635
2.20	0.0866	0.45	0.0177	1.85	0.0728	49	0.0730
2.50	0.0984	0.45	0.0177	2.15	0.0846	45	0.0820
				TAP DRILL (75% THD.)			
3.00	0.1181	0.50	0.0197	2.51	0.0988	40	0.0980
3.50	0.1378	0.60	0.0236	2.92	0.1150	33	0.1130
4.00	0.1575	0.70	0.0276	3.32	0.1307	30	0.1285
4.50	0.1772	0.75	0.0295	3.77	0.1484	25	0.1495
5.00	0.1969	0.80	0.0315	4.22	0.1661	19	0.1660
6.00	0.2362	1.00	0.0394	5.03	0.1980	9	0.1960
7.00	0.2756	1.00	0.0394	6.03	0.2374	8	0.2380

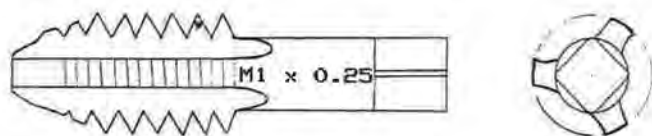
$$\begin{aligned} & \text{thread diameter} \\ & \text{minus} - (1.299 \times \text{pitch} \times \text{percentage of thread}) \\ & \text{equals} = \text{tap drill size} \end{aligned}$$

metric example: 1.00 mm diameter
 $- 0.19 \text{ mm } (1.299 \times 0.25 \times .60)$
 M1 X 0.25 = 0.81 mm tap drill size

Using inch values for the same thd. 0.0394 inch diameter
 $- 0.0076" (1.299 \times 0.0098" \times .60)$
 = 0.0318 inch tap drill size

Figure 6

METRIC TAP MARKING



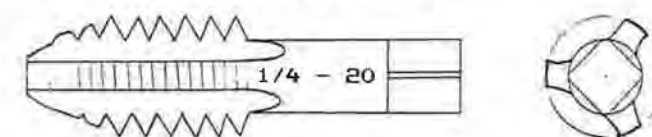
M stands for metric.

1 is the nominal diameter of the thread in millimeters.

0.25 is the pitch of the thread in millimeters.

Figure 7

INCH TAP MARKING



1/4 is the nominal inch diameter of the thread.

20 is the number of threads per inch

Figure 8



Figure 9



Figure 10



Figure 11

COARSE AND FINE INCH THREAD SERIES

THREAD DIAMETER inch	THREADS PER IN.	 PITCH	CALCULATED TAP DRILL (75% THD.)	AVAIL. DRILL	EQUIV. SIZE inch
0 (0.060)	80	0.0125	0.0478	3/64	0.0469
1 (0.073)	64	0.0156	0.0578	54	0.0550
1 (0.073)	72	0.0139	0.0595	53	0.0595
2 (0.086)	56	0.0179	0.0686	51	0.0670
2 (0.086)	64	0.0156	0.0708	50	0.0700
3 (0.099)	48	0.0208	0.0787	47	0.0785
3 (0.099)	56	0.0179	0.0816	45	0.0820
4 (0.112)	40	0.0250	0.0876	43	0.0890
4 (0.112)	48	0.0208	0.0917	42	0.0935
5 (0.125)	40	0.0250	0.1006	38	0.1015
5 (0.125)	44	0.0227	0.1029	37	0.1040
6 (0.138)	32	0.0313	0.1076	7/64	0.1094
6 (0.138)	40	0.0250	0.1146	33	0.1130
8 (0.164)	32	0.0313	0.1336	29	0.1360
8 (0.164)	36	0.0278	0.1369	29	0.1360
10 (0.190)	24	0.0417	0.1494	25	0.1495
10 (0.190)	32	0.0313	0.1596	20	0.1610
12 (0.216)	24	0.0417	0.1754	17	0.1730
12 (0.216)	28	0.0357	0.1812	14	0.1820
1/4 (0.250)	20	0.0500	0.2013	7	0.2010
1/4 (0.250)	28	0.0357	0.2152	7/32	0.2188

Note: A Tap 2 pocket watch stem and crown uses 0-80 thread.

A Tap 1 watch stem can be made using a 1-72 die.

Figure 12



Figure 13



Figure 15



Figure 16



Figure 17

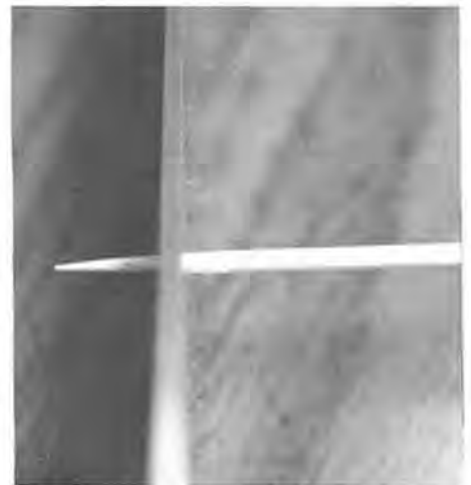


SCREW PLATES

Figure 12 shows a pair of watchmakers screw plates. The numbers on the plates are, in most cases, unique to each manufacturer and usually are not interchangeable. If you are fortunate enough to have a set of matching taps with your screw plate, it is then relatively easy to figure out the diameter and pitch each number on the plate relates to. Otherwise, it is cut and dry.

A method of approximating the diameter for each marked hole on the screw plate by measuring the diameter at the break-out point of the conical depression of the thread is shown in Figure 13. Figure 14 shows a way to get an idea of the pitch and diameter of the larger sizes in the screw plate by threading a wooden toothpick through the hole.

Figure 14



THE REAL WORLD

Problem: "Rush job, crown only, need it by tomorrow, can you help me?" Sure, no problem. (How many times have we heard that request?)

At first glance the job looked simple enough. . . crown missing from a quartz movement with a strange sounding name from a faraway place. Fit a 4 mm diameter, tap 10, white crown with a long post and the job will be done. It's a piece of cake.

Oops! The tap 10 crown wobbles on the stem—too loose. It must be one of those new smaller sizes, and there's no crown to match. A stem extender would solve the problem, *if* we had one with two different tap sizes!

A micrometer measurement shows the stem thread diameter to be 0.68 mm, probably a 0.70 mm nominal diameter. Wonder what the pitch is? A .70 X .17 mm tap was selected and compared to the stem as shown in Figure 15. The threads matched perfectly.

Figure 16 shows how a piece of steel stock was chucked in the lathe and turned to a diameter that matched the crown post. The section to be threaded to fit the tap 10 crown was turned to 0.87 mm diameter and about twice as long as actually needed. A large drop of lathe oil was put on the section to be threaded.

The .90 X .22 mm die, at work cutting the tap 10 thread, is shown in Figure 17. The spindle pulley was turned by hand, alternately feeding the die onto the material about half a turn and then backing off to clear the die of chips until the male post was completely threaded, as shown in Figure 18. The stock was then cut off, reversed in the lathe, faced, and then drilled with a number 74 (0.0225 inch) drill

as shown in Figure 19. (A small drill index containing 20 drills from numbers 61 through 80 is very handy for a lot of work described in this article.)

Figure 20 shows the .70 X .17 mm tap used to thread the hole we have just drilled. Lathe oil was again used to lubricate the tap as it was alternately turned part of a turn to advance the tap into the part and then backed off to clear the chips until the hole was completely threaded. Care was taken so the tap would not break when it reached the bottom of the hole.

The completed extender and the stem and crown it is to join is pictured in Figure 21. Figure 22 shows the completed assembly. The job was delivered on time. No problem, a piece of cake, right?

Figure 23 is a suggested before die threading allowance chart that may be useful to you. The actual die performance will depend on the material being threaded, the lubricant used, as well as the design and sharpness of the die or screw plate.

An Elgin watch thread chart is shown in Figure 24, and a Waltham watch thread chart in Figure 25. Figure 26 is a letter, number and fractional drill size chart for your convenience. Useful information about watch stem and crown threads is contained in Figure 27.

Tap and die work is fun and profitable when you have enough information to work with. This article may provide you with more than you had. Have fun!

Figure 18



Figure 19



Figure 20



Figure 21



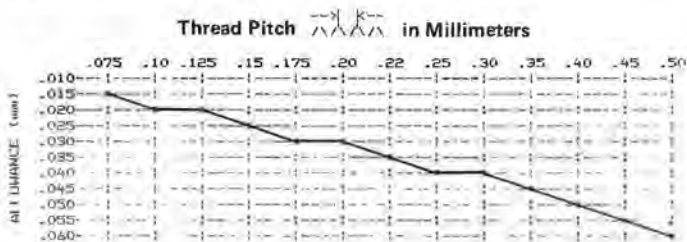
Figure 22



Figure 23

DIE THREADING ALLOWANCE

It is suggested that the nominal part diameter be reduced before threading by the allowance amount shown on the graph below because the cutting and forming action of the die will usually cause a slight increase in thread diameter. The extra clearance will also help prevent interference between matching internal and external threads.



EXAMPLE: A tap 10 watch stem we are making is to be threaded with a .90 x .22 mm die. What is the suggested diameter before threading?

.900 mm nominal diameter
minus .035 mm allowance
equals .865 mm diameter before threading with a die.

Figure 24

ELGIN WATCH THREADS

THREAD DIAMETER		THREADS PER INCH	PITCH inch	CALCULATED TAP DRILL (75% THD.) inch
inch	mm			
0.0132	0.34	360	0.0028	0.0105
0.0148	0.38	320	0.0031	0.0118
0.0168	0.43	260	0.0038	0.0131
0.0208	0.53	220	0.0045	0.0164
0.0228	0.58	260	0.0038	0.0191
0.0248	0.63	220	0.0045	0.0204
0.0268	0.68	180	0.0056	0.0214
0.0288	0.73	220	0.0045	0.0224
0.0308	0.78	180	0.0056	0.0254
0.0308	0.78	220	0.0045	0.0264
0.0368	0.93	140	0.0071	0.0298
0.0368	0.93	220	0.0045	0.0324
0.0408	1.04	120L	0.0083	0.0327
0.0408	1.04	200	0.0050	0.0359
0.0428	1.09	120	0.0083	0.0347
0.0448	1.14	110	0.0091	0.0359
0.0468	1.19	110	0.0091	0.0379
0.0488	1.24	140	0.0071	0.0418
0.0488	1.24	200	0.0050	0.0439
0.0508	1.29	110L	0.0091	0.0419
0.0548	1.39	180	0.0056	0.0494
0.0608	1.54	110	0.0091	0.0519
0.0608	1.54	110L	0.0091	0.0519
0.0708	1.80	180L	0.0056	0.0654
0.0768	1.95	110L	0.0091	0.0679
0.0772	1.96	80L	0.0125	0.0650
0.0892	2.27	80L	0.0125	0.0770

"L" denotes a left hand thread

Figure 25

WALTHAM WATCH THREADS

WALTHAM TAP NO.	THREAD DIAMETER		THREADS PER INCH	TAP DRILL	
	mm	inch		mm	inch
1	1.50	0.0591	110	1.32	0.0520
3	1.20	0.0472	110	1.02	0.0402
5	1.10	0.0433	120	0.95	0.0374
7	1.00	0.0394	140	0.85	0.0335
9	0.93	0.0366	160	0.71	0.0280
11	1.34	0.0528	170	0.122	0.0480
13	1.00	0.0394	180	0.85	0.0335
15	0.83	0.0327	180	0.71	0.0280
17	0.65	0.0256	200	0.54	0.0213
19	0.55	0.0217	220	0.45	0.0177
21	0.45	0.0177	240	0.34	0.0134
23	0.35	0.0138	254	0.27	0.0106

Figure 26

LETTER, NUMBER AND FRACTIONAL DRILL SIZES

DRILL SIZE	DECIMAL INCH	MM	DRILL SIZE	DECIMAL INCH	MM
80	0.0135	0.343	36	0.1065	2.705
79	0.0145	0.368	7/64	0.1094	2.779
1/64	0.0156	0.396	35	0.1100	2.794
78	0.0160	0.406	34	0.1110	2.819
77	0.0180	0.457	33	0.1130	2.870
76	0.0200	0.508	32	0.1160	2.946
75	0.0210	0.533	31	0.1200	3.048
74	0.0225	0.572	1/8	0.1250	3.175
73	0.0240	0.610	30	0.1285	3.264
72	0.0250	0.635	29	0.1360	3.454
71	0.0260	0.660	28	0.1405	3.569
70	0.0280	0.711	9/64	0.1406	3.571
69	0.0292	0.742	27	0.1440	3.658
68	0.0310	0.787	26	0.1470	3.734
1/32	0.0312	0.792	25	0.1495	3.797
67	0.0320	0.813	24	0.1520	3.861
66	0.0330	0.838	23	0.1540	3.912
65	0.0350	0.889	5/32	0.1562	3.967
64	0.0360	0.914	22	0.1570	3.988
63	0.0370	0.940	21	0.1590	4.039
62	0.0380	0.965	20	0.1610	4.089
61	0.0390	0.991	19	0.1660	4.216
60	0.0400	1.016	18	0.1695	4.305
59	0.0410	1.041	11/64	0.1717	4.366
58	0.0420	1.067	17	0.1730	4.394
57	0.0430	1.092	16	0.1770	4.496
56	0.0465	1.181	15	0.1800	4.572
3/64	0.0469	1.191	14	0.1820	4.623
55	0.0520	1.321	13	0.1850	4.699
54	0.0550	1.397	3/16	0.1875	4.763
53	0.0595	1.511	12	0.1890	4.801
1/16	0.0625	1.588	11	0.1910	4.851
52	0.0635	1.613	10	0.1935	4.915
51	0.0670	1.702	9	0.1960	4.978
50	0.0700	1.778	8	0.1990	5.055
49	0.0730	1.854	7	0.2010	5.105
48	0.0760	1.930	13/64	0.2031	5.159
5/64	0.0781	1.984	6	0.2040	5.182
47	0.0785	1.994	5	0.2055	5.220
46	0.0810	2.057	4	0.2090	5.309
45	0.0820	2.083	3	0.2130	5.410
44	0.0860	2.184	7/32	0.2188	5.558
43	0.0890	2.261	2	0.2210	5.613
42	0.0935	2.375	1	0.2280	5.791
3/32	0.0938	2.383	A	0.2340	5.944
41	0.0960	2.438	15/64	0.2344	5.954
40	0.0980	2.489	B	0.2380	6.045

Figure 27

WATCH STEM AND CROWN THREADS*

TAP NO.	THREAD DIAMETER mm inch	NO. OF THREADS PER IN.	PITCH mm inch	CALCULATED TAP DRILL (60% THD.) inch	AVAIL. DRILL	EQUIV. SIZE inch
0	2.26 0.089	60	0.42 0.0167	0.0760	48	0.0760
1	1.88 0.074	72	0.35 0.0139	0.0632	1/16	0.0625
2 pocket	1.55 0.060	80	0.32 0.0125	0.0503	3/64	0.0469
2 pin lev	1.47 0.058	84	0.30 0.0119	0.0487	3/64	0.0469
3	1.19 0.047	110	0.23 0.0091	0.0399	41	0.0390
4	1.29 0.051	84	0.30 0.0119	0.0417	59	0.0410
5	1.36 0.054	110	0.23 0.0091	0.0449	56	0.0445
6	1.19 0.047	110	0.23 0.0091	0.0399	61	0.0390
7	1.19 0.047	110	0.23 0.0091	0.0399	61	0.0390
8	1.09 0.043	100	0.25 0.0100	0.0352	65	0.0350
9 Elgin	1.03 0.041	120	0.21 0.0083	0.0345	66	0.0330
9 Swiss	0.99 0.039	110	0.23 0.0091	0.0319	68	0.0310
10 USA	0.90 0.036	113	0.22 0.0088	0.0291	69	0.0292
10 Swiss	0.89 0.035	110	0.23 0.0091	0.0279	70	0.0280
11	0.84 0.033	140	0.18 0.0071	0.0274	71	0.0260
12	0.76 0.030	140	0.18 0.0071	0.0244	73	0.0240
13	0.70 0.028	144	0.17 0.0069	0.0226	74	0.0225

Please note that taps 3, 6, and 7 are alike.

* Chart compiled from information shown in the "Watch Crown Manual" by Henry B. Fried, used with permission.

The Pitch and Tap Drill information shown in the above chart was calculated using the Major Diameter and Threads per Inch information shown in Mr. Fried's manual. The Tap 13 values were derived from measurement of actual parts and are believed to be correct.

THIS

LUBRICATION

(Continued from page 25)

initial decrease in friction. Gears and pinions (by design) minimize friction by having the teeth and leaves rolling on their contours during contact. Plate or pivot wear causes a misalignment of the pitch circles and causes scuffing and wear to occur. Again, it is not acceptable here to lubricate to reduce friction. The pivot and/or plate must be repaired to restore pitch circle contact.

Over-lubrication can cause problems too. A tightly wound, freshly greased mainspring should have any excess grease that is squeezed out, dabbed off. Excess grease makes a mess and picks up dirt. Pivots that are over-oiled will have the oil run down the plate, taking more oil out than what could be held at normal application.

Sliding levers, cams, racks, etc. should have an application of light oil, just enough to prevent friction at the point of contact and yet avoid excess runoff.

On higher force areas, such as the strike star wheel points, hammer lift points, etc., a grease should be applied. Here the grease will cling and provide a reservoir of oil for the duration, more than what could be accomplished by just oil.

The escape wheel should have just a dab of light oil touched to three or four teeth. The oil will adequately spread over all of the teeth via the anchor and will prevent excessive scuffing and friction loss.

Posts that carry the rack, the chime and strike flint, etc. are given a light coat of oil to prevent corrosion and dry binding. These areas have little friction loss, but a little lubrication is still necessary.

Lubrication should be purchased fresh, not opened until used, and kept in a darkroom temperature area. Oil and grease will eventually oxidize when exposed to air and will lose its effectiveness with time. So don't start the process early by leaving the container open. I prefer to purchase container sizes so that the oil or grease is used up in, at most, a year. Oil that changes color or odor should not be used.

Mr. John Nagle, in his article "Tips From a Friend," mentioned a couple of lubricants that he liked. As he mentioned, try different products that are available and keep track of the results. Hopefully this information will help you in utilizing the excellent products that are available.

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COURSE ON COMPLICATED WATCHES: WOSTEP INNOVATION IN ADVANCED WATCHMAKER TRAINING

The Watchmakers of Switzerland Training and Educational Program (WOSTEP), the advanced watchmaker training institute in Neuchatel, Switzerland, has just announced the successful completion of its special course entirely devoted to complicated watches and reserved for watchmakers who have already completed a first WOSTEP course with high marks and have basic knowledge and experience in turning, pivoting, and filing.

As recently stated by WOSTEP director Antoine Simonin: "Today more and more people are looking for old timing instruments such as pocket watches and marine chronometers. There is also a strong demand for modern wristwatches with complications such as chronographs. This trend has an inevitable effect on after-sales service. Watchmakers with higher qualifications are needed and WOSTEP's special course is designed to help satisfy this need."

The WOSTEP course on complicated watches this year was run side-by-side with the first 1989 standard 20-week WOSTEP course which brought together experienced watchmakers from four different countries.

Places on WOSTEP's second 1989 basic course are all taken, but a few vacancies still exist for courses in 1990. A good basic knowledge of watch repair techniques and fluency in English are required for acceptance. Applications for places on WOSTEP courses next year should be sent soonest to: **WOSTEP, Rue des Tunnels 1, 2006 Neuchatel, Switzerland.**



WOSTEP student Jouni Sakari Pollanen working on a repeater watch during the course on complicated watches.

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TIME LOCKS

David A. Christianson, CMW



MOSLER TIME LOCK MOVEMENTS

PART I

If the numerous safe time mechanisms developed over the past century, one company's unique design emerged as a leader in the field and continues today, essentially unchanged in basic concept and design.

In the latter part of the nineteenth century, the Mosler Safe and Lock Company of Hamilton, Ohio developed a simple time lock mechanism controlled, as all were, by a small time movement. What made Mosler's unique was their use of a modified but regular production pocket watch movement housed in a removable movement block. This idea had several advantages over other time lock mechanisms:

1. The company could go into the marketplace and purchase movements that were already being produced. They didn't have to contract to a watch or clock company for movements that would require special tooling, manufacturing and design costs; thus saving considerable start-up costs.

2. Repair parts would be readily available without having to contract for unique spare parts.

3. As a regular production watch movement became obsolete, a later movement could be easily adopted to the same movement block.

4. Repair work in the field could be greatly facilitated by the simple exchange of movements or complete movement blocks in the event a movement needed more than a simple cleaning and oiling.

Mosler, as well as Diebold and a couple of other safe and lock manufacturers, maintained and fielded teams of service technicians that would travel the country servicing and maintaining their company's safes and time locks. Most of the personnel for these crews were recruited from the better watchmaking schools. Since the new recruits already had the skills necessary to repair and service the time lock movements, it was a simple matter to teach them the additional tasks of servicing the locking mechanisms as well. When trained, the new recruits would be let loose to solve installation problems, mechanism failures, lockouts, and other various problems associated with mechanical devices, as well as periodic maintenance on a contractual basis for the time lock movements themselves.

Whether at the local bank, jewelry store, lumber

company, or whoever was using a Mosler time lock, the safe technician/watchmaker would periodically remove the time lock movement and make any needed repairs as well as a routine cleaning and reoiling on the premises. For the most part, the technician had the capability of replacing or resetting pallet stones, bushings, or broken or chipped jewels, replacing train wheels if a pivot sheared off, and replacing mainsprings . . . *all* on the job site. If for some reason all necessary repairs could not be completed on the site (perhaps due to scheduling or parts depletion), the technician could readily exchange the Mosler time movement block (movement and all) and complete the repair upon returning to his branch office.

As time progressed and safe locking mechanisms themselves became more complex and the protection industry turned more to electronic perimeter protection, more companies, it seems, relied more and more upon electronic protection around their safes and less on the time lock within the safe.

Although banks still utilize time locking devices, only a limited number of other companies do. Mosler Safe and Lock Company, as well as the others, found that time and talents could be better utilized in the installation of electronic protection devices and in the continued maintenance of the safes themselves.

Time lock maintenance, although very important to those who still rely on them, is of lesser importance to the service companies. As such, the repair and maintenance of time lock movements is beginning to be contracted to independent watchmakers by the various safe and lock service companies.

THE TIME LOCK MOVEMENT ITSELF

Starting in the later nineteenth century, Mosler time locks were fitted with an 18 size Illinois model #4 watch movement (Figure 1). Some time later the 16 size Waltham watch movement was adapted for use (Figure 2). In fact, the 16/s Waltham movement, with its adaptor ring, is interchangeable with the movement block that houses the 18/s Illinois (Figure 3). Still later into the late fifties a Swiss

FIGURE 1. MOSLER 18/s ILLINOIS MOVEMENT

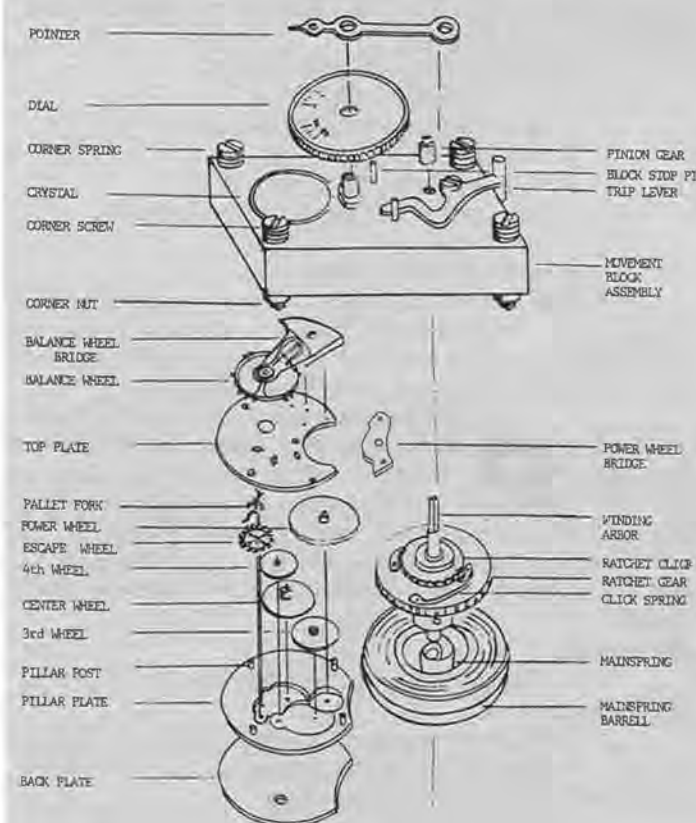
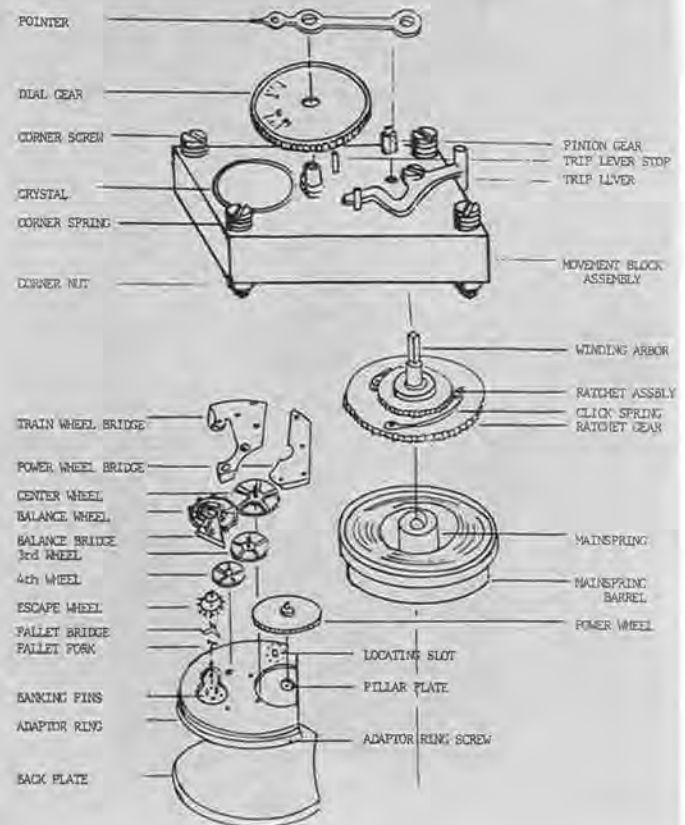


FIGURE 2. MOSLER 16/s WALTHAM MOVEMENT



movement was designed, using regular production Recta movement parts, to fit into the same Mosler time lock case. The Recta movement block (as it has evolved) is slightly different than the old Illinois and Waltham blocks, but it is still interchangeable and will fit any Mosler time lock case, whether it be a single movement case, double, triple or four movement case, as well as any variations to the multi-movement cases that have come about in later years (Figure 4).

Speaking of time lock cases and their mechanisms, what started out as a simple device (that simply unlocked the safe's locking mechanism) has evolved into an unlocking device with relocking devices, delayed time devices, etc. But this is another discipline in itself. We are concerned here with the time lock's movement which fits by way of the four spring-loaded corner screws into each and every one of Mosler's time lock cases.

So . . . with this in mind . . . let's look at the Mosler 18/s Illinois time lock movement (Figures 1 and 5).

THE DISASSEMBLY PROCEDURE

Using the usual watchmaker's sense, caution, and acquired skills, the Mosler time lock movement presents little challenge. Probably the two most needed bits of information are:

1. how to release the mainspring (so the train wheels aren't destroyed)
2. how much to prewind the mainspring (so the movement won't stop before opening time).

But, we'll go through the entire procedures as a matter of record and just in case, but first some important notes on removing power. Keep in mind there is no ratchet click on the movement that you can get to from the outside to release power.

Releasing Reserve Power

The amount of power stored by the mainspring could be just the reserve power (when the movement is run all the way down) or any amount of power depending on when the movement stopped running.

a) Place the movement block upside down in one hand, gripping the barrel with thumb and forefinger, as shown in Figure 6. Grip tightly, making sure your fingertips are dry and not greasy since the barrel surface is quite smooth.

b) Loosen three of the four screws—two at the center of the movement block and one on the outside.

c) Loosen the fourth screw and at the same time you'll feel the barrel trying to slip in your fingers.

d) Grasp the barrel with your other hand and release pressure on the barrel as you let the barrel slip slowly until the mainspring unwinds completely.

This is not as tricky as it may seem. You'll have plenty of control of the mainspring barrel with a firm grip since the spring is quite soft compared to the stiffer, stronger clock springs of the same size.

Disassembly (refer to Figure 5)

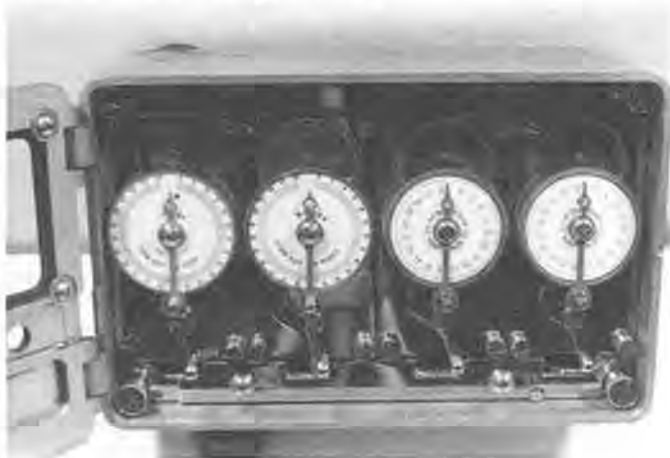
1. Remove dial pointer and pinion.
2. Remove dial.
3. **Never** remove trip lever.
4. Remove power on mainspring.
5. Push mainspring arbor and barrelled spring out of block (Figure 7).
6. Remove arbor from mainspring by twisting backwards as with a watch.
7. Examine click, click spring, and teeth of the ratchet gear assembly (Figure 8).



Figure 3. Mosler time lock movement block with 18/s Illinois Model #4 movement.

8. Remove the back plate of the movement by removing the four screws (Figure 9).
9. Turning the movement over in your hand, movement will drop out into your hand (Figure 9).
10. Disassemble the movement as with any watch movement. Note that the movement is merely a modified version of a standard pocket watch, except that some holes and cut-outs were not made for use as a pocket watch (Figure 10).

Figure 4. 4-movement Mosler time lock fitted with four generations of movement blocks: (L to R) 16/s Recta "New Style," 16/s Recta "Old Style," 16/s Waltham, 18/s Illinois.



Repair Procedure

Repair of the Mosler time lock movement requires the same skill, knowledge, and material as with any watch movement of similar design.

Common problems encountered are:

1. loose or broken roller jewel
2. worn pivot holes (quite common)
3. broken balance staff pivots
4. broken jewels (not common)
5. most commonly, foreign matter and dried lubricants
6. balance assembly out of beat.

Clean as with any pocket watch movement and make usual repairs. The movement should be hand oiled, balance cap jewels should be removed and cleaned with pegwood, and all hole jewels and pivot holes should be pegged.

Be sure to put the movement "into beat," in other words, the balance staff, pallet fork and escape arbor must line up so that the movement will be self-starting. Some of the later movements by Mosler and other makers were designed to be self-starting by using specially designed escape wheel teeth and greater angles of lift on the pallet surfaces, but this is not the case with the Illinois and Waltham movements.

Reassembly

1. Reassembly of the movement is the same as all pocket movements.
2. Place the movement into the movement block.
3. Replace the ratchet gear assembly into the mainspring barrel, along with the mainspring.
4. Oil the ratchet click with a heavier clock oil or a light watch mainspring grease.
5. Insert the ratchet gear/mainspring/barrel assembly into the movement block.
6. Replace the movement back plate and screws; always tighten opposite screws.
7. Turn the barrel until (a) tension is on the mainspring and (b) the screw notches on the barrel line up with the screw notches on the movement block and replace the screws.
8. Apply reserve power, wind the mainspring arbor nine half-turns ($4\frac{1}{2}$ full turns).
9. Hold trip lever to the right as far as possible.
10. Place winding pinion on the winding arbor with the collar up.

Figure 5. 18/s Illinois time lock movement removed from movement block.



11. Insert the dial so that the stop pin is as close as you can get it to the flat side of the trip lever.

12. Replace the pointer so that it is pointing to zero on the dial and replace the screw.

Testing the Movement

Turn the dial to four hours. The movement should start on its own and run down to "zero" time as indicated by the dial, whereupon it will stop running and the trip lever will be pushed to the right.

While the movement is running, check its rate on your timing machine. If needed, rate can be adjusted as with any pocket watch by removing the glass tension ring and glass covering the balance wheel (dial must be removed first).

If the movement doesn't self-start, check alignment of the staff-pallet arbor-escape arbor. If the movement doesn't run down, you have a mechanical problem such as worn pivot holes, lubrication, bent pivots, foreign matter, etc. as in any watch.

TIME

Figure 7. Removing barrelled mainspring/ratchet wheel assembly.



Figure 6. Releasing mainspring power (refer to text).

Figure 8. Ratchet wheel assembly removed from movement block. Note lower half contains movement behind round back plate.

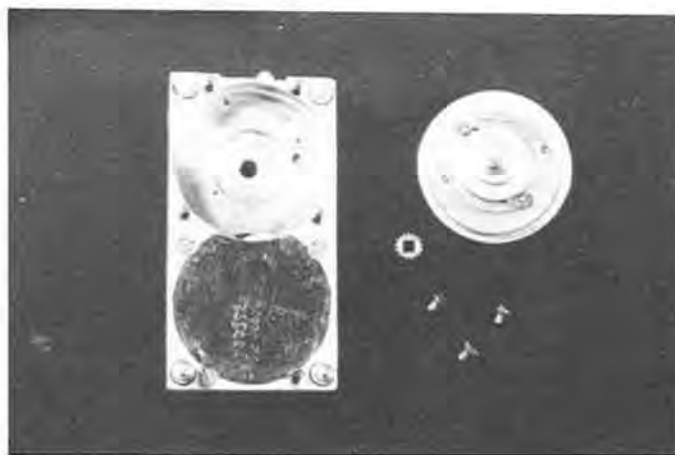


Figure 9. Movement block with back plate and movement removed.

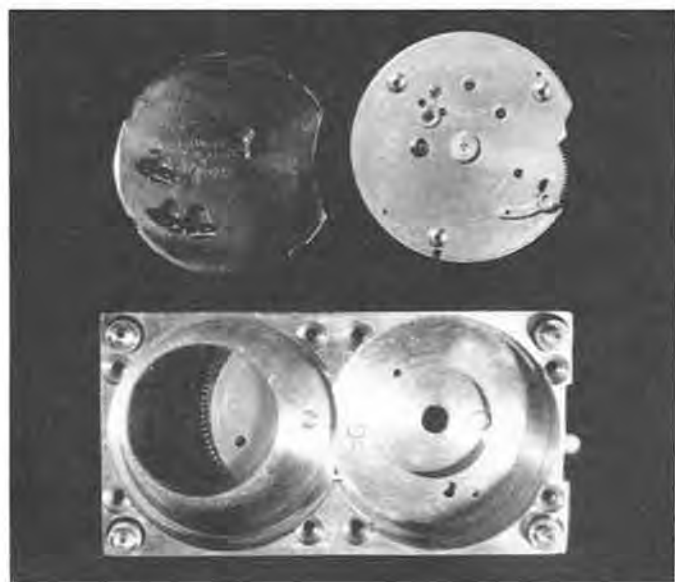
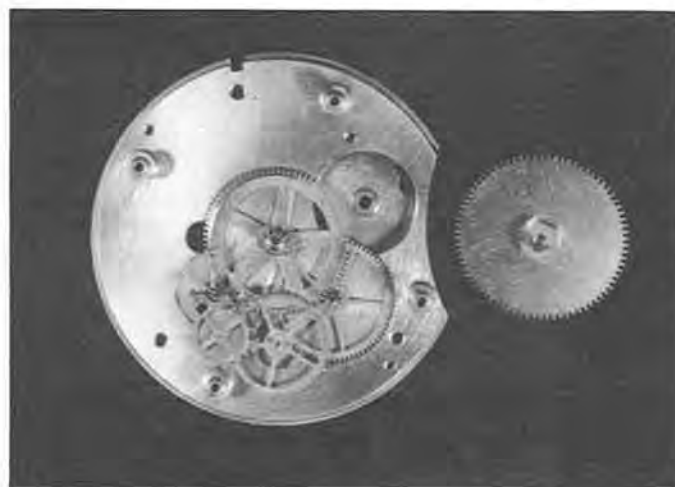


Figure 10. Movement with train bridge removed. Note large power wheel which transfers power from large mainspring to movement.



Novice Watchmaker

James Adams, CMW, CMBHI



REFERENCES: Unless otherwise noted, this material is taken from personal experience gained through school, apprenticeship, on the job, and the school of hard knocks.

American Pocket Watch - The Case

I'd be willing to bet that you, as a novice watchmaker, have not had the opportunity to work with an American pocket watch. I'd go a step further and say there are some of my novice friends who haven't seen one close up, close up enough to carefully examine it. If you were an old mossback like me, you would think everyone cut their watchmaking teeth on a 16 size Studebaker grade South Bend, or maybe an 18 size, full plate, 15 jewel Elgin. Then again, maybe it was a G.M. Wheeler grade with the bridge work covered with ultra fancy engraving. To get one of these at the bench today would be sure to put me in "Hog Heaven."

One problem I'd run into (because I have) is I'd diddle around with it and spend as much time with that one masterpiece as I would have spent on three or four of these newfangled "thing-a-ma-bob" watches of today. There is no prettier sight in this vale of tears than a freshly overhauled 18 size Waltham that is half-timing. Half-timing? I'll get into that down the road a bit, but first things first.

THE CASE

Now remember, novice, we are discussing the old American pocket watch made in the 1930s or older (and most are older). Do not confuse these with any modern pocket watches you see. The modern pocket watch is a different breed of cat altogether. The old American cases were made of gold, either 10K, 14K or 18K. Most of the gold cases I've seen and worked with were 14K yellow gold. The next grade would be what is known as either 5, 10, 15, 20, 25 or 30 year warranted cases. Back then most of the time warranted cases passing over my bench were 10, 15, and 20 year cases.

The manufacturers would designate on their cases the grade of case by stating how many years of service could be expected of it before the surface gold layer would wear down to base metal. A case stamped as a warranted 15 year case was meant to assure the new owner at least 15 years of wear and tear before the base metal began to show through.

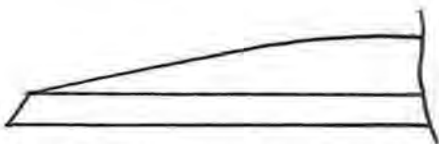


Figure 1. Miconcaves: used with ordinary open face watches.

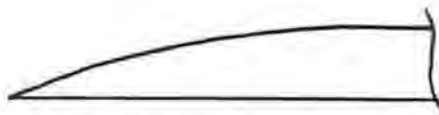


Figure 2. Lentilles: high grade watch glass used on better grade open face watches.

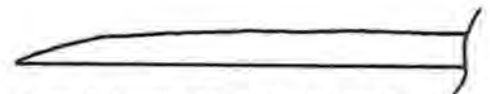


Figure 3. Lentille Chevés: similar to and same quality as Lentilles, meant for high grade thin watches.



Figure 4. Extra Thick Miconcaves: meant for use on silver, silveroid, open face watches, such as carried by railroad engineers.

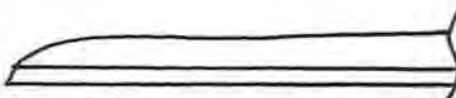


Figure 5. Empire Chevés: for use on lower grade thin watches. Less expensive than Lentille Chevés.



Figure 6. Genevas: in various heights for hunter case use.

I always thought that was a nice, substantial way of indicating quality. Quality . . . today you have to look the word up in the dictionary to discover the meaning. But anyway, Uncle Samuel, in his desire to protect us from ourselves, decreed "year" marks were not nice and so a newer designation began to appear. The term was "gold filled." So when you open a case back and read "Warranted 15 Years" the case would probably go 20 years before showing its age. Some pristine cases today are as bright as a new Indian head penny, but that's another story.

Then we have the workhorse "silveroid" case. These were no-nonsense work watches. Some were really big and heavy, and I mean BIG and HEAVY! Some cases seemed to weigh five pounds empty. Others were more conventional in size. Silveroid (or nickel silver cases) were made of an alloy of 45% nickle, 54% copper, and the balance of manganese. Manganese is a hard, tough material that seemed not to wear out. It took such a nice, high silvery polish that it matched a newly minted buffalo nickel for looks.

Much of what is said here and the following articles is going to be new to the novice. Some of the tools described will be new to you, as they are (for the most part) unique to the American pocket watch. It may be that one of you will accept the challenge and become an expert in servicing these timepieces. With that thought in mind, pay attention to these special tools.

There are two types of watch cases you will run into. The first is the open face case. In most of these the case back screws onto the center casing ring unit as does the crystal bezel screw onto the casing ring unit. Many times these backs and crystal bezels become excessively tight, either through deliberate tightening by the owner or watchmaker, or by the passage of time which tends to freeze these tight. In any event, *(Please turn to page 54)*

AWI PRESS BOOKS & VIDEOS

VIDEOS:

BASIC JEWELRY REPAIR—Marshall Richmond. 1 hr., 52 minutes covering ring sizing, shanks—half and full, prong repair and tipping, stone setting, complete ring fabrication, torches, filing, sawing, and finishing. VHS and Beta, \$49.95

INTRODUCTION TO THE MULTIMETER & TESTING QUARTZ WATCHES—James Adams. A no-nonsense approach to quartz watch repair. Using a Citizen multimeter and an ESA 963 calibre quartz watch, Mr. Adams explains how to use and understand readings of the meter as various checks are performed to diagnose problems with quartz watches. The 1 hr., 30-minute video will teach you to transfer the instructions for use of the Citizen multimeter to any meter you have. VHS and Beta, \$49.95

BOOKS:

BENCH PRACTICES FOR WATCH/CLOCKMAKERS—Henry B. Fried. Hairspring practices, replacing regulator pins, jewelry and dial repairs. \$16.95

CAVALCADE OF TIME—Henry B. Fried. Highlights of the Zale Private Collection of Timepieces. \$16.95

THE BEST OF J.E. Coleman—CLOCKMAKER—Orville R. Hagans. An aid to solving everyday problems in clock repair. \$30.00

ESSENCE OF CLOCK REPAIR—Sean C. ("Pat") Monk. A practicing clockmaker reveals repairing secrets. \$19.95

GRUEN WATCHES, A SPECIAL COLLECTION—Robert D. Gruen. Booklet is a publication devoted to the Gruen collection on display at the Orville R. Hagans AWI Museum. \$6.95

HOW TO REPAIR HERSCHEDE TUBULAR BELL CLOCKS—Steven G. Conover. A book for the serious clockmaker interested in high-quality timepieces. \$12.95

QUESTIONS & ANSWERS FOR THE WATCHMAKING PROFESSION—AWI. Helpful information on repairing watches. \$5.95

QUESTIONS & ANSWERS FOR THE CLOCKMAKING PROFESSION—AWI. Experts answer everyday questions about clockmaking. \$14.95

REPAIRING QUARTZ WATCHES—Henry B. Fried. Includes a basic course in electricity and electronic horology. \$22.95.

STRIKING CLOCKS—Joseph G. Baier, Ph.D. A hands-on survey for the clockmaker. \$7.95

THE SHIP'S CHRONOMETER—Marvin E. Whitney. A concise treatise on the fascinating nautical timepiece . . . for the collector as well as the horologist. \$75.00

WATCH & CLOCK INFORMATION, PLEASE—W.H. Samelius. The writing of Samelius edited by O.R. Hagans. \$30.00

THE WATCH ESCAPEMENT—Henry B. Fried. How to analyze, adjust, repair the lever and cylinder, and more. \$14.95

THE WATCH REPAIRER'S MANUAL—Henry B. Fried. The newly expanded and updated Fourth Edition of this popular textbook on watch repair. \$27.00

ALL BOOKS & VIDEOS SHIPPED POSTPAID

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NOVICE WATCHMAKER

(Continued from page 53)

if the backs or fronts will not turn with applied palm pressure, there are rubberized cups of various diameters that can be hand held and pressure applied while turning. The adhesion friction between the case and cup will turn almost all very tight backs and bezels. Remember, when screwing these back on, use finger tight closing only. Sometimes, because of the fineness of threads involved, it's easy to cross-thread these backs and bezels (misaligned male/female thread joints that will actually screw the back or bezels incorrectly together). You will see this now and again. The only thing you can do if you can't unscrew this mismatch is to slip a thin-bladed case knife or razor blade in the slot created by the mismatch. Try to work the blade around with a twisting motion of the blade, trying to snap the cross-threaded area back into proper thread alignment.

American pocket watch movements are held secure in the center casing ring by two casing screws, either half headed or full headed. Sometimes these casing screws work loose and bind against the inside of the case back. This literally locks the case back and prevents back removal. This, at best, is a very trying experience. Try removing the crystal bezel and, while the watch is dial down, gently shake the cased watch and try to get the movement to fall downward, making the casing screws fall away from the inside case back. Then gently, with the case cup, try to turn the back loose. It may turn only 1 or 2 mm and lock up. Turn the back tight again and turn it loose again.

The back-and-forth rocking, along with shaking the movement dial side down, sometimes works to relieve the binding casing screws from the inside case back.

The last resort is to treat the bound case back as being cross-threaded, and gently pry the back off with the least amount of thread damage. It can be done. After the back is off, many times you will see nasty gouge marks inside the case back. You must restore any of the casing threads back to good functional order.

On the open face American pocket watch case, there are five things that need servicing. They are: crystal replacement, crown replacement, sleeve replacement, stem replacement, and bow replacement.

CRYSTAL REPLACEMENT

This is a ticklish job. Ticklish in that the American pocket watch used glass crystals in several different configurations. They are: Miconcaves (Figure 1), Lentilles (Figure 2) Lentille Chevés (Figure 3), Extra Thick Miconcaves (Figure 4), Empire Chevés (Figure 5), and Genevas (Figure 6). Nowadays all a person can get are plastic crystals for pocket watches. It may be, if you want to restore the American pocket watch, that some glass crystals might be secured through old stocks of retiring watchmakers. Might, in this case, is an awfully big word. Barring that, you will be forced to use current plastic ones. These are O.K., but . . .

CROWN REPLACEMENT

In working with the American pocket watch, the most replaced part because of wear is the crown. Most of the older, larger cases used a ball-shaped crown. Others, slightly newer (and that's a relative term), used a tapered antique

shaped crown, while some cases used crowns specifically designed for those cases. It's a simple matter today to secure an assortment of ball-shaped and tapered antique crowns, either in white or yellow. As a novice watchmaker, interested in having your skills honed to the point of expertly servicing the American pocket watch, it is necessary to explore all avenues of material sources. I won't mention mine, as that would only antagonize other suppliers of the same products. Crowns need to be changed on virtually every pocket watch coming in for repair. It's as common as putting power cells in quartz watches, and as lucrative also.



Figure 7. An assortment of sleeves.



Figure 8. Two pocket watch stems; the upper has a sleeve slipped onto it.

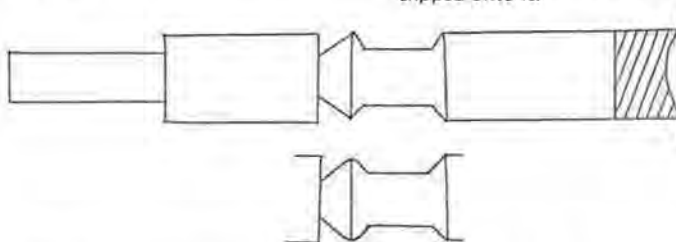


Figure 9. Top illustrates the American pocket watch stem. After years of daily use, the switching shoulder becomes worn as seen in the lower drawing. Sometimes the rounding can be touched up with a lathe and graver. This technique, and a new sleeve, many times corrects the problem.

SLEEVE REPLACEMENT

In case repair work, next to crown replacement comes sleeve replacement. Let me explain this sleeve concept to you. In the American pocket watch the winding and setting mechanism was divided between part being in the movement and part being in the pocket watch case pendant neck. Simply put, the American pocket watch used a two-piece stem. The case contained the crown and male stem. The controlling unit used to hold the male stem in either the winding position or the setting position is the sleeve (Figure 7). The sleeve screwed into the pendant to hold it in correct position and the area under the threaded section was a group of leaf springs that gripped the male stem to hold it in proper winding or setting position. Figure 8 illustrates this action on the stem.

American pocket watch bulk stem assortments are available today, although the male stem part seldom needs replacing.

STEM REPLACEMENT

As mentioned above, these seldom need replacing. But with many years of constant use, the stem at the switching point (Figure 9) will wear to such a point that the stem will jump out of the winding into the setting position, due to the pressure applied by the movement's portion of the winding/setting mechanism. Also, another cause of this jumping into the setting position is a badly worn sleeve or broken sleeve leaf springs.



Figure 10. Two sleeve wrenches for removing and inserting sleeves.

These sleeves are removed and replaced with a tool known as a sleeve wrench. This wrench has several diameters

to engage the sleeve slot to screw it in or out. Figure 10 illustrates two of these wrenches. The wrench is used to seat the sleeve in the pendant neck to such a position as to affect the proper winding action or setting action. A sleeve adjusted too far out will not allow the pocket watch to be wound up. A sleeve adjusted too far in will not allow the pocket watch to be set.

BOW REPLACEMENT

Bow replacement is necessary at times. Sometimes the bows are missing or ill-fitting through bow to pendant neck fit, or even there may be a wrong bow style for case match. Here again, there are bows available in assortments and singly. Some cases require the very old-fashioned round bow, others may use a more oval shape, either plain or with fancy embossing on them. The tough ones are when special shaped bows are used on special cases. You are "up the creek" then. It is sometimes necessary to fit bushings in badly worn case pendants. Years ago there were assortments of these replacement bushings to be had. I don't know about today. I've got some of these oldies left. The brand name is Torpedo.

Earlier I said working on the American pocket watch made you feel like a watchmaker. So far I've just skimmed over the open face case. Next comes the hunter case.

A real good source of detailed information on the various aspects of American pocket watch repair would be Henry B. Fried's *The Watch Repair's Manual*, available from AWI.

TIMES



Hand-held screw back case opener.



A variety of shapes of bows used in the American pocket watch.



An assortment of antique crowns with one ball shape crown at lower left.



Part of an assortment of American pocket watch screws.



Case pendant bushings. There are four lying on the box, if you can see them.

Affiliate Chapter Column



Paul D. Wadsworth

WE NEED MORE DELEGATES

It's time for your association to choose their delegate and alternate for the 1990 Affiliate Chapter and AWI Meeting. According to the affiliate chapter bylaws, delegates are to be selected by each affiliate chapter; said delegate to assume office at the convening of the affiliate chapters annual meeting, and will continue in office until the ensuing annual meeting. It is their responsibility to brief the next delegate on what to expect at the annual meeting. It is always better to be able to plan this trip as far in advance as possible. This will allow the next delegate to be ready with lots of good new ideas of things their chapter would like AWI to do. Therefore, I urge all chapters to select their delegate for next year as soon as possible.

As some of you will remember, we, the affiliate chapters, asked to have more delegates present at the annual meeting. AWI has now worked out a program that would help to cover some of the expenses for the trip. AWI would provide \$200 toward the cost of sending a delegate to the annual meeting. One of the requirements for this type of support would be that 60% of your affiliate chapter members (with a minimum of 15) must be AWI members. This would seem only reasonable. This might be the time to look at your chapter's roster. As an aid in this, you might consider adding a box to be checked for AWI membership on both your dues notices and applications. This is the time to start, not next year when you find out you missed out in qualifying by one or two members. As I see it, we have only a few choices: one would be to only allow AWI members to join our associations; another would be to require all members of our association to join AWI. As these are rather harsh choices and would, I am sure, require many changes in the bylaws, etc., let's see what we can do to promote AWI so that every affiliate chapter member would want to be a member of this great team.

I would like to point out that all members of AWI are invited to attend the annual meeting and all would be more than welcome. For those of you that haven't attended one of these meetings, it is a great experience to see an association such as this in operation. One very important point is that everyone has a chance to voice their opinion and discuss each issue at both the Affiliate Chapter meeting and the AWI Board meeting. However, only the official delegate may vote at the affiliate's meeting and only the board member may vote at the AWI meeting.

Next year is AWI's 30th anniversary and I would encourage all of you to start making plans now to attend. The dates are already set for June 22, 23 and 24, 1990. I hope to see you there.

After the request for letters, post cards, and manuscripts that I had in last month's news, I took the liberty of informing my local post office to be prepared for a deluge of mail. The postmaster informed me that she was sure they could handle the extra load or two; however, it might re-

quire an increase in the postage rates in the near future. This sounded like a good lesson for watchmakers. Most of us are working long hours with only the thought of getting the work out and keeping our customers happy. Maybe we should be thinking as the postal employee about an increase in our charges. Perhaps a little less work at an increased rate would equal the same thing now—and I am sure the volume would build up again.

I know that every time the postage goes up I vow not to send any more letters. My thinking says it's faster to use the phone. Then the next thing I know the phone company decides to increase *their* rates, and it's back to the post office again. It's just a vicious circle. It seems that people are doing similar things with watches. The throwaway watch has its place and so does the quality watch. I am sure that most people have at least one good quality watch. If you haven't seen it for quite a while maybe an increase in your prices will bring them out. This may seem all backwards, but I am sure that the post office will not go out of business because of an increase in rates . . . and neither will a watchmaker.

My mail this month included a letter from Dorothy A. Masticola, the public relations director of The Time Museum in Rockford, Illinois. I had stopped there on vacation after the AWI meeting and I left a note asking if AWI could have a copy of their video on time. It seemed to do a great job of covering the history of time. The letter sent her regrets that due to copyright laws they are unable to permit anyone else to use it. Well, it seems that the only way to see the video is to go to Rockford. In my opinion, it would be a very worthwhile part of any vacation or trip in the area. Along these lines don't forget that AWI is always looking for good quality information on horological topics.

I had an interesting phone call the other night from our president, Robert Bishop. It seems that somehow my name must have fallen out of the hat when he was looking for a committee chairman. This seemed strange to me and I questioned him as to who put my name in there. He assured me that the handwriting had to be mine as no one could read it. Well, anyway, what's another committee when it's really only my latest hobby? I am the proud chairman of the new committee to study computers and the watchmaker. I will be looking for any ideas anyone has along this line. If anyone has any programs they are using now, please let me know. I think a questionnaire would be good. I know that without my computer I wouldn't want to have this newsletter to do.

(P.S. Don't forget to send in the news of your chapter. This can include pictures (black and white). The *HT* staff will fill up all the space that I don't use with whatever they can get from your chapters.)

THIS

ASSOCIATION NEWS

NORTH CAROLINA

On July 16th the Cape Fear Guild of the North Carolina Watchmaker's Association held its annual auction for watchmakers, clockmakers and jewelers. There was an excellent selection of items brought for sale.

The Coastal Plains Guild held a lunch meeting on Sunday, July 9th. As host guild for the 1990 convention and preparer of the yearbook, foundations were laid for the proper motel location, changes to the yearbook, and activities for the ladies during the convention. A short program was presented on jewelry repair pricing.

NEW YORK

The New York State Watchmakers Association, Inc. held their last board meeting on July 9th at the Sheraton Inn, Syracuse, New York. Bob Swann reported on the annual AWI meeting. Cameron Spicknall and Tony Guzzo reported on the Pennsylvania state meeting at Lancaster.

Tony Guzzo, Harold Kentner, and Julius Maier worked at the National Association of Watch and Clock Collectors meeting in Buffalo in June. The Mart had over 800 tables, and special exhibits included tower clocks, rare watches, music boxes, and an exhibit on clocks made in New York State.

WASHINGTON

MANY AVENUES MISS GEORGE T. LEWIS

George Lewis was a horology instructor at the North Seattle Community College until he retired less than a year ago. His untimely death on May 28th brought this much-deserved retirement to a premature end.

George Lewis enjoyed a number of careers during his 68 years; he was a teacher, a watchmaker, owner of the Time Shop, an outdoorsman, an Olympic class gymnast, and Olympic coach. Many of us simply remember him as a respected colleague and loyal friend.

Nancy Verheyden, who taught with Lewis for many years, speaking in the S.C.C. newsletter *Faculty Voice* remembered him as

"an uncompromising craftsman in all aspects of his life. He loved the precision he found in the works of a fine old watch. The parts were more than a clever machine."

Verheyden continued:

"He had reverence for fine work; he felt the harmony, the synchronization in the dynamics of movement. His classroom was similarly geared in synchronized meshing—there was energy and movement, with Lewis making everything go."

George Lewis earned the respect of his fellow instructors as he attended AWI REC meetings and workshops. He also earned the respect of the teaching profession by earning the National Award for Teaching Excellence. Equally important, he earned the respect of all the lives he touched as teacher and coach.

The many roads George Lewis traveled during his life will miss his presence.

TIME

UPCOMING CONVENTIONS

*Iowa Jewelers and Watchmakers Association
Convention and Trade Show
September 9-10, 1989
Airport Hilton Inn – Des Moines, IA*

*New York State Watchmakers
Seminar, Convention & Annual Meeting
September 22-24, 1989
Sheraton Inn – Syracuse, NY*

*Florida State Watchmakers Association
Annual Convention
October 20-22, 1989
Hilton Inn Gateway – Kissimmee, FL*

*Illinois Watchmakers Annual Convention
October 20-22, 1989
Ramada Inn – Effingham, IL*

AN ERA COMES TO AN END

When Gerald Jaeger, Instructor of the Horology Department at Milwaukee Area Technical College, Milwaukee, WI, opted to retire at the end of the May term, it signaled the end of a long and proud tradition at the school. Many generations of watchmakers have been trained at MATC. Pictured below is the final graduating class of horology students from the Milwaukee school.



Pictured, left to right, front row: Todd Aschengach, Scott Moline and Jack Pizzo. Back row: Gerald Jaeger, Instructor of Horology; Mary Anna Petrick, Instructor of Jewelry; George Berman; Amos Cutt and Don Braun.

New Products and Literature

GERMANOW-SIMON'S NEW UV CURE GLASS GLUE WITH PRECISION APPLICATOR TIP

The Germanow-Simon Corporation announces its new Ultraviolet Cure Glass Glue with a Precision Applicator Tip. Developed especially for the watch repair trade, this special formulation glue securely bonds glass watch crystals to metal and plastic watch cases quickly and easily, with no mess. An exclusive applicator tip allows placement of a precise amount of glue for secure bonding.

G-S Ultraviolet Glue will not yellow with age and cures in 20 to 30 seconds when exposed to direct sunlight, or in 2 minutes with the G-S UV lamp. A tube of G-S Ultraviolet Cure Glass Glue contains twice the amount of other UV glues.

A new Ultraviolet Cure Lamp with convenient stand is also available. Makes indoor curing easy and dependable. Both hands are free, enabling the repair person to cure many jobs at the same time.

Both the G-S Ultraviolet Glue and Cure Lamp are now available from watch material distributors.



Germanow-Simon's UV cure glass glue w/precision applicator.

MAXIMIZE CLEANING WITH L & R WATCH AND CLOCK SOLUTIONS

L&R Manufacturing Company, makers of fine ultrasonic cleaning machines, solutions, and accessories, offers a complete selection of watch and clock cleaning and lubricating solutions. These special formulas are designed to ease the cleaning process and to increase operating efficiencies of

the parts to be cleaned. From ultrasonic cleaning concentrates and solutions to lubricating and rinsing solutions, each product has been carefully tested in L&R's own laboratories. The solutions are available in a range of sizes to accommodate everyone's cleaning needs.

A color catalog featuring all of L&R's watch and jewelry cleaning equipment, solutions, and other accessories, is available free of charge. All L&R products are designed with one goal in mind—providing the user with maximum cleaning effectiveness in a minimum amount of time.

To place an order, or for more information and a free catalog, contact: **L&R Manufacturing Co., 577 Elm St., Kearny, NJ 07032.**

COMOR PERPETUAL CALENDAR WATCH

From the beginning of the 17th century, so-called astronomical watches were among those produced in Geneva, but paradoxically they had a single hand (the one showing the hours). The famous watches of Jean-Baptiste Duboule (1615), or of Jacques Sermand, the nephew (1636), or Millenet's table clock—a true work of art produced in 1712—are the best-known examples. However, the first perpetual calendar mechanism appeared much later on. It was invented and constructed by Elisee Piguet in 1853 when he was only 17 years of age.

The Comor Perpetual Calendar Pocket Watch has his handmade mechanism constructed on an IWC movement which has all the visible parts of the escapement side hand-engraved under sapphire glass. A solid 100-gram, 18 ct. gold case completes the craftsmanwork of only five pieces to come out of a Limited Edition of 30 numbered watches.

For more information, contact: **Comor Watch, Adolf L. Benz, Box 137, 3000 Bern 7, Switzerland. Fax: 031-210285/210275, c/o Comor.**



L&R cleaning solutions.

Comor perpetual calendar watch.



2V LITHIUM WATCH BATTERIES—NEW FROM RENATA

Silver oxide batteries have established themselves as a safe and reliable power source for electronic watches. Experience has shown, however, that when it comes to producing extra-flat batteries in silver oxide (with a height of 1.2 mm or less), there are limits to preventing electrolyte leakage and an undesirably high rate of self-discharge.

For this reason, Renata SA of Itingen, Switzerland has developed a 2V lithium battery based on the Li/CuS (lithium/copper sulphide) system. The company states that this is the only miniature lithium battery available on the market which is

compatible with today's electronic analog movements and offers the following advantages: minimum self-discharge, excellent leakproofness, high energy density, and good electrical properties at low operating temperatures.

To obtain these characteristics, Renata worked out a new battery construction which has been patented worldwide. Since August 1986, this battery (No. 751, 5.8 x 1.2mm) has been used in very slim and exclusive watches by several famous Swiss watch manufacturers.

For additional information, contact: **Henry Kessler, Renata US, 2263-C Valdina St., Dallas, TX 75207; in Texas (800) 442-5101; in USA, (800) 527-0719; Fax is (214) 630-2568.**



Renata 2V lithium batteries.

SWEST RELEASES NEW FINDINGS CATALOG

Swest, Inc. is offering Catalog F-90, a complete listing of all jewelers' findings, stones, and metals available from the leading supply house. All products are featured in full color. Contact: Swest, Inc., Advertising Dept., P.O. Box 540938, Dallas, TX 75354-0938; (214) 350-4011; (800) 527-5057 (national); or (800) 442-3092 (Texas).



Jewelers' FINDINGS & STONES & METALS

Swest SINCE 1923 INC.

Swest's new catalog F-90.

FOREDOM'S NEW FULL-SPEED, QUICK-CHANGE HANDPIECES

The Foredom Electric Company has just introduced two new handpieces suited to professional jewelers, lapidaries, and craftsmen.

New to the Foredom line of more than 20 interchangeable handpieces is the No. 17 Handpiece, which features a pencil-thin design with a diameter of only 5/16" at its tip. This double bearing, collet handpiece runs true and cool in continuous use at speeds of up to 18,000 RPM and is intended for use with 3/32" shank accessories exclusively. The handpiece has the added advantage of a push-pull mechanism, allowing for the quick and easy change of accessories. It measures 6 3/4" long, has a shipping weight of 3 oz., and includes a collet.

Of particular appeal to jewelers is the No. 17D Handpiece which shares the features of its companion model but comes equipped with a duplex spring drive connection and cover for even greater flexibility. This unique connection provides the kind of precise control required for work that is especially delicate. The drive spring is of special steel, double-wound, tubular construction, and is protected by a flexible spring cover. It is 10 1/4" long, has a shipping weight of 4 oz., and includes a collet.

For more information, contact: **The Foredom Electric Co., Rt. 6, Bethel, CT 06801; (203) 792-8622.**



Foredom Electric Co.

KASSOY INTRODUCES NEW OHAUS CT SCALES

Two new scales from Ohaus offer solid, sensible, no-nonsense weighing. Portable, accurate, and very versatile, these scales are easy to operate and have multi-modes.

The Carat Scale (50 carats x .01, 10 grams x .002, 6.5 dwt. x .002) comes with a weighing pan, draft shield, and AC adaptor. Its model number is SC10T, and introductory price is \$449.95.

The Gold Scale (600 grams x .1, 390 dwt. x .1, 39 Troy ounces x .005) comes with weighing pan and AC adaptor, and is priced at \$349.95 (model number SC600T).

Contact: **Kassoy, 16 Midland Ave., Hicksville, NY 11801; (800) 4-KASSOY; (516) 942-0560 in NY state.**

CASIO WATCH MEASURES TEMPERATURE

Casio has introduced a digital watch that measures the temperature (model TS100-IV). It has

five alarms and a countdown alarm. The watch can tell the time in 23 cities around the world and it is a 1/100 of a second chronograph. One of the unique features of the TS100-IV is the fact that it stores thermo data—12 months of high and low temperatures for 23 cities. In addition, it can store hourly temperatures for the last 24-hour period.

For more information, contact: **Casio, Inc., 570 Mt. Pleasant Ave., P.O. Box 7000, Dover, NJ 07801; (201) 361-5400.**

Casio temperature watch.



Carat scale (left) and gold scale (right) from Kassoy.

ADVANCED LIGHTING SYSTEM FROM EDWIN PRODUCTS

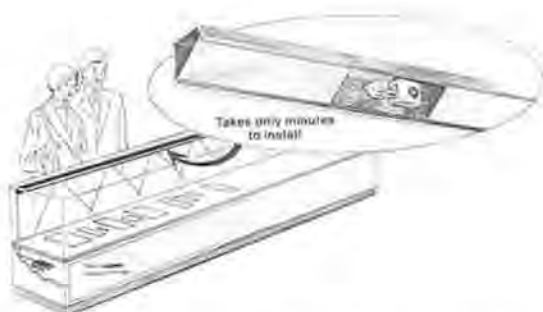
Edwin Products of Queens, NY has announced the availability of its advanced lighting system for showcases, making fluorescent fixtures virtually obsolete.

The new streamline 1"x1" track system takes minutes to install and is measured to fit any size case. Priced affordably, it modernizes showcases and in-

creases sales.

The whiter, bright halogen light makes merchandise show like never before. Each 20-watt lamp provides three times more light than 150-watt overhead lights. Additional benefits include less glare, less overhead heat, and less energy usage.

Contact: **Edwin Products, 213-18 64th Ave., Bayside, NY 11364; (718) 225-0564.**



News in the Trade

STEPHEN D. ENGLE'S MONUMENTAL CLOCK AT NAWCC MUSEUM

The Watch and Clock Museum of the National Association of Watch and Clock Collectors in Columbia, PA will exhibit one of its most recent acquisitions, Stephen D. Engle's Monumental Clock. After a private unveiling, it will open to the public on September 19, 1989.

Standing eleven feet tall and nine feet wide, the Engle Clock is the first of what was titled "monumental clocks." It generated similar mechanisms that celebrated the mechanical, technical, and artistic ability of American craftsmen by using patriotic and religious themes incorporated into a variety of functions.

Dr. Engle of Hazelton, PA worked for 20 years to create this monumental timepiece before completing it in 1877. It involves 48 moving figures, each approximately ten inches tall, including the twelve apostles, the three biblical Marys, Orpheus and Linus, and Molly Pitcher with Continental soldiers from the Battle of Monmouth. Two separate organ movements play at regular intervals. An orrery can be viewed which shows a representation of the constellations in relation to the earth at any time.

The Engle clock traveled on display for many years along the east coast, as far south as New Orleans and west to Ohio. On January 14, 1878, the *York Record* reported: "The exhibition of this famous clock in York closed on Saturday night. Notwithstanding the several days of very inclement weather, the exhibition was exceedingly well patronized by the citizens of York and vicinity. During the week there were 7,982 cash admissions, and this flattering result, under the circumstances, goes far to show the intrinsic merit of the clock, and also that the public were not humbugged."

The *Philadelphia Inquirer* stated on February 19, 1878,

"The celebrated Engle clock, which embraces many more mechanical movements than the world-famed Strasbourg clock, will not be exhibited in this city longer than this week, owing to engagements elsewhere, after which Captain Reid proposes to beard the lion in his den by taking his clock to Strasbourg for the purpose of showing the Strasbourgers that their clock is not much after all, as a Pennsylvania Dutchman (Mr. Engle, the inventor) will submit his clock as a Yankee nut worth cracking."

It is not documented that the Engle Clock actually toured Strasbourg or anywhere outside the United States with Captain J. Reid, its owner. However, numerous newspaper articles and abundant Engle Clock paraphernalia testify to its popularity and the fascination the public had for this unusual timepiece.

The monumental clock was stored in barns in New England during the past 40 years. Since arriving at the Watch and Clock Museum in October of 1988, Stephen D. Engle's clock has undergone thorough restoration due to the museum's dedicated staff and several talented volunteers.

The Watch and Clock Museum of the NAWCC is located at 514 Poplar St., Columbia, PA. Museum hours are 9 AM to 4 PM, Tuesday through Saturday; closed holidays. An admission fee is charged; guided group tours at discount rates are available by appointment.

For any further information, contact: Roseann Robinson, Museum Assistant, (717) 684-8261.

JOHN RYAN NAMED GENERAL MANAGER CORPORATE SALES — SEIKO CLOCKS

John Ryan has been named General Manager of Sales and Marketing for Seiko clocks, it was announced recently by Hal Wilensky, Executive Vice President. In his

Stephen D. Engle's Monumental Clock.



new capacity, Mr. Ryan will serve as coordinator of Seiko's nationwide clock business.

Mr. Ryan, 36, has been with the company since 1980 in key posts. Most recently he had been General Manager of the Sales Service Department.

Seiko Time is the U.S. marketing and distribution company for Seiko brand watches and clocks. Seiko Time is headquartered at 640 Fifth Ave., New York City.



John Ryan

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Dates to Remember

Ad Index

SEPTEMBER 1989

- 9-10—Iowa Jewelers and Watchmakers Association Convention and Trade Show; Airport Hilton Inn; Des Moines, IA.
- 9-11—Advanced Clock Repair Bench Course (AWI); Salt Lake City, UT.*
- 11-15—Introduction to Clock Repair Bench Course (AWI); Winston Salem, NC.*
- 17—Introduction to Quartz Watch Repair Bench Course (AWI); Kansas City, MO.*
- 17—Retrofitting & Casing Bench Course (AWI); Buffalo, NY.*
- 24—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); Cincinnati, OH.*
- 22-24—New York State Watchmakers Seminar, Convention and Annual Meeting; Sheraton Inn Syracuse; (315) 457-1122.
- 23-24—Repair of the Atmos Clock Bench Course (AWI); Baltimore, MD.*
- 23-24—Horological Association of Indiana 1989 Fall Workshop and Annual Meeting; The Old Columbus Holiday Inn (junction of I-65 and SR 46, exit 68); Columbus, IN.
- 23-24—Swest Fall Jewelry Making Workshop; Glendale, CA. Tuition \$60.00. Contact: Swest, Attn: Tom Rush, 1725 Victory Blvd., Glendale, CA 91201; (818) 246-8385; (800) 423-2706 USA; (800) 232-2136 (CA).
- 24—AWI Northwest Regional Seminar; Seattle, WA.*
- 30-1—Advanced Quartz Watch Repair Bench Course (AWI); Springfield, MO.*

OCTOBER 1989

- 7-8—Swest Fall Jewelry Making Workshop; Norcross, GA. Tuition \$60.00. Contact: Swest, Attn: J.R. Newman, 5805-A Peachtree Corners East, Norcross, GA 30092; (404) 441-0404; (800) 241-5738 (USA); (800) 282-8958 (GA).
- 14-15—Pennsylvania Jewelers Association Annual Meeting/Convention, State College, PA; (717) 233-3254.
- 15—Introduction to Quartz Watch Repair Bench Course (AWI); Hartford, CT.*

- 15—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); San Antonio, TX.*
- 20-22—Florida State Watchmakers Association Annual Convention; Hilton Inn Gateway; Kissimmee, FL.
- 20-22—Annual Illinois Watchmakers Convention; Ramada Inn; Effingham, IL (junction of interstates 57 & 70). (217) 342-2131.
- 21-22—Repair of the Atmos Clock Bench Course (AWI); Seattle, WA.*
- 21-22—Advanced Quartz Watch Repair Bench Course (AWI); Atlanta, GA.
- 21-23—Advanced Clock Repair Bench Course (AWI); Allentown, PA.*
- 22—Retrofitting & Casing Bench Course (AWI); Portland, OR.*
- 29—AWI Northeast Regional Seminar; Providence, RI.*

JANUARY 1990

- 20-21—Repair of the Atmos Clock Bench Course (AWI), Dallas, TX.*
- 20-21—Advanced Quartz Watch Repair Bench Course (AWI), Tampa, FL.*

FEBRUARY 1990

- 5-9—Introduction to Clock Repair Bench Course (AWI), San Jose, CA.*
- 11—Retrofitting & Casing Bench Course (AWI), Phoenix, AZ.*
- 12-16—Introduction to Clock Repair Bench Course (AWI), Riverside, CA.*
- 17-18—Repair of the Atmos Clock Bench Course (AWI), Pensacola, FL.
- 24-25—Repair of the Atmos Clock Bench Course (AWI), Orlando, FL.*

MARCH 1990

- 11—Retrofitting & Casing Bench Course (AWI), St. Louis, MO.*

APRIL 1990

- 8—Retrofitting & Casing Bench Course (AWI), Philadelphia, PA.*
- 21-22—Wonderful World of Gems; Veterans Memorial, 300 W. Broad St., Columbus, OH. Information: Robert Kell, 3848 Norbrook Dr., Columbus, OH 43220; (614) 457-1838.

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*For more information on AWI Bench Courses contact AWI CENTRAL, 3700 Harrison Ave., P.O. Box 11011, Cincinnati, OH 45211.

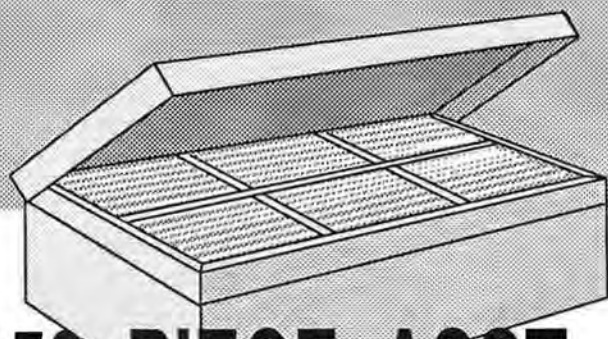
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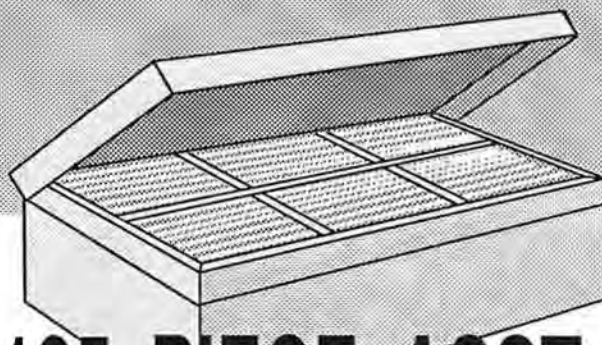
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BENCH COURSES

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- * Introduction to Quartz Watch Repair
- * Advanced Quartz Watch Repair
- * Retrofitting & Casing
- * Introduction to Clock Repair
- * Advanced Clock Repair
- * Repair of the Atmos Clock
- * Useful Techniques: Mechanical Watch Repair
- * Introduction to the Watchmakers Lathe

Here is a listing of the seminars scheduled to be held during the remainder of this year and the beginning of 1990 and their locations. If you are interested in information regarding any of these courses, write to AWI today. The information will be sent to you as soon as it is available.

1989

SEPTEMBER

9-10	Repair of the Atmos Clock	Pittsburgh, PA
9-11	Advanced Clock Repair	Salt Lake City, UT
11-15	Introduction to Clock Repair	Winston Salem, NC
17	Introduction to Quartz Watch Repair	Kansas City, MO
17	Retrofitting & Casing	Buffalo, NY
23-24	Repair of the Atmos Clock	Baltimore, MD
24	Useful Techniques: Mechanical Watch Repair	Cincinnati, OH
24	AWI Northwest Regional Seminar	Seattle, WA
30-1	Advanced Quartz Watch Repair	Springfield, MO

OCTOBER

15	Introduction to Quartz Watch Repair	Hartford, CT
15	Useful Techniques: Mechanical Watch Repair	San Antonio, TX
21-22	Repair of the Atmos Clock	Seattle, WA
21-22	Advanced Quartz Watch Repair	Atlanta, GA
21-23	Advanced Clock Repair	Allentown, PA
22	Retrofitting & Casing	Portland, OR
29	AWI Northeast Regional Seminar	Providence, RI

NOVEMBER

5	Introduction to Quartz Watch Repair	Dallas, TX
5	Retrofitting & Casing	Kansas City, MO
6-10	Introduction to Clock Repair	Waco, TX
11-12	Repair of the Atmos Clock	St. Louis, MO
12	Useful Techniques: Mechanical Watch Repair	Tampa, FL
11-13	Introduction to the Watchmakers Lathe	Sacramento, CA

1990

JANUARY

20-21	Repair of the Atmos Clock	Dallas, TX
20-21	Advanced Quartz Watch Repair	Tampa, FL

FEBRUARY

5-9	Introduction to Clock Repair	San Jose, CA
11	Retrofitting & Casing	Phoenix, AZ
12-16	Introduction to Clock Repair	Riverside, CA
17-18	Repair of the Atmos Clock	Pensacola, FL
24-25	Repair of the Atmos Clock	Orlando, FL

MARCH

11	Retrofitting & Casing	St. Louis, MO
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APRIL

8	Retrofitting & Casing	Philadelphia, PA
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