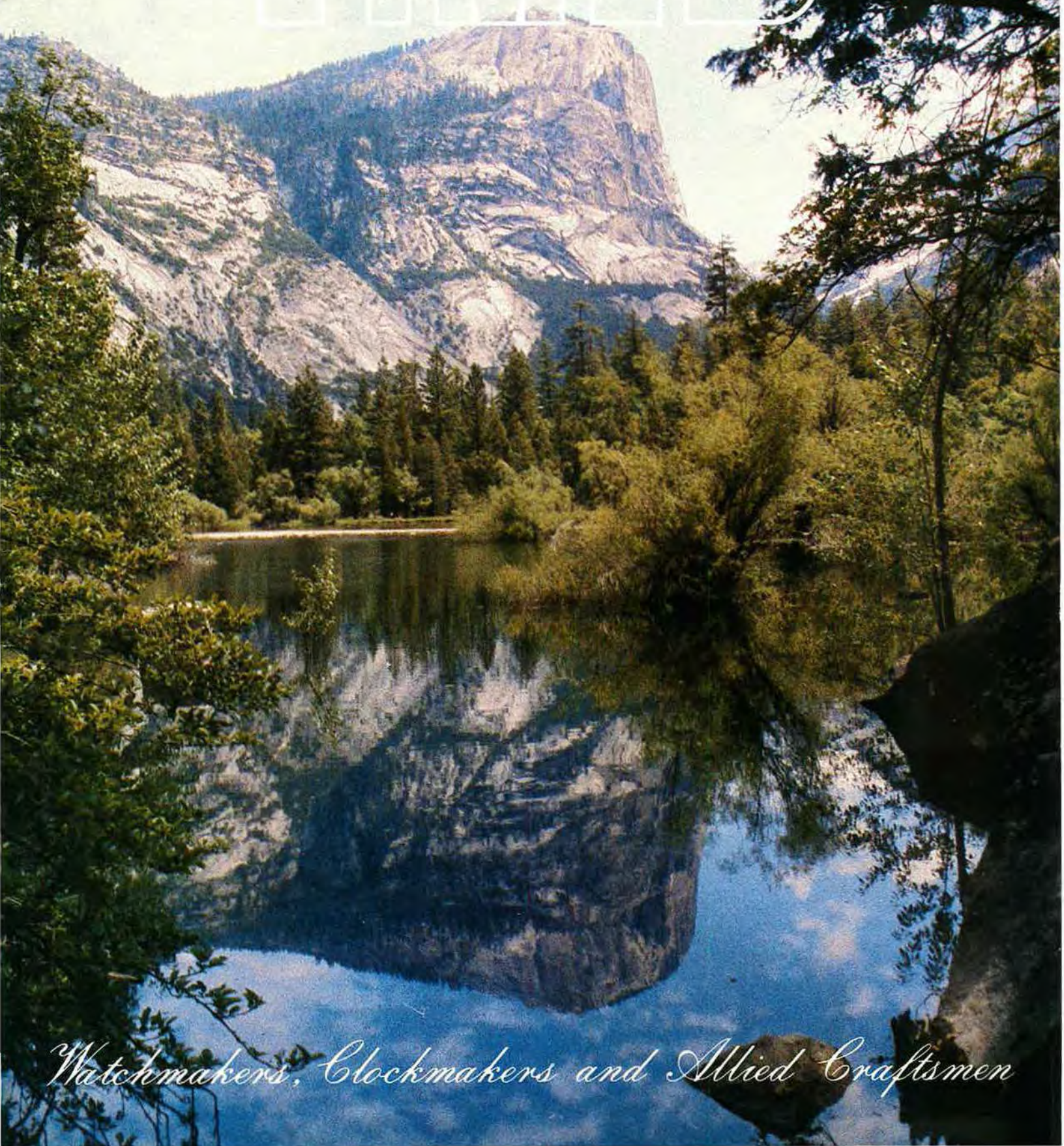


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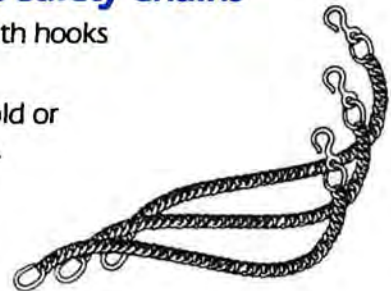
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Official Publication of the American Watchmakers Institute

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# HOROLOGICAL TIMES™

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P.O. Box 11011  
3700 Harrison Avenue  
Cincinnati, Ohio 45211  
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# Editorial

Do we sometimes revere and rely too much on the past masters of our profession? Because a particular operation was performed in a certain manner years ago, must we follow the exact rule of that master?

We overlook the masters of our time and those who will succeed them. Too often new ideas are criticized only because it means change. Mankind, by his nature, opposes anything that will deviate from his built-in time clock.

Listen, give a mind's-eye view and explore every avenue to accomplish your goals, whether professional or personal.

## UP FRONT

### FTC CHARGES MICHIGAN WATCHMAKERS GUILD FIXED MINIMUM REPAIR AND CLEANING PRICES

On April 15th the Federal Trade Commission charged that the Michigan Watchmakers Guild conspired with its members to fix nationwide prices for cleaning and repairing watches, clocks, and jewelry by establishing suggested minimum prices, in violation of federal antitrust law. Under a consent agreement with the FTC, the Guild agreed not to establish minimum or other prices in the future.

Since February 1980, after attending a joint Justice Department/Federal Trade Commission seminar on the subject, AWI has been advising individual members and Affiliate Chapters not to discuss prices with others engaged in the field of watch and clock repair, and certainly not to conduct price surveys for the purpose of establishing recommended repair prices. A few chapters, including the Michigan Watchmakers Guild, and some individuals failed to heed AWI's advice. This resulted in the recently announced FTC action.

According to a complaint accompanying the consent agreement, the Guild has adopted and distributed annual suggested price lists to its members and others throughout the United States. The complaint alleges the Guild used the price lists to restrain price competition and to increase or maintain cleaning and repair costs to consumers.

The consent agreement was scheduled to appear in the Federal Register April 18. It will be subject to public comment for 60 days, until June 16, after which the Commission will decide whether to make it final.

A consent agreement is for settlement purposes only and does not constitute admission of a law violation. When the Commission issues a consent order on a final basis, it carries the force of law with respect to future actions. Each violation of such an order may result in a civil penalty of up to \$10,000.

Comments should be addressed to the Office of the Secretary, FTC, 6th St. and Pennsylvania Ave N.W., Washington, D.C. 20580.

Copies of the agreement, the complaint, and an analysis of the agreement are available from the FTC's Public Reference Branch, Room 130, same address; (202) 523-3598; TTY (202) 523-3638.

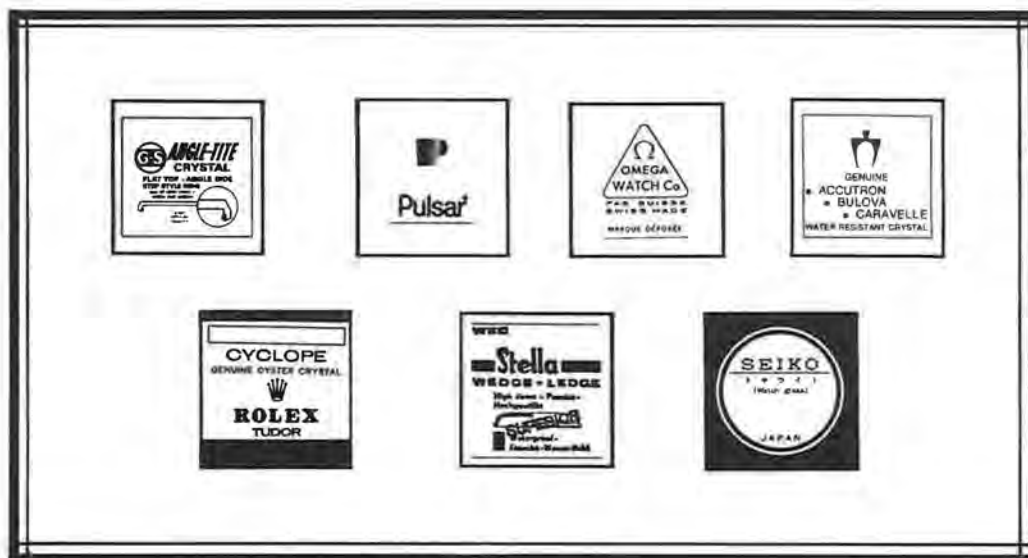
This month's front cover is a scene from Yosemite National Park in California. Gregory Zaroni of Trenton, New Jersey is the photographer.

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# PRESIDENT'S MESSAGE...



Fred S. Burckhardt

## *Are You a Talker or a Doer?*

I am a great believer in the old saying "Don't preach me a sermon, show me one!" Life is composed of two kinds of people—the 'talkers' and the 'doers.' The talkers can ramble on and on, tell you what to do and how to do it, yet they are never able to do it, or worse yet, never get around to doing it themselves.

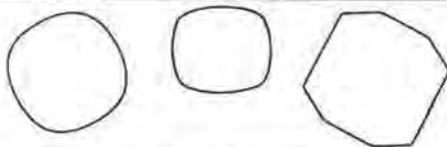
On the other hand, the doers get it done in about the same time the others spend just talking about it. It may not be the fanciest way or even the best way, but it does get done.

Thank goodness I've been surrounded with with the doers these past two years. These are the

people who deserve the credit for whatever success AWI has experienced in these years. Since this will be the last message from me as president, I would like to take this opportunity to thank the doers: the Board of Directors, the AWI Central staff, the *Horological Times* staff, the AWI Past Presidents, the committee chairmen and committee members, and of course, Milton C. Stevens and Michael P. Danner.

We should all feel very fortunate for those listed above. These are the ones who have worked for our benefit. As I said before, "Don't preach me a sermon, show me one!"

WIB



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303	.70	<b>364</b>	<b>.27</b>	395	.46
313	.65	366	.55	396	.47
315	.62	370	.46	<b>397</b>	<b>.36</b>
317	.75	371	.44	399	.46
319	.85	373	.65	LR43	.24
321	.45	377	.45	LR44	.24
323	.49	379	.93	1220	.71
325	.49	381	.48	1620	.71
329	.68	384	.35	<b>2016</b>	<b>.63</b>
341	.82	386	.52	2025	.61
343	.46	387	.75	2032	.61
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# Bench Tips

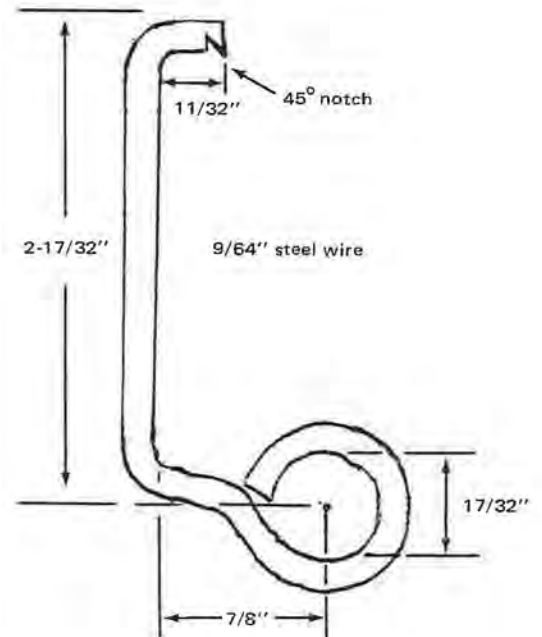
Joe Crooks



## A Hook to "Catch" the Hole

This month's tip comes from W.A. Jaggard of Altoona, Pennsylvania.

For the times that occasional hole end of a mainspring "slips" inside the barrel of my Wilbers clock mainspring winder, I made a hook to "catch" the hole.



This is in addition to the two hooks furnished with the Wilbers Mainspring Winder.

I hold the barrel and notched end of the hook in the slot against the mainspring with my gloved left hand. While turning the crank with my right hand, the hook notch will catch the hole. A turn or two of the crank will enable the repositioning of the barrel where desired.

I really enjoy and benefit from the tips appearing in this column, as well as all of the other articles in the *Horological Times*.

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# Questions & Answers

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



## A Centennial Watch

**Q** I have an 18s silver case pocket watch. It has an enamel dial with Roman numerals. The name on the dial is Centennial. It has the following insignia on the back of the watch:



The bezel snaps on. The back is hinged at the bottom. It has a stem to wind it. To set it you push in a lever on the outside of the case, then the stem will move the hands. It has no movement numbers of any kind.

Can you tell me who made this watch and when it was made?

Vernal J. Taysom  
Cedar City, UT

**A** I am familiar with some of the models sold by the Centennial Watch Co. The earliest of their watches was made for them by G.J. Jacot of leLocle and the plates were designed in the form of four bridges—1776, made expressly for the U.S. Centennial in 1876. These were rather well made and were marketed by the Centennial Watch Co. of Philadelphia. (Lingg Bros. was the importer and registered the trademark at that time.) After that they imported other non-patriotic models with the Centennial trademark, such as yours, probably with pin settings requiring that

a pin near the pendant on the case edge be depressed to shift the clutch lever into the hand setting position. Those with the 1776 bridges are collectors' pieces. Others are hardly that desirable. The 1776 bridge models had serial numbers on the lower plate, visible from the movement side. (See "Cavalcade of Time", by Henry B. Fried, for photo of such watch.) Your watch was most likely made in the decade following 1876.

**Q** It is good to know there is an expert to turn to when help is needed. Here is my problem:

I have a ladies' watch, Omega Modern, number on caliber: 36

403787

I repaired the watch. When I put it on the machine Vibrograph B-200A, the watch gave me a perfect beat at 28,800 but the watch runs 1 hour faster on 24 hours.

Do you have a catalog or a book that shows the number of teeth on the wheels and their pinion? I need to count and find out which of the wheels is wrong.

Angel del Razo  
Lemon Grove, CA

**A** In your letter you mentioned that you have a ladies' watch, Omega cal. 36. I have called up Mr. Van Kempen, head technician at

Omega in New York. He told me that there is no ladies' Omega watch with 28,800 vibration. According to my own past studies and records of all watches with odd vibration rates (published 1970 by AWI), no ladies' watch had vibration rates faster than 21,306.13 per hour.

Your watch has just 1200 beats an hour too much, so the correct vibration rate with the gear train you now have should be 27,600 V.P.H. It is possible that somewhere along the line a third, fourth or escape wheel might have been changed which has a different tooth or pinion count than what the real wheel or pinion should have.

**Q** I have a fusee watch with this inscription on the dial and back of the movement: *Johan Riel in Stadtamhof.*

The number "32" is found on the back of the dial, inside the case, and on the movement. The initials "GD" are stamped on the front of the movement. Do you have any background on this?

Grant Dittmar  
Petoskey, MI

**A** I have a record of having examined a watch with the same name and markings. I noted that it was French, despite the fact that Stadtamhof was very near Nuremberg in Germany. The French made and sold (Please turn to page 14)

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## WATCH TESTING EQUIPMENT

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Figure 1 identifies the various components and their function. This unit also permits measurement of the rate of the watch at the same time current consumption is being recorded. The test portion (17) is fitted with rigid probes that are inserted into the top supply and common terminals (15 & 16) and allows the probes to make contact with the test points on the watch movement. These probes are color

coded—red for positive and black for negative (common). The mirror allows the operator to observe the action of the dial and hands of the watch while the tests are being performed. The unit also has a set of flexible probes that can be connected to a watch that is not in a movement holder on the mirror.

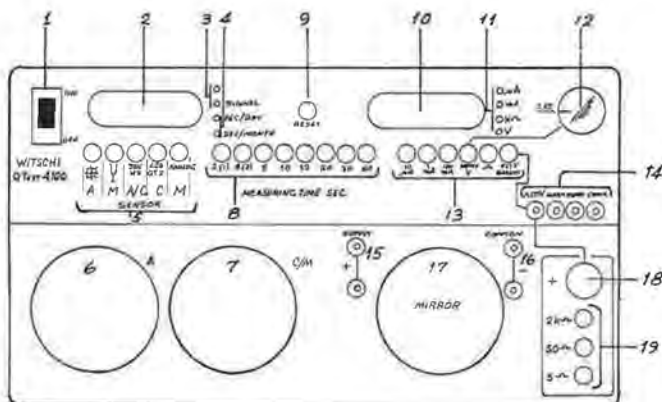
### BATTERY TESTING

Battery testing can be conducted in two conditions: with no load and fixed loads, depending on the use of the battery. The three fixed loads are for 2k $\Omega$ , 50 $\Omega$ , and 5 $\Omega$ .

The load of 2k $\Omega$  corresponds approximately to the load the motor coil of analog watches. This load can be applied to all battery types.

The load of 50 $\Omega$  corresponds approximately to the load of the light bulb of LCD watches. Apply this load only to

Figure 1



### CONTROLS AND INDICATORS

1. On-off switch
2. Display for accuracy
3. Indicators for signal intensity and bipolar pulses
4. Indicator for display quantity
5. Selector for measuring mode
6. Acoustical sensor
7. Capacitive and magnetic sensor
8. Selector for measuring time for accuracy and consumption measurement
9. Reset button for the start of a new measuring cycle
10. Display for current, voltage, and resistance
11. Indicator for display quantity
12. Control for module supply voltage
13. Selector for measuring mode
14. Sockets for additional tests
15. Module supply +
16. Module supply -
17. Window with mirror for the observation of the watch
18. Support for battery test
19. Load resistances for battery test

high drain batteries. Do not depress the button 50  $\mu$  longer than needed for measurement, as the high current will rapidly discharge the battery. The load of 5  $\mu$  is used for clock batteries. It should not be used for watch batteries.

With no button depressed, the load is 1M  $\Omega$ . This is the equivalent of the load of the integrated circuit of a watch.

A. Figure 2A shows the measuring portion of battery testing for a battery out of the watch.

1. The battery is placed in the battery support (18) with the positive side down.
2. Using the negative module supply adaptor (16), make contact to the battery negative side.
3. Depress external battery voltage button (13) and measure the voltage of the battery on LED display (10).
4. Using the proper load for the type of battery being tested, measure the voltage under load.

B. Figure 2B shows the method of measuring voltage of a battery in the watch.

1. The battery probes are connected to the positive and negative connections on the meter. The positive  $\mu$  ext. V (14) connector is the same as the battery support cup (18). The negative (common) (16) is the same at any negative connector.
2. Voltage is indicated on the LED display.
3. It is not necessary to test batteries in the watch with a load since the load is already on the cell.

**CURRENT CONSUMPTION**

The Q Test 4100 is designed to permit measurement of current consumption of the entire watch with the voltage

set to full operating voltage or at a reduced voltage.

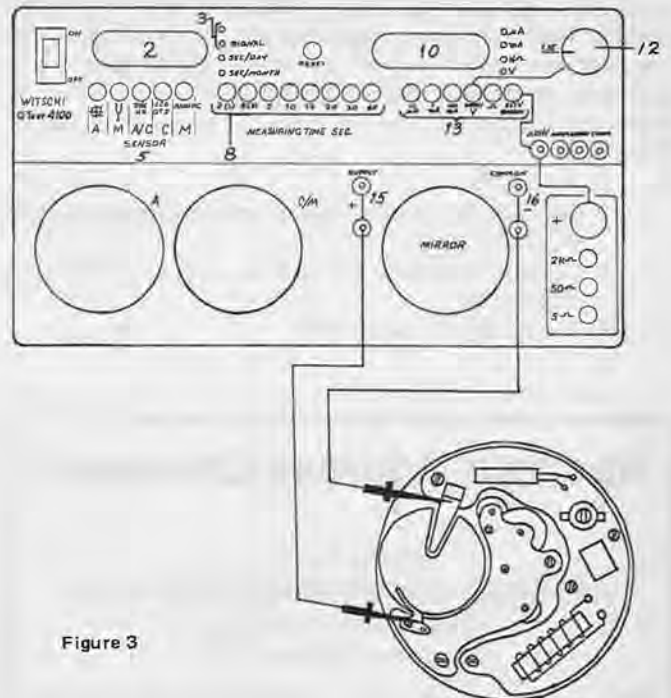
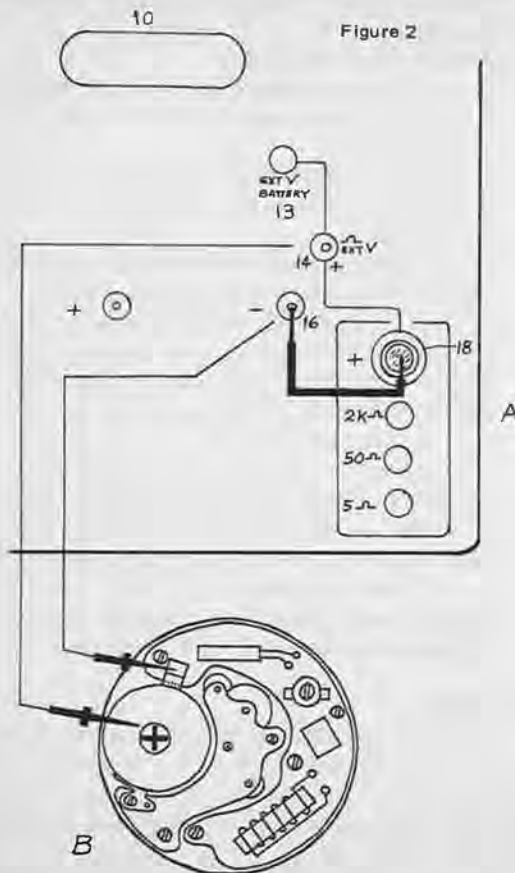
A. Testing at full voltage (Figure 3),

1. With a movement in holder, dial side down, the positive (15) and negative (16) probes are connected to the corresponding terminals on the watch (*no cell in the watch*).
2. Depress "Supply V" measuring selector button (13).
3. Adjust voltage at rheostat control (12) to operating voltage of the watch (for most quartz stepping motor watches, 1.5V).
4. Depress "10  $\mu$  A" measuring selector button (13).
5. Measurement of current consumption will be indicated on LED display (10).

B. Testing at reduced voltage (Figure 3).

The same connection as in "A" above are used to test at lower voltages. The purpose of lower voltage testing is to make a check on the mechanical condition of the watch. It is similar to winding a mechanical watch a couple of turns and observing the motion of the balance wheel. The supply voltage is reduced until the train of the watch no longer advances. Observe what this voltage is and compare with the permissible low voltage specified in the service manual. Usually this voltage is two- or three-tenths of a volt lower than the operating voltage.

1. Depress "10  $\mu$  A" consumption button (13).
2. Reduce voltage using rheostat knob (12).
3. Observe the train of the watch until it stops advancing.
4. Depress "Supply V" button and read the voltage on LED display (10).
5. Compare this to low voltage specifications in service



manual.

- If the watch train stops before the low voltage value is reached, check the train for mechanical problems, binding, dirt, lack of oil, or thickened oil.

### RATE MEASUREMENT

The accuracy measurement of the watch can be measured by means of the current drain.

- Measurement by means of quartz frequency for watches with 32KH $\pm$  quartz frequency.
  - The watch can remain connected to the test equipment as shown in Figure 3. The movement can be connected by means of the rigid or flexible leads.
  - Set appropriate supply voltage (13) with rheostat (12).
  - Depress 10  $\mu$  A button (13) to measure current consumption.
  - Select test mode 32KH $\pm$  (5).
  - The monitor light (3) indicates the intensity of the signal.
  - The resulting rate appears after two seconds on LED display (2).
- Measurement by means of motor pulse.
  - Retain test connections the same as 1, 2 and 3 above.
  - Select test mode "Quartz analog" (5).
  - Select measuring time (8) according to stepping motor pulse duration (see individual manual or chart for frequency).
  - The monitor light signal (3) flashes with each motor pulse.
  - The resulting rate will appear on the LED display (2).

### RESISTANCE MEASURING OF COIL COIL INSULATION TESTING

These two tests can be done at the same time with the same setup because testing is done to the same component. There are three conditions of the motor coil that can be determined: (1) good, (2) open, (3) grounded. These tests must be done *without a battery in the watch*. It is not necessary to disconnect the coil from the electronic assembly (Figure 4).

- Coil resistance.
  - Connect the red test lead to the red socket marked  $\sim$ EXT V (14).
  - Connect the black test lead to any one of the black sockets (16).
  - Depress button " $\sim$ " (13).

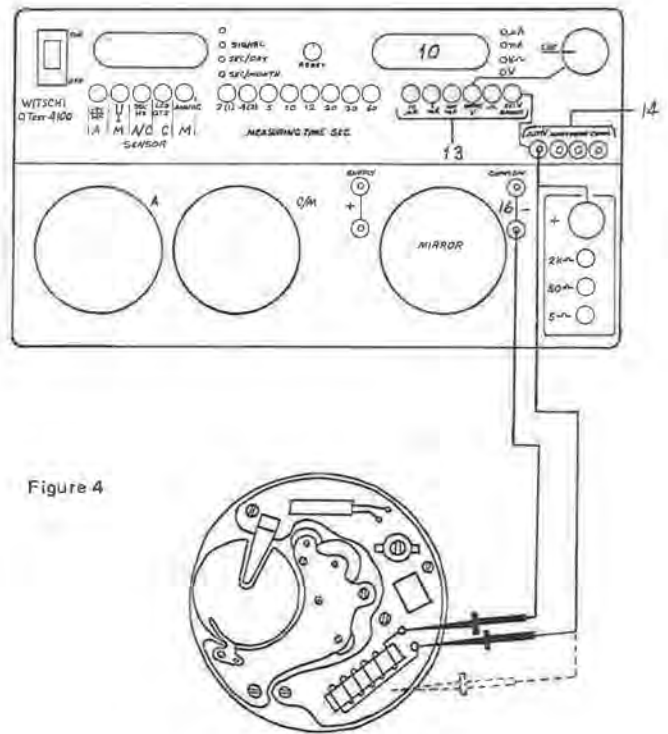


Figure 4

- Contact the red and black probes to the coil connections (polarity does not matter).
  - Read the result on the LED display (10).
  - The normal coil resistance will be from 1 to 4K $\sim$ . Consult watch service manual for values.
  - A broken (open) coil will be indicated by a flashing display. Some breaks of the coil wire can be repaired with conductive epoxy or conductive paint. This repair will not affect the resistance of the coil significantly.
- Coil Ground Test (Figure 4).
    - Connect test leads the same as 1, 2 and 3 above.
    - Contact the black probe to one of the coil connections.
    - Contact the red test probe to the plate of the watch or the metal core of the coil (shown by dotted lines in Figure 4).
    - If the display on LED (10) flashes, this is an indication that the insulation of the coil is good.
    - If there is a display of resistance value of LED display (10) this is an indication that the wire insulation is broken and a wire is touching the metal core of the coil or the plate of the watch. This is a grounded coil. It must be replaced. It cannot be repaired. A grounded coil can be difficult to determine as the condition may come and go. Moisture can create a grounded condition and it can disappear when it dries out. If a coil is drawn tight against the plate it can cause insulation to "flow" away from the pressure point and permit the base wire to contact the metal causing a grounded condition.

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### CONCLUSION

The Q Test 4100 is a versatile test device. It allows testing of all types of quartz watches. It has provisions for testing alarms and LCD displays. It provides the means of checking the rate of mechanical, tuning fork, quartz analog, and digital watches.

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## QUESTIONS AND ANSWERS

(Continued from page 8)

such movements to the Swiss and Germans who could have put their names upon them. My notes showed that the watch had a white enamel dial with painted and fired enamel numerals.

Johan Riel operated from the first half of the 18th century to the latter part of that century, close to the 1800s.

From my notes, yours could be French or Swiss, as few German watches were made during that time.

Henry B. Fried

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**Q** I have a Herschede Tubular Chime clock (9 tubes). This is not the three weight movement, it only has two weights. For control of the hour strike it does not have a rack gathering pin. It has an arrangement on the end of the music roll with a spiral track that controls the number of hours struck by dropping in a slot and the music roll shifts so it does not raise the hammer. The drum with spiral track is controlled by a shaft with a bezel gear on each end which runs diagonally to a gear on the hour shaft. The problem was the chime ran so slowly.

I had the clock completely apart, cleaned, carefully pegged out all pivot holes, assembled it carefully, checked the end shakes, and oiled the it. It didn't improve the chime. Now I have a problem with the strike not striking correctly. I did improve the speed of the chime by closing in the wings (almost completely) of the fly wheel. But since the fly wheel controls both the hour and chime, the hour strikes very fast.

Both pulleys were worn and I bushed the holes. I am wondering if I should get two new pulleys.

Do you have any technical information on this movement, particularly in regards to adjusting the hour strike?

Robert R. Smith  
Easton, PA

**A** I have restored several of these movements in the past years, but they are very infrequently found. Further, as you probably know, they were discontinued in manufacture many years ago, and are not found described in literature available to the clock repairman.

As you found, the single strike weight is heavier than the usual quarter-hour weight. This does place a heavy load on the pivots and bushings, requiring special attention, such as bushing replacement in the first few wheels using bronze instead of hard brass, and recutting and polishing of pivots, if not replacement, when needed. Also, these first few bearing areas must be lubricated with a very heavy oil, which will not be squeezed out of the bearing contact areas. I use an oil of about an SAE value of 150 (Eureka R, not likely available, but Moebius D-5 is available, but a lighter grade of heavy oil).

Apparently, in the strike train of your clock, the train is not completely free to transmit the power required to run the eight tube hammers, as several may be in the act of being lifted at the same time, while during the hour portion of the striking action, only one hammer tail is being lifted at any given time, and with a lesser call for work to be performed, the train will run faster. The only solution here is to be sure that all pivots and bushings are in order, smooth, well-fitting, polished and lubricated, and that the wheel teeth and pinion leaves are properly formed, with the correct depth between mating wheels and pinions. If the speed of rotation of the fan arbor is set for the quarter-hour strike, the hour strike may run away with itself, as you discovered.

Now, for setting the quarter-hour to hour strike changeover: the meshing of the train of four wheels and pinions, comprising the two bevel gears, running diagonally from the hour pipe to the drum, must be properly synchronized. You will find that the chime drum, along the top of the movement, will have a small round window on the right side of the front of the clock (not your right side) through which a number 12 will be visible if that drum is turned by hand to the correct position. Synchronize this position of the drum (#12 showing) with the meshing of all teeth in that train, running diagonally, so that the hour pipe will receive the hour hand, with the hand pointing directly up to the 12 o'clock position. So, in retrospect, when the clock is about to strike the 12 o'clock hour on the deeper gong, the "12" will show in the window, and after the quarter strikes, the 12 o'clock hour will strike. In effect, this setting of that train of wheels and pinions will cause the proper number of hour strikes to occur at each and every hour because the pin running in the spiral groove on the drum will cause the drum to shift away from the remaining hour lift pins. This is so that while the drum makes a full turn each hour, only a limited number of hour strikes will be heard depending upon the hour of the day or night.

I am not aware of any description for setting up this clock. It is a fine movement, but was discontinued in manufacture very early. My description to you is totally from memory, a procedure I choose to follow rather than seeking a "how to" manual for each movement I tackle.

Joseph G. Baier, Ph.D.

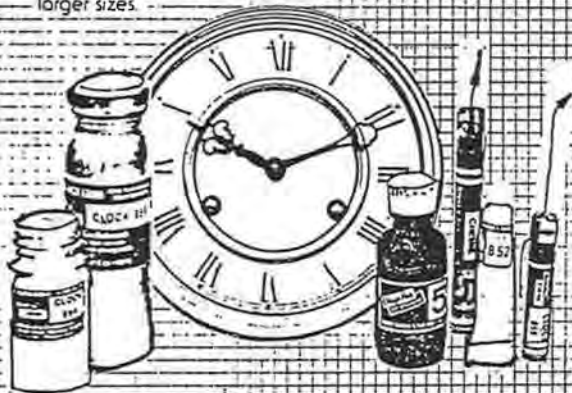
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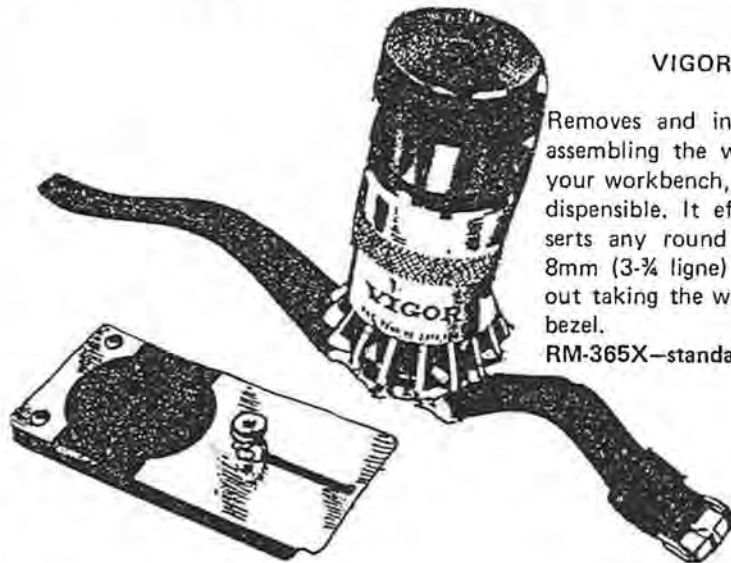


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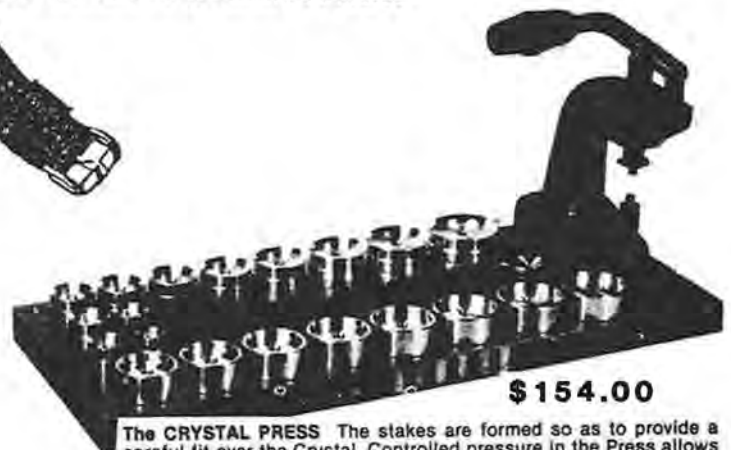
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# Chime and Strike

**NOTE TO CONOVER READERS:**  
See page 31 of this issue for two important corrections pertaining to The Urgos 9-tubular bell movement.

Steven G. Conover



## ANSONIA CHIME\*

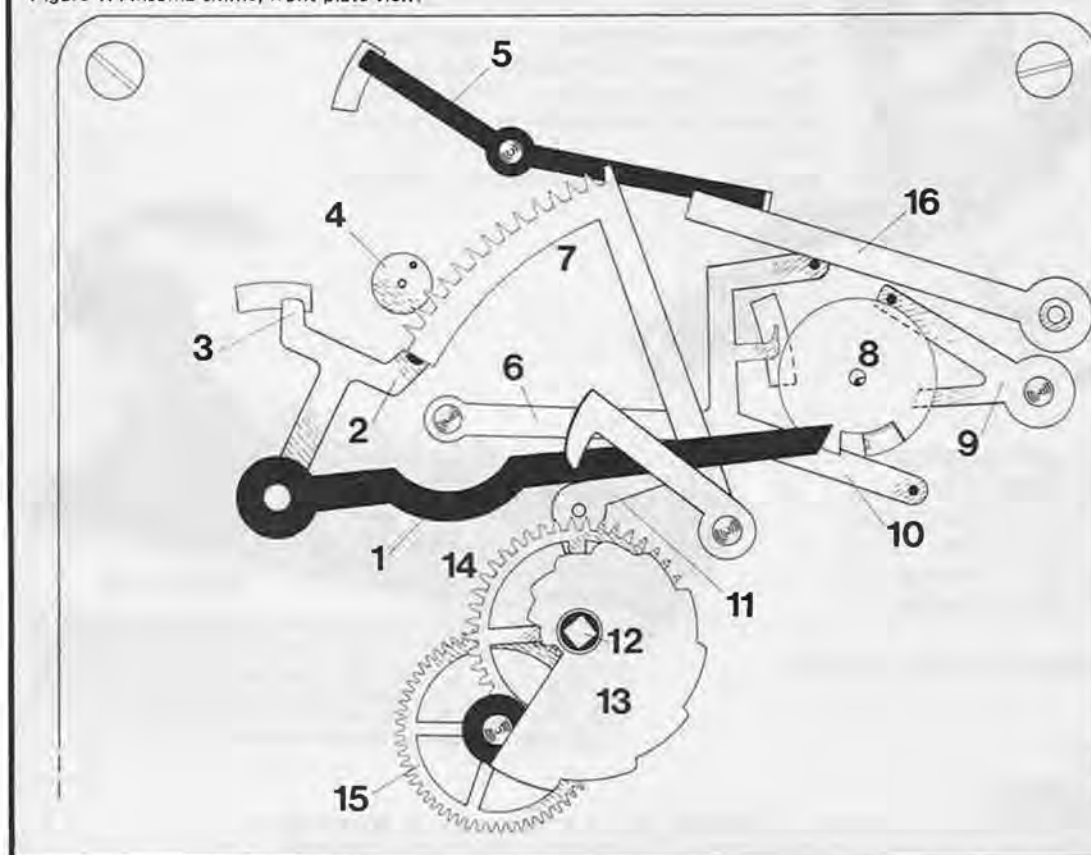
This month we will study an American chime clock by Ansonia. The movement comes in a tambour mantel clock case 22-1/2 inches wide. It's typical of the style which became popular during the 1920s and 30s. Overall movement dimensions are 4-5/8 inches wide by 5-3/4 inches high. The three mainsprings are contained in barrels. Each winding mechanism has an extra wheel to "gear down" the ratio and ease the effort of winding the powerful springs. Although some movements of this type have double clicks (on the chime, at least), this one does not. Clickspring or click failure brings serious damage, usually in the form of broken barrel teeth. The greatest service problem is the potential for

this kind of damage.

Following mainspring let-down, you can remove the lower front movement plate to gain access to the barrels without taking the movement completely apart. In most instances, the movement needs to come apart anyway. But reassembly is made easier by the fact that you can add the cumbersome barrels at the end.

First, we will look at the front movement parts. Then we will look behind the plate for more aspects of the chime and strike, including the chime self-correction mechanism. In the next article, we'll finish up the Ansonia with a study of the hammer assemblies and silencer, and some hints on reassembly.

Figure 1. Ansonia chime, front plate view.



- 1 strike unlocking lever
- 2 rack hook
- 3 strike locking lever
- 4 gathering pallet
- 5 strike warning lever
- 6 chime unlocking lever rack
- 7 rack
- 8 chime correction cam
- 9 chime correction lever
- 10 chime correction arm
- 11 lifting piece
- 12 center arbor
- 13 snail
- 14 hour wheel
- 15 minute wheel
- 16 strike lifting lever
- 17 strike warning wheel
- 18 strike locking wheel
- 19 chime locking wheel
- 20 chime lock pin
- 21 chime locking lever
- 22 chime warning lever cam
- 23 cam
- 24 chime drop lever
- 25 chime lock piece
- 26 locking plate
- 27 strike lock pin
- 28 strike warning pin
- 29 chime correction pin

## CHIME

The chime train is the locking plate type, as we would expect. A look at the front of the movement in Figure 1 shows a disk on the right side of the movement. However, this disk (8) is actually the chime correction cam, not the locking plate. Notice that the cam (8) only has one slot instead of the four for the locking plate. Figure 2 shows the locking plate (26), located between the movement plates. Once this point is cleared up, the Ansonia movement is easier to understand.

Chiming begins as the star cam (not shown) raises the lifting piece (11). This piece acts upon the chime unlocking lever (6). Figure 1 makes it appear that the lifting piece works on the lever (1), but this is not so. The chime and strike levers overlap each other, making it difficult to trace them visually. The chime unlocking lever (6) raises the strike lifting lever (16), causing several things to happen at once. We'll trace each one.

The lever (16) moves the strike warning lever (5), affecting the strike train. We will cover this action later under "Strike." Refer now to Figure 2. The lever (16) is fastened to an arbor which runs between the plates. Three other levers are attached to this arbor, behind the front plate. These are the chime locking lever (21), the chime drop lever (24), and the chime lock piece (25).

As we have seen in other movements, the chime locking lever (21) stops the chime lock pin (20) to hold the chime train. When the lever (16) is raised, the locking lever releases the pin, allowing the chime locking wheel (19) to turn. At the same time, the chime lock piece (25) comes up from a slot in the locking plate (26). The locking plate determines the length of each chime sequence. The other action occurring at the same moment involves the chime drop lever (24). As it is raised out of the slot in the cam (23), the chime train is mov-

ing toward the warning position. This action is enough to move the slot out from under the drop lever. Then, at the moment chime begins, the drop lever falls to the rim of the cam. The higher position (compared to the slot) keeps the chime lock piece from dropping back into the slot in the locking plate. If it did drop back, chiming would not happen at all. Remember that the four levers (16), (21), (24), and (25) are all fastened to the same arbor. They move together.

The chime warning lever (22) stops the chime train at warning. When the chime locking lever (21) releases the pin (20), the warning lever is already in position. It stops the pin and holds it until chiming begins. The chime continues until the chime lock piece drops into the next slot in the locking plate. This action places the chime locking lever in the path of the chime lock pin.

## CHIME CORRECTION

The automatic chime correction feature is a source of confusion on many chime movements. At least with the Ansonia, the mechanism is easy to understand. The fact that it is on the front of the movement, instead of buried inside, makes it easier to observe. Like most of these devices, it corrects the chime sequences by blocking the hour chime except on the hour. And since the strike is started up by the chime, it is automatically going to fall upon the hour as well. Figures 3, 4, and 5 show how the mechanism works.

Begin with Figure 3. The chime correction lever (9) rides on the chime correction cam (8) as the clock chimes. The cam holds the lever high, keeping the chime correction pin (29) clear of the chime correction lever. Chiming proceeds without any interference.

Figure 4 shows the mechanism in the "chime correcting" mode. It is blocking the chime because the minute hand is

Figure 2. Front view showing chime and strike levers.

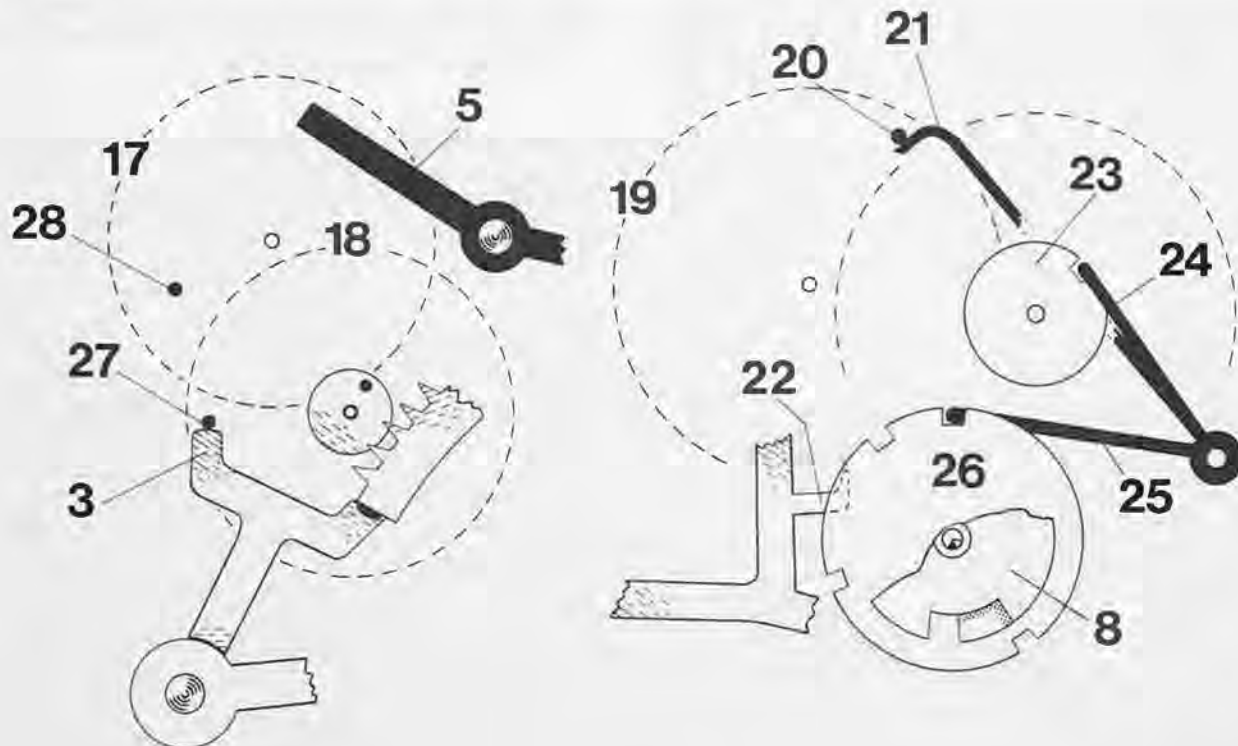
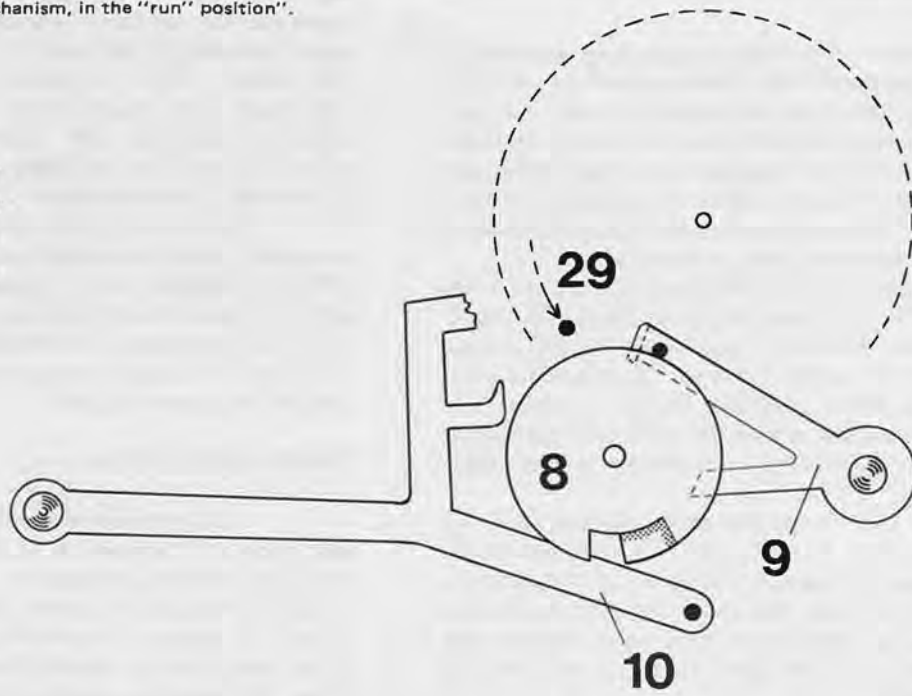


Figure 3. Chime correction mechanism, in the "run" position".

- 8 chime correction cam
- 9 chime correction lever
- 10 chime correction arm
- 29 chime correction pin



not pointing to the hour. The hand is pointing to one of the other quarters instead, for some reason. The chime correction lever has dropped into the single slot in the chime correction cam (8) at the end of the third quarter chime, and now the clock has ceased chiming. The lower position of the lever (9) moves it into the path of the chime correction pin (29). It

will remain this way until the actual hour arrives. A maximum of three chiming opportunities can be blocked until the chimes are synchronized again. The only time the pin actually touches the lever (9) is in case of correction; if there is no need of synchronization, they never touch.

Figure 5 shows how the chime is unlocked for the hour. The chime correction arm (10) is raised each quarter hour, but not high enough to unlock the mechanism. The higher lift for the hour, however, raises the lever (9) out of the slot in the chime correction cam (8). The cam slot contains a spring-loaded gate. As the lever comes up, the gate slips under the pin. In this way, the chime correction feature is cancelled out. Chiming will begin at the hour.

Figure 4. Chime correction mechanism locked following third quarter chime.

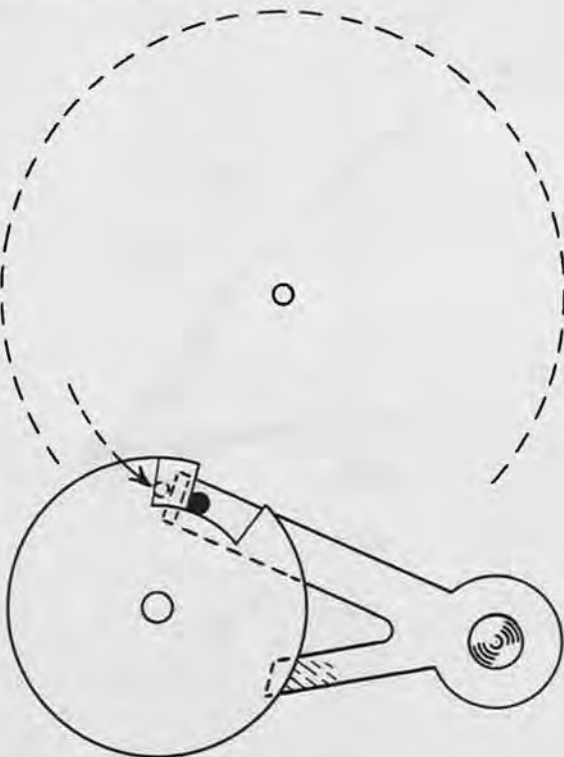
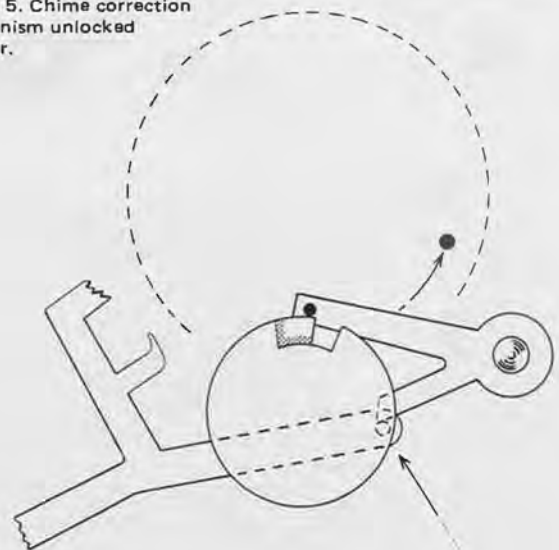


Figure 5. Chime correction mechanism unlocked at hour.



**STRIKE**

The strike mechanism is the rack and snail type. Refer to Figure 1. The gathering pallet (4) is a disk with a pin. The rack hook (2) and the strike locking lever (3) are part of the same piece. There is nothing unusual about the rack (7) and snail (13).

To start the strike, a pin on the chime correction cam raises the strike unlocking lever (1). This happens during the hour chime. The lever is fastened to the piece which makes up the rack hook and strike locking lever, so they all move together. As the strike locking lever moves away, the strike lock pin (27) is released. The strike warning pin (28) moves around to the strike warning lever (5).

At this point it is necessary to explain the operation of the strike warning lever (5). Before the hour chime even begins, the strike lifting lever (16) pushes up the right side of the strike warning lever. This pivots the left side of the lever downward, where it will be in a position to stop the warning pin.

Just before the end of the hour chime, the pin on the chime correction cam releases the strike unlocking lever (1). The rack hook then seats itself in the rack. The location depends upon the rack tail, which falls to a step on the snail (13).

As the hour chime concludes, the strike lifting lever (16) drops, removing pressure from the strike warning lever (5). The warning lever is spring-loaded in the "run" position, so it readily releases the warning pin. The strike train proceeds to run until the gathering pallet has counted off the last rack tooth. As the rack hook slips under the end of the rack, the strike locking lever stops the lock pin.

Next time: more about the Ansonia chime.

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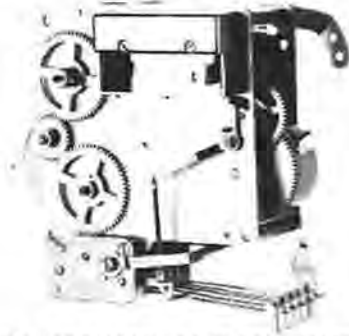
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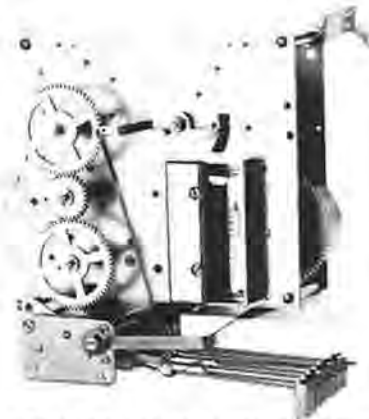
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## Mechanical Repairs In Quartz Watches

### CLEANING - PART II

Last month's article included detents and removing stems to separate the movement (or module) from the case, so we are now ready to clean our watch.

#### LCD WATCHES (Liquid Crystal Display)

When the first quartz watches came out, we thought our cleaning and overhauling jobs were over. Liquid Crystal Display (LCD) watches do not have a movement of train wheels, winding wheels, clutches, ratchet or crown wheels, and not even a stem to possibly rust. It looked like the end to an era and we would have to throw out our cleaning machines (except for the fact that we knew those old-fashioned tick-tock watches were still around).

It was only a short time thereafter that we found some cleaning *was* necessary on LCD watches. Most of these modules could be cleaned by hand. No oiling was necessary on the module parts. Of course LCDs have case parts, such as case back gaskets and pushers with gaskets, that should be lubricated.

The most cleaning we do on LCD watches is to be sure the zebra strips are clean and also the circuit board at all points or areas where any contacts are to be made. We must check and remove dirt, rust, and even the least amount of film of any sort to assure a good contact.

It is just as important to remove rust in our quartz modules as it is for our older spring wound watches. If rust is under one or more of the screw heads on the circuit board, it must be removed. This alone can cause the watch to stop. Sometimes this rust area is so small that it is hard to see; however, this minute amount is all that is necessary to disconnect our circuit (see Figure 1 A). All of these rust spots must be removed and/or the rusty parts replaced with new ones.

Bench solutions like hairspring cleaner or circuit board cleaner may be used to remove dirt and maybe soft rust, however, a more potent liquid solution may be needed. Commercially available Liquid Wrench® may be used on parts such as setting wheels and plate screws on LCDs and analogs. We could actually use a wire brush on some steel setting parts, but common sense prevails and naturally we cannot use a wire brush around the circuit, etc. If the rust is too bad, a part replacement must be recommended just like

we do in our tick-tock watch repairs. Rust on circuit boards must be removed very carefully with a circuit board cleaner or some other solution that we have found by experience to work for us. Some have used hydrogen peroxide to clean circuit boards when other solutions have failed.

#### ANALOG WATCHES

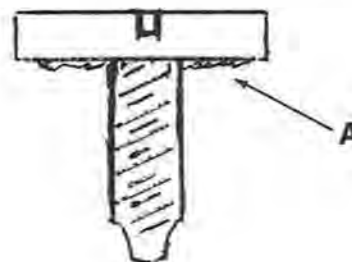
It looks like the trend is toward the majority of our new watches being analog. At first, analog watches seemed to require little service as they were practically foolproof (we thought). As time went by we found that rust and dirt were still enemies of all watches, including the quartz analog. They have train wheels, a stepping motor, a stem, and some setting parts. We seemed to feel that these watches would require very little oil (if any) but soon discovered that proper cleaning and especially proper oiling was definitely necessary.

#### STEPS TO DISASSEMBLE ANALOGS

(1) It is generally desirable to place the stem back into the module and leave it there at least while removing other segments.

(2) Remove the circuit board. Normally two or three screws are holding it to the pillar plate. Notice the screw lengths. If they are not all the same, be careful so later they will be put back into their proper location.

Figure 1



(3) Remove the coil unit. Normally there are two screws to loosen (one screw on each end of the coil). Be careful so that the screwdriver doesn't slip into the coil. Some coils have a cover piece of some sort to protect it from potential danger; however, once we have removed this cover the chance of coil damage increases.

(4) Check the cell (battery) well area and remove any loose pieces such as plastic pieces or other types of insulators and remember where they came from so they may be properly replaced.

(5) The remaining train may now be cleaned by usual methods.

Some use ultrasonic in the last rinse, either with One Step® or other similar lubrication solution. However, many feel that this self-lubrication solution should not be used at all on quartz. Some also feel that a hand cleaning method is better than running the train through the cleaning machine. The train section is a very small amount of the watch area once we have removed and hand cleaned the balance of the watch.

There also seems to be several opinions on the ideal amount of oil to be used, if any. Some factories first said *not to oil* the rotor bearings and then later said *to oil* them. Many of these watches *were not* jeweled, and now some of the same models *are* jeweled.

My personal experience (which seems to agree with several whom I have talked to recently) is that in most modules, train bearing oiling is desired. But we need to be careful not to over oil. It is also very important to be sure the bearings (especially the rotor bearings) are very clean before oiling. We have had new watches in our stock which have stopped and then ran perfectly after just oiling the rotor and train bearings.

We should use whatever method that works the best for us. If we decide to oil the train, it will not be because it will wear out if we don't, but because we feel this was necessary for the watch to run.

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# Antique Watch Restoration ©1986

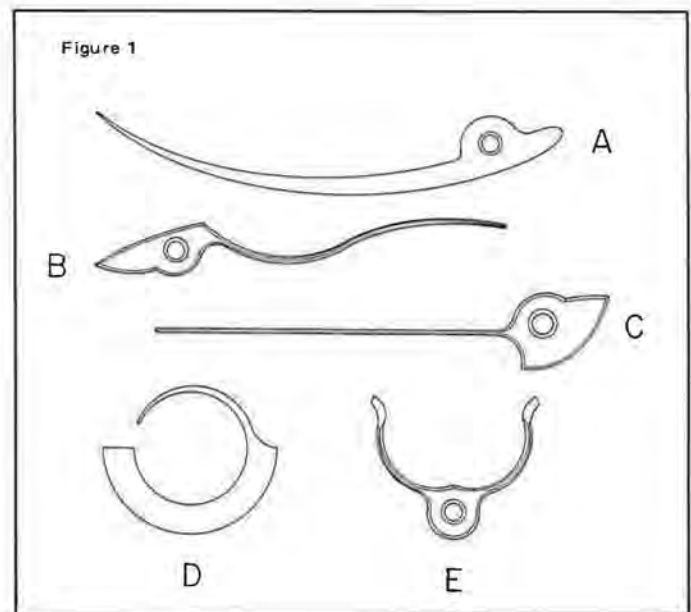
## Part VI

When restoring antique watches, especially the more complicated ones, it is quite often found that one of the flat springs is broken. Since it is impossible to buy most of these springs, they must be hand made by the watch restorer. Flat springs on antique watches can be found in many designs. The design of a spring is somewhat governed by its function and the space available for it to fit into. Sometimes the space for a spring is very limited, especially when we consider that the spring needs to contact its lever in a certain position and manner.

Figure 1 shows a few of the many flat spring designs. View A shows a heavy curved design which is commonly seen in some of the very old antique watches. The end of this spring works against the edge of a lever or against a pin on the lever. View B, Figure 1 shows a very delicate "S" curved spring usually used in some of the finer complicated antique watches. This spring usually works against the edge of a lever that needs very little pressure against it. View C, Figure 1 shows a very delicate spring of the straight design. The end of this spring usually works against a rounded section on the edge of a lever. It could also be used to work against a pin on a lever. View D shows a circular click spring which is used on key wound watches. The spring shown has a slightly beveled edge and it snaps into a circular recess in the watch bridge around the ratchet wheel. The end of the spring rests against the click. Sometimes this type of click spring is held in position with two screws which go through two holes in the base of the spring into the watch bridge. View E, Figure 1 shows a special double spring which is used on a split second chronograph. This spring is called a brake spring, and it is held on the brake levers by a screw. Each spring arm presses against the two brake levers which work against the edge of the split seconds wheel. These examples of flat springs are only a few of the many that will be encountered in antique watch restoration; however, they will serve to show some of the basic designs.

Flat springs are usually made from flat high carbon steel plate stock which is of the water hardening type. When making a flat spring, the old broken spring is fastened to the

steel plate so its outline can be scribed on the steel plate. Some watchmakers use soft solder to sweat the broken spring to the steel plate; however, the spring can also be fastened to the plate with shellac. Figure 2 shows the broken spring fastened to the steel plate. Note: Before the broken spring is fastened to the steel plate, the steady pin or pins should be removed from the base of the spring. The steel plate is heated over an alcohol lamp until the shellac or solder melts. Then the spring is placed on the plate and pressed down flat on the plate and held until it has cooled. A fine scriber is used to scribe the outline of the spring on the metal. A phonograph needle in a pin vise makes a good scriber. The holes in the spring should also be scribed so they will be located at the correct position in the base of the spring. After the shape of the spring has been scribed, then the plate is reheated over the alcohol lamp so the spring can be removed from the plate.





Any shellac can be removed from the plate by soaking in denatured alcohol. Soft solder can be mostly removed by wiping the plate with a piece of wadded cloth while the solder is melted. Caution must be used when this is being done to avoid getting burned by the hot solder or by the alcohol lamp flame.

After the spring has been removed from the plate and the solder or shellac has been removed from the plate, the next step is to spot centers for any holes in the base of the spring. Then the holes are drilled with the proper diameter drills in the base of the spring. Note: It is very important to drill the holes in the base of the spring before the spring is sawed out of the metal since it is very difficult to hold the spring for drilling the holes after it has been sawed out, and there is also a danger of breaking the spring during the drilling process.

If the screw hole in the old spring is countersunk or counterbored, then this should be done to the new spring before it is sawed out of the metal also. If the screw hole is countersunk (bevel cut) for a beveled headed screw, then a drill can be used to countersink the new hole in the new spring. If the screw hole in the old spring is counterbored with flat bottom for a flat screw head, then a counterbore slightly larger in diameter than the screw head is used to counterbore the screw hole in the new spring. The drilling and countersinking/counterboring can be done with a sensitive drill press or on the watchmakers lathe. If the lathe is used, the steel plate is held flat on a drill pad in the lathe tailstock while the drill or counterborer is held in a chuck in the lathe headstock. It is a good idea to rest the steel sheet on a thin piece of flat parallel wood while the drilling is being done.

After the drilling and countersinking/counterboring has been done, then the new spring is sawed partially out with the jewelers saw. Some of the sheet material is left attached to the spring to serve as a handle to hold onto while the spring is being worked on to bring it to size. Note: The sawing is done just outside the scribed line as close to the line as possible without running into the line with the saw blade. Figure 3 shows the spring after being sawed out. After the exposed part of the spring is brought to size and shape, then the handle is sawed off and that part of the spring is brought to size and shape.

One of three methods can be used to bring a spring to size and shape after it has been sawed out of the steel sheet. A hand filing method can be used, a saw table and grinding wheel can be used, or a filing machine can be used. A combination of these three methods can also be used. Regardless of the method used to bring a spring to size and shape, the final finishing on the edge of the spring should be done first by draw filing with a fine file. Then the edge of the spring is smoothed still further by using fine emery paper such as 4/0 grit paper. Finishing the edge of the spring in this manner helps to prevent the spring from breaking when it is in service in the watch as well as to improve its appearance.

Figure 4 shows a saw table and grinding wheel being used to grind the spring to size and shape. To grind a spring, it is very important that the saw table which supports the spring during grinding be adjusted so the spring is on center with the grinding wheel when the spring is resting flat on top of the saw table. It is also very important to have the saw table adjusted so it is close to the grinding wheel at the side of the wheel as well as the edge of the wheel. When grinding a concaved surface, such as is shown in Figure 4, the face of the grinding wheel should be rounded as is shown. When grinding the edge of the spring, the spring should be moved back and

Figure 2

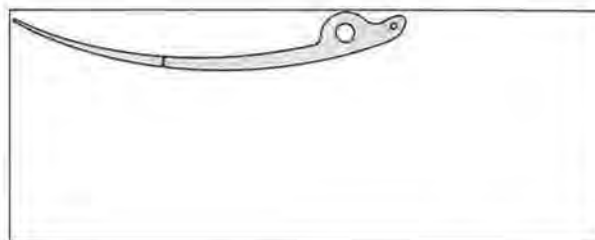


Figure 3

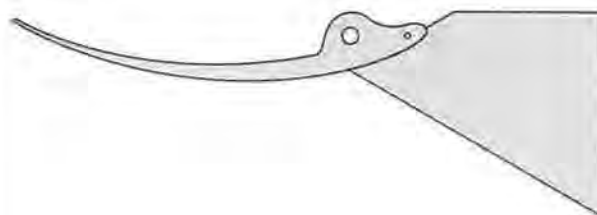
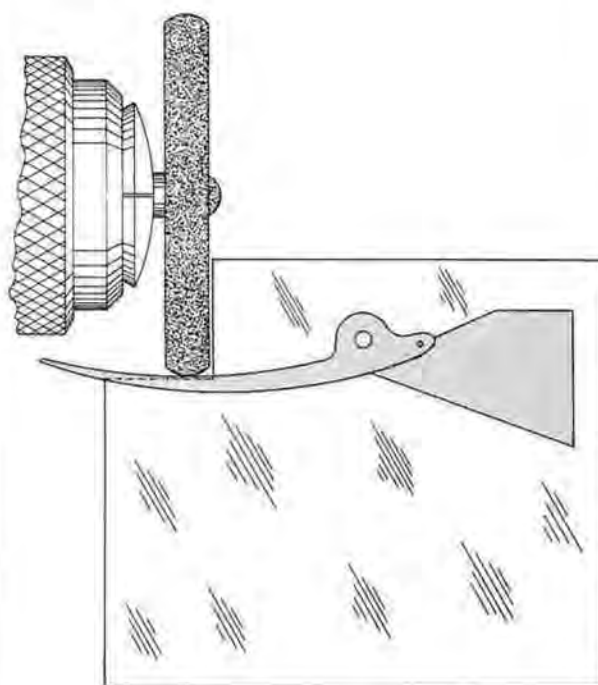


Figure 4



forth on the saw table as its edge is held lightly against the edge of the grinding wheel. Note: A fine India wheel is excellent for grinding springs. For a smoother finish, an Arkansas stone wheel can be used.

Figure 5 shows the saw table and grinding wheel

being used to grind a convexed surface on the spring. In this case, the edge of the grinding wheel should have a straight surface as is shown. Note: In some cases where a convexed surface or a straight surface is being ground, the side of the grinding wheel can be used with equal success.

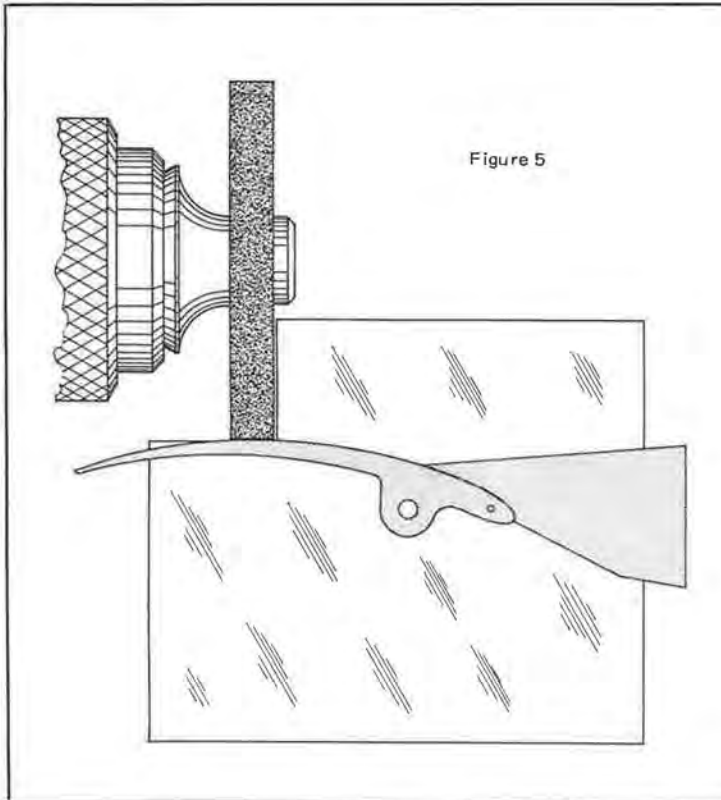


Figure 5

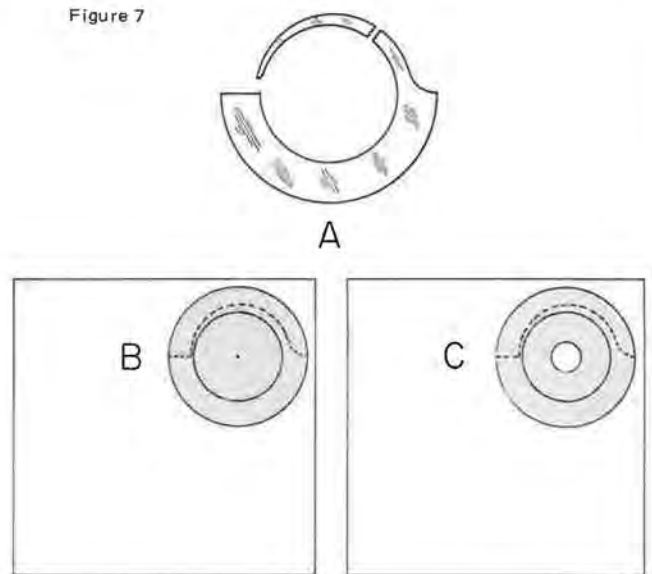


Figure 7

Figure 6

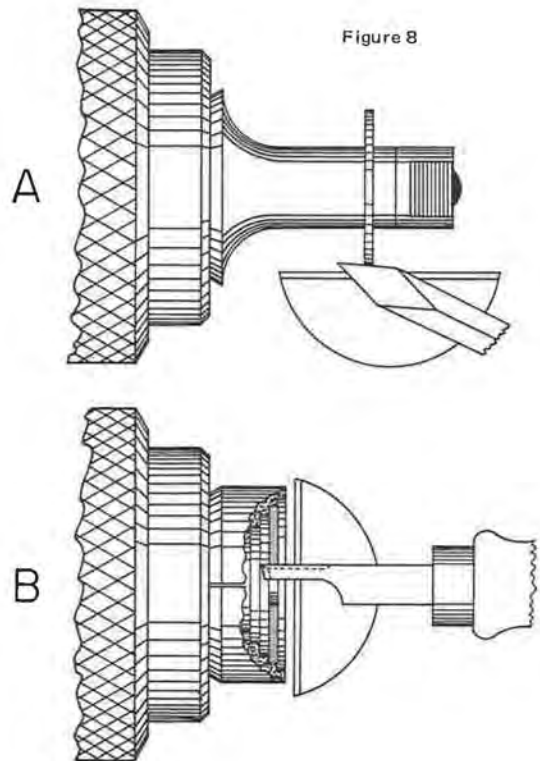


Figure 8

Figure 6 shows a small filing machine that can be used for filing a spring to size and shape. This filing machine fits on the bed of a watchmakers lathe. The file fits into a block on the filing machine which moves up and down as the lathe headstock is turned (see December 1975 *Horological Times*, "Technically Watches", pp. 14-19). The spring is held flat on top of the table and is moved back and forth against the file as the file moves up and down through the hole in the table. If a half-round file is used in the filing machine, convex, concaved, and flat surfaces can be filed with the same file.

Figure 7 shows the beginning steps in making a circular click spring. View A shows the broken spring, and View B shows the spring scribed on the sheet steel. To do this, first a center punch mark is made in the sheet steel, then a pair of

dividers is used to scribe the inside and outside circles which form the outline of the body of the spring. The shape of the spring can also be laid out at this time. Now, a hole is drilled in the center of the body of the spring to fit an arbor chuck which is available. This is shown in View C, Figure 7. After this, the spring is sawed out of the metal just outside the outside body circle. Note: If the spring is of the type that is held to the watch bridge by two screws, then the holes must be drilled and countersunk before the disc is sawed out of the metal. The spring is then chucked on an arbor chuck as is shown in Figure 8, View A. Then the outside diameter of the disc is turned down to the proper size. Note: The edge of the disc is turned slightly tapered (smaller at the top of the disc) so the spring will snap into its recess in the watch bridge.

After the diameter has been turned down to size and shape, the disc is removed from the arbor chuck and the disc is then chucked in a wheel chuck while the hole in the disc is bored out to size. The boring can be done with a hand held boring tool as shown in View B, Figure 8, or the disc can be bored out with a boring tool held in the slide rest.

Figure 9 shows how the disc is held on the saw table as the spring portion is ground to size and shape. The last step in forming the spring is to separate the end of the spring from its base. It is best for the end of the spring to remain attached to the base until the spring is shaped for rigidity reasons. The grinding wheel used to grind the spring should have slightly rounded corners.

*"The Making of Springs" will continue next month.*

TMB

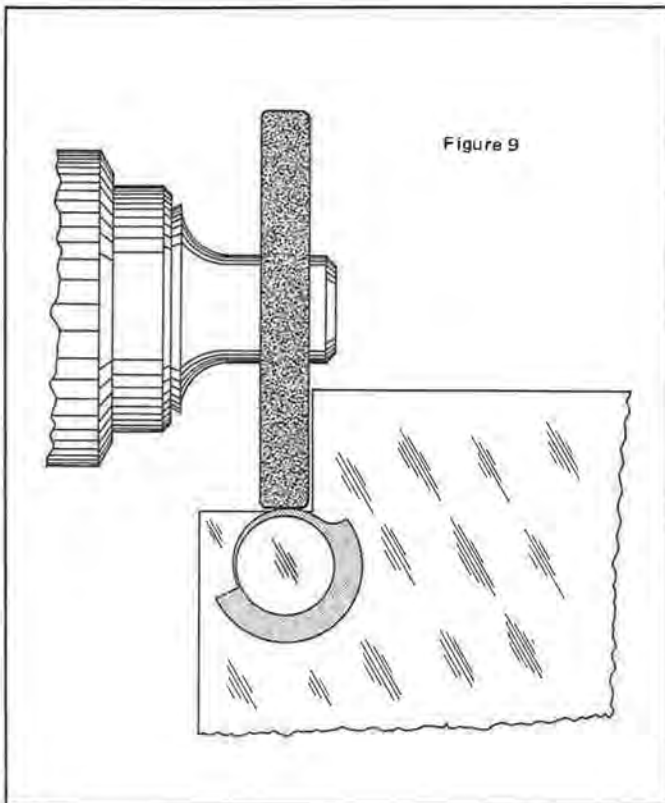


Figure 9

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# Restoring A Turret Clock

*How Clockmaker Jay Foreman  
of Los Angeles Dealt With a Case  
of "Slight Surface Rust"*

The three photos below are all of the Thwaites and Reed turret clock prior to restoration.



**E**arly October 1985, Jay and Susan Foreman were perusing an auction catalog which listed the items to be sold at an upcoming horological auction. The item which caught their eye had this description:

*"An iron quarter striking turret clock. Three train within flat bed frame, four-arm two-legged gravity escapement, signed Thwaites and Reed London 1878. Surface rust, escapement disaligned. 74 x 24 x 36 inches."*

Jay, having owned the House of Clocks in Los Angeles for over 30 years, and having been involved in watch and clock restoration since 1941, decided that the "slight surface rust and escapement slightly out of alignment" did not sound too serious. They sent their bid, and it was the highest. The turret clock was theirs. The clock was crated up and shipped to the United States. On December 27 the crate with the 2,000 pound clock arrived on the Foreman's doorstep.

"Surface rust" scarcely describes what was found upon opening the crate. "Solid rust" would have better described what they found. Not to mention leaves, a bird's nest, and a crumpled, indecipherable business card.

We must interject at this point that Jay's other interest is the building and restoring of race cars. It is because of this second interest that Jay had the tools large enough to undertake this huge horological restoration project.

After looking at the pile of rust for nearly two months Jay finally decided the time had come to start the project. First he purchased a case of WD-40 (12 spray cans of lubricant). For one week he periodically sprayed the clock with the lubricant. The disassembly had begun.





Photos of the turret clock during restoration.

The amount of rust on each individual part was so extensive that hand polishing was out of the question. Eighty-three pieces were sent out to a professional polishing company—this included all the nuts and bolts as well. Sixty-nine pieces were so large that they required the services of a company with a "bead blasting machine". So these 69 pieces were handed over to a firm that generally does nothing but rebuild cylinders for airplane engines. The two rails on which the clock movement rested were sent to yet another establishment—a professional sandblaster. The biggest fear was that a part might come up missing. All parts were returned. The bronze wheels were once again yellow in color; the iron down to the bare metal. All parts were then coated with a clear lacquer (this required 12 spray cans to adequately cover all parts). Reassembly was begun.

"Escapement disaligned" hardly described the condition of the gravity escapement. "Escapement destroyed" might have better detailed the condition. The four-arm, two-legged escapement was twisted and rusted into an almost impossible to disassemble mass. The entire unit was soaked in eight quarts of high-grade automobile oil. After soaking the escapement in oil for 10 days, he then boiled it in water for an hour and it finally came apart. The parts were straightened, polished, reassembled, and to the amazement of all, worked.

Also not included in the original description, but a reality with which the Foremans found necessary to face, was the fact that there were no weights, no pendulum, no bells, and no schematic indicating the types and sizes of these

items.

Through trial and error Jay determined the length and weight of the pendulum needed, and then fabricated accordingly. Trial and error was also used for the amount of weight required to keep the clock running.

Susan was given the job of finding bells. Referring to the telephone directory under the listings of "Foundry: Brass and Bronze", the third telephone call met with success. Though apprehen-

(Please turn to page 33)

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_____	10 White Hard	10 Karat	Sizing, Shanks	10.95
_____	14 Yellow Easy	10-14 Karat	Heads, Prongs, Posts	13.35
_____	14 Yellow Hard	10-14 Karat	Sizing, Shanks	13.35
_____	14 White Easy	10-14 Karat	Heads, Prongs, Posts	13.85
_____	14 White Hard	10-14 Karat	Sizing	13.85
_____	18 Yellow Easy	14-18 Karat	Heads, Repair	17.00
_____	18 Yellow Hard	14-18 Karat	Sizing	17.00
_____	18 White Easy	14-18 Karat	Sizing 14K, Repair 18K	18.40
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Marshall F. Richmond, CMW

## Repairing Stone Settings

### PART II

Figure 1. Note worn prongs.



#### REPLACING PRONGS

In the last article we discussed solder tipping to build up prong or bead tips. A rule of thumb that was pointed out was if there is metal over the girdle of the stone, it could be built up with a solder tip. If very little or no metal was over the girdle of the stone, the complete prong should be replaced, which would give new metal from below the stone over the edge and with new metal it can be bent over the girdle without weakening it. This will make it as strong (if not stronger) than the original prong. In many cases with a four- six-, or eight-prong setting, a combination of new prongs and solder tips makes an acceptable repair.

Figure 2. Boric acid and alcohol to prevent oxidation.



#### REMOVING THE STONE

There are several methods of replacing prongs. The method I use when replacing the prong without removing a stone that will take heat is to file the edge of the prong from the girdle down the prong a fourth to a half way down the prong. The illustrations were made on a repair that was a genuine amethyst—which will not take heat—so the stone was removed.

Figure 1 shows the mounting after the amethyst was removed. The wear was bad enough that all six prongs had to be replaced. After the prong(s) are filed, before applying heat the ring is dipped in boric acid and alcohol (Figure 2) and then ignited and burned off (Figure 3), leaving a white residue. Figure 4 is a drawing that shows a ring with two prongs filed off and a piece of gold stock with gold solder flowed on the surface to be joined to the prong. Again we have alternatives on how to hold and align the gold stock while applying heat. With a steady hand the stock can be held in tweezers with one hand and the torch in the other hand while applying the heat to flow the solder and attach the prong.

Figure 3. Burn-off of alcohol from boric acid.



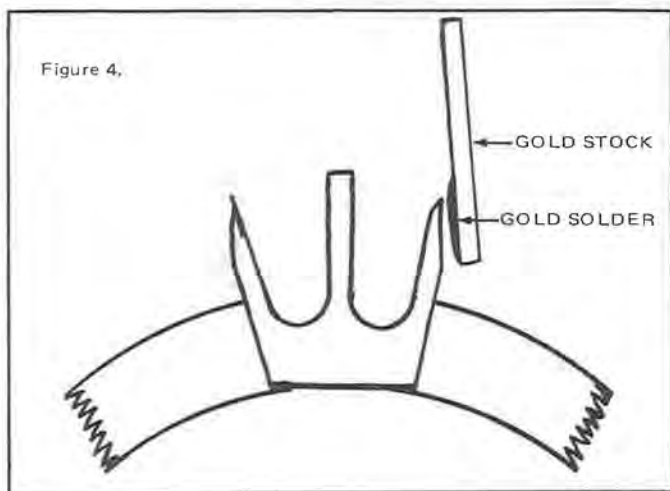


Figure 4.

Figure 5 shows a setup using the third hand tool to hold the gold stock. To me this is just added work, but if your hand is not steady enough this method will work. As every good mechanic has a lot of ingenuity, many types of rigging can be worked out to hold and align the gold stock to the prong. Any way that works well for you is the one to use.

In applying the heat and making the solder flow, it is only necessary to get the prong stuck to the gold stock. Cut off the gold stock, leaving enough protruding above where the girdle of the stone will set to easily bend over the stone. After the gold stock has been cut off heat can again be applied. As the solder flows again it will seemingly suck the gold stock tight against the prong (see Figure 6). Sometimes the gold stock will be a little to one side and can be pulled over by applying the heat from the opposite side. Otherwise, it may be necessary to remove it and do it over.

With a lot of practice and observation it is amazing what can be done with heat and solder by learning how to flux, and the direction heat is applied from or moved about while the solder is in a liquid state. It is possible to move the gold stock on the prong after it has been soldered and cut off by grasping it with tweezers and laying them on the asbestos pad weighed down with the steel bench block which will keep it from moving. With the pick in one hand and the torch in the other, heat can be applied; when the solder becomes fluid the gold stock can be moved on the prong with the pick, attaining almost perfect alignment.

After heat has been applied once, it is a good idea to flux it again before heating again, for sometimes the heat will burn off the flux and the solder will be reluctant to flow due to the oxide that may have formed (Figure 7). After the prongs needing replacement have been attached it will not be necessary to again apply heat. The boric acid and alcohol can be removed by boiling in hot water, boiling in pickle solution, soaking in pickle, or using the ultrasonic tank with a cleaning solution. While it is still wet, remove any residue with the bronze wire wheel on the polishing machine. This will leave it bright.

### FILING

The next step is filing. With no stone in the setting the prongs can be shaped by using needle files to file around the outside and on the sides of the prongs. The prongs can then be polished with felt buffs and tripoli. Small thin felt buffs can polish between the prongs. This can even be followed by using rouge so that when the stone is set very little polishing will be necessary.

Setting the stone is easy now that the needed prongs have been replaced. Use a setting bur (Figure 8) the same diameter as the girdle of the stone. If the setting burs are either too large or too small, use the one smaller than the diameter of the stone. When the seat is cut the prongs will give enough to let the stone snap into the seat. If setting a soft stone it may be necessary to spread the prongs slightly so the stone will not be chipped. It is important that the seat has cut into each prong which will weaken it enough to bend easily over the girdle of the stone. Your own initiative and judgement must be used in bending the prongs over the stone.

I usually start with a pair of chain nose pliers, putting pressure on prong tips opposite each other and bench them slightly over the stone. Then after all have been bent slightly over the stone I check from all sides to see that the stone is setting level and straight with the mounting. After this I use setting pliers to bring the tips down tight against the stone.

Figure 5. Soldering on prong.



Figure 6. One prong soldered on.



Figure 7 (left): All six prongs attached with solder.

Figure 8 (top): Cutting stone seat with setting bur.



With the prongs over the girdle of the stone they can be cut off using a jeweler's saw with 6/0 or smaller blades. The ring can be held in a ring clamp and rested against the sawing and filing block on the edge of the bench. The cuts should be made leaving enough metal over the edge of the stone to form a nice rounded bead. Some jewelers point the ends of the prongs over the stone but this makes it more difficult to finish them so they will not catch on clothing when the ring is worn. I like to rough-shape the prong tips with a needle file (Figure 9) and then with a cup bur in the flex shaft tool finish the tip to a nice domed bead. In using cup burs (Figure 10) a better bead can be formed if beeswax is used in the cup; this will make the cup burs last much longer before wearing smooth.

Figure 9. Shaping prongs with needle files.



When the stone is not removed it is more difficult to file and polish the sides of the prongs, and there are other differences in the whole process. Before installing a replacement prong without removing the stone, make sure the stone will stand the heat. Recently I assumed an amethyst stone was synthetic and put on a prong. It turned out that the amethyst was genuine and it turned clear as glass, so it had to be replaced with a genuine amethyst.

Another stone that could easily be mistaken for a synthetic is Cubic Zirconia (CZ). When heated these stones shatter. After determining that the stone will stand the heat, dip the ring in boric acid and alcohol, and burn it off. This gives the stone some protection as well as the setting under the stone that cannot be reached to polish if oxide is formed there. Like the prong installation with the stone removed, the prong should be fluxed as well as the gold stock. It can be put on exactly in the same manner as was previously described. After the prong(s) have been soldered on, bent over and sawed off, the outside of the prong can be shaped with needle files and most of the excess metal on the sides of them can also be filed away. There is some metal that cannot be reached with a file due to the ring shank so I have always used a 38 or 40 flat engravers graver to trim the metal away (Figure 11). If the graver is properly sharpened and the belly polished it will leave a bright cut which will require very little polishing. The tips can then be rough finished with needle files and cup burs. It is necessary to remove the boric acid and alcohol by boiling in water or pickling and rinsing in water. The ring can then be polished using a bristle brush wheel on the polishing motor to polish the prongs and tips using a coarse abrasive, such as tripoli, followed using a fine abrasive such as rouge. It can then be finished by washing in a soap and ammonia solution or cleaning in an ultrasonic tank. In most cases setting repairs can be made to be stronger than they were when new. Rarely do I get a return job with a complaint even when the prongs are catching on garments—which is much more than I can say about the new merchandise that I sold when operating a retail jewelry store.

Figure 10. Finishing tips with cup bur.



is no bend in a solder joint as the bend is in the new metal. Square and rectangular box settings often have corners only holding the stone. These can be repaired by filing them down to the girdle of the stone, then using a piece of metal of the same quality as the setting and the thickness needed to make a firm prong when bent over the stone. It should be wide enough that it can be bent lengthwise into an angle. I usually roll a piece out to a thickness of .4 to .5 mm and about three inches long and 2 to 3 mm in width. I put this in a vise and bend it with a chasing hammer so each side of the angle is 1 to 1½ mm wide. This can be soldered onto the corner going down the corner of the box 1½ to 2 mm and protruding above the girdle seat by about the same when it is cut off. With a fine cut triangular file a "V" can be filed into the corner and when bent over the parts on each side of the "V" will come together and equal two prongs on each corner.



## NOTE TO READERS

We would like to point out a correction to those readers who enjoy the "Chime & Strike" column by Steven G. Conover. The correction involves the Urgos 9-tubular bell movement which was discussed in the February and April '86 issues.

**PAGE 7, February issue:** The second last sentence in paragraph 2 states: "If the chimes are placed on "silent," the hour strike is also silenced." Mr. Conover would like to point out that while this is true, the owner also has the option of silencing just the chimes.

**PAGE 22, April issue:** The four chime selector positions were described here. However, there are five. The fourth position is "chime silent," labeled "strike" on some dials. The strike will sound, but the chimes do not. The fifth position is "silent," in which both chimes and strike are silenced.

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These can then be filed to a desired shape and polished. The part that goes down on the corner(s) of the box

Figure 11. Trimming edges of prongs with hand graver.



setting can be filed and polished so when the repair is completed and final polished the repair is difficult to find, even for an expert. This repair can be made without removing the stone if it is a stone that will stand heat.

Usually if all four corners need replacing, I remove the stone even if it is a stone that will take heat. Marquise stones (called *navette* if other than diamonds) have two-pointed ends; pear shape stones have one pointed end. The pointed end prongs can be replaced with similar metal stock as has previously been described except the angle has to be reduced to fit the setting on the pointed ends of the stone. After the prongs have been bent over the stone and finished if the stone will take heat a small piece of solder the same color and metal can be flowed into the crack, making a slight dome on the top of the stone end. This will give the maximum strength you can obtain with prongs and will be less likely to have any rough edge to catch on fabrics.

After many years of replacing prongs, I still find it challenging and interesting. I continually try different ways of doing jewelry repairs. One of the greatest satisfactions is to look over a finished repair and if it is difficult to see where it is repaired feel proud of my accomplishment.

The next article will be a continuation of repairing stone settings.



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# Book Review

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*STRIKING CLOCKS, THEIR WORKING & REPAIR*, by Eric Smith, 192 pages, 40 line drawings, 80 black and white photographs, published in 1985 by Arco Publishers at \$19.95.

This is a workshop type book. If one was to recommend three books for clockmakers, this would be the one for striking clocks. DeCarle's *Practical Clock Repairing* and Penman's *The Clock Repairer's Handbook* would be the other two. This book was first published in 1940 and has been made available by this second printing.

Mr. Smith says the book is intended to provide information regarding medium priced and inexpensive clocks most likely to turn up in the workshops of today. A grand sonnerie carriage clock is neither medium priced nor inexpensive at present. However, this is a statement that may be a leftover from the 1940 edition and should not subtract from the value of this book. As a matter of fact it enhances the scope of the work.

The book consists of nine parts: 1. Elements of sounding mechanisms, 2. Striking and chiming gear trains, 3. Countwheel striking, 4. Rack striking, 5. Countwheel chiming, 6. Rack chiming, 7. Repair of individual parts, 8. Setting up and adjusting, and 9. Correcting faults.

To give some idea of the scope of this book, striking details of clocks from the following areas are presented: Carriage, Comtoise (Morbier), Cuckoo, French, American, English, and German clocks.

In the early part of the book the distinction is made between striking, chiming, and musical clocks. Once this has been established, the counting systems are discussed. An exposition follows of the sequence of events. This includes let-off, warning, flirts, and concludes with the locking.

The photographs, while in black and white, generally are very good in quality and illustrate the text that they are intended to refer to. In many cases the photographs are enhanced by excellent line drawings which provide additional details.

This is a book that should be in every clockmaker's or student clockmaker's library. It is the best reference on striking and chiming clocks available today.

Otto Benesh

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*SANTE FE: HOW IT GOVERNED ITS TIMEPIECES THROUGHOUT THE SYSTEM*, by David M. Nicholson, The Dougherty Press, Inc., Enid, OK, 8½ x 11, soft cover, 48 pages, 63 photos, including several charts and tables in addition to two railway maps of the Santa Fe, at \$12.95.

This is a story of the importance of time to the railroad systems of America. Photographs show the various clocks and watches found within stations and carried by railroad personnel of the Santa Fe.

The role of the watchmaker in assuring "railroad accuracy" is explained with the tolerances allowed and the

requirements of examination, repair, and lubrication to meet those ends.

A listing is given of the watches, make, grade, number of jewels and size, including Elgin, Illinois, Hampden, South Bend, Hamilton, Waltham, and Ball.

Historical information concerning the departments and personnel over a period of years, with individual and group pictures are shown with selected persons named. The author is a local watch inspector for Santa Fe in Enid, Oklahoma where he owns a clock repair business. He is a member of both the American Watchmakers Institute and the National Association of Watch and Clock Collectors.

The pamphlet should be of particular interest to watch collectors, especially of railroad quality types.

Joseph G. Baier, Ph.D.

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*REPAIRING AND RESTORING PENDULUM CLOCKS*, by John Plewes, 8½ x 11, either hard cover or paper back, 223 pages, 116 figures and 8 tables, published 1984, Sterling Publishing Company, Inc., New York.

John Plewes, CMC, has written for the clock collector and enthusiast who would like to restore his/her collection. He presumes little basic knowledge on the part of the collector, and attempts to bring that person to an understanding of clock terminology, mechanisms, and to instill the procedures to undertake a responsible restoration. According to the publisher's news release, "Plewes covers all the commonly found clocks—the clocks that you're likely to inherit, find at auctions and flea markets, or buy from dealers".

Photographs of selected clocks and diagrams assist in clock identification, as well as assisting in the restoration process. With his background, Plewes has included directions for the fabrication of selected tools, presumably for educational purposes and for skill development, certainly not necessarily because of initial greater expense or availability. The book comprises some nine chapters organized within four major parts.

PART I – Preliminaries, Chapter 1, covers a word to the clockwise, nomenclature, and basic clock concepts.

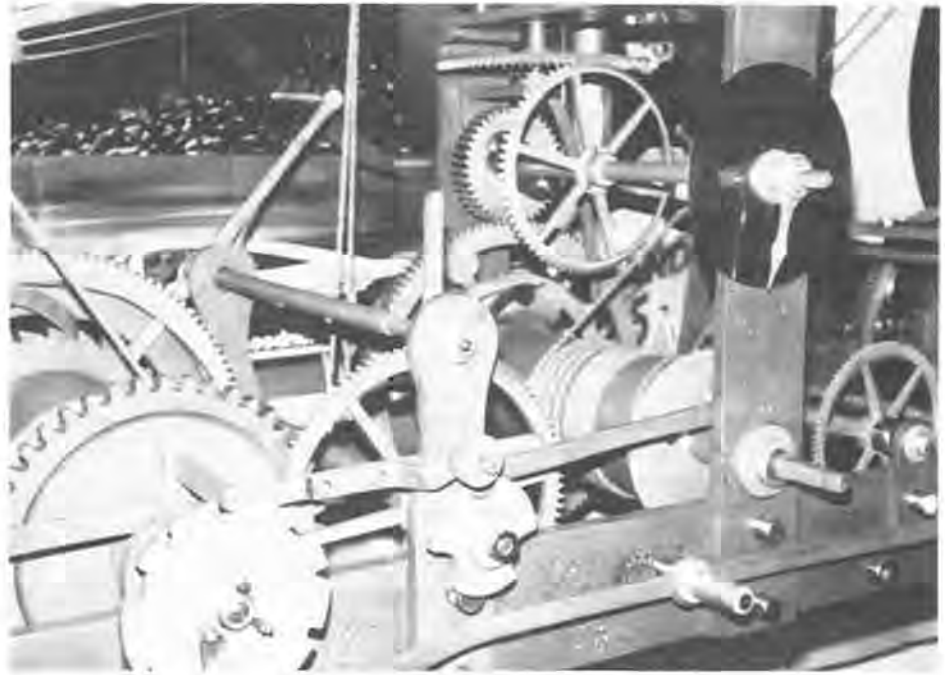
PART II – Repairing Antique Clock Movements: American, Canadian, English, French, and German, with 6 chapters. Chapter 2, The Basic Repair Text, using the American 30-hour weight driven OG as its subject, and including other American clocks. Chapter 3, More American Clocks, including the Lyre, Seth Thomas Regulator, #2, a Banjo, the Mission Long case clock, all 8-day weight driven, and an 8-day spring driven movement, and the 30-hour wood movement. Chapters 4 through 7, include representatives of Canadian, English, French, and German clocks. Typical styles are selected and described as types with some restoration suggestions.

**RESTORING A TURRET CLOCK**  
(Continued from page 27)

sive, she asked her question: "Do you make bells?" When the man answered "Yes", Susan was sure she had misunderstood. So she asked, "Do you make large bells?" He answered, "Well, if you consider 25 inches in diameter large, then the answer is yes." They visited the foundry, selected the three sizes that would be suitable, and asked for a price quotation. The man called the next day with a price of \$3,200.00 ! So it was decided that brass tubing was a lot cheaper and that chime rods would probably do the job.

Finally, a stand was made on which to rest this enormous movement. A pulley arrangement was made for each of the three trains. The pulleys were attached to the beams of the 16-foot high ceiling and the cables and weights were added. The chime rods were installed.

This incredible timepiece from 1878 is once again ticking off the minutes and striking the quarter hours and hours with the greatest of pride.



Pictured above is the turret clock after restoration was completed.

TIMES

PART III – Restoring Dials and Cases. Chapter 8, Dials, covers Longcase White Dial, Wooden Dials, Zinc Dials, Paper Dials, Silvered Dials, Spun-Brass Effect, and Arabic Numerals. Chapter 9, Cases, covers their restoration, including repairs, and refinishing of a selected series of types.

PART IV – Glossary of Horological Procedures and Devices. This section alone covers a little less than half of the book devoted to restoration procedures. Topics are listed alphabetically, from Anvil and Arbors to Wheels and Workshop Safety. Herein are found such subjects as bushing and pivots, how to build a chainmaker for the repair of links in broken weight chains, how to make a clock cleaning machine, including its associated parts, how to make a clock stand, how to make a gear expander (wheel stretcher), and others, some of which would be a great challenge to many non-professional as well as professional clock repairmen and collectors. But the challenge is offered and procedures are given.

The list of references could readily have been expanded, particularly to give greater background and interpretation of the procedures suggested and the explanations involving the restoration processes. Among the many, let me just cite two—Gazeley's *Clock and Watch Escapements* and DeCarle's *Practical Clock Repairing*, if not Saunier's *Treatise on Modern Horology*.

Joseph G. Baier, Ph.D.

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# Our Readers Write

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## IDENTIFICATION MARK SYSTEM

I have just finished reading the February '86 issue of *Horological Times*. This, I feel, has been one of your better issues and I enjoyed reading it very much.

One point of special interest to me was the article concerning the Identification Mark System. I feel this is a very good idea and would like to become a part of this important function. Please assign me an identification number so that my name can be added to the list of other watchmakers currently playing a significant role in our society.

Carl D. Stahl  
Johnstown, PA

## GOOD CANDIDATES

After reading the qualifications of the 12 candidates for the AWI Board of Directors, I am impressed by their abilities and by their dedication to AWI as well as their fellow members in their craft. It is too bad that we will only be able to avail ourselves of the talents of five of these outstanding people. I sincerely hope that the seven not elected will remain active at the national and local level of AWI affairs and be available and willing candidates again. I am sure that other members of AWI share my sentiments.

Anthony Prasil  
Rochester, NY

## LEARNING NEVER ENDS

Three years ago I and eight other fine watchmakers were employed by large department store. Because of company problems many of their services were eliminated, including the watch repair center. I have started a new business close to my home in a small shopping center, now entering my third year. It has been difficult but now that I am getting established and just about the only full-time watchmaker in our area, business has picked up. I am kind of the "cross-generation" watchmaker, with my dad now retired at 81 (European watchmaker), whom I have learned with since the age of 18 . . . to the modern quartz technician with which I have become certified through five companies.

American Watchmakers Institute is the finest organization that I know of for the professional watchmaker. I am proud to belong and will belong always. For me it has been a rough new beginning in a new business. Oddly, most of my repairs are the older watches which I welcome all the time. Today's watchmakers must know as much of the old as well as the new to survive. I enjoy going to seminars and have learned a great deal from them. You continue to learn all the time. It never ends.

Thomas J. Marton  
Matteson, IL

# BATTERY NEWS

By Ewell Hartman, CMW

## BATTERY NUMBER SYSTEM

Refer to your 1985-86 Battery Number System booklet to make the following additions:

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AWI, S17:	Add to Panasonic,	SR726W
AWI, S21:	Add to Panasonic,	SR920W
AWI, S23:	Add to Panasonic,	SR721W
AWI, S29:	Add to Panasonic,	SR927W
AWI, S12:	Add to Panasonic,	SR721SW
AWI, S14:	Add to Panasonic,	SR621SW
AWI, S18:	Add to Panasonic,	SR920SW
AWI, S32:	Add to Panasonic,	SR626SW
AWI, S38:	Add to Panasonic,	SR716SW
AWI, S40:	Add to Panasonic,	SR916SW
AWI, S56:	Add to Panasonic,	SR521SW
AWI, S64:	Add to Citizen,	280-66
AWI, S64:	Add to Panasonic,	SR712SW
AWI, A01:	Add to Citizen,	280-904
AWI, A01:	Add to Panasonic,	*LR44
AWI, A03:	Add to Panasonic,	*LR43
AWI, A05:	Add to Panasonic,	*LR1130
AWI, A07:	Add to Panasonic,	*LR1120
AWI, L12:	Add to Citizen,	280-205
AWI, L28:	(This is a new listing, following L26)	
AWI, L28:	Add to Voltage,	3.00
AWI, L28:	Add to Diameter,	16.0
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17-18	W	Newark, NJ	GEIGER

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6	T	Denver, CO	CARPENTER
6-8	U	San Francisco, CA	PERKINS
7	T	Kansas City, MO	CARPENTER
14	T	Austin, TX	BROUGHTON
14-17	M	Seattle, WA	BAIER
21	D	St. Paul, MN	SMITH
28	T	Columbus, OH	BROUGHTON

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5	T	Richmond, VA	CARPENTER
12	T	Huntsville, AL	BROUGHTON
18-19	W	San Francisco, CA	GEIGER
19	A	Baltimore, MD	JAEGER
22-24	I	Cincinnati, OH	PERKINS
25-27	U	Cincinnati, OH	PERKINS

## NOVEMBER

9	T	Philadelphia, PA	BROUGHTON
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## FEBRUARY 1987

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- E Quartz Watch Test Equipment . . . . .Calvin E. Sustachek, CMW
- F Common Sense Quartz Watch Repair. . . . .Robert F. Bishop
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## THE NEWMARK WATCH

The appearance of a wristwatch of the Roskopf type with the words "Made in England" on its plates would have seemed most unlikely a few years ago, but the introduction of the Newmark watch has brought it about and has shown that it is possible to make inexpensive watches in this country in a way that can compete with the products of any foreign manufacturer.

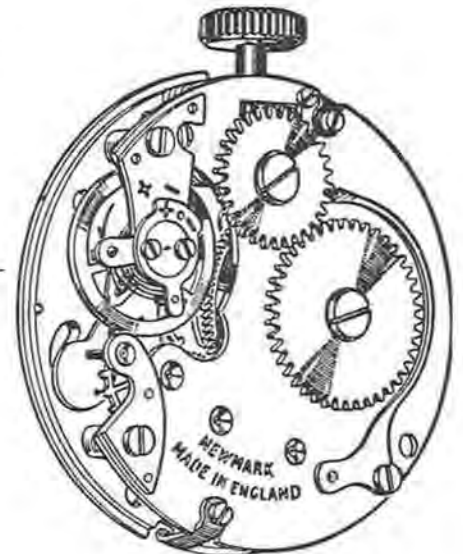
In appearance, the Newmark watch is neat and attractive. Case, dial and hands are all of nice proportions, and have a high finish. As in most sales, appearance is an important factor in final choice, this is a good point. There are four main styles selling at 44s., 46s 9d., 59s. 6d., and 63s.

With the removal of the movement from its case, it can be seen at once that the Newmark is, quite frankly, a mass-produced Roskopf watch, but it is equally apparent that it is an unusually good one. The normal Roskopf train layout is followed, no attempt being made at any point to pretend that the watch has features which it does not possess. Realizing that limitations of price necessarily govern the amount of finish that can be given to details, the makers have preferred to give the most essential mechanical parts the lion's share of attention. As a result, simple straight graining has been adopted for the plates, cocks, keyless wheels, and so on, but the finish of the wheel-teeth pinion leaves and escapement details have obviously had considerable care. The large barrel has a mainwheel with wide and well-cut teeth, and the cover snaps into its groove with a neatness equal to that of many watches costing many times the price of this one.

The barrel arbor is also good, and its hook is formed to hold the spring securely, but without any tendency to "hump" adjacent coils, and so lead to possible breakage. Another good detail is the attachment of the motion-work wheel and pinion to the barrel cover. It is at this point that the setting grip of a Roskopf watch is provided, and quite a lot of trouble has been experienced with the assemblies of this type in some watches. The usual trouble is slackness of the grip, a defect which renders it necessary to take the watch right down in order that the wheel can be made properly friction-tight. On the Newmark, the wheel is mounted against a large diameter shoulder, and as a result, loose motion-work should be avoided.

Figure 1

A normal Roskopf—  
but an unusually  
good one (twice  
actual size).



The mainspring powers the movement for well over the 30 hours which is its rated run. The power output is commendably even. Finish is good on all mainspring surfaces, particularly the edges, and the hooking attachment to the barrel is soundly designed, capable of withstanding all normal strains—and a bit over!

The train is made up of three wheels and pinions, including the escape wheel, and a satisfactory quality of finish is given to all points which have any bearing on timekeeping. All the gear teeth are excellently cut, with no trace of chatter or roughness, and the pinion leaves have a degree of polish that is most effective in reducing friction. As may be expected, the train runs smoothly and freely, a feature which is helped by the good form and high finish of the pivots.

The pin-pallet escape is becoming the accepted one for moderately-priced watches, and this trend seems likely to persist. Many years may go by before we see again escapements of the normal club-toothed lever type applied to the lower-priced movements, but that is nothing to deplore. If it is soundly made, a pin-pallet escapement can give quite good

account of itself, as many an ancient alarm clock can show. It is certainly not as durable as the club-toothed lever, but it is far less costly to manufacture. The Newmark version is quite a soundly made example of such an escapement. The escape wheel is nicely cut, and the locking and impulse angles are well chosen. Sometimes there seems a tendency to give too much draw to escapements of the pin-pallet type, but though draw is safe here, it is not taken to the point where unlocking is made heavy. The impulse is good, the wheel mounted with correct concentricity (a thing not always done!) and such factors as drop, banking, and so on, are right.

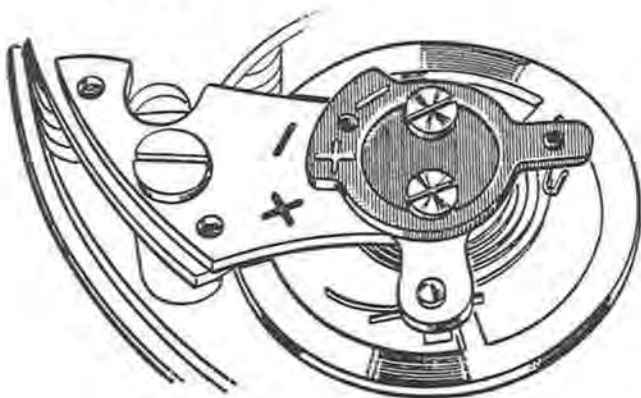
#### LEVER AND BALANCE DETAILS.

The same good sense has been used in designing the lever fork and the balance details. The interaction of fork and balance-pin (or rather tongue) gives a smart, brisk delivery of the impulse, and the banking and safety actions are correct. The guard-pin is of the "riveted-in-and-bent-over" type, which is more complex to manufacture and assemble than the pressed-out form, but seems superior in action.

The plain circular balance is nicely true and flat, and the balance spring, though not of the "close-coiled" type, is properly proportioned and mounted. There are no jewels anywhere in the watch, and steel endpieces are used for the balance pivots, which run in brass holes. The two screws which hold the balance cock endpiece also retain the regulating index, which is a little novel in form, as it has an enlarged circumferential portion instead of the usual tail. All the same, adjustment can be made quite easily, and the absence of a tail may discourage the owner from making his own adjustments—a thing that may really be an improvement!

The keyless and winding assemblies are quite effective. Indeed, the keyless assembly is so simple and works so well that its general form might be worth copying for more ambitiously finished movements. The keyless stem runs in a brass block made up of five pressings, all assembled to form a solid block which gives a good bearing. It is easier to produce than a solid component produced by shaping or extrusion, and is probably more durable than a die-casting. It provides a long and most effective bearing for the bolt-screw, and that is important, for looseness and shake there can lead to a lost winding stem. Incidentally, this stem and its crown and castle wheels are all well made, as are the winding-wheels and the click-and-spring, the latter being, as usual in Roskopf movements, a "one-piece" job.

Figure 2

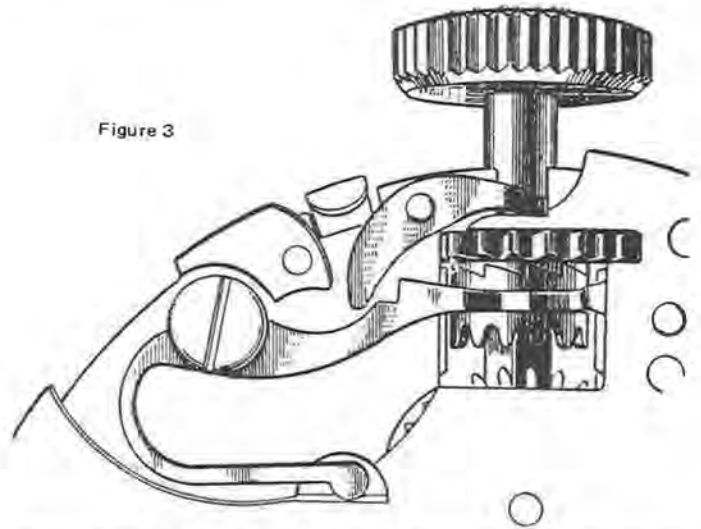


Two screws hold the unusual regulating index as well as the balance cock endpiece. The laminated block for the winding stem can be seen (about five times actual size).

The plates and pillars are quite neat and serviceable, and here, as indeed, on all the other components, both press-work and turning are well finished, and have a notable absence of burrs and rough edges.

The dials are a special feature of the line. The hands match the dial very well, and can be easily read. It is worth mentioning that the cannon pinion and hour wheel pipe fit so well that there is no annoying up-and-down shake on the hands. This defect has been one that has caused a lot of trouble on many Roskopf watches, leading to hands catching up, but it seems to have been overcome here. Incidentally, the dial of the watch examined had luminous numerals and hands which glowed most effectively in darkness.

Figure 3



Effective keyless work operated by a sensibly-sized winding button (about five times actual size).

The winding button is large enough to get hold of, and its shape does not cause it to cut the fingers—a point the user will appreciate. Winding is easy, and so is hand-setting, the change being also sharp and effective. Our usual test of 100 in-and-out movements of the winding stem was tried and the mechanism functioned perfectly each time.

#### FITTING IN CASE.

Two springs, attached to the back plate, secure the movement into its case. The grip they afford is secure, but not so tight that the movement has to be forced out when its removal is necessary. The case itself fits together well, and as the strap lugs are wisely attached to the bezel, complete loss of the movement through accidental knocking off of the bezel will not be likely to occur.

To sum up, the Newmark watch is a very useful addition to the products of the British horological industry. It is not a high-precision timekeeper, and it is not claimed to be. On the other hand it does provide a reasonably good personal timepiece for folk who require a moderately priced watch.

It is distinctly interesting to see a watch of such characteristically "Swiss" design produced in England. It used to be assumed by many in the industry that manufacture of this kind was exclusively a continental business, but the repeated successes of our own factories, in one field after another, show how well we can master the necessary technique if we make the effort.

THIS



...from all around the ASSOCIATION...

#### WISCONSIN

On April 11, 12, and 13, 1986 the Wisconsin Horological Society held their 51st Annual Convention at the Radisson Inn, Madison, Wisconsin. Friday evening's activities included a board meeting and welcome party.

Saturday morning began with a tour of Ray-O-Vac National Headquarters and Technology Center. A business meeting to elect directors and hash out old business was held prior to lunch. Steven Conover presented an afternoon program on the Servicing of Today's Grandfather Clocks. The evening banquet and dancing was enjoyed by all. The banquet speaker was "Mr. Enthusiasm" Ewell Hartman.

A business meeting was held Sunday morning, with door prizes awarded. Bob Nelson presented a program on escapements in watches. Following lunch Ewell Hartman spoke on "Balance Wheels Are Important Business"—how to make a mechanical watch keep proper time with adjusting methods that are fast, but rarely taught; and "The Key Test for Quartz Analog Watches"—how to diagnose and estimate service problems in quartz analog watches with a universal procedure that is easy to learn and practical to use.

#### VIRGINIA

The Horological Association of Virginia held its annual convention on May 2-4, 1986 at the historic Hotel Roanoke in Roanoke, Virginia.

Each seminar period had a choice of topics to attend. Charles Imundo of Portescap gave a presentation on using equipment to diagnose and separate mechanical and electrical problems for estimating and repairing. Harold F. Jennings, Jr. of Virginia Gemological Services, Inc. gave a presentation on Diamonds in Color. Bob Mandrioli of International Watchmakers, a material distributor specializing in high grade watch parts and equipment, gave two presentations—one on watchmaking opportunities and how to use them, and one on high grade and quartz technology. Gary Pettera, a watchmaker and clockmaker who founded E-Z Start Software, gave two presentations on computer software application to the watchmaker and jeweler. Paul W. Nordt III of the John C. Nordt Company, Inc. gave a presentation on the technology of modern ring manufacturing.

The convention included a dinner and dance on Saturday night and a luncheon on Sunday with installation of officers. Mr. Fred T. White was awarded Watchmaker of the

Year.

For membership information in the Horological Association of Virginia contact: Stan Palen, 11 Oakwood Drive, King George, VA 22485.

#### MASSACHUSETTS

The Massachusetts Watchmakers Association, Inc. will hold their Annual Dinner Meeting on June 17, 1986 at the Howard Johnson motel in Cambridge, MA at 7:30 P.M. For more information contact: Joan Curran, Secretary, King's Jewelry, Inc., Wilmington Plaza, Wilmington, MA 01887; phone. (617) 658-2122.

#### CONVENTIONS

*North Carolina Watchmakers Association  
Annual Convention  
June 6, 7 & 8, 1986  
Radisson Hotel — High Point, NC*

*Watchmakers Association of Pennsylvania  
Annual Convention  
June 6, 7, 8 & 9, 1986  
Holiday Inn — Lancaster, PA*

*Watchmakers Association of Ohio  
40th Annual Convention  
July 25, 26 & 27, 1986 — Columbus, OH*

*Nebraska & South Dakota Jewelers Association  
81st Annual Convention  
August 22, 23 & 24, 1986  
Ramada Inn — Kearney, NE*

*Iowa Jewelers and Watchmakers Association  
Convention and Trade Show  
September 13-14, 1986  
Des Moines Marriott Hotel — Des Moines, IA*

*North Dakota Jewelers and Watchmakers Association  
Convention and Trade Show  
September 13-14, 1986  
Seven Seas Motor Inn — Mandan, ND*

*Arizona Horological Association Convention  
September 27, 1986 — Prescott, AZ*

*Florida State Watchmakers Association Convention  
October 24, 25 & 26, 1986 — Palm Beach, FL*

*Illinois Watchmakers Convention  
November 1-2, 1986  
Clock Tower Inn — Rockford, IL*



**NEW JERSEY**

The Watchmakers Association of New Jersey had as their guest speaker in April Mr. Henry Loeser, manager of retail repair service for Cartier, Inc., New York.

Mr. Loeser drew on his 21 years of experience with Cartier as background for an illustrated talk on Cartier clocks. Pictures of the store and its retail displays, as well as of many clocks in the Cartier historical collection were included in the program.

**NEW YORK**

The Horological Society of New York recently heard a program on "Quartz Watch Repair—Update and Troubleshooting". Irving Albert and Dennis Tricarico gave an informative talk on the servicing of quartz watches. Both are members of the Bulova Watch Company technical staff—Irving Albert is manager of its Technical Information Department and Dennis Tricarico is supervisor of its Quality Assurance Department.

The talk concentrated on the general principles that apply to all quartz watch servicing. A question and answer period concluded the program.

**ILLINOIS**

The Annual Illinois Watchmakers Convention will be held on November 1-2, 1986 at the Clock Tower Inn in Rockford, Illinois—home of the world acclaimed Time Museum.

Information is available by calling (309) 467-5016. Anyone interested in attending the tours, seminars, special programs, and meals is welcome to pre-register, either by calling the above phone number or by writing: Sue Hinrichsen, Gangloff Jewelers, Inc.; 114 North Main Street; Eureka, IL 61530.

**INDIANA**

The Horological Association of Indiana conducted their Spring workshops at Jasper, IN April 20 and at Plymouth, IN on May 4. David Christianson gave a presentation on diagnosing and repair of quartz watches with less than \$50 in additional equipment. Glenn Seeds presented "Clock Wheel and Pinion Cutting" with hands-on demonstration of gear cutting and mainspring barrel teeth repair. The 80 attendees at Jasper and 50 at Plymouth received credit hours to apply to their license required training time. Ladies present attended a program on craftmaking conducted by Nancy Oldfather. The HAI Spring workshop of 1986 was deemed a big success.



TIMES

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# New Products and Literature

## REPLACEMENT STRAPS ENCASED IN DISPLAY AVAILABLE FROM OCEANSIDE

"Switch-a-Strap" display unit features replacement watch-strap styles that fit popular fashion watches, including Swatch, A-Watch, Watch-it, Sasson, Advance, and Guess. Each style is available in a full range of colors, from Oceanside.

Contact Oceanside Time, Inc., 2790 Harbor Blvd., Costa Mesa, CA 92626; toll free 1 (800) 292-5522; in California 1 (800) 331-5522; or 1 (714) 751-5522.

"Switch-a-Strap" display unit available from Oceanside



## JEWELRY FINDINGS CATALOG AVAILABLE FROM BOREL

"It's the most comprehensive Jewelry Findings Catalog we've ever produced," said Roger Borel of Jules Borel and Co. of Kansas City, MO as he announced plans to distribute Borel's 1986 Findings Catalog.

"We have added a 20-page full-color section which features our new 14K semi-mountings as well as our quality gold mountings, wedding rings, chains, and findings," Borel continued.

The catalog has over 5000 items listed, including settings, shanks, pendant mountings, ear mountings, bead cords, clasps,

spring rings, and birthstones.

For your copy of Borel's 1986 Jewelry Findings Catalog, send a request for Catalog No. F-86 to Roger Borel, Jules Borel & Co., 1110 Grand Ave., Kansas City, MO 64106. There are three Borel distribution centers to serve the nation's jewelers: Jules Borel & Co., Kansas City; J. Borel & Frei, Los Angeles; and Otto Frei-Jules Borel, Oakland.

Borel's 1986 Jewelry Findings Catalog



## QUARTZ MOVEMENT FROM RONDA

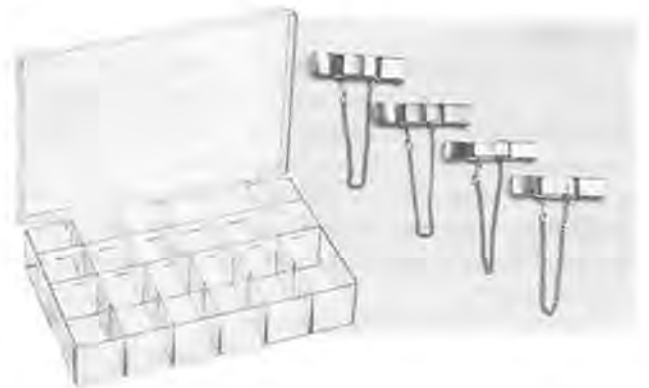
This is a new miniature quartz movement, 5½ line calibre (13 x 15.55 mm). Overall thickness is 2.5 mm. Designed for volume production, the movement has centre seconds, and the metallic base ensures high reliability.

More information can be obtained from: Ronda Watch Corp., 390 Fifth Ave., Suite 412, New York, NY 10018; (212) 564-2567.

Ronda



Cas-Ker's assortment of clasps



## CLASPS FROM CAS-KER

The Cas-Ker Company is offering a new assortment of clasps and accessories for Seiko, Pulsar and other popular styles of mesh bracelets. The assortment contains foldover clasps, safety chains, spring bars, and buckle extend-

ers. The assortment, which comes in a plastic compartment box, would cost \$75 if purchased separately. Cost is now \$39.95.

For more information contact: Cas-Ker, 2121 Spring Grove Ave., Cincinnati, OH 45214; (513) 241-7073.

## SPORTS-SPIRITED WATCH FROM MOVADO

A sporty version of Movado's "Museum Watch" is their ultra-slim, black chrome case set with a black-tinted sapphire crystal. The dial features only the Movado logo at 12 o'clock; quartz movement. Contact: Movado Time Corp., 650 Fifth Ave., New York, NY 10019; (212) 397-7800.

Movado



## WELDING TORCH USES DISTILLED WATER AS A FUEL

A line of precision welding units using distilled water for fuel and producing a 6000°F flame has been introduced by the Henes Products Corporation.

Called the Henes Flame Generator, the three MG (mixed gas) units use electrolytic action to produce the hydrogen and oxygen gasses from water in the optimum two-to-one ratio to achieve superhot combustion. These generators are designed for welding, brazing, soldering, drilling, cutting, polishing and annealing for metals, ceramics, glass and plastics.

By varying torch tip size and gas pressure, flame length may be adjusted from .01" to 6" through tips with openings from .003" to .062". With gas production and pressure easily adjustable, the Flame Generator is well suited for welding and fusing platinum, copper, beryllium, nichrome, chromel, and other

Henes welding torch



hard-to-handle metals.

For applications where torch temperatures of less than 6000°F are needed, Henes provides an optional alcohol booster. The introduction of alcohol vapor to the gases lowers flame temperature to 4000-4500°F. Fluxes may be added to the booster mixture and fed directly to the flame for ease in soldering gold and silver, silver brazing, and soft solder applications.

Standard equipped models range in price from approximately \$1000 to \$2000. For more information contact **Henes Products Corp., 4225 E. Madison, Phoenix, AZ 85034; phone (602) 275-4126.**

#### MINIATURE GAS TORCH FROM MICROFLAME

The Microflame miniature gas torch is a high quality heating, soldering and silver-brazing tool that develops a 5000°F fine-point flame using a mixture of compressed Micro-nox™ and Butane gases. It provides instantaneous and precise heat only where needed without risk of damage to adjacent areas for heating, soldering and silver-brazing applications as are often required by hobbyists, craftsmen, and service technicians. Both standard and deluxe kits are available at \$29.95 and \$49.95 with quantity discounts offered. For further information contact **Microflame, Inc., 14857 Deveau Pl., Minnetonka, MN 55345; (612) 935-3777.**



Miniature gas torch from Microflame

#### JUNIOR WAX INJECTOR FROM GESSWEIN

Gesswein has added a new wax injector to their casting products line. Their new Junior Wax Injector has all the features of a large wax injector.

The 2¼ quart (5½ pound) capacity wax tank is completely insulated for energy efficiency. It is equipped with a liquid type thermostat for accurate temperature control and an easy-to-read 0-15 PSI pressure gauge.

For further information, contact **Gesswein, 255 Hancock Ave., Bridgeport, CT 06605; (203) 366-5400.**

Gesswein's junior wax injector



#### SEIKO INTRODUCES DUAL CLOCK/TIMER FOR THE KITCHEN

Seiko has given new meaning to two-timing with the introduction of its new kitchen wall clock and quartz timer.

The timer can either stand alone or be hinged to the clock as an attractive unit for convenient, out-of-the-way storage. The modern cream-white wall clock with large Arabic numbers and matching 60-minute quartz timer has a suggested retail price of \$59.50. The unit is available from the nationwide network of Seiko distributors, or by contacting: **Seiko Time Corporation, 640 Fifth Ave., New York, NY 10019; (212) 977-2800.**



Kitchen wall clock and quartz timer from Seiko Time Corp.

#### CARAVELLE® QUARTZ WATCH FROM BULOVA

For daytime or evening, the Caravelle® Quartz model (48L69) is delicate and graceful. Designed in goldtone, its mesh bracelet and oval case complement the gilt linear patterned dial with applied quarter hour markers. This model has a suggested retail price of \$84.95, and is available from **Bulova Watch Co., Inc., 26-15 BQE, Woodside, NY 11377.**

Bulova's quartz watch



#### KASSOY OFFERS RETROFIT HALOGEN LAMP

Low voltage halogen tungsten lamps have three times longer life than ordinary lamps, a company spokesman claims. These lamps deliver pure white day light. Retrofit allows the lamps to screw into any standard fixture, with no transformers or electricians needed. A person can update his old lighting quickly using his current fixtures.

The model pictured is LA17 (bulb and adaptor), and retails for \$39.95. For more information contact: **KASSOY, 32 W. 47th Street, New York, NY 10036; toll free: 1-800-I-KASSOY.**

Kassoy's halogen lamp



# New Products and Literature

## AKKO INTRODUCES ART DECO ACRYLIC MANTEL CLOCK

In a design recalling art deco, AKKO's new mantel clock is formed of pure thick acrylic. A one-inch thick clear acrylic rod is bent softly around the black acrylic face. A one-inch acrylic base, a red accent at 12 o'clock, and brass hands complete the design. The clock measures 9½"x2½"x9" and includes an accurate mini-quartz movement powered by a single AA battery. The suggested retail price is \$90 (stock number 2001). Catalogs are available from **AKKO, Inc., 300 Canal St., Lawrence, MA 01840; 1 (800) AKKO-INC.**



AKKO's art deco mantel clock

## PULSAR LADIES' DRESS ANALOG QUARTZ

This new ladies' dress analog quartz baguette (model PEX104) in Pulsar's "Diamond Collection" series makes a high fashion statement for their 1986 line. Two diamonds embellish the borders of the gold tone case. An integrated gold tone Florentine finish bracelet enhances the timepiece. Gilt delfine hands and hour stick markers stand out on the

brushed gilt dial. The suggested retail price is \$225; approximate three year battery life.

For more information, contact **Pulsar Time, 1111 MacArthur Blvd., Mahwah, NJ 07430; (201) 529-2400.**



Ladies' dress quartz from Pulsar

## RIO GRANDE INTRODUCES AN IMPROVED BUR LIFE DISPENSER

Now, without stopping work, jewelers can apply lubricant to their hand tools, burs, and wire. Rio Grande Albuquerque, Inc. has just introduced a handy new dispenser for their exclusive lubricant, Bur Life.

Bench Bur Life conveniently attaches to the side of a workbench so a jeweler can just reach over with his tool hand and apply lubricant while his other hand is free to hold his work.

Unlike other lubricants, Bur Life is globular in structure. It is like coating the surface of a tool or workpiece with tiny ball bearings. When the cutting tool comes in contact with the workpiece, instead of drawing away, Bur Life tends to gather at the point of contact, where lubrication is needed.

Bench Bur Life is easy to install. The refillable base screws right into the edge of a jeweler's workbench. Replaceable, cone-shaped cartridges slip into the base and come with a protective

plastic cover for storage.

For more information, contact **Rio Grande Albuquerque, Inc. at 1-800-545-6566 or write: 6801 Washington NE, Albuquerque, NM 87109.**



Bur Life dispenser from Rio Grande Albuquerque, Inc.

## JEWEL CASE INTRODUCES THE "CLASSIC COLLECTION"

Jewel Case Corporation in Providence, RI has introduced a line of packaging designed to allow custom-sizing of metal boxes without the inherent start-up (tooling) costs of metal, shell-type boxes. Named the "Classic Collection" for its traditional, up-scale jewelry store look, the line is priced competitive with many standard, all-metal box lines. It also features a variety of colors, textures, and materials.

"But, the 'flexibility of size' is the characteristic that makes this box most unique," says Richard Gaboury, president of Jewel Case. "Using our unique, patented, metal/heavy board



Howard Miller makes time a modern art form in a collection of wall clocks with the elegance of brass and the accuracy of a quartz battery movement. The unique loop-and-circle design known as the "Aura" (left) suspends in a clear acrylic disc a brushed brass-finished dial with ebony grid, hands, and markers. The square "Image" has a brushed brass finished dial with black hands and Arabic numerals. In see-through cartons, these clocks have a suggested retail of \$24.95-\$39.95. For more information contact **Howard Miller Clock Company, 860 East Main St., Zeeland, MI 49464 (616) 772-9131.**

"Classic Collection" from Jewel Case Corporation



construction, we can offer customers custom boxes with sizes tailored to their needs . . . at reasonable prices, and with relatively fast delivery" he adds.

The line is now available through a nationwide sales organization. Samples and pricing can be obtained by contacting Jewel Case's National Sales Manager, Eileen Moser at (401) 943-1400. The company is headquartered at 300 Niantic Avenue, Providence, RI 02907.

#### SELF-WINDING WATCH WITH TOURBILLON FROM AUDEMARS PIGUET

This self-winding wristwatch's movement incorporates a tourbillon, one of the most complex horological mechanisms invented. The movement is an extra-thin construction, only 2.50 mm thick and 7.20 mm wide. Total watchcase thickness is 4.80 mm. The movement's rotor is in platinum-iridium alloy; 18K yellow gold case. The tourbillon can be observed through an aperture in the gold dial.

For more information, contact Audemars Piguet, 350 Fifth Ave., Suite 7712, New York, NY 10118; (212) 947-1055.

Audemars Piguet



#### GAMZON BROS. INTRODUCES NEW TORCH ADAPTER SET

With the new Torch Adapter Set and 6 tips, a jeweler can convert his standard oxygen bench torch into a multi-function soldering, welding, and melting torch. The Torch Adapter Set eliminates the need to purchase expensive water welders. The six tips enable a torch to produce a flame ranging from the finest micro all the way up to a very hot melting flame. The set produces a non-oxidizing flame with less pickling needed. Jewelry comes out much cleaner. Production is speeded up and the Torch Adapter without the tips can even melt platinum. The finest intricate work, thinnest chains, rings, pendants, bangles and even large silver hollow ware can all be soldered expertly with ease. Tips are easily removed with the flick of the wrist. For further information call: Gamzon Bros., Inc., 21 West 46th St., New York, NY 10036; Tel: (212) 719-2550, outside NY state call: (800) 223-6464.

#### NEW JEWELERS SAW FRAMES FROM OLSON SAW CO.

Olson Saw Company has introduced 10 new premium quality

jewelers saw frames for the professional craftsman. Each frame features:

- \* Rigid, polished steel frames for a solid feel;
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- \* Aligned and serrated blade clamps for straight line sawing and secure blade retention;
- \* Hardened steel thumb screws.

Jewelers saw frames are also available with a blade tensioning end screw and have depths ranging from 2 1/4" to 8". Olson's four-page catalog illustrates a comprehensive line of premium quality jewelers, coping, fret, and pocket hack saw frames and blades. For a free copy of Olson's Frame and Blade Catalog Sheet OL-29A, write to: The Olson Saw Company, Rt. 6, Bethel, CT 06801; (203) 792-8622.

#### "FREEDOM" WATCHES FROM CONCORD

One of Concord's new collection leaders, this upmarket timepiece called "Freedom" is made either in surgical steel, 18K yellow gold, or in a gold-and-steel combination. Its bracelet fits smoothly into the slim water-resistant case whose intermediate gold links

can be set or even cobbled with diamonds. Contact: Concord Watches, 650 Fifth Ave., New York, NY 10019; (212) 397-7800.



Jewelers saw frames from the Olson Saw Company



"Freedom" watches from Concord Watch Company

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## "OBJECTS OF ADORNMENT" ON EXHIBIT AT MILWAUKEE ART MUSEUM

A comprehensive exhibition of jewelry dating from ancient and medieval times through the beginning of the 20th century will be on display at the Milwaukee Art Museum June 20 through August 24 in the Journal/Lubar Galleries. The Opening Reception will be on June 19 from 5:45-8:00 P.M.

Co-organized by the Walters Art Gallery (Baltimore) and the American Federation of Arts, the exhibition will include 213 rare and precious objects ranging from amulets reportedly possessing special powers to death masks, prelate's rings and pomanders, stomachers and stick pins. The exhibition includes many masterpieces such as a bracelet from the Olbia Treasure, the Esterhazy Marriage Collar, the Tiffany sapphire Iris, and Rene Lalique's Tiger Necklace.

The Walters Art Gallery possesses one of the largest, most comprehensive collections of jewelry in the world, but it is virtually unknown. This is the first time that a portion of this enormous collection has ever traveled. The show's ten-museum tour is providing a unique opportunity for the American public to view the broad history of this art form.

The exhibition is being brought to Milwaukee through the support of Boston Store and the law firm of Michael, Best and Friedrich. Nationally, the exhibit is supported by grants from the National Endowment for the Arts and the Mabel Pew Myrin Trust.

The jewelry collection was assembled by Henry Walters, a railroad magnate and an avid collector who admired fine workmanship in small and precious

objects. Between 1893 and 1931, Walters purchased hundreds of examples of historical jewelry. His search led him all over the world.

For further information, call (414) 271-9508.

## CAS-KER ADDS ANSON TO ITS JEWELRY LINE

The Cas-Ker Company has recently added the Anson brand to its line of jewelry products. The company is stocking the complete Anson line and is now the only Anson distributor in the Greater Cincinnati-Southwestern Ohio Valley area. The Anson line is a significant addition to the company's expanding product line.

Further information can be obtained by contacting: **Adrian Herberger, Jewelry Manager, CAS-KER Co., 2121 Spring Grove Ave., P.O. Box 14069, Cincinnati, OH 45214; (513) 241-7073.**

## JEWELERS GUILD-CHICAGO NAMES FRED PHILLIPS "SALESMAN OF THE YEAR"

The Jewelers Guild of Greater Chicago has chosen Fred Phillips, sales representative for Pulsar Time, to be honored as "Salesman of the Year" for 1986. Award ceremonies were held at the Guild's 59th Annual Banquet in May.

The Guild stated that its selection of Phillips for the award was due to his keen attention and cooperation which is greatly appreciated by the organization's members whom he serves. Phillips, a resident of Long Grove, IL, joined Pulsar in November 1982.

## LONGINES-WITNAUER REALIGNS SALES TEAM

John L. Davis, President of Longines-Wittnauer Watch Co., announced the following new appointments in the firm's executive sales team:

Harvey Kaplan has been promoted to Eastern Regional Sales Manager. Mr. Kaplan will work with company sales representatives in maintaining Longines-Wittnauer's standards in servicing accounts.

Carol Duclos will replace Mr. Kaplan and represent Longines-Wittnauer in California and Arizona.

Longines-Wittnauer has also appointed Michael J. Healy in the Bay area. Because of Mr. Healy's sales record in the New York market, he has been given this new assignment.

Peter J. Lombardi will fill the position vacated by Michael Healy. Also, Stephen Verrill has become the company's sales representative in the New England area.

## FELDMAR WATCH & CLOCK CENTER CELEBRATES ITS 30TH ANNIVERSARY

It was 30 years ago that the present Feldmar Watch Company (now known as Feldmar Watch and Clock Center) was organized.

The original Feldmar Watch Company was started in Hungary in 1902 by Jack Feldmar. In 1913 the United States (Newark, NJ) became the new home of the Feldmar family. Later the family moved to California where Feldmar set up his bench. His son Barney became his partner when he learned the trade.

During World War II when new watches and stopwatches were impossible to get, the



Harvey Kaplan



Carol Duclos



Peter J. Lombardi

telephone company had 196 stopwatches that other watchmakers declared irreparable. They insisted that the team of Barney and Jack Feldmar see if they could repair any of them. They did—175 of them. This introduced them to the importance of stopwatches in industry. With a contract from Western Electric to repair all of their stopwatches, they started repairing and selling stopwatches to many of the local schools, studios, and industries.

In the early 1960s the first electronic watch—the Bulova Accutron—was invented, and though the Feldmar Watch Company had sold and repaired wristwatches in addition to the stopwatches, the precision of the Accutron fit right in with their timing company. With establishment of Bulova Accutron Centers in various large cities in the U.S., Bulova appointed the Feldmar Watch Company to be the Accutron Center for the Los Angeles area. Before long they became the #1 Accutron center in the U.S.

With the advent of the quartz watches—both digital and analog—many new manufacturing companies entered the watch field as well as many older ones. Feldmar Watch Company now has over 1500 watches on display representing most of the major watch companies.

In 1974 Sol Meller joined the Feldmar company, and is now the Vice President and Manager. One of his major innovations was the addition of a very complete clock department. The walls had to be knocked out to make room for the display of all the various clocks representing most of the major clock manufacturers.

Thus with over 1500 watches on display, the world's larg-

est selection of stopwatches, a large selection of clocks, and a watch and clock repair department, the Feldmar Watch Company has grown considerably in its 30 years of business.

The company's address is 9000 W. Pico Blvd., Los Angeles, CA 90035; (213) 272-1196.

#### GERMANOW-SIMON ANNOUNCES NEW LINE OF PRODUCTS

Recently at the co-convention of the American Jewelry Distributors Association and Jewelry Industry Distributors Association, Germanow-Simon Machine Company announced a complete new line of magnifiers and loupes to be sold through watch material and jewelry distributors.

The G-S Hypo-Tube cement used for years by watchmakers has been repackaged in a skin pack for distribution in the craft and hobby fields. G-S Hypo-Tube cement is also still available in its original individual box.

Information on both products can be obtained from distributors or direct from the factory. Contact: Germanow-Simon Machine Co., Inc., P.O. Box 1091, Rochester, NY 14603.

#### CLOCK INDUSTRY MEETING A SUCCESS

The Clock Manufacturers and Marketing Association's business meeting held recently in Chicago during the International Housewares Show was considered a success by association organizers.

Twenty-eight companies were represented among the registrants.

There were five separate



30th Anniversary—Feldmar Watch Company. Comedian Mort Sahl (center), long time customer, with Harriet and Barney Feldmar.

committee meetings: Marketing & Research, International Trade, Membership Promotion, Clock Terminology, and Meetings & Conferences. Here are some of the association's plans for the future:

The CMMA will start compiling industry statistics to be distributed annually to members of the Association who participate. The data will be broken down by units and wholesale dollar amounts and by categories of clocks including estimated retail dollars.

The International Trade Committee of the CMMA has started plans to establish overseas contacts with suppliers, work with contacts in Washington, D.C. regarding tariffs, and establish foreign exchange information (foreign exchange rates).

The Association has a total of 31 companies on the membership roster, which includes 20 manufacturing companies and 11 supplier companies.

A rough draft of a clock terminology manual is being assembled which will be distributed to the membership for revisions

or additions. Once completed, this manual will be distributed to member firms and the retailer/distribution industry as recommended standard terminology for the clock industry.

The next association meeting is scheduled for November 12, 1986. For more information contact: CMMA, 710 East Ogden Ave., Suite 113, Naperville, IL 60540; (312) 369-2406.

#### PARIS JUNIOR COLLEGE GEMOLOGY CLASS GRADUATES

Eleven students received certificates for completion of Paris Junior College's professional gemology program on May 8. Those who graduated included Texas residents Leesa Burnett of Forney, Jesus Guerrero of Brownsville, John Dougan of Sulphur Springs, Luis Moreno of Del Rio, Larry Norrell and Cole Searcy, both of Fort Worth. Other graduates are Randy Bristor of Dodge City, KS, Kerry Krag of Memphis, TN, Mary Ellen Madden of Tulsa, OK, Roy Moore of Centerville, TN, and Kyoko Tahara of Osaka, Japan.

# Classified Ads

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# Dates To Remember

# Advertisers' Index

## JUNE 1986

- 6-8—Antique Watch Restoration Bench Course (AWI); Archie B. Perkins, instructor; Austin, TX.
- 6-8—North Carolina Watchmakers Association Annual Convention; Radisson Hotel; High Point, NC.
- 6-9—Watchmakers Association of Pennsylvania Annual Convention, Holiday Inn; Lancaster, PA.
- 14—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Los Angeles, CA.
- 15—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; San Francisco, CA.
- 18-22—41st NAWCC Convention; Cleveland, OH.
- 28-29—American Watchmakers Institute (AWI) Annual Board of Directors meeting; Flagship Inn; Arlington, TX.

## JULY 1986

- 12-13—Indiana Jewelers Association Convention; Indianapolis Convention Center; Indianapolis, IN, (317) 631-8124.
- 13-14—Jewelers of America New Orleans Trade Show; Hyatt Regency; New Orleans, LA.
- 25-27—Watchmakers Association of Ohio 40th Annual Convention; Columbus, OH.

## AUGUST 1986

- 17—Retrofitting Bench Course (AWI); James Broughton, instructor; Nashville, TN.
- 17—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Boston, MA.
- 17-18—Restoration of Fusee Watches Bench Course (AWI); Ralph Geiger, instructor; Newark, NJ.
- 22-24—Nebraska & South Dakota Jewelers Association 81st Annual Convention; Ramada Inn; Kearney, NE.

## SEPTEMBER 1986

- 5-7—Intermountain Jewelers Association 25th Silver Jubilee Convention; Elkhorn Resort; Sun Valley, Idaho.
- 6—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Denver, CO.
- 6-8—Advanced Lathe Bench Course (AWI); Archie B. Perkins, instructor; San Francisco, CA.

- 7—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Kansas City, MO.
- 13-14—Iowa Jewelers and Watchmakers Association Convention and Trade Show; Des Moines Marriott Hotel; Des Moines, IA; (515) 274-1596.
- 13-14—North Dakota Jewelers and Watchmakers Association Convention and Trade Show, Seven Seas Motor Inn; Mandan, ND, (701) 667-2836.
- 14—Retrofitting Bench Course (AWI); James Broughton, instructor; Austin, TX.
- 14-17—Striking Clocks — Advanced Seminar (AWI); Joseph G. Baier, instructor; Seattle, WA.
- 21—Seiko Quartz Combos Bench Course (AWI); Leslie L. Smith, instructor; St. Paul, MN.
- 27—Arizona Horological Association Convention, Prescott, AZ.
- 28—Retrofitting Bench Course (AWI); James Broughton, instructor; Columbus, OH.

## OCTOBER 1986

- 5—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Richmond, VA.
- 12—Retrofitting Bench Course (AWI); James Broughton, instructor; Huntsville, AL.
- 18-19—Restoration of Fusee Watches Bench Course (AWI); Ralph Geiger, instructor; San Francisco, CA.
- 19—Meter Microamps and Modules Bench Course (AWI); Gerald Jaeger, instructor; Baltimore, MD.
- 22-24—Using the Watchmakers Lathe Bench Course (AWI); Archie B. Perkins, instructor; Cincinnati, OH.
- 24-26—Florida State Watchmakers Association Convention; Palm Beach Airport Hilton; Palm Beach, FL.
- 25-27—Advanced Lathe Bench Course (AWI); Archie B. Perkins, instructor; Cincinnati, OH.

## NOVEMBER 1986

- 1-2—Illinois Watchmakers Convention; Clock Tower Inn, Rockford, IL. For information: (309) 467-5016.
- 9—Retrofitting Bench Course (AWI); James Broughton, instructor; Philadelphia, PA.

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Referenced by case number. **Mechanical Movement Parts List:** includes all movement part numbers for all Seiko mechanical watches. Referenced by calibre number with pictures of the parts. **Master Band Cross Reference:** this list, never before available, provides you with the band number for all Seiko watches by both case number reference and model number reference.

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