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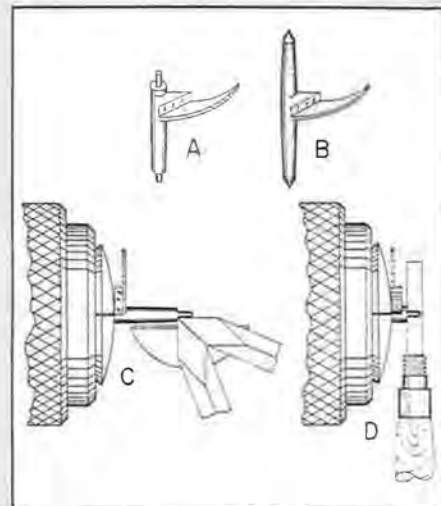
# HOROLOGICAL TIMES™



Official Publication of the American Watchmakers Institute

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# HOROLOGICAL TIMES™

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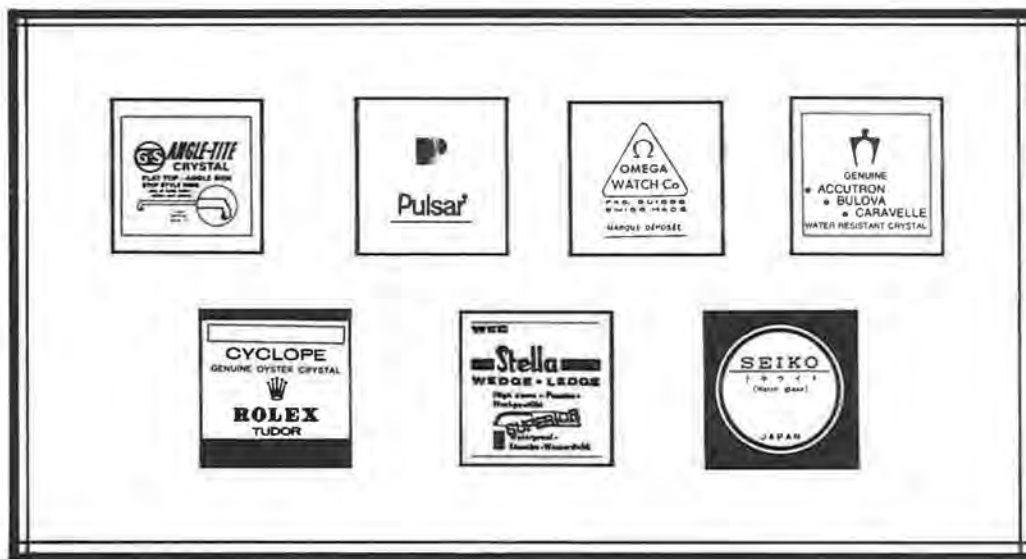
ON THE FRONT: Warm candlelight and seasonal poinsettias grace our cover this month in time for the Holidays. Photo courtesy of F. Sieb/H. Armstrong Roberts, Inc., Philadelphia, PA.

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# PRESIDENT'S MESSAGE...



William Biederman, CMW

## Put & Take

**S**ome people unknowingly take the free ride. They don't really intend to continually take, and if they knew that they were always on the receiving end, they would be the first to want to give to atone for the imbalance. The method of communication usually is the telephone, with the request such as, "What's the beat of an AS1677?"—or, "What can I do to repair a coil, or do I have to buy a new one every time one goes bad?" A good part of the time you are able to answer the inquiry from the top of your head, but there are times when you must search in technical bulletins or even contact the American Watchmakers Institute for the answer. Your friend then becomes the second mem-

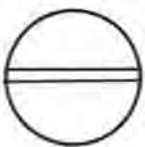
ber of AWI. Your organization then begins to serve two for the price of one. You care for two for the time of one.

Very tactfully, it is time for you to invite your friend for a friendly heart-to-heart talk. Explain the advantages of belonging to a guild, association, and AWI. Explain the disadvantages of not belonging to trade organizations. Once a prospect for membership understands this, he will soon recognize that simple "put and take" is all that is required to become a member of a successful organization. Then AWI and you will be able to enjoy the fruits of this new member's friendship and knowledge.

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# Questions & Answers

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



## A Waltham Maximus

**Q** I would like some help in positively identifying my customer's pocket watch. I think it is a Waltham, 16 size, 23 jewel, Riverside Maximus, with a wind indicator, Serial No. 23100110. It has two diamond endstones, one on the balance and one on the escape wheel.

I thought it was Model 1899, so I checked the current *Complete Guide to American Pocket Watches, Book No. 5*. They have a Riverside Maximus pictured on page 78, but the crown wheel, ratchet wheel and complete movement configuration is different than my customer's.

Did Waltham, in fact, make a Riverside Maximus with different movement configurations to fit different cases? Is my customer's watch a model 1899? If not, what model is it? Is it a valuable collectors item?

Any and all information you can give me will be greatly appreciated.

Richard Decker  
San Jose, CA

**A** According to my own Waltham records, movement number 23,100,110 was made in 1920. It was a 1908 model modified in 1912. It

is listed as a Maximus (Riverside), 16 size, open faced, 23 jewels, with whiplash patented regulator. Two hundred were made of this run at that 1920 date.

Today, any 23 jewel, Waltham watches with up and down indicators are desirable items. As for the size, Waltham stated that it was 16 size. The Riverside Maximus was made in different models and also in the colonial A series.

One that resembles your watch movement the closest is a 23 jewel Riverside Maximus, with movement number 18,144,592, but hunting. This is pictured in Roy Ehrhardt's book, Volume 1 on American Waltham Watch Company movements. This had a different regulator than yours. Another is one made for the Army and marked, "Vanguard", also with a different regulator. Riverside Maximus watches were made in the 16 size, 1888, 1890 (6s), 1894 (12s), 1899 (16s) and 1900 (0s).



**Q** I have a watch that appears to be Swiss 20 ligne. It has two mainsprings and three trains including dial train. It has a sweep hand and second hand. The second hand appears to be for 10th seconds. The name on the movement is—A. Huguenin & Sons Loge.

There is a button above the II and IV. When the button above the II (Please turn to page 8)

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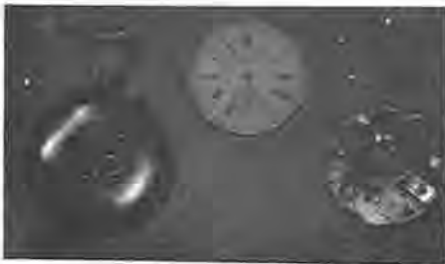
## QUESTIONS AND ANSWERS

(Continued from page 6)

is pushed, the entire watch stops. The other button sets the hands. The case is made of solid 18K with the monogram letters of S.W. (raised). The numbers inside the case are N12724

Any information you can provide on this watch will be appreciated. What is its approximate age? How rare is it? Where was it manufactured? What was its purpose?

K. Hoover  
Provo, UT



**A** I have examined the photos of your watch closely. It shows a chronograph-type watch made just before the introduction and invention of the heart cam (which allowed a fly-back to zero without stopping the watch). Your watch is of the 1870 period and was made in LeLocle in Switzerland close to the French border and also near Neuchatel, a present busy horological center in Switzerland.

Examination of the dial under magnification shows that the outer dial is divided into minutes (or seconds) and half seconds, not tenths. This would reinforce the opinion that your watch beats not fifths, but four times a second (14,400 VPH). This also allowed the "flying" seconds hand at the lower dial to divide the seconds into fourths.

Two of these would be observed at the outer dial markings if the watch also contained a centered seconds hand. The two barrels probably supplied power for eight days. Large watches of that time contained two barrels and an extra set of train wheels also multiplied the number of days the watch could run on one full winding. Some such watches also had a differential type of gearing to the train of wheels which allowed stopping the chronograph train and allowed the time train to continue. Setting the sweep hands to zero however, was a task in quickness of the stop mechanism being indexed at the appropriate moment.

Huguenin & Sons of LeLocle was a well-known maker of very high grade watches. This one is no exception, showing very high grade workmanship and quality. It is somewhat rare. Such watches were used to time events and also as pulse meters. The jump fourths seconds make this more desirable. Multi-trains also make these more attractive but they must be in working order.

Henry B. Fried

**Q** Perhaps you can help me with some information on the history of the movement of the Seth Thomas I purchased at a local garage sale. It was completely disassembled and in an assortment of miscellaneous junk, but all parts (except the springs) were in a separate box and the support (cast iron) bracket was with the pendulum.


After rebuilding the movement, I mounted it on my board, but ran into trouble with the suspension. After trying several suspension springs #2 regulator, I found the beat very erratic, so I made a spring from a flexible tape measure ( $\frac{1}{2}$ " x .007" x  $1\frac{3}{4}$ ") and finally wound up with a satisfactory time keeping unit.

I used standard American mainsprings purchased from Merritts ( $\frac{3}{4}$ " x .018" x 96") and they seem to work very well. I also used a new escape wheel ( $1\frac{3}{4}$ " x 40 teeth) and a Seth Thomas #2 regulator from the same supplier.

I found a slight reference in the book *200 Years of American Clocks & Watches*, a Rutledge book printed by Prentice Hall, NJ. On page 173, illustration #210, it mentions that the movement was made by Seth Thomas for the Dey Time Register, Syracuse, NY. But no mention is made of the specifications or how it is cased.

The following measurements are my own:  $\frac{3}{32}$ " brass plates not bushed;

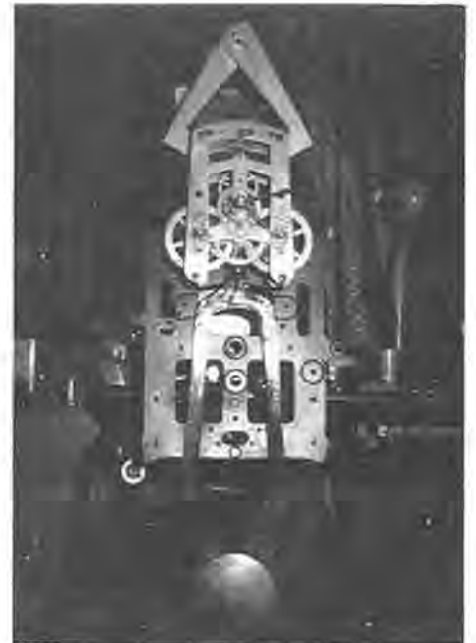
$1\frac{5}{8}$ " between plates; 6 steel pillars  $\frac{5}{16}$ ";  $7\frac{1}{2}$ " x  $5\frac{1}{8}$ " plates (see photo); 2 mainsprings, both left wound; 2 mainspring wheels,  $3\frac{3}{8}$ " diameter; 25" from suspension spring to bottom of 5" bob; Lyre Pendulum rod, mahogany, 2 sections; all brass wheels with lantern pinions; Graham dead beat escapement (or seems so). The unit runs 13 or 14 days without a loss of beat (80 per minute). The front plate is stamped

 Made in the U.S. America

beneath the cannon pinion.

I would appreciate any information you can supply, as I would sure like to know how to properly case this unit and know the proper size of the mainsprings and the right size for suspension springs.

George St. Garrity  
Allison Park, PA



**A** Your letter has been referred to me for an answer. I recognized the photographs of the movement from several I have restored in the past. However, they have specialized parts according to their use in industry. It is very likely that it could have been used by Dey Time Register of Syracuse, NY, or by many other companies in need of registering or controlling an event.

The movement is very similar to one shown as Figure No. 86F (really representing the entire No. 86 series) on page 4, in the reprinted booklet "Factory List of Seth Thomas Clock Movements". Thomaston, CT.

(Please turn to page 15)

# European Watch, Clock and Jewellery Fair

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# Bench Tips



Joe Crooks

Send your tips to: Jingle Joe, AWI Central, 3700 Harrison Ave., Cincinnati, Ohio 45211.

## A Tip for Bushing Clocks

**H**ere's a tip from Al Dodson of Lexington, Kentucky. To you young squirts in the AWI—Al is the son of the late Jim Dodson who was a past president of the AWI. We old-timers still miss Jim dearly.

This is a tip for a fast and reliable method for bushing clocks. I make a *piloted* reamer which I use in the drill press; the pilot provides an accurate location of the hole and it is not necessary to clamp the plates down—a real time-saver. Here's how to make this tool:

1. From a piece of drill rod, turn a pilot the size of the original pivot.
2. Next, turn the section behind the pilot .02 or 3mm smaller than O.D. of bushing. This will be the cutting portion.
3. File cutting portion flat on one side until level with pilot.
4. Rotate 180° and file down to pilot.
5. File rounded side of cutting portion to give relief until leading edge just disappears and becomes sharp cutting edge.
6. Rotate 180° and repeat # 5.
7. Now relieve front of cutting portion to make cutting edge.
8. Repeat # 7 on other side of pilot.
9. Harden and temper.

10. Test on scrap stock. If the bushing fits too loose grind on sides of cutting portion to reduce O.D. If the bushing fits too tight it may be necessary to make a new cutter or the hole could be slightly broached. This tool is basically a counterborer.

I've made these tools up with pilots sized every .1 mm to fit either brand of bushing. I do all my bushing work with these and have had excellent results.

[P.S. Why do they call you Jungle Joe? You don't look like Tarzan at all.]

*What Al has made is a clever two-sided counterdrill with a pilot/pivot in the center of the countersink tool. The sides are flat like a pilot drill. The pivot on the tip makes it almost impossible to drift to the worn side of the pivot hole while boring the hole for a bushing using a drill press or a bushing tool.*

*Al, I didn't use your drawings of the tool for two reasons. First, you described the tool so clearly, no drawing is needed, and second your drawings are so lousy why mess up a good Bench Tip?*

*As for your P.S., take off that cracked loupe and you will see that it's Jingle Joe, not Jungle Joe. Also, that Tarzan remark wasn't nice . . . after all, Cheetah was part of that jungle family! Some day I'll tell you how I got the handle "Jingle Joe." And that's Jingle like in JINGLE BELLS and a MERRY CHRISTMAS TO ALL!*

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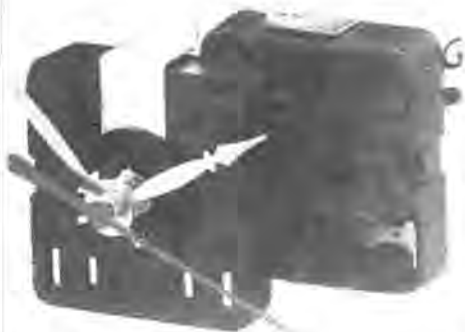
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# WATCHES *Inside & Out!*

By Louis A. Zanoni  
and Gregory L. Zanoni

## Zantech Quartz Watch Analyzer Model ZA900

### PART III



### AUDIBLE COIL TEST

Very often there is uncertainty about the continuity of the coil in a quartz watch. When the clicking of the ZA900 (which indicates that current is passing through the coil), doesn't occur during routine testing, you must not automatically assume the coil is broken. The ZA900 will NOT click when the stem of the watch is pulled out in the stop mode. It will also not click if the oscillator is dead. The lack of clicking only tells you that there are no pulses going to the coil.

There are two ways the continuity of a coil can be tested without removing it from the circuit. One way is to short the terminals of the coil together with a pointed pair of tweezers while the ZA900 is connected to the battery terminals of the movement. If the coil is open and the circuit board is trying to send pulses into the coil, the pulses will pass through the tweezers which act as a substitute for the coil, and cause the analyzer to click. The disadvantage to this test is the long time delays between pulses on some movements. The quickest way to determine if a coil is open or not is with the audible coil test of the ZA900.

To test the coil, plug the mini banana plugs of the dual tip probe into the COIL TEST/MOTOR DRIVE jacks (Figure 1). Push in the COIL TEST button (Figure 2) and probe the two terminals of the coil with the two needle tips of the dual tip probe. If the coil is good, the analyzer will buzz. If the coil is broken or shorted, there will be no sound. When testing coils, be sure to check for shorts between the coil windings and the metal center post of the coil. If it shorted internally to the metal center post, the coil will be shorted to the mainplate. It must be replaced.

(Please turn to page 14)

COIL TEST/  
MOTOR DRIVE

VO  
BA\*



Figure 1



Figure 2

# ZANTECHNOLOGY

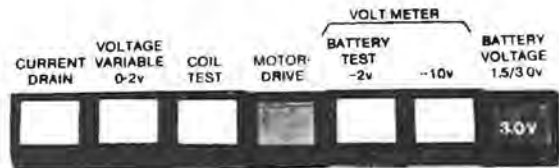
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## WATCHES INSIDE & OUT

(Continued from page 12)

### QUARTZ CRYSTAL TESTING

If the quartz crystal of the movement is faulty, the watch will not run. It is only one of the many reasons a watch won't run. Therefore, it must be tested.

The easiest way to determine if the oscillator circuit (which includes the quartz crystal) is working or not is to place the powered-up movement next to the sensor of a quartz timer (Figure 3). If the oscillator is running, the timer will sense the vibrations of the quartz and display the accuracy of the movement in seconds per month.

If the oscillator is not running, the quartz crystal is the prime suspect. To test the quartz crystal without removing it from the circuit, plug the RCA SHIELDED CABLE PROBE into the QUARTZ CRYSTAL SUBSTITUTE jack (Figure 4). While the movement's battery terminals are connected to the ZA900, use the probe tip of the RCA SHIELDED CABLE PROBE to make contact with one of the quartz crystal leads. Try each of the quartz terminals; only one needs to respond. If the quartz crystal is the only problem with the movement, the movement will begin to run. You see, the probe acts as a substitute for the quartz crystal. If the movement begins running, replace the quartz. If it does not run, visually examine the physical condition of the trimmer, circuit board, and any other associated components. Use a microscope. The components are small and they are very close together.

### MOTOR DRIVE (circuit board substitute)

Prior to ordering a replacement circuit board for a quartz analog movement, check the operation of the rest of the movement with the MOTOR DRIVE and provide more accurate estimates to your customers. The MOTOR DRIVE circuit of the ZA900 acts as a substitute for the circuit board. It can be used to run a movement when the circuit board of the movement has been removed, providing the coil is still on the movement.

To use the MOTOR DRIVE, push in the MOTOR DRIVE button (Figure 5) and plug the mini banana plugs of the dual tip probe into the COIL TEST/MOTOR DRIVE jacks (Figure 6). After removing the circuit board from the movement, screw down the coil and probe the two terminals of the coil with the dual tip probe. The dual tip probe will provide pulses to the motor once a second. If the coil, stator, rotor, and geartrain are functioning properly, the movement will begin to advance once a second.

The one second pulses of the MOTOR DRIVE are also helpful when troubleshooting mechanical problems in the rotor and geartrain; especially when the original circuit board only provided pulses every 30 seconds. Things just happen faster.

### SWITCH CONTACT

All LCD watches and some quartz analog watches use electronic push buttons for activating and setting the time, as well as other functions. The push buttons on the side of LCDs, Digi-Anas, and some analogs are electrical contacts that complete an electrical circuit when they are pushed in. When the push button on the outside of the case makes contact to the movement inside the case, the integrated circuit responds according to preprogrammed instructions within the integrated circuit.



Figure 3

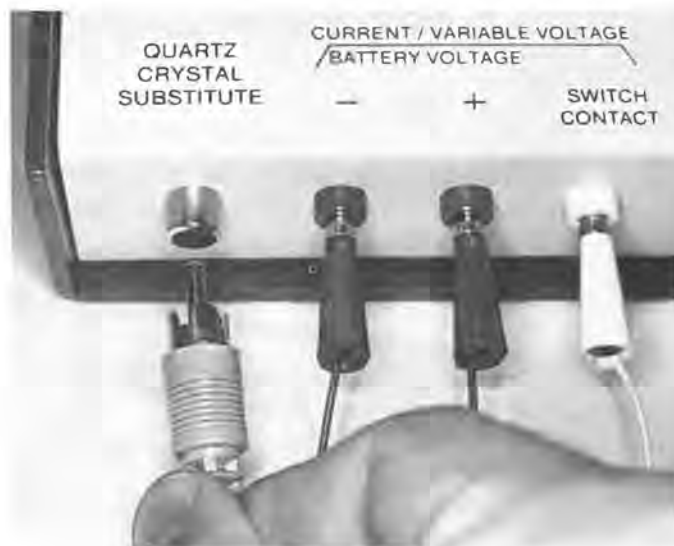
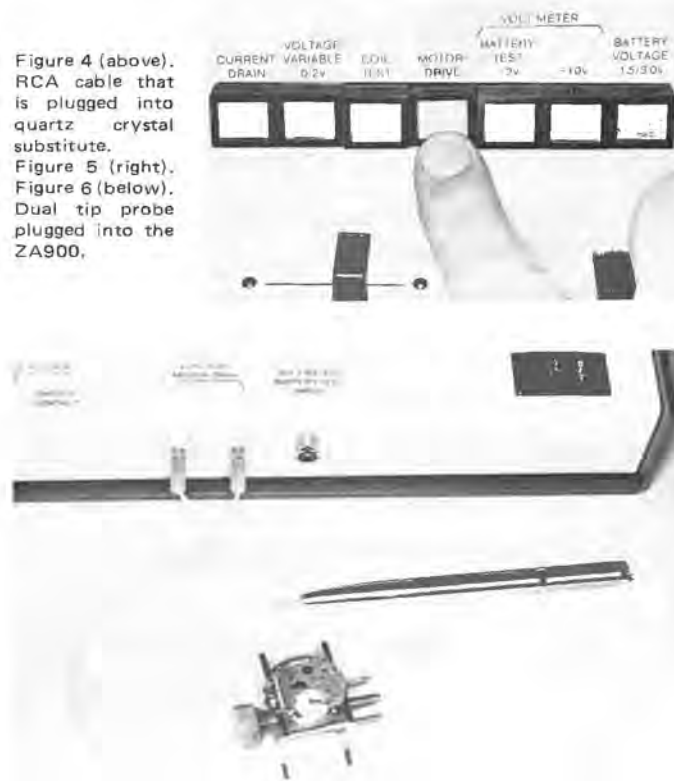


Figure 4 (above). RCA cable that is plugged into quartz crystal substitute.

Figure 5 (right). Figure 6 (below). Dual tip probe plugged into the ZA900.



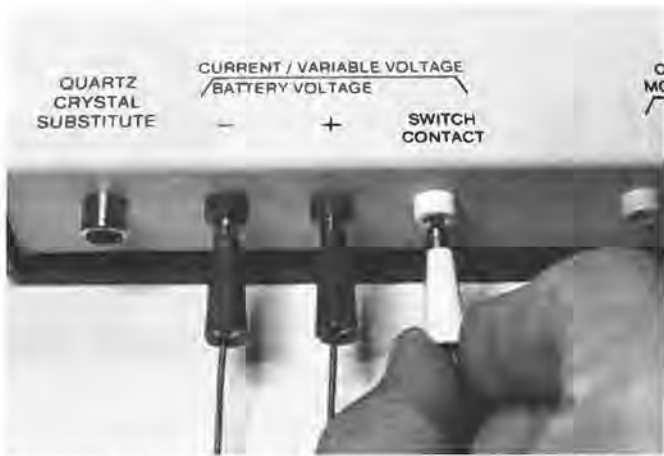


Figure 7. Switch cable being plugged into socket.

Movements or modules that have electronic control and setting switches can easily be tested with the ZA900. While the module or movement is connected to the power terminals of the analyzer, and the CURRENT DRAIN button is pushed in, plug the mini banana plug probe cable into the jack marked SWITCH CONTACT (Figure 7). While the battery terminals of the module or movement are connected to the ZA900, use the pointed end of the switch probe to activate the setting mechanism of the watch by probing the module switch contacts with the pointed end of the probe.

If the electronic switching functions of the module or movement are working properly, the module or movement will respond as it would when it is in the case, and its buttons are pushed. Many problems occur between the movement/module and the case. Therefore, it is extremely important to

(Please turn to page 36)

## QUESTIONS AND ANSWERS

(Continued from page 8)

The brief description of Figure No. 86F, which looks like your movement in every respect, states on page 21 of this 25 page booklet, "No. 86F - 15 day, extra large pendulum, time, spring, double spring, 18" gallery. Pendulum from center of movement to end of rating screw 8-1/4", with No. 22 ball: diameter of ball 3-11/16". Wood rod. Crown 60, dead-beat, center 1-1/2". Length 7-13/16", width 7-1/16", depth 4-1/2". Mainspring No. 137, 10' x 3/4" x .015".

The booklet lists some 16 variations on this movement involving primarily the number of escape wheel teeth (called the "crown" in the booklet) from 36, 44, 50, 56, to 60, and pendulum lengths varying accordingly from 8-1/4" to 26-7/8", apparently requiring some differences in tooth and pinion leaf counts as well. But you chose a 40 tooth escape wheel for obtaining the pendulum length desired. Incidentally, the book lists pendulum length from movement center to bottom of rating nut presumably for purposes of case length.

I hope this is some help on the ST movement, but the case style is another problem. I have an empty case for an International Time Company Time Clock, but no indication of the type of movement or recording device used; only the name plate attached to the bottom inside of the case is present with four mounting holes for a large plate, in turn to hold the movement found on the back board. These holes are found in a rectangle measuring 14" across and 13-5/8" down.

Joseph G. Baier, Ph.D.

T-13

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## LOOKING AT PICTURES

**W**atch out for the customer who comes in talking about their recent trip or something to do with a member of their family. When this happens, it can only mean one thing—pictures. It isn't that someone else's pictures are boring, it's just that they are uninteresting!

One good customer came in one time to have her watch checked. I knew something was up when she said it was giving her trouble while she was on her trip; I knew what was coming so I made like I didn't hear what she said. Then she said, "I think it started while we were in Rome." I still played dumb. She added, "Or maybe it was Singapore." You could tell she was an expert at this sort of thing by the way she worked the pictures into the conversation. She said, "I remember the exact place because I noticed my watch while I was taking a picture. Let me see if I can find it." Let's face it, this is a pretty smooth entree into a complete recapitulation of the trip. If it reaches this point, forget it. The rush job you are working on will have to wait. This is what is known as 'the point of no return'.

Sure, we all like to retain some memories of trips we have taken. Some overdo it, like a watchmaker acquaintance of mine. This guy and his wife saved up for several years in order to take their dream trip. Granted, it's nice to see when someone's dream comes to fruition, but to relive it with them is an entirely different matter. On their return, I received an invitation to stop by and see a few slides that were taken during the trip. Not wanting to hurt his feelings, I did stop by, thinking it would only take a minute. I should have sensed something was amiss when his wife brought out some dip, a plate full of sandwiches and a pot of coffee. There was enough food to last the night. In fact, there was enough to last until the middle of the next day.

It started off with a homemade slide that said, "Tom and Gretchen's Vacation Trip" (snappy intro). Then it started. I won't go into the whole trip, but to show you what it was like, I'll review the first ten slides—

1. Tom and Gretchen leaving through the front doorway, waving.

2. Tom and Gretchen loading the luggage in the car trunk, waving.

3. Tom and Gretchen backing out of the driveway, waving.

4. Tom and Gretchen inside the car pointing to the airport seen in the distance, waving.

5. Tom and Gretchen taking a parking ticket from the fellow at the airport entrance, waving to him and he was waving back.

6. Tom and Gretchen unloading their luggage at the parking garage, waving.

7. Tom and Gretchen standing in line to check their luggage, waving.

8. Tom and Gretchen waving to the girl at the ticket counter, with her waving back.

9. Tom and Gretchen walking into their respective restrooms with silly looks on their faces, waving.

10. Tom and Gretchen standing at the gate awaiting departure, waving.

It took another ten slides before they even left the ground. I finally left after number 178, promising to come back some other time. As I was walking down the driveway to my car, guess what Tom and Gretchen were doing. You guessed it, waving. This has to be the wavingest couple on earth.

As much as I hate to bring up the subject of grandchildren, it must be done when talking about pictures. Grandchildren and pictures are as inseparable as bologna and whipped cream. Have you ever attended a meeting or convention where new grandparents are present? If you know about their blessing ahead of time, at least you have a chance to avoid being trapped for an hour or so. I'll never forget the time at one convention when the speaker, while showing some slides of a particular watch movement, knowing he had everyone's attention, showed a slide of his new grandchild. Of course, he made the excuse of not knowing how it got in there but went ahead and told of the birth, weight, length and how much the kid looked like him. There was about as much

resemblance as there is between a hippo and an aardvark.

There are times when pictures are necessary. For example, if you write to Henry Fried and ask about a particular watch or clock, sure a picture is a big help. If you plan a trip out of the country and need a passport, sure you have to have a picture. Many states require a picture on a driver's license. Guest speakers usually have to supply a picture for the convention program or booklet. All these examples are to show when a picture is a necessity.

One thing I could never understand is why people have pictures made of themselves. Have you ever noticed when you're cornered and have to look at some and the person showing them will always say how good someone else looks, but when they appear they always say what a terrible picture it is. These are the same people who never want their picture taken but are always ready to pose for one.

Show me a family with three or more children and I'll show you a family with three thousand pictures of the first born, seventeen pictures of the second and none of the third or more. I was the youngest of ten and there isn't a picture of me until I went into the service. It's a good thing they didn't put them on milk cartons back then. Mine would have been blank. Then again, with ten children, nobody would have known I was missing.

That's all for now. Have to get over to pick up some pictures at the photo shop before they close.

TIMES

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# CLOCKS *Inside & Out!*

## *Repivoting Hardened Arbors*

By R. Lloyd Mize, BFA, CMC, FBHI

**O**ne of the most common jobs of the clock restorer is that of repivoting an arbor. It is not unusual to see a pivot worn almost completely through, but with the pivot hole in the plate virtually without wear. An exception is the common French eight-day time and strike round movement. Here, more often than not, the pivot is simply broken off; usually from shock or inept reassembly after cleaning. I have replaced many broken French pivots but only rarely do I see one badly worn.

The pivots and arbors of French clocks are usually small and quite hard. This combination of low mass and high hardness is really the root of the problem. It is futile, and hazardous to one's peace of mind, to try to face off and drill the end of such an arbor without first annealing the end of the arbor. Any clockmaker, I hope, knows that the annealing of hardened steel requires heating to a specified temperature; usually judged by color, and allowing it to cool slowly. The word *slowly* is the key word here. Many, apparently, try the

quick and easy way; that is, clean up the pivot end to a bright finish, then get out the alcohol lamp and heat the end to the desired color, then lay it aside until it cools. Unfortunately, with such a small mass, the arbor end cools too quickly, and despite the color, it is still quite hard—sometimes even harder than before. As a matter of fact, when I used to make small drills or reamers (broaches) I simply whipped them through the air a couple of times, as if I were trying to extinguish an old-fashioned kitchen match, and they were hard and cool immediately.

Another problem of annealing a French arbor is the danger of using too much heat over too large an area of the arbor. Most wheel collets of these clocks are cylinders of brass, soft soldered to the arbor, with the wheel seat turned "in situ", as our British cousins say. Maybe you have had the gut wrenching experience of seeing a wheel suddenly sag and go drunkenly awry as a bubble of solder appeared at the collet-arbor juncture. This is why tranquilizers were invented.

### *About the Author*

*R. Lloyd Mize ("Lloyd") served his apprenticeship in the metal trades, and retired in 1979 as a Master Toolmaker. He was one of the original instructors in AWI's first correspondence course in Clock Repair and Restoration. He was certified as a Master Clockmaker by AWI in 1971, and in 1975 was awarded the annual Bronze Medal of the British Horological Institute. He holds a First Class Certificate in Technical Horology from BHI and is listed in the National Register of Craftsmen (UK). He lives in rural Woodford County, Kentucky, near Lexington. Correspondents may address him at Rural Route 6, Huntertown Road, Versailles, Kentucky 40383.*





FIGURE 1. Example of center wheel-arbor-pinion, placed in secure position in can of clean sand, with sheets of aluminum foil at left, and brass slug heat sink at right.

I will describe the procedure that I have found safe and which makes repivoting a French clock as simple as for any American kitchen clock.

In order to properly anneal that part of the arbor which we will drill for a new pivot, we must use a heat sink which will allow us to (A) bring the arbor to a proper temperature and (B) allow it a *slow* cool down period. We must also, at the same time, protect the wheel, its collet and the remainder of the arbor from excess heat. The heat sink simply adds mass to the arbor end. Brass rod cut-offs are ideal for this purpose. I accumulate and save short ends of brass rod in diameters of 3/8 to 1/2 inch diameter and from 3/4 to 1 inch in length. Normally, no more than 3/8 to 1/2 inch of the arbor needs to be annealed, so these sizes are adequate.

First measure with a micrometer the diameter of the arbor end to be annealed. Then select a drill size just barely larger (I just use the closest, next larger number drill) than the arbor end, then drill a blind hole to the depth to be annealed in the brass cut-off piece. For example, if the arbor measures 0.047 inch diameter I select a number 55 drill, which is the next size larger than 0.0465 inch or number 56. The arbor end should be a close fit but not sloppy. Nor should it be tighter than a finger push and sliding fit. Here, concentricity and neatness are not important, we only want an efficient heat transfer from the brass heat sink to the arbor.

Next, we need to support the wheel and arbor and protect all but the pivot end from the heat. A small tin can, such as a vienna sausage tin, will do. I've also used a small clay flower pot. It only needs to be about one standard measuring cup capacity. If you have meticulously saved all your clean brass filings and chips you can use these, otherwise use common sand. Stick the arbor with wheel attached in the sand or the brass filings as shown in Figure 1. The wheel and collet placement on the arbor will vary, of course, depending on which wheel is being repivoted. Pack the sand or brass filings around the arbor with the end to be annealed uppermost and exposed. Before you slip the heat sink brass cylinder in place, get two pieces of aluminum foil, such as Reynolds Wrap™, about 4" square. Stab the upright arbor



FIGURE 2. Flame is directed only to the brass heat sink.

through the center of the first piece and crumple it closely around the arbor at the level of the sand or brass filings. Take the second piece and stab it down over the arbor, but leave it opened out flat. Now slip the brass cylinder heat sink, which you earlier drilled, over the exposed end of the arbor, which is the end to be repivoted.

We are now ready for heat. Don't use an alcohol lamp here. A small pinpoint flame propane torch, such as the bench size (6 ounce) Bernz-o-Matic™, should be used. Apply the point of the blue flame (see Figure 2) to the brass cylinder heat sink only. Do not play the flame on the arbor directly. As you heat the brass, rotate the pot or can so that the brass heat sink is evenly heated. As you heat the brass (it will take about one or two minutes) you will notice that the flame causes dancing shadows on the brass. The brass sink will actually be just below red heat. Do not heat the brass to red heat—that is too hot and unnecessary. Practice on a junk arbor if you lack confidence. Keep the brass sink at heat for a few seconds more then stop, leaving the heat sink in place. At this point extinguish the torch flame and do one of several things:

1. Go wait on several customers (always preferred),
2. Sweep up around your bench; or
3. Work on another bench job, being careful not to disturb your still hot heat sink and arbor.

The important thing is to allow plenty of undisturbed cool down time. In any event leave the setup as is for at least an hour. When the brass heat sink has cooled to room temperature it may be removed. Keep it for future use. You can reuse it for a like sized arbor or later redrill it a larger size. Then you may carry on the drilling for repivoting in your usual manner.

Pivoting (or repivoting) has been adequately covered in this journal and other horological literature, so it may appear that I'm "reinventing the wheel". But, because there are many ways to do any job, I will describe the procedure which has worked well for me.

First, let me say that I don't claim that my method is superior to any other, or that it is original. I learned it as



FIGURE 3. Chuck holding tailstock runner at left, typical female centering runners at right.

a distillation from other masters of the craft. My only claim is that it accomplishes the objective, which is simply to start and drill a truly central hole in the end of an arbor and to insert a new pivot. The new pivot should be permanent, functional, and undetectable from the original.

I don't even own a Jacot Tool in a pretty mahogany box, so my pivoting must be done using a standard WW pattern watchmakers lathe, with collet holding tailstock, and an inexpensive but efficient steady rest, made by R. Flaming and obtainable from most horological suppliers to fit any lathe.

Necessary accessories which you can make yourself, as I did, are several runners with different sizes of female centers, made of stock ground and polished annealed drill rod, easily obtainable from any industrial tool and metal stock distributor (see Figure 3). The draw-in collet holder for my WW tailstock measures exactly 0.500 inch diameter, and one three foot length of Stentor™ annealed drill rod furnished enough stock for several runners with some left over. These homemade tailstock runners need not be hardened, as they are used only in the initial setup, as described following:

With the steady-rest in position on the lathe bed, and its three brass runners drawn well back, select a collet for the headstock to hold the arbor at the end opposite the end to be drilled. Now insert your homemade tailstock runner with an appropriate size female center (see Figure 4) and bring it up to meet and center the arbor tip which is to be drilled for the new pivot. Next, tighten down the headstock collet, and with light pressure on the tailstock center, tighten the tailstock and the headstock collet securely. There should now be no "shake" to the arbor-wheel-pinion assembly. Next, adjust the position of the steady-rest so the three runners will grip the arbor as near the end to be drilled as possible. Lubricate the points where the steady-rest runners bear on

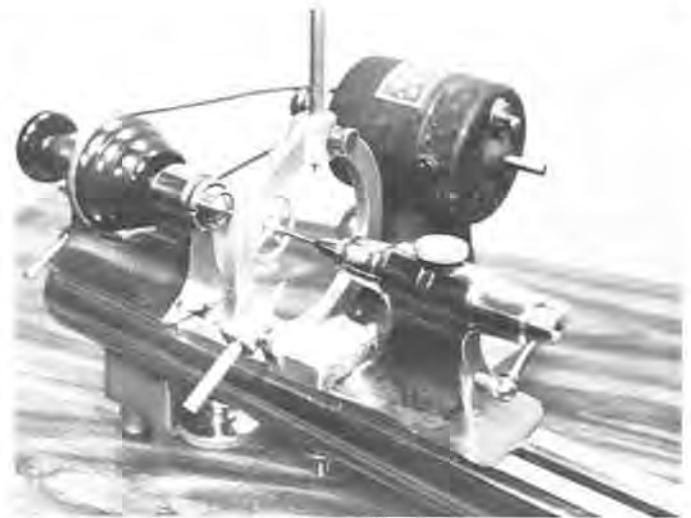


FIGURE 4A. Arbor in position for drilling. Note female tailstock runner being used to accurately center arbor, before steady-rest runners are tightened down.



FIGURE 4B. Steady-rest runners are now evenly tightened down, and female runner in tailstock replaced by chuck-holding runner, preparatory to drilling.

the arbor. The arbor-wheel-pinion assembly should now freely rotate, but without any "shake". Care should be taken in adjusting and tightening the steady-rest runners, with the tailstock female center in position; tightening each a bit at a time alternately; first one, then two, then three, and then repeat; so the holding pressure will be even.

When this is done, the arbor is well supported, independent of the tailstock, and your temporary centering runner can be removed from the tailstock. Replace it with the regular collet holding runner and draw-in rod.

*"Clocks Inside and Out" will continue next month with more on Repeating Hardened Arbors.*

TMB

## ASSOCIATION NEWS

### NEW YORK

On October 6, 1986 at the Hotel Summit, NY, the Horological Society of New York received a presentation from Zenith Manufacturing and Chemical Corporation, Ed Pedzy, president, and his son, Peter.

Using slides, Mr. Pedzy recorded the development of the early watch cleaning technology with vapor degreasing processes. It can clean mechanical and quartz movements, coils, plastic parts, clocks, cases, and bracelets.

Mr. Pedzy supplied some special touches. He had a repeater with a missing mainspring and offered \$10 to anyone who could determine its dimensions. Paul Homburger accepted the challenge and won. Also, Pedzy offered as a door prize a watchmaker's ultrasonic cleaning machine—won by Howard Levy.

The National Association of Watch and Clock Collectors awarded Henry B. Fried for his contribution to the field of horology. It was also announced that he had become a member of the Chinese Watchmakers Association.

TMB

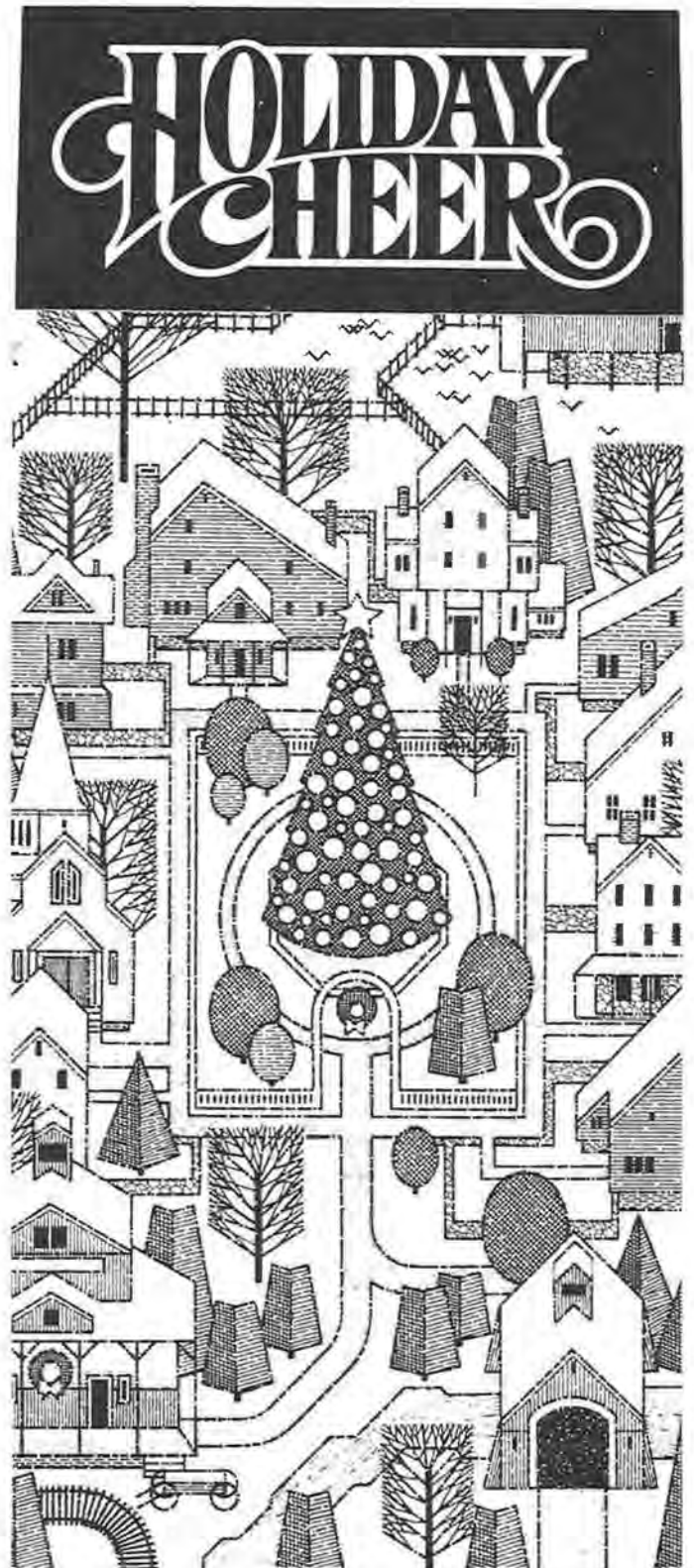
### UPCOMING EVENTS

*Minnesota Watchmakers Association Convention  
February 27, 28, and March 1, 1987  
Radisson South — Bloomington, MN*

*Iowa Jewelers & Watchmakers Association  
Spring Seminar  
April 12, 1987  
The Highlander Inn — Iowa City, IA*

*Ontario Watchmakers Association  
50th Anniversary Annual Meeting & Banquet  
April 26, 1987  
Loews Westbury Hotel, 475 Yonge Street  
Toronto, Ontario CANADA*

*Iowa Jewelers & Watchmakers Association  
Convention & Trade Show  
September 12 and 13, 1987  
Airport Hilton — Des Moines, IA*



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# Chime and Strike

Steven G. Conover



## *English Bell Strike Grandfather Clock\**

PART 2

To finish with the English bell strike movement, we'll try to pick up where we left off in October. In that article, I covered the basic operation of the strike train. After identifying the front movement parts, I described some adjustments and repairs. A diagram of the strike train layout showed how simple it really is compared to other clocks we repair.

Actually, that simplicity can get you into trouble. It's so easy to assemble one of these old movements. Fitting the pieces together is just the beginning, however. Accumulated wear combines with the scars from old repairs. What you are left with is a movement that can fail in many ways. More than once I have seen them work well on the test stand, only to act up soon after delivery to the owner.

This month we will look behind the front plate of the movement, to cover the rest of the strike train. Along the way we'll try to anticipate some of the common problems you should expect. If you can spot a potential failure and correct the worn or ill-fitting part, you are doing good work. To trust the test period alone to shake out all the "bugs" is not wise. Movements of this type are heavily powered. The mechanism can push its way through weeks of "trouble-free" operation, only to quit on the customer.

### HAMMER ARRANGEMENT

Figure 4 shows the hammer arrangement. Imagine the front plate removed, and that you are looking inside. The pin wheel (19) provides lifting action for the hammer (27), which strikes a bell (28). Hammer tension is supplied by the hammer spring (23). As the lifting pins raise the hammer tail (24), the hammer arbor (25) pivots, carrying the hammer with it. The upper left movement pillar (26) acts as a damper to help limit the bouncing of the hammer.

You can bend the hammer shaft to bring the hammer head closer to the bell, or further away. If the hammer is too

far away the sound is faint, and if too close it stays against the bell. Adjusted correctly, the metal hammer raps on the bell to produce a loud, piercing tone. It's a bit too much noise for many people, and you will see everything from tape to cotton balls wrapped around the hammer to deaden the sound. Make sure you satisfy the customer on the volume. Otherwise he may call you back to quiet the bell.

By adjusting the hammer spring (23) you can exercise some control on the noise level. Even when the movement is assembled, you can remove the spring and change the tension easily. But if the tension is too light, the strike sound will be faint and erratic. In addition, the hammer will bounce too much. As shown in Figure 4, part of the hammer rests on the flat top of the spring. A weak spring will not control the bouncing, so the hammer head will hit more than once. A stronger spring will limit bouncing, at the same time it raps the hammer firmly on the bell. But excessive tension will overload the strike train, inevitably causing it to stall.

Of course, the bell itself has everything to do with the sound. Often the bell is not original, or has been cracked and repaired. You may need to replace a bell to achieve a good sound. If the bell stand (29) has been bent over to accommodate a different diameter bell, you should be especially wary. It may be hard to adjust the hammer to hit the bell properly.

### MORE ON ASSEMBLY AND ADJUSTMENT

Although we covered some basic adjustments last time, we need to step back a moment to consider more points. Figures 4 and 5 will show what you should look for as you assemble the strike train.

There are only a few basic adjustments to make. Figure 4 shows the hammer tail (24) at rest. It is free of the pins on the pin wheel (19). This means that the hammer does not end up on the rise at the end of any strike sequence. As the strike begins on the next hour, the strike train is able to

# Chime and Strike

reach full speed before a pin engages the hammer tail. The hammer load is considerable, so it is not a point to be taken lightly.

To observe the hammer action, assemble the movement including the gathering pallet, rack, and rack hook. Rotate the wheels with your finger to see the result as the gathering pallet locks. Remember that you can install the gathering pallet four different ways. Each position will change the rest position of the hammer. The other way to change things is to separate the plates slightly and disengage the pin wheel from the pinion on the gathering arbor. Then mesh the teeth in a different spot.

The only other internal adjustment to check is the position of the warning pin. At rest, it should be at 11 or 12 o'clock, viewed from the front. Figure 5 shows the warning wheel as a dotted circle, with the pin in black. The pin must be in this position to allow the warning action to work. To change the adjustment, disengage the warning arbor pinion from the gathering wheel below it. Mesh at the correct spot, then fit the plates together and check.

The remaining adjustments, most of which were covered in the October article, can be done from outside the movement.

## LOCK-WARNING-RUN

Whenever you try to adjust an English bell strike movement or analyze faults in it, you should check the mechanism in three phases of operation. The first of these is the lock. Figure 5 shows the gathering pallet locked on the rack pin. In many clocks, the point of contact between these two may not be positive. A worn gathering pallet, or one of the wrong size, may glance off the pin. The pin itself may be worn or loose. Instead of locking, the pallet misses, and the rack hook pops up again. Striking will begin over if the rack falls back to the snail. After the count is completed again, there is another opportunity for the mechanism to lock the way it should.

Check the rack hook to see if it is part of the problem. A rough, worn surface will not slide smoothly down the last rack tooth. If the rack is sticking because of this, the rack pin will be to the left of the correct position as the gathering pallet makes its last pass. The mis-locking often causes the strike to run on unpredictably. Look for rust on the rack hook post, or an ill-fitting taper pin holding the hook. Sometimes the post is loose on its threads, and can be easily tightened.

Figure 6 shows the second phase, with the strike train at warning. The warning pin (at arrow) has moved to the warning lever. The lever has, in turn, raised the rack hook, allowing the rack to move. Notice that the gathering pallet

is free from the pin. Always look for a worn or marked-up warning lever, where the pin hits it. With the movement in the warning position, it is easy to find the exact spot. Remove the warning and lifting levers and polish them. While you're at it, check for rust or roughness on the post, and check the tightness. Always use new taper pins when installing levers. The old ones can cause hang-ups.

Figure 4. Hammer arrangement.

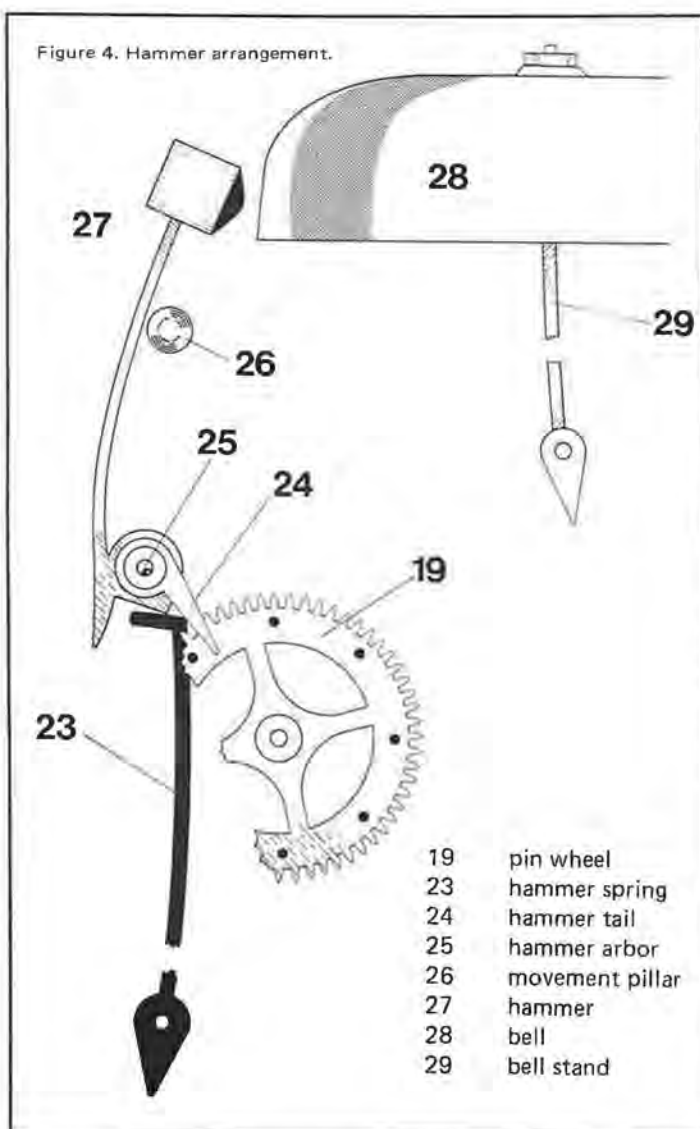


Figure 5. Strike train in lock position.

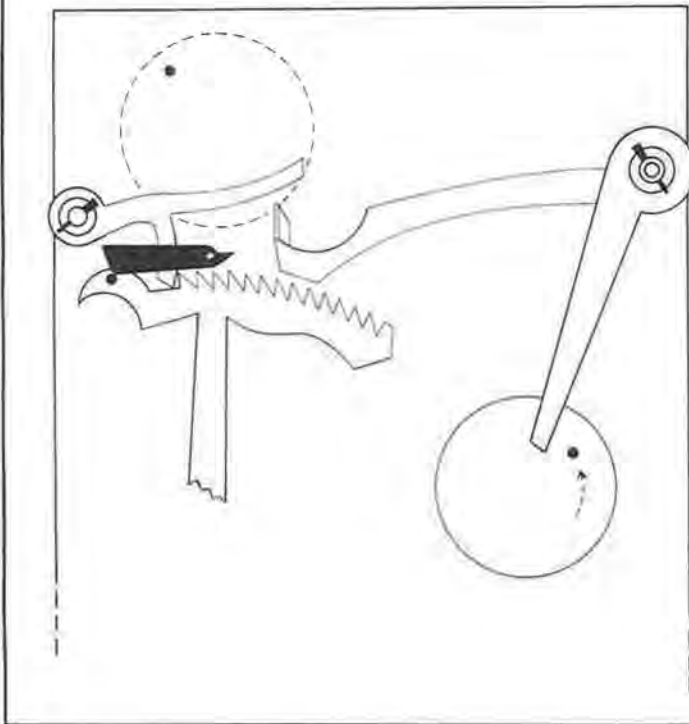


Figure 6. Warning position.

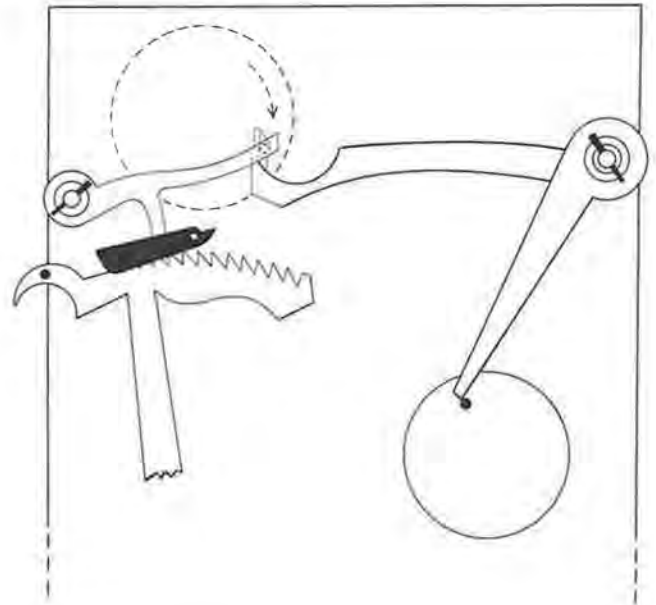
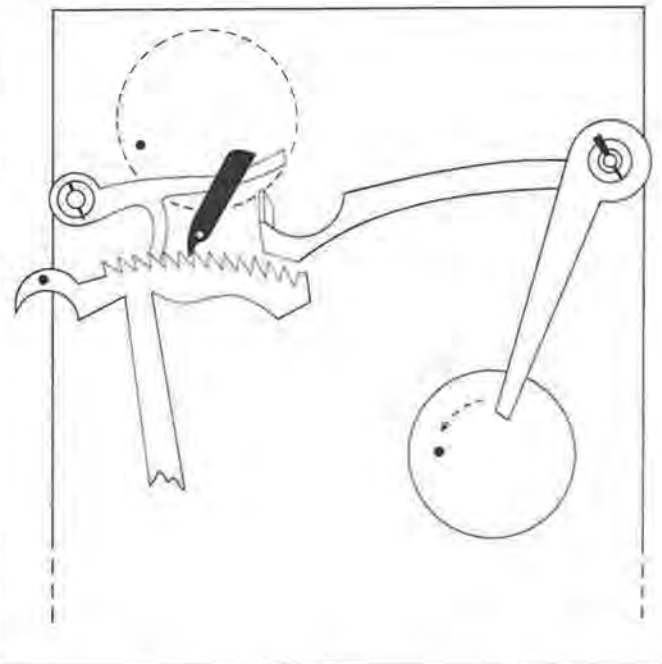


Figure 7. Run position.



At the hour, watch for a smooth drop-off of the warning pin from the lever. It must slide easily. If it does not, re-check until you find the cause. The clock will never be right unless you can count on positive action. A failure may happen every hour, or only once a day, causing the strike to stall.

Before striking begins, see whether the rack hook has dropped neatly into the space between two rack teeth. If it stops partly up the side of a tooth, you are risking an incorrect hour count on at least some of the hours. The joint between the rack and the rack tail may be loose, or it may have solder on it, a tip-off of previous work. Adjust the angle of the rack and rack tail until the unit will allow the rack hook to seat itself properly. Remember to check all the twelve hours.

Figure 7 illustrates the third phase, the running of the strike train. As the gathering pallet picks up each rack tooth, the rack hook slides over and holds the rack at another tooth. By closely observing a twelve-count, you can find out if there are one or more short teeth on the rack. The gathering pallet

will release these early, and the rack hook may not always seat itself at the next tooth. The result is an intermittent error in strike count. If you take the time to watch the strike train work, you can usually spot defects.

#### TESTING

The English bell strike movement needs a relatively long test. A week seems too short. Two or three weeks will probably be enough to turn up most defects. But if you continue to have adjustment problems during the test, you need to keep the movement longer. If the customer becomes impatient, you can briefly describe some of your concerns. Usually he will understand the need for more testing. If he insists on "no more delays," it's for his convenience. Certainly it won't be for yours, if you have to return to his house for further work later on.

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- T Retrofitting . . . . .Buddy Carpenter, CEWS  
James H. Broughton, CEWS
- U Advanced Lathe Course . . . . .Archie B. Perkins, CMW
- V Antique Watch Restoration . . . . .Archie B. Perkins, CMW
- W Restoration of Fusee Watches. . . . .Ralph Geiger, CMW, CMC, CEWS

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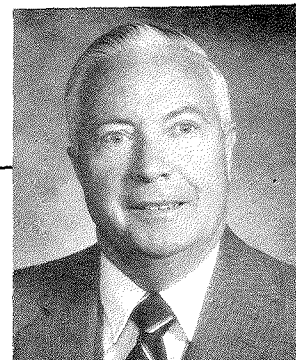
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## Part XII

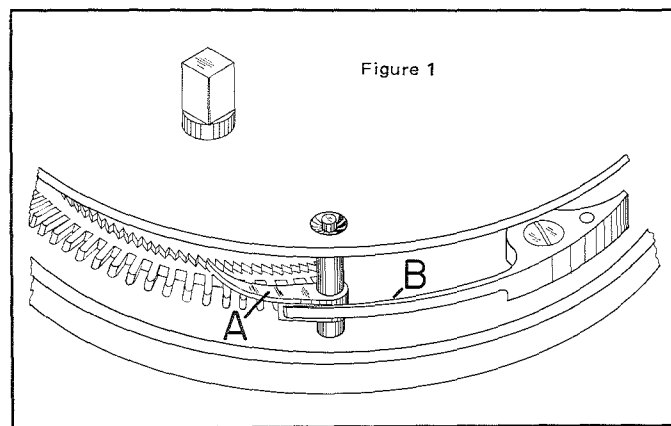
**I**n continuing the discussion of making clicks for fusee watches, we will now discuss the making of a maintaining click. The need for making one of these clicks can be because the click is badly rusted, damaged otherwise, or perhaps is missing entirely from the watch. Since the click is pivoted between the plates of the watch and not held down by a screw or a rivet, it is more likely to become lost than clicks that are held down by some means.

Figure 1 shows how the maintaining click is situated between the plates of the fusee watch. View A shows the click and how it works in the teeth of a maintaining ratchet wheel. View B shows the maintaining click spring and how it works with the click to apply pressure on the click to keep the point of the click engaged between the teeth of the ratchet wheel.

The process used in finishing an unfinished click is shown in Figure 2. View A shows the bottom side of a finished click. The making of this click is a complicated process unless the watch restorer can locate some blank unfinished clicks.

View B, Figure 2 shows a blank unfinished click. It might be possible to locate some of these from suppliers in England or Switzerland. These are usually finished except for the pivots. These unfinished blanks are made in one piece and have a very unusual shape for a watch part. Both of these conditions cause it to be very complicated to make.

View C, Figure 2 shows how the blank unfinished click is chucked in the lathe and how the pivots are turned on each end of the blank. Note: It is important to check the blank click with a fine file to see if it has been hardened and tempered. If it has not been hardened, then it should be hardened and tempered to blue before the pivots are made on it. Since the lower end of the arbor is very short, it is extremely important to turn and finish the upper pivot first



as is shown. If the lower pivot is done first, then there will be nothing to chuck onto while doing the upper pivot.

View D, Figure 2 shows the lower pivot being burnished with a sapphire burnisher to smooth it prior to polishing it. The polishing is done with a boxwood slip or a slip made from hard French pegwood. The polishing material applied to the slip can be Linde A or diamantine. Some alcohol is applied to the slip prior to applying the polishing material. This is to hold the polishing material on the slip.

In case a blank unfinished click cannot be obtained, then the following procedure is used to make a maintaining click. Figure 3 shows this process. A high carbon steel rod is selected which is large enough in diameter to form the length of the click. This rod is chucked in a large lathe or a 3-jaw chuck in the watchmakers lathe and a blank is roughed out so it can then be chucked in a wire chuck in the watchmakers lathe as shown in View A, Figure 3. The rough blank is then

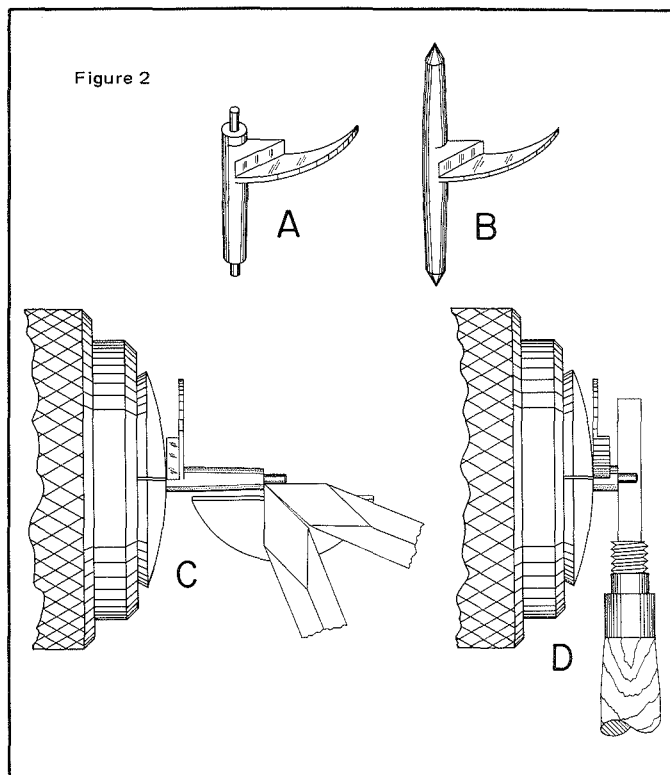
tuned to size as is shown. There will need to be two discs turned on the click arbor as shown. The larger diameter disc is used to form the click and the smaller diameter disc is used to form a ledge for the end of the click spring to rest on to apply tension on the click when it is in use.

View B, Figure 3 shows the click blank after it has been turned to size and shape. The shape of the click that will be made from the blank is shown in dotted lines. All of the excess material is removed from the blank by sawing, filing, or grinding to form the click.

View C, Figure 3 shows the blank click after it has been formed from the rough blank. After this, the blank click is hardened and tempered.

To harden the blank click, it is first wrapped with iron binding wire to build up the mass so the click will harden uniformly. If this is not done, there is danger of overheating the delicate tip of the click. The end of the wire can be twisted up to form a handle to hold onto while the blank click is being heated for hardening. The binding wire used should be #28 (.008 inch). After the click blank has been wrapped with the binding wire, it is then heated slightly over the alcohol lamp flame and then placed in powdered boric acid so a uniform coating of the powder is formed on the wrapped click blank. This procedure is used to help keep the click blank from oxidizing (turning dark). After this, the click blank is then reheated over the alcohol lamp flame to a medium cherry red color, then it is plunged into a container of cold water to harden it. Now the binding wire is unwrapped from the click blank, and the blank is tested with a fine file to tell if it has been sufficiently hardened. If the file bites into the arbor of the click, then it has not been sufficiently hardened and the process must be repeated. If the file does not bite into the arbor of the click blank but just slides over it, then the click blank is hardened enough.

Now that the click blank has been hardened, it must



be tempered to a blue color so it will not be brittle which could cause it to fail when placed into operation. Tempering the click blank also allows the pivots to be formed on the blank.

Before the blank click is tempered, its surfaces should be cleaned off with fine emery paper and then it is cleaned thoroughly with cleaner and rinsed in alcohol and dried.

To temper the click blank, a bluing pan is used. Some clean ash tray sand is used in the bluing pan. The click is



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placed on the sand, making sure that the click blank touches the sand at all points. Now, the pan is heated uniformly over an alcohol lamp flame. The change of color on the click blank should be carefully watched. The first color will be a pale straw color, then the color will change to light straw, then to the following colors: medium straw, dark straw, brown, purple, and then to blue. When a full blue color shows up, then the click blank is removed from the sand and cooled on a slab of glass.

The blue can be removed from the click blank by placing it in L & R rust remover or Duro™ naval jelly ®. After the blue has been removed, the click blank must be cleaned thoroughly.

Now, the surfaces on the click blank that are to be polished should be polished. Usually the top of the click finger is polished as well as the surface where the end of the click spring touches and the back edge surface of the click finger. These surfaces can be smoothed with hand held grinding slips and then polished with a boxwood slip with Linde A and alcohol.

The arbor of the click can be polished in the lathe as the pivots are made on the arbor. The pivots are made on the arbor as is shown in Figure 2. View D, Figure 3 shows the finished click after the pivots have been formed on the arbor of the click.

Some maintaining clicks, especially the ones in marine chronometers, are made in two pieces as shown in

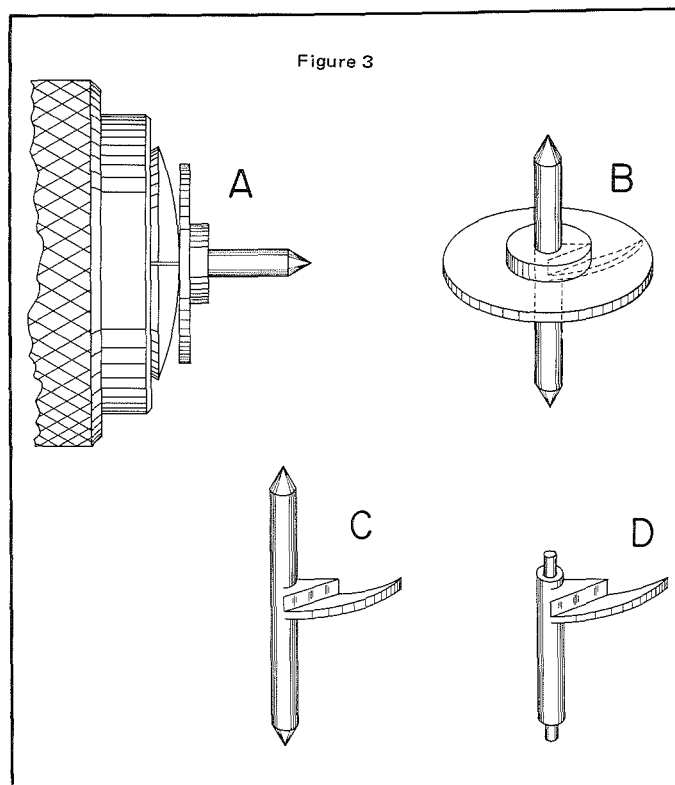
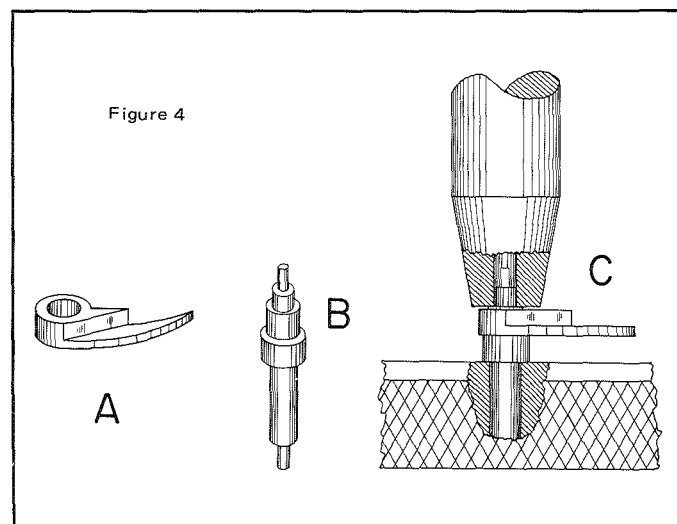


Figure 4. The click finger is made in one piece as is shown in View A, Figure 4. The arbor shown in View B can be a riveted type or a friction type. View C, Figure 4 shows a staking tool punch being used to rivet an arbor into the click. The punch is a flat faced hole punch. The hub on the arbor rests on the die plate of the staking tool in a hole that just clears the body of the arbor for the riveting process. If the arbor is of the friction type, then it can be pressed into the click with a friction jewelng tool. A friction arbor can also be staked into the click by the use of a staking tool.



"Antique Watch Restoration" will continue next month.

## Change of Address Form

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# Book Review

Henry B. Fried

*TURNING AND MILLING IN HOROLOGY*, by J.C. Nicolet. Hard covers, 8¼" x 10¾", 53 pages, 62 illustrations. Published by Bergeon & Cie, LeLocle, Switzerland @ 40 SFR plus packing and forwarding.

In the past few years there has been a remarkable growth of interest in the restoration of older timepieces, as well as in the actual making and reproduction of rarer clocks and watches. As a result, lathes, gear cutting and milling equipment are selling better than in the past 40 years.

Instruction in the use of such equipment has tried to keep pace with this new interest. Bergeon, one of the largest suppliers to the watch and clock trade, markets a very wide range of accessories, materials, tools and equipment.

This book mainly covers the use of watch and clock lathes, milling and wheel cutting equipment and how to use these. Two types of gear cutting devices are featured as models. One is the Schaublin 102, the Rolls Royce of watchmakers lathes and millers. The other is the Bergeon watchmakers lathe. Another included is the Aciera F3 miller. While the book contains but 53 pages, it manages to cover both the basics as well as the more involved methods and operations of wheel cutting and milling.

Milling tools and cutters of all types are shown and explained, using line drawings and good photographs. These include cutters made of tool and high speed steels. Grinding operations, cutting speeds and directions of cut as well as characteristics of the featured lathes and millers are covered.

Cutting speeds, lubrication, milling tool dimensions, attachments to the lathes and millers, dividing plates, worn screw dividers and their uses are nicely covered. Various types of gear-wheel cutters are shown and discussed as to wheel and pinion cutting. Wheel and pinion blanks, spoking or "crossing" of the wheel's arms are part of the construction. Using cylindrical or flat cutters, crenelating a wheel in order to use a rounding-up tool, or replacing only one or two teeth in a barrel are all illustrated in these pages.

The making of all types of ratchet wheels, pinions, lantern pinions and numerous tables of cutting speeds, methods of calculating pitch diameters, pitches and gear modules are covered as well. Cutter selection, dividing plate sections and their types are also included.

Gear tooth profiles, methods of discovering the dimensions of a lost wheel or pinion, cutter choices, and making striking count wheels or racks are illustrated with the text.

This book is a most handy one and its illustrations and examples are easily transposed by the reader to the use of his own equipment. To those who own and operate or would like to learn to use these small lathes and millers, this book should be helpful and enriching.

*AMERICAN POCKET WATCHES—UPDATED AND REVISED EVALUATION GUIDE, 1986 EDITION*, by Cooksey Shugart and Tom Engel. 5¼" x 8¼", soft covers, 395 pages of text and illustrations, 1000+ illustrations. Published 1986 by Overstreet Publishing, Inc., Cleveland, TN 37311 @ \$10.95.

This is the sixth edition (yearly) of this identification and price guide. Its scope is virtually encyclopedic in its coverage. In this newer edition, a chapter on "European Watches Collected in America" has been included. Watches by Aggasiz, Audemars, Piquet & Co., Ellicot Jurgensen, Lange, Vacheron, Rolex, Patek Philippe and some others have been included.

Each new edition since 1981 has added newly discovered information, pictures of movements and corrections. This newest edition, as in previous printings, also serves as a price guide, here updated. The current rise in prices achieved at auctions and at mart tables has indicated but slight gains for the investor.

As in previous editions, there are many chapters dealing with the advice to the reader on appraising, grading, a short history of each factory or company, case quality and appraising these as to value and desirability. Other chapters instruct on how to identify a movement and establish its age, grade, model number and value or rarity. Other chapters show how to identify fakes, prestige watches and other facets of importance to the collector or investor. Wristwatches are mentioned and a few are illustrated and described. Lists of factory serialized production numbers and the dates of such manufacture are included with almost every important watch factory.

A ten page "Pocket Watch Terminology" has been greatly improved with many previous errors corrected. The section on "Museums With Watch Collections" omits the very large and important collection of the American Watchmakers Institute and omits their important trade publication (*Horological Times*) in that small section of trade journals available to the collector. However, it still continues to hold its position as the best available comprehensive volume on American Pocket Watches.

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# THE PICKLE BARREL



Marshall F. Richmond, CMW

## ***BASIC JEWELRY REPAIR***

### SOURCES OF HEAT AND THEIR APPLICATION

#### Lesson 3

#### TORCHES & GASSES

**T**he torch and the electric soldering machine are really the only two sources of heat suitable for use in making jewelry repairs. There are many types of torches in common use. Most are Prest-O-Lite (acetyline) which require a tank of Prest-O-Lite gas, a regulator, and a Prest-O-Lite torch, suitable for light to medium jewelry soldering.

A second type is the gas and acetyline system where oxygen and a combustible gas are mixed under light pressure in a torch to produce a very hot flame. Acetyline, propane, or natural gas are the most commonly used gasses to be mixed with oxygen. Acetyline will produce the hottest flame, propane somewhat less hot, and natural gas will produce the least hot flame of these gasses.

Oxygen requires a regulator and two gauges. The regulator has a control that will monitor the amount of pressure that goes to the torch. One gauge gives tank pressure and the other gives the pressure into the hose.

Acetyline also requires a regulator with two gauges much like the oxygen regulator. Propane uses a regulator that has no gauge. Its pressure is set at about 9 to 11 pounds and it is adequate to use with the oxygen. Natural gas needs no regulator, as the line pressure is adequate for torch use.

#### HOSES, FITTINGS, & HOOKUPS

These are of great importance for safety and performance. Gas hoses carrying flammable gas should be red in color, while hoses carrying air or oxygen should be green. The hex connecting nuts for flammable gas are left-hand threaded, with a groove midway around the nut for identification. Oxygen or air connecting nuts are right-hand threaded and smooth with no groove. Natural gas requires a shutoff valve where the hose connects into the line. Acetyline or oxygen tanks have a shutoff at the tank where the regulator connects. The connecting nuts on the regulators are also left-hand threaded for gas and right-hand threaded for air connections.

#### CHECKING FOR LEAKS

After every hookup, a complete check should be made for leaks. With two gauge regulators a good check can be made quickly by turning the pressure regulator control counterclockwise far enough that no gas will go through the regulator. Next turn on the valve at the cylinder and observe the reading. The tank pressure should register and the line gauge should show zero. Now shut off the valve at the tank and watch the pressure gauge. If the pressure drops it indicates a leak where the regulator connects to the tank. If it holds, continue to the next step.

Turn the regulator control clockwise until you get a reading of about 5 to 7 pounds after turning the pressure on at the tank. Turn off the pressure valve at the tank and again watch the high pressure gauge. If it starts to drop, this means a leak. Since the tank connection showed no leak, it therefore must be from the regulator to—or in—the torch.

Check to see if the torch is turned off. Then check the nut where the line connects to the regulator. If these are tight and still the pressure in the gauge drops, take a soap or detergent solution that will suds well and apply the soap solution with a small paint brush to all connections. The leak will appear in the form of bubbles. Usually when a leak is found it is caused by a fitting that wasn't properly tightened. But whatever the leak may be, it should be corrected before proceeding with lighting the torch.

#### MORE ON TORCHES

There are many small torches available today that are adequate for jewelry crafting or repair. Probably the most popular are the old manufacturing jewelers' favorite—the Hoke Torch, and today's Little Torch (sometimes referred to as the mini-torch). The Hoke Torch usually comes with three tips, is available for acetyline and oxygen, propane, or natural gas and oxygen, and is excellent for light, medium, or heavy jewelry soldering. A set of small tip attachments are now available that even make it good for tips, prongs, or fine chain repair.

The Little Torch comes with five tips, will operate



Figure 1. 110 cubic foot oxygen tank.



Figure 2a. "M.C." acetylene tank.  
Figure 2b. "B" acetylene tank.

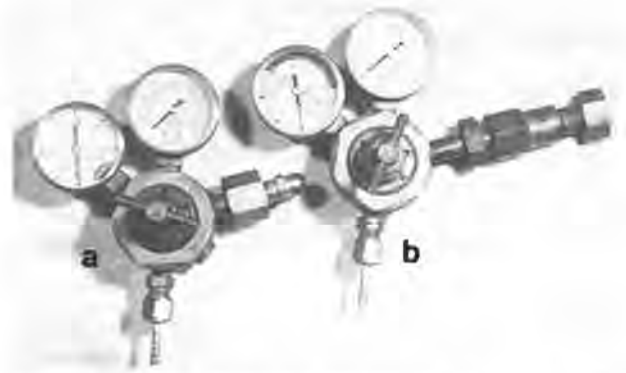


Figure 3a. Oxygen gauges and regulator. 3b. Acetyline gauges and regulator. NOTE: Left gauge is low pressure; right gauge is high or tank pressure. Adjusting bar in center of regulator. Turning clockwise increases pressure; counterclockwise decreases pressure. Nuts on acetyline regulator are grooved indicating left-hand thread.

on oxygen with acetyline, natural gas, or propane. I personally feel it performs best when used with acetyline and oxygen, because acetyline is a much hotter gas than propane or natural gas, and will let the torch handle much heavier work.

To operate either of these torches after they are hooked up and tested for leaks, the oxygen and acetyline gauges should each be adjusted so the low pressure gauge shows from 3 to 5 pounds pressure. The torch should be turned on to bleed any air from the lines. This is important, for air in the lines when the torch is lit can result in a "flashback" through the hose and can cause damage to a regulator. After the air has been bled from the lines, close both the gas and oxygen valves on the torch; then open the gas valve about  $\frac{1}{4}$  turn and light with a match or flint igniter. Then very easily open the oxygen valve until the flame turns blue. A small, different color blue cone protrudes from the torch tip within the blue flame. The tip of this cone is the hottest place in the flame. With practice and experimentation you can learn how to adjust the flame, what tip to use, and how to increase the heat by increasing the pressure in the regulators.

I will not try to make explanations about the electric soldering machine since my experience with it is very limited, but I have known jewelers that could do anything with the soldering machine that can be done with the torch.

It might be well to devote a little time to explain the different containers that are used for containing the oxygen and flammable gasses that you may need to use.

**OXYGEN**—Available in many size tanks. However, for jewelry work using the larger torches (such as the Hoke), a cylinder with a capacity of 110 cubic feet of oxygen will supply oxygen for one jeweler—usually for many months if there are no leaks and it is used wisely. These tanks can be obtained from suppliers found in the local phone book. For no more gas usage than we jewelers need it is probably best to purchase the tank and many suppliers will sell you the tank and exchange it for full ones when you need it rather than making you wait to have your own original tank refilled. Other suppliers will sell the oxygen in their tank and if it is not used up in a short time and returned, a demurrage charge will be assessed. Some of these suppliers will make a lease agreement for a period of time for a lump sum and then it should negate

any demurrage charges, but beware. Usually you pay the cost of a new tank for the lease charge—then every year they could trump up some type of a service charge, probably equalling the cost of demurrage if you did not have the lease agreement. *Beware of these lease agreements!*

A smaller tank can be purchased that is half the size as the aforementioned one, holding 55 cubic feet of oxygen. This tank is not usually exchangeable, but can be left at the supplier and picked up in a few days refilled. Smaller oxygen tanks are also available that work well with the little torch. These are not too expensive to purchase but in many cases have to be left with the supplier for refilling. Some suppliers have these on hand for immediate exchange. NOTE: Oxygen is not flammable, but it supports combustion. Although it will not burn, when mixed with a combustible gas it will burn with a very hot flame, and under certain conditions be explosive.

**ACETYLENE GAS**—Available in many size tanks but for the jewelry repair shop the smaller sizes are the most practical. Like oxygen, the larger tanks can be obtained on a lease basis or a demurrage basis, but the most practical way is to own your own tank. The smallest is a Prest-O-Lite "M.C." tank (Figure 2a). The next larger is the Prest-O-Lite "B" tank (Figure 2b). It might be interesting to know that these tanks were originally designed to furnish lighting for motor vehicles before they had electric lights. The "B" tank was used on automobiles and trucks and the "M.C." tank was used on motorcycles (which is what the "M.C." stands for). The "M.C." tank and the small oxygen tank are used for the little torch that is made up as a portable unit with regulators and a carrying rack. This is ideal for one torch operation and the tanks will last for months without refilling. The "B" tank with larger oxygen tanks is more practical when using larger torches or more than one torch in a shop where more than one jeweler is working.

**NATURAL GAS**—Where natural gas is available it is probably the most practical gas to use with a Hoke or comparable torch that is made for natural gas or propane. The gas hose can be connected direct into the gas line with no regulator required because the line pressure is correct for the torch. It is neces-

sary for safety reasons to have a cut-off valve where the hose is connected to the line.

**PROPANE**—For use in a shop a 20 pound cylinder can be used with a fixed regulator such as is available for portable gas grills. This can then be used with oxygen from any size tank if an oxygen regulator is used. As these are the same size propane tanks that are used on campers, usually they can be filled at a local dealer while you wait.

### LIGHTING THE TORCH

After the hookup has been checked for leaks, the gas and oxygen should be turned on at the tanks. The pressure on the low pressure gauge set to read from 3 to 5 pounds, and by opening the valves on the torch the air should be bled from the lines for several seconds (depending on how large or long the hoses are). Next, close the valves on the torch and open the gas valve a little, igniting it with a match or flint lighter. Open the valve enough that you have a yellow flame. Then open the oxygen easily and adjust until the flame turns blue with a smaller size blue cone appearing at the tip of the torch. The point of this tip is the hottest place in the flame. If the flame hisses, it indicates too much pressure for the size tip which gives an oxidizing flame. It is better to use a softer flame, as it will not oxidize the metal on which the heat is being applied. There are several adjustments that can be made to obtain the type flame you need. The pressure can be increased or decreased with the regulator or by the valves on the torch which increase or decrease the volume of gas going through the tip of the torch.

Before applying heat to metal for the purpose of soldering there are some things that should be understood. To anneal nonferrous metal it can be heated to a cherry red and quenched in ambient water or slow-air cooled. Either will render the metal dead soft. When quenching in acid pickle any oxide residue on the metal from heating will be removed. Before attempting to make any kind of solder joints on metal, it should be clean. Annealing is often necessary to take strains out of the metal to be soldered saving the other solder joints in the piece of jewelry from separating when heat is applied in surrounding areas.

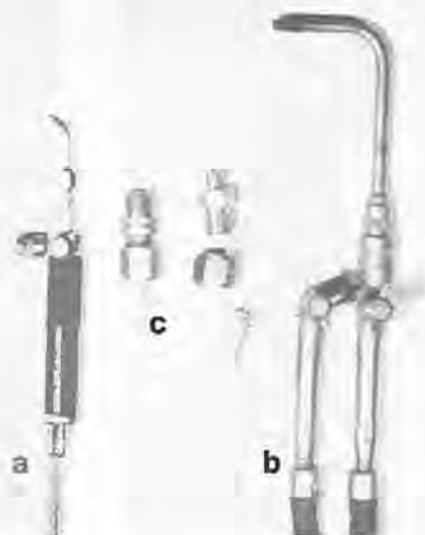


Figure 4a. The Little Torch. 4b. The Hoke Torch. 4c. Fittings for attaching torch hose to regulators. NOTE: Fittings on left are for acetyline and are grooved to indicate left-hand thread.

### CLEANING

The importance of pre-cleaning the work cannot be emphasized enough. Unclean work can keep the solder from flowing or if it does flow cause pits in the solder joint making a weak and unsightly joint. Pre-cleaning can be done with ultrasonic or by brushing with a strong jewelry cleaner and then rinsing well to remove any residue from the contaminants or the cleaning solution. In cleaning jewelry with a buildup of soap, detergents, or body secretions and oils, sometimes a regular jewelry solution will not get these cleaned (such as in rings with recesses under stone). I have found that by boiling the article in a pickle solution and then using the jewelry cleaner will usually render it clean. Be sure before boiling or using pickle solutions that stones in the article of jewelry will not be damaged.

Next month's article will be the fourth lesson in basic jewelry: Ten Main Steps to Soldering.

TJES

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Charlie Cleves receives instructions on how to get "the feel" while burnishing.

## COURSE PARTICIPANTS





Wes Door, CMW

## Band Fitting and Repairs

**T**he old saying that "a chain is only as good as its weakest link" may also apply to watch attachments. New watch bands should not have any weak links. However, the spring bars that connect the band to the watch case may be the weak link we are talking about—that is, if they are improperly fitted.

Spring bars shown in Figure 1-B and C are called single step or regular spring bars and are correctly used in watch cases which have holes drilled completely through the lugs (Figure 1-A). The spring bar in Figure 1-B is of the proper length while Figure 1-C shows a spring bar that is too short.

Figure 2 shows one of the most common types of case lugs seen today. The lug holes are not drilled all the way through the lugs and thereby offer a more pleasing appearance (Figure 2-A). The lug holes on some of these watch cases (with hidden lug holes) are not drilled deep enough to guarantee security and the spring bars may pull out. Many cheaper watches have such shallow case lug holes, any type of spring bar will likely pull out.

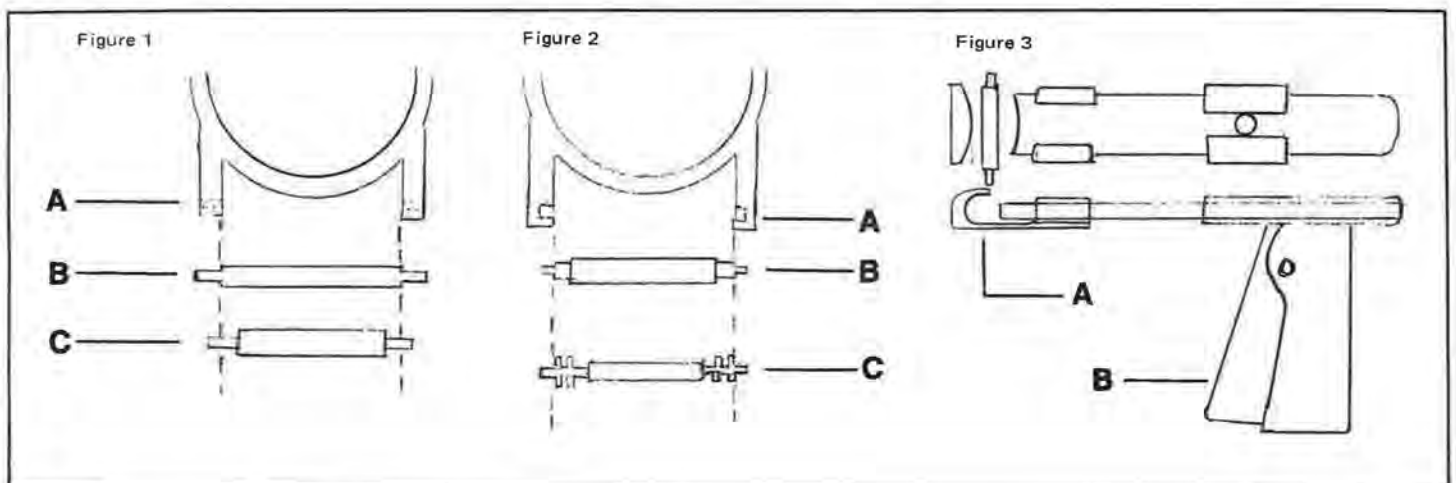
These shallow holes should be drilled deeper. A twist drill may be selected that fits into the existing shallow hole and then carefully drilled deeper, but without going through the outside lug walls. Hopefully, this won't increase the hole diameter any appreciable amount. The proper spring bars to be fitted in this type of case lugs are shown in Figure 2-B and C. The double shoulder type shown at Figure 2-B and the double flange at Figure 2-C are both suitable for use with this type of case lug.

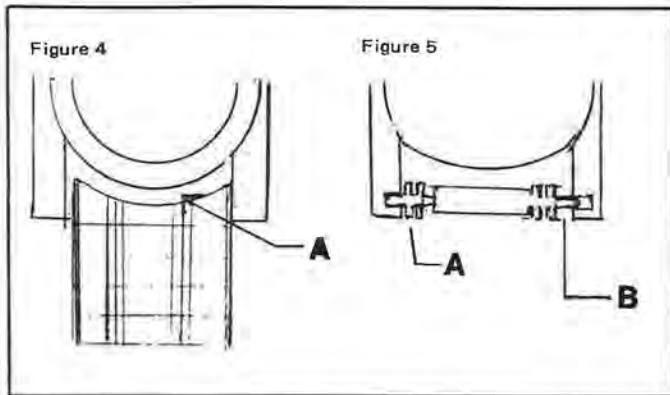
### CURVED SPRING BARS

Many new watches have little clearance after the factory-fitted band is removed and replaced with an expansion band. Sometimes fitting a pair of curved spring bars is the answer. Curved spring bars can be purchased or any good straight spring bar can be curved with the proper tools. Some like to use two spoons and place the straight spring bar between these two spoons and squeeze the spoons together. This does work; however, there are special tools designed for this purpose and available from our wholesale material supplier. I use the type shown here in Figure 3, but in no way do I suggest that other tools are not just as suitable.

First place the straight spring bar into slot "A" and squeeze handle "B". This will reform the spring bar into a curve that will hopefully solve the "lug hole to case clearance" problem. Note: Some of the cheaper spring bars may crack, but all of the good ones, like stainless steel, will curve without breaking. The amount of curve can be controlled with this tool by the amount we squeeze on handle "B" with this tool. Also, if we curve the spring bar so much that the ends will not freely move (telescope), then we must throw it away and use another new spring bar. The overall length will naturally be shortened slightly, but this should be no problem if we have chosen the proper spring bar.

Figure 4 shows a typical condition wherein a non-expansion factory band shows excessive space between the band end piece and the watch case. This can be solved by replacing the worn-out spring bars with a pair of new straight ones. In this case the old spring bars, when worn, forms a





curve as the stronger center area pulls the smaller diameter telescoping ends out away from the case and in this case, the curved effect does not hold the band tight enough against the case. We must use this straight type spring bar even though it is sometimes very difficult to do. We wonder how the factory ever got the band to fit this tight. Also, we must be sure to push both ends of the double flange tightly against the inside case lug. Figure 5-A shows one flange pushed into proper position. Notice that in Figure 5-B there is too much space between one flange and the inside case lug and this spring bar will not hold. So we naturally push this side in place but generally this will now push out the other side "A" again. We solve this by holding side "A" in place with a screwdriver while pushing side "B" into place. Note: For explanation purposes, the band is not shown in this figure; however, the problem does not exist until we have the pressure of the band itself. Some customers like to change to an expansion band and this does seem to eliminate the recurring problem of spring bars bending.

There are bands on the market that give the solid or built-in look and still expand. Sometimes this is a good choice for those who continue to have this type of band problem.

### LEATHER STRAPS

When fitting leather or any other type of straps, it is very important to have the width of the strap match the case lug width. An edge of a narrow strap may catch on the

flange of a double flange spring bar or on the shoulder of a double shoulder spring bar and pull this spring bar out and possibly cause the loss of the watch. Actually, even a strap of the correct width can also pull out any spring bar with shoulders or flanges. Therefore, if possible, a regular (single step) spring bar should be used. Cutting pliers of some sort can be used to cut out this "solid" spring bar, when necessary, to install another new band later on. Also, some watches are made to take very thin spring bars and we may need to update our assortments to include them.

### WATCH BAND CLASP

Some band clasps require not only a slender bar but one with special short ends that do not protrude through the outside wall of the clasp. If necessary, we may file the end of a regular spring bar down to match the clasp wall thickness.

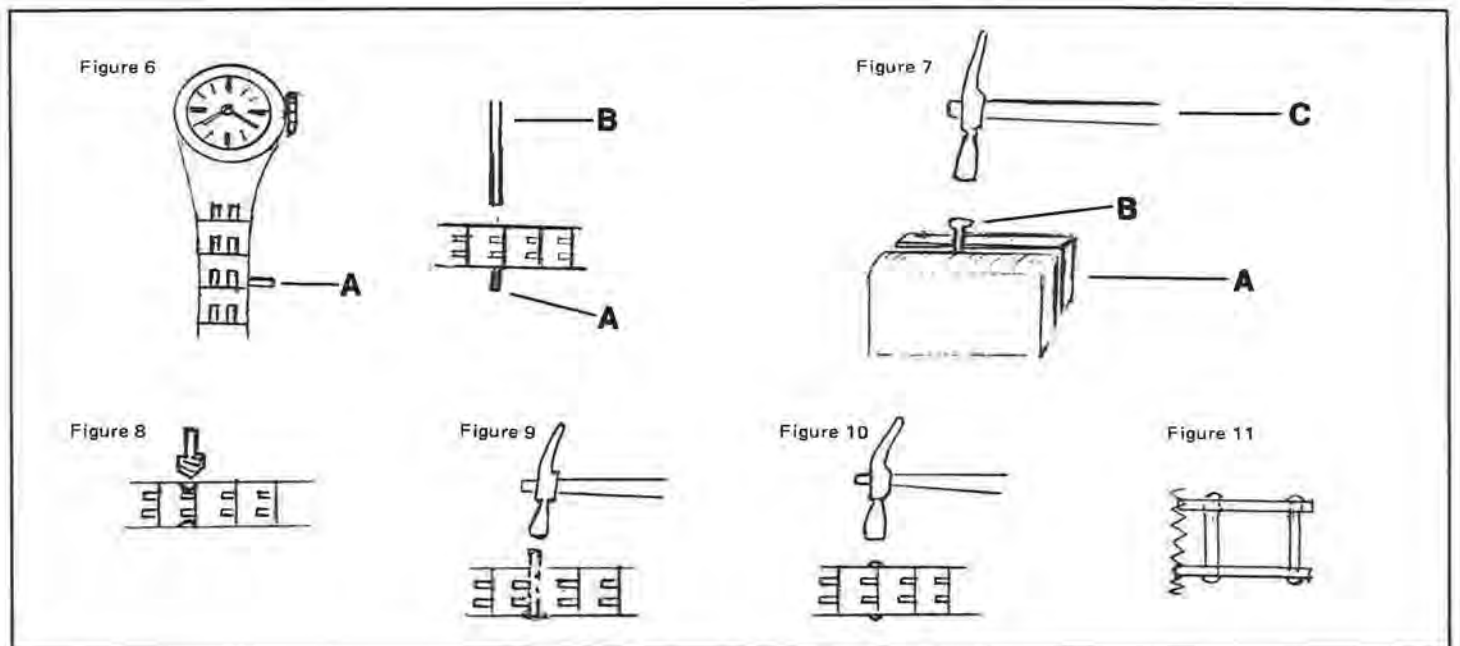
### LINK BANDS

Most link bands have some removable links, and generally new bands can be adjusted by simply removing screws and the number of links desired. This is fine on new bands; however, Murphy's Law says that generally a band will break in a place that does not have screws to hold the links. These bands can still be repaired by removing the pins that hold the links together. If the band has a broken link, it can be removed, soldered and replaced or a new link installed (if available).

Figure 6-A shows a link pin we are pushing out. Figure 6-B shows a punch we are using. Notice, unlike our ordinary staking set punches which have tapered ends, this punch has straight sides. A good one can be made by grinding off enough of the point of a needle to obtain enough straight area to punch the old pin out. Some pins may be riveted in and the head on one side of this pin must be ground off before we can remove it. Even if the pin is not riveted, it is a good practice to rivet in the new pin.

The following steps show one way of doing this job:

1. Grind off one side of the old rivet (if one exists).
2. Push out the pin (Figure 6-A) using a small punch as shown at Figure 6-B. It may be necessary to drill out the



old pin if it is difficult to punch it out. It is safest to use a drill slightly smaller than the diameter of the pin to be removed. Only if necessary, use another drill larger than the first drill.

3. Make or select a new pin of the largest diameter that will fit into the band link hole without binding. Wire may be nickel alloy (for white bands) and brass (for yellow bands). Of course, if the band is karat gold, a matching gold replacement pin should be used.

4. Using a small hammer (Figure 7-C) lightly tap on the edges of one end of the new pin "B" which is held in a vise (Figure 7-A). This will "peen" one end as shown at "B". Notice this gives us a nice rounded head and even with the slight flattening acquired when we finish the other end to match, this pin will still look nice.

5. Countersink the hole (on both ends) using a setting burr or even a round burr. This step is very important, but not necessary to cut very deep. Figure 8 shows an exaggerated cut just to show detail for our purpose here.

6. Place a new pin (with head down) in the band as shown in Figure 9 and tap with a hammer to form a head on the other side. If the pin is still loose (that is, excessive end shake), it is too long. Simply cut off a little from one end and re-rivet.

7. Polish the ends to finish and the job is complete. It should look as good or probably better than the original. Figure 10 shows the finished job.

8. Figure 11 shows another type of clasp that was repaired by this same method.

I hope you enjoy band repairing during this busy season.

*Merry Christmas and Happy New Year*



## WATCHES INSIDE & OUT

*(Continued from page 15)*

test the functions of the movement or module outside of its case. The SWITCH CONTACT probe allows you to do this test.

### FAILURE ANALYSIS

In order to understand the results of testing a quartz analog watch, one must first have a thorough understanding of how the watch works.

The quartz analog watch is a relatively simple electro-mechanical device. It can be broken down into eight major sections:

1. Case/Band
2. Dial and Hands
3. Day/Date Mechanism
4. Setting Mechanism
5. Geartrain
6. Motor - Coil/Rotor/Stator
7. Circuit Board
8. Battery

The majority of the watch is made up of traditional mechanical components that are very familiar to even the novice watchmaker. Items 1 through 5 can be found, in one form or another, in most traditional spring-driven watches. Therefore, traditional watch servicing procedures apply to these sections.

Although traditional techniques of repair apply to the mechanical portions of the watch, electronic testing of the movement can help isolate and pinpoint the exact location of mechanical problems, as well as electrical problems.

Problem solving is a process of elimination. The eight sections of the quartz analog watch are all dependent on each other. If one section fails, the watch will stop. So if the watch is dead, which section or sections has failed? That is the question!

By removing the movement from the case and removing the battery from the movement and then testing the movement separately, two major problem sections of the watch (1 and 8) can be isolated. A third section, the dial and hands can be visually inspected for problems and quickly eliminated from suspicion. The mechanical setting mechanism can also be tested by mechanically setting the watch. This leaves only sections 5, 6, and 7, for electrical testing, the geartrain, the motor, and the circuit board. The ZA900 is capable of testing every component on the circuit board, and every component of the motor. It is also capable of determining when the geartrain needs cleaning or lubrication.

The CIRCUIT BOARD (7) generally contains only three major sections, the oscillator, the integrated circuit, and the substrate. The substrate supports and interconnects all the electrical components of the watch together. Occasionally, the coil is also mounted to the substrate and becomes a part of the substrate.

The SUBSTRATE is generally made of fiberglass-filled epoxy with gold-plated copper conductors bonded to the surface. The problems that occur with the substrate are usually visible under a microscope. Dirt and contamination are the most common problems associated with the substrate failure. A high current measurement can quickly tell you if the substrate needs cleaning. A low or no current reading generally indicates damage to the substrate or integrated circuit. Examine the substrate carefully under a microscope and you will occasionally find broken conductors, especially when the stem release is through a hole in the substrate (Figure 8). When all the electrical components are mounted on a substrate it is referred to as THE CIRCUIT, CIRCUIT BLOCK, or CIRCUIT BOARD.

The INTEGRATED CIRCUIT is the major component mounted on the substrate. It is the most reliable component in the entire watch. It should NEVER be considered to be faulty until all other sections of the watch have been thoroughly tested.

### THE OSCILLATOR CIRCUIT

The circuit that makes things happen in the watch is the OSCILLATOR CIRCUIT. The QUARTZ watch gets its name from the major component in the oscillator circuit—the QUARTZ CRYSTAL. The oscillator circuit can be as simple as one quartz crystal connected to the integrated circuit. Most often an adjustable capacitor (trimmer) is used in the oscillator circuit to regulate the accuracy of the watch. The trimmer is part of the oscillator circuit, and when it is turned, it changes the number of vibrations produced by the quartz crystal and therefore changes the accuracy of the watch.

The quickest way to determine if the oscillator circuit is running is to place it next to the sensor of a quartz timing machine, similar to the Zantech 1100A (Figure 3) while it is powered by the ZA900. The quickest way to determine if the quartz crystal is the reason the oscillator is not running is to probe the quartz crystal leads with the QUARTZ CRYSTAL SUBSTITUTE from the ZA900, while the move-



Figure 8. Broken trace on circuit board.

ment is being powered by the ZA900. The quickest way to determine if the trimmer is faulty is to turn it while a timer is sensing the oscillations. If the oscillator frequency (accuracy) doesn't change, the trimmer is probably damaged. Examine it under a 30 power microscope for physical damage such as cracks in the ceramic plates of the trimmer and/or poor connection to the substrate.

When all components test good, be sure to examine the assembled circuit board for shorts to the mainplate, or breaks in the substrate. The instruments can only tell you which part of the watch is having a problem. It is up to you to find and repair the problem.

### THE MOTOR

The motor consists of three major components: the coil, the stator, and the rotor. The coil is the most delicate component in the quartz watch. It is easily damaged by careless handling. The wire that makes up the coil is one continuous length of very fine insulated wire. Just one break in one strand will cause an open coil and a dead watch. The test procedure is described earlier in this article and in the October 1986 issue.

The only way to determine if a rotor is turning is to visually see it, the geartrain, or the hands turning. When the hands are not turning and the ZA900 tells you the circuit board is good and the coil is good, you must begin to look for mechanical problems. The type of problems that plague rotors are generally due to metal fillings stuck to the magnet of the rotor. The usual solution is to disassemble the geartrain and clean all loose debris from the rotor. While the rotor is being cleaned (under a microscope), check the magnet portion of the rotor to be sure it is firmly bonded to the shaft of the rotor pivot (Figure 9). The round magnet portion of the rotor is cemented to the gear and pivot shaft and it occasionally becomes loose. When it does, only the magnet portion of the rotor will turn but the gear and pivot will not. The magnet can be recemented to the shaft with a small drop of super glue.

The GEARTRAIN test procedure, "LOW VOLTAGE TEST," was described in the November issue of the HT. Since the power of the quartz watch motor is very, very low, it doesn't take much dirt or dust to stop the geartrain from turning; therefore, cleanliness is of the utmost importance.

The best way to solve the problem of a sluggish geartrain is to remove the bridge and the wheels in the geartrain and clean them thoroughly. On occasion, a slight amount of

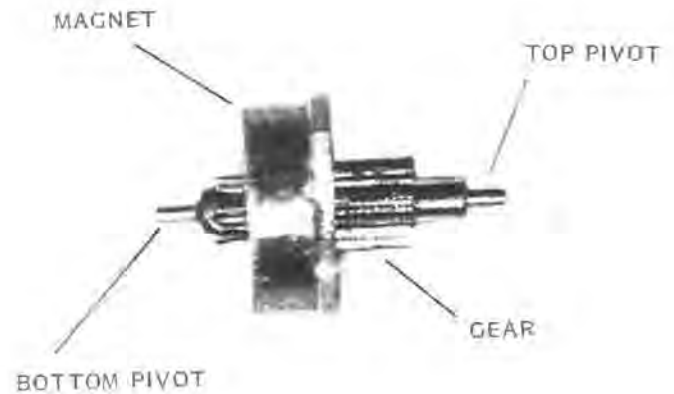


Figure 9

lubrication is required. Do not lubricate the pivots if the movement is free running at a very low voltage. It won't help but only cause problems if too much oil is used. Always perform the LOW VOLTAGE TEST after all service is complete; especially after you have disassembled and cleaned the movement. It is an important means of quality control. When a movement is free turning at a low voltage (below 1.25 volts), you have the assurance that all moving parts are free and clear and the probability of a comeback is slim.

### SUMMARY

Every part of a quartz watch serves a critical function. If one part fails, the watch will not function properly. Even the loss of a gasket will eventually contribute to a failure by allowing dirt or water to enter the watch.

When electrically testing the watch, begin with the battery and proceed toward the coil, geartrain, etc. Failure analysis is a process of elimination and one must always be asking questions: Is the battery dead? Is current flowing into the movement? Is the oscillator running? Is the integrated circuit producing pulses? Is the coil good? Is the rotor turning? Is the geartrain turning? Are the hands moving freely? What is the lowest operating voltage of the movement? Can the time and date be set? Is the watch case and band clean and presentable? Will the customer be happy? **HAVE I DONE A GOOD JOB?**

It is not difficult to do a good job if you thoroughly understand the quartz watch and use reliable instruments and tools. There is no surer road to success than enthusiasm and doing the best job you know how.

If there are any questions pertaining to the use of this instrument, contact Lou or Greg Zaroni at Zantech, Inc., 77 Shady Lane, Trenton, NJ 08619; (609) 586-5088.

AWI

*...if you're not doing it...*

**...You Should Be...**

*using your AWI casemark!*

# How an insurance company evaluates a jeweler's security

## PART ONE

by William P. Herrbold and Jed Block

**H**ave your insurance premiums increased? Has your insurance company asked you to upgrade your alarm system, buy a better safe, or install videotape surveillance equipment?

Have you heard of another jeweler's insurance claim being rejected because of a "technicality"? Do you know people in the industry who cannot buy coverage, regardless of what they're willing to pay?

For jewelers, insurance has become a subject of concern. Significant numbers of retailers can answer "yes" to one or more of those questions.

The same questions, however, also indicate that insurance companies are concerned. In fact, insurers became concerned first. They increased premiums, required better security systems, enforced strict policy conditions, and adopted very careful underwriting guidelines, all of which prompted such questions to begin with.

To understand today's complex insurance problems and to find coverage which is reasonable and right for your situation, you should be aware of the security considerations an insurance company evaluates each time a jeweler applies for protection.

### STEP ONE

The person who evaluates the security of a potential policyholder for an insurance company is known as an underwriter. In a nutshell, an underwriter's job is to determine the acceptability of an applicant by rating the applicant's security setup.

As far as the jewelry industry is concerned, the first thing an underwriter wants to know is if an applicant is a retailer, manufacturer, or wholesaler. This is very important because it is the initial step in establishing the potential risk of an account.

Historically, jewelry retailers suffer the most losses. In 1982, retailers accounted for 82 percent of Jewelers Mutual Insurance Company's claims. Wholesalers and manufacturers suffered 9.2 and 8.3 percent of the losses respectively.

Not only do statistics show that retailers are more vulnerable to losses, but the nature of the retail business also increases a retailer's exposure to crime. Generally, retail operations are more visible in their communities, and traffic through the premises is greater than it is for wholesalers or manufacturers. To the typical thief, a retail store is simply a more convenient target.

On the other hand, because of the way they do business, wholesalers and manufacturers can develop elaborate security precautions, and work within a virtual fortress, with little danger of alienating their customers.

Another prime consideration of an underwriter is the jeweler's location and what kind of bearing the location

could have on a potential loss.

For instance, the underwriter wants to know if the business is adjacent to a restaurant which could pose a fire hazard. Is the address in a major metropolitan area known for its high-crime rate? Would thieves have easy access to a main highway from the premises? What are typical response times for the locale's law enforcement agencies?

After studying the type of business and location, the underwriter "moves inside" the applicant's operation. The underwriter evaluates the jeweler's particular set of security circumstances according to three main categories: **physical, electronic, and procedural.**

### PHYSICAL

Physical security deterrents are one of the best ways for a jeweler to prevent losses while the premises are closed to business. An underwriter's checklist for evaluating physical security includes:

- \* Safes.
- \* Vaults.
- \* Time-locks.
- \* Door, display case, and show window locks.
- \* Protected windows.
- \* Sprinkler system.

A jeweler's network of physical security should correspond to the size of his or her inventory and the area where the business is located. If a great deal of valuable merchandise is kept in the safe of a store located in a major metropolitan area, the jeweler should spend a great deal of money for a highly burglary-resistant safe or vault. While a jeweler is closed to business, there is no better way to prevent a serious burglary than by storing all valuable merchandise in a burglary-resistant safe or vault.

There are many different brands and models of burglary-resistant safes. They also vary greatly in the degree of their protection. Because of their expense and broad range of diversity, Jewelers Mutual recommends that jewelers contact several reputable suppliers of safes and vaults and study the products carefully. Before making a purchase, consult with a qualified jeweler's block insurance agent or the home office underwriter who will handle your account.

Do not think that because the door of a safe or vault is burglary resistant the entire unit is burglary resistant. A vault with walls that are made of hollow concrete block is not secure against a burglar. Vault walls should be constructed of appropriate materials, such as specially hardened concrete which is reinforced with steel bars. Burglary-resistant safes range from door-only protection against burglars to six-sided protection.

Of course, locks are very important to jewelers. A time-lock on a safe or vault makes it impossible for anyone to open the door, except at times specified by you, without an alarm being transmitted to your monitoring station. However, make sure you post a sign on the safe door, informing people of the time-lock and explaining how it works. Otherwise, a robber trying to force you to open the safe before hours might think you're trying to outsmart him, and your life could be in danger. All doors leading to the outside should be outfitted with deadbolt locks. A good kind of lock for display cases, wall cases and show windows is the type which does not permit you to remove the key unless the lock is in the locked position.

Protected outside windows have reduced losses in the jewelry industry significantly. During certain periods, three-minute smash-grab-and-run burglaries were the most common type of loss submitted by Jewelers Mutual policyholders. Since jewelers located in areas where such losses are common began protecting their windows and glass doors with iron bars or burglary-resistant glazing material, smash-grab-and-run claims decreased drastically. If you do install glazing material, make sure it's at least one-quarter inch thick and securely anchored with proper frames.

### ELECTRONIC

In many cases, electronic security supports and enhances the physical precautions which jewelers use to protect their businesses. Good electronic security also can be a primary line of defense. Some electronic devices can reduce your chances of being victim of the jeweler's nightmare—armed robbery. Though no precaution will stop a determined armed robber, your chances of avoiding an armed robbery will be much greater if you dissuade a criminal with the right sophisticated electronic security devices.

Electronic devices to protect jewelers are numerous. Jewelers block insurance underwriters are most interested in:

- \* Alarm systems for perimeter of premises.
- \* Alarm systems for safes and vault.
- \* Motion detection equipment.
- \* Advanced line security.
- \* Early morning devices.
- \* Holdup buttons (permanent and wireless).
- \* Surveillance equipment.
- \* Locked-door/buzzer system.
- \* Metal detection system.

Regardless of risk and location, virtually all jewelers must prove that they have adequate alarm systems to protect the perimeter of their premises to get insurance coverage. At the very least, perimeter protection should monitor all accessible openings of the premises, including doors, windows,

skylights, air-conditioning and heating vents, and false ceilings.

In case intruders get through the perimeter protection system without activating an alarm, underwriters recommend that a separate alarm system protect the safes and vault. Not only should such a system be completely separate from the perimeter alarm, but Jewelers Mutual recommends that high-risk jewelers have the two systems connected to different monitoring facilities. That way, even if something goes wrong and an alarm signal is not received by the alarm facility guarding the perimeter, a signal should be received by the facility watching the safe or vault.

Motion detection equipment also can back up the required perimeter alarm system. Motion detectors operate on ultrasonic, passive infrared or microwave concepts to sense movement inside the premises. Such a system should be arranged to protect your alarm control unit and telephone terminal box so that it will detect somebody tampering with your perimeter or safe protection systems.

The weak point of most alarm systems is the telephone line which transmits signals to a monitoring facility. Many burglars try to bypass or deactivate alarm systems by tampering with telephone lines. Advanced line security can protect those necessary lines of communication and detect intruders.

Many jewelers have been held up or taken hostage during nonbusiness hours. Early morning devices are effective means of alerting your alarm company that you're being forced to open your safe at an irregular time. They can be a last line of defense which will send a signal even if a robber forced you to deactivate your other alarm systems.

Holdup buttons, of course, should be used with extreme care. Never endanger yourself by moving to activate a button if there's a possibility that an armed intruder could see you. Wireless holdup buttons, which you can carry with you, are very effective. It's wise to carry one in your hand in plain view while opening or closing the business.

Surveillance equipment is a very effective deterrent. More than 75 percent of Jewelers Mutual's losses, which occur during business hours, are reported by policyholders who do not have surveillance equipment. A closed circuit television system with a videotape recorder provides very good images and eliminates film and development costs. In addition, the system can be used to train employees and deter them from employee dishonesty.

Locked-door/buzzer systems and metal detection entrance ways provide the ultimate in security against armed robbery for the high-risk jeweler who uses the systems wisely. In some cases, metal detection equipment has the potential of replacing an armed guard. Both systems also are a good idea for retailers who occasionally must operate the store alone.

**NEXT MONTH: PART TWO**

# New Products and Literature



Seiko's Art Deco Watches

## SEIKO'S JEWELRY COLLECTION WITH ART DECO ACCENTS

Seiko creates an art deco effect with three ladies watches from the Seiko Jewelry Collection. A combination of contemporary tones makes these watches versatile enough for day and evening wear.

An elongated oval case flows into a slender link bracelet. It is accented by a goldtone center link. The Seiko art deco ladies watches are available in all goldtone, brushed silver and goldtone, or polished grey and goldtone.

These watches are available from Seiko's nationwide network of authorized distributors.

## ABOVE OR BELOW WATER

This quartz timepiece from Bulova's Fall 1986 Marine Star Collection is for those who require exacting performance in an underwater watch. Water resistant to 660 feet, this diver's model is crafted of all stainless steel with

a screw back, screw-down crown and one-way ratchet bezel. It features luminous markers and hands on a black dial with day/date display. The model shown is 91C14; its suggested retail price is \$165. Contact: Bulova Watch Co., Inc., Bulova Park, Flushing, N Y 11370; (718) 565-4200.



Quartz Watch from Bulova

## SWEST INTRODUCES REY BUR-CUT LUBRICANT

Rey Bur-Cut, a non-petroleum lubricant for cutting and abrading action, is now available from Swest, Inc. Bur-Cut can be used to lubricate burs, sawblades, gravers, drill bits, or virtually any other tool that cuts, grinds, pierces, etc. It can be applied directly to abrasive wheels and wire to reduce drag. Thus, tools stay sharp longer, work faster, and have a much longer life.

The product comes in a handy "push-up" tube dispenser and sells for \$2.75. To order, contact the Swest office nearest you. Or you may contact: Swest, Inc., Advertising Department, P.O. Box 20938, Dallas, TX 75220; (214) 350-4011.



Rey Bur-Cut from Swest

## PRECISION TOOL CATALOG FROM MOODY TOOLS, INC.

Over 400 precision measuring devices and miniature hand tools are featured in the new Moody Hand Tools Catalog #867. In addition to their standard line of products, more than 100 Moody and Acu-Min® tools for home and industrial use have been added in this 56-page edition.

The newest addition to the catalog is the introduction of a broad line of precision quality measuring tools, marketed under Moody's Acu-Min brand name. This new products grouping

includes outside, inside and depth micrometers; vernier, dial and electronic digital calipers; dial indicators and sets. The Acu-Min line has been further expanded with the addition of a series of stainless steel tweezers for a variety of industrial assembly applications; a versatile inspection light, plus a new 30-piece Tool Roll Set—all for the industrial marketplace.

For a copy of the Moody Hand Tools Catalog #867, call or write: Moody Tools, Inc., 42-60 Crompton Avenue, East Greenwich, RI 02818; 1(800) 223-9036. Enclose a check or money order for \$2.00 to cover postage and handling.



Moody Tools Catalog No. 867

## TELUX-PIONEER'S MARINER CHRONOGRAPH

From Telux-Pioneer, function and beauty come together producing this instrument. It has a French quartz movement and day/date calendar window. The two-tone 18K gold-plated case has easy-to-read luminous dial and hands. It has a second hand and matte black dial, as well as a compass with a rotary bezel that clicks into place as it is turned. Screw-down watertight gold-plated crown with scratch resistant mineral glass crystal complete

the timepiece. There is a 3-year battery system in place. The case is black anodized metal.

For further information contact: **Richard McKean, c/o the Information Refinery, 665 Franklin Ave., Nutley, NJ 07110; (201) 661-3850.**



Telux-Pioneer's Chronograph

#### EXPANDED LINE OF DIAMOND ACCESSORIES FROM FOREDOM CO.

The Foredom Electric Company announces the addition of more diamond accessories in their catalog 290B. These new diamonds—available in mandrel-mounted points, discs, and wheels—are for use with rotary power tools. They are ideal for cutting, carving, and engraving on glass, ceramic, hardened steel, semi-precious stones, and other hard materials impervious to standard carbide, steel, or abrasive accessories.

For more information about the Catalog 290B, contact **The Foredom Electric Company, Rt. 6, Bethel, CT 06801; (203) 792-8622.**

#### HELBROS' NEW ULTRA-THIN SERIES

Helbros has introduced a new

series of ultra-thin strap watches with varied dial and strap treatments, in men's and women's matching models.

Included in the collection are brilliant black dial models with black leather straps; champagne dials with pigskin straps; white dials with full Arabic numerals in red, with matching burgundy leather straps, or gray Arabic numerals with matching gray lizard straps. All styles have ultra-thin quartz movements, goldtone cases, and cabachon crowns. The watches retail at \$50.00.

Contact: **Helbros Watches, Inc., 330 W. 34th St., New York, NY 10001; (212) 736-1144.**

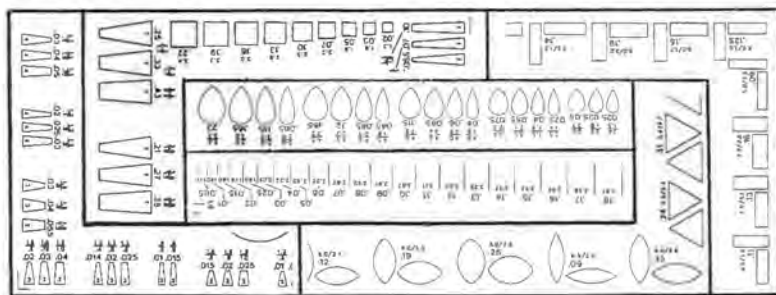


Ultra-thins from Helbros

#### THE MELEEMETER FROM GESSWEIN

Gesswein further expands their line of gemological tools with the Meleemeter. This new micro-gauge template system easily and quickly measures stones and mountings where even calipers and micrometers cannot reach. The Meleemeter contains 8 templates with over 290 stone shapes and sizes, all measured and computed for weight. Millimeter lengths and widths, as well as the formula weights are at the

#### Gesswein's Meleemeter



stone outline.

By scanning a mounting with a Meleemeter gauge, a person can find the best stone shape and ratio quickly since the measurements are at the gauge profile. The Meleemeter is made of optically clear, stabilized Mil-Spec polyester with printed circuit technology for use under magnification.

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

#### FLASHBACKS FROM TIMEX

The new Flashbacks watches from Timex's "Big-o Bold-o Beautiful" Collection recreate the classic look and feel of the Thirties and Forties. In the photograph, the watch shown on the left (#42001) sports an old-fashioned center design on a white dial in a rectangular gold-tone case. The style on the right

(#53461) hosts a calendar and offers traditional elegance. Both the Flashbacks are accented by a medium-brown pigskin leather strap and have a suggested retail price of \$34.95. Contact: **Timex Corporation, Park Road Extension, P.O. Box 2126, Waterbury, CT 06720; (203) 573-5000.**

Timex



#### FROM ROLEX

Rolex's famed "Submariner Date" model in 18K gold. Its rotating bezel features 12 baguette diamonds, 27 sapphires, and 9 rubies. 268 more diamonds plus 8 round, 2 baguette and one triangular rubies grace the dial. Its water-resistant case holds a selfwinding movement. For more information, contact: **Rolex Watch USA, Inc., 665 5th Avenue, New York, NY 10022; (212) 758-7700.**



## **BASLE: 70 YEARS OF FAIR HISTORY**

The Basle Fair has existed in its present form for 70 years now. It owes its long history to its adaptability in the face of changing economic conditions. At the start strictly a national fair, open to both the general public and trade buyers, it has spawned a total of 22 specialist events with an international reach, all of them highly successful.

Basle's watch and jewelry fairs probably provide the best examples of this successful evolution. By 1931, Swiss watch manufacturers were in sufficient numbers to form a homogeneous group within the national fair. By 1963, European and overseas buyers were attending in great numbers.

The fair's success attracted increasing attention from producers in other European countries. They asked to be allowed to join. So in 1973 the Fair for the first time became an international event. It brought together manufacturers from 10 European nations, all with clear free-trade policies—a precondition for admission. The new formula immediately caught on and the international fair grew steadily in size.

By 1984 the European Watch, Clock and Jewellery Fair entered a new phase of its development, as a separate trade fair distinct and apart from the Basle Spring Fair. New exhibitors continued to join, reaching 1,784 in 1986. That year, too, the Fair reached out to the world by admitting non-European exhibitors for the first time.

Also, more and more trade visitors come to the Fair with each passing year, as recent figures show: in 1984—77,405; in 1985—81,247; and in 1986—91,151.

The largest of its kind in the world, the Fair has adapted smoothly to changing business and trading conditions. From a general purpose national fair it has evolved into an international event of the first order. It has also achieved the objective it had set itself: to stage an annual presentation of the widest range of products under one roof for the benefit of the largest number of trade buyers from every continent.

## **JIDA NAMES SHANER FOR MANAGEMENT**

The Jewelry Industry Distributors Association (JIDA), a nonprofit trade organization representing wholesalers of jewelry and watch repair products, has named The Joseph E. Shaner Company in Baltimore to provide it association management services.

In selecting the Shaner organization, JIDA named Thomas C. Shaner, a Certified Association Executive of the American Society of Association Executives and president of the firm, to be JIDA's executive director. Debbie Rommel was appointed administrative coordinator and Judi Melendick was named financial manager.

JIDA has relocated its corporate offices from Chicago to Shaner's offices on Franklin Street in Baltimore. These offices will serve as the base of operations for all JIDA activities including membership data collection, financial transactions, convention planning, and the general administration of the association.

In addition to JIDA, The Joseph E. Shaner Co. also serves nearly 20 other trade and professional associations ranging in scope from international to local.



Students of the Milwaukee Area Technical College Horology Class. This class is 100% AWI membership. Pictured are (front, L to R): Shiritia McNealey, Lidia De La Fuente, Deborah Connerton; (middle, L to R): Gerald Jaeger (instructor), Brandy Glass, John Kueny, Nicki Koehler, James Stoehr; (back, L to R): William O'Donnell, William Brewster, Amparo Rafael, Jr., Keith Hinrichsen, Douglas Gubin, Randy Kmiecik, Wayne Hack. Not pictured: Curtis Smith, Thomas Huth.

## **GERMAN WATCHES AND CLOCKS TODAY**

The German watch and clock industry reports both an upcurrent and stabilization at a high level as it comes up to Inhorgenta 87, the 14th International Trade Fair for Watches, Clocks, and Jewellery, to be held in Munich February 13-17, 1987. This trade fair is the main marketing instrument of the branch for promoting exports and domestic sales.

In 1985 the branch, comprising some 250 businesses that employed 16,000 people, achieved its best annual sales of DM 1.62 billion—an increase over the previous year of 5%. Exports, already accounting for 50%, went up by 12.4%. In terms of units German watch and clock production by medium-sized firms is "number one" in Europe: 62.1 million units were produced. The official statistics count finished clocks and watches as well as their

movements. Clocks (alarm clocks, wall clocks, etc.) accounted for 59 million units and watches for 3.1 million units. The value of exports rose by 6.6% in the first four months but did not achieve the increase rate on the domestic market.

The Federal Republic remains a magnet for imports. In 1985 finished clocks and watches, movements, and clock and watch parts were imported for just under a million. As for watches, over 30 million units were imported (i.e. ten times more than Germany produces). In spite of the increased imports, the export share predominated.

## **BILL BOYAJIAN NAMED GIA PRESIDENT**

Following a unanimous vote by its Board of Governors, the Gemological Institute of America has named Bill Boyajian as its new

President. The appointment was made at a meeting of the Board at GIA's Santa Monica, CA headquarters on September 26. It came after a period of less than two months during which Bill Boyajian served as acting President following the resignation of Glenn R. Nord.

GIA under Boyajian has already made priorities of education and gemological research and is expanding its capability to meet the trade's demand for diamond grading reports.

**PULSAR NAMES  
"PRESIDENT'S AWARD"  
CO-RECIPIENTS**

Pulsar Time announced recently that Judie Golden, National Accounts Coordinator, and Peggy Abrams, Customer Service Manager, have been named co-recipients of Pulsar's President's Award for 1985.

Arthur J. Cohen, President of Pulsar, stated that the award is given "in recognition of exceptional and significant contributions to the progress and success of the company." He pointed out that this is the first time ever the award has been given to more than one person. "Since they have each distinguished themselves in their area of expertise, we decided that they are both deserving of the award."

Judie Golden, who resides in Cranford, NJ, and Peggy Abrams, a resident of Oak Ridge, NJ, both joined Pulsar Time in 1980.

**FOUR NEW JEWELRY  
INSTRUCTORS AT PJC**

Four new jewelry instructors have joined the Paris Junior College faculty in the Division of Jewelry Technology, Horology, and Gem-

ology, according to Dr. Harley Davis, dean of applied sciences. The new instructors, who began teaching this fall at the college, are: Chari Bierlein, Joan Goe, Ulla Raus, and Gordon Wanshura. They are instructors in the various areas of the PJC jewelry division, which is being expanded because of a demand for its graduates, Dr. Davis said.

**TAG-HEUER APPOINTS  
CAROL JOHNSON  
SALES COORDINATOR**

Tag-Heuer of Springfield, NJ has appointed Carol Ann Johnson sales coordinator. The announcement came from Jean-Pierre Loraux, president of the 126-year-old Swiss manufacturer of sport-watches, yacht timers, stopwatches, and timing equipment.

Ms. Johnson most recently served as financial and office manager for E.M. Sewell, architect, located in New York City. Before joining Sewell, she had been office and sales manager since 1980 for Cuffs Planning & Models, Ltd., a software firm in New York City.

Ms. Johnson lives with her husband, William, and her son Mark in Scotch Plains, NJ.



Carol Ann Johnson



Jack Miles (right), regional sales representative of Omega Watch, presents an Omega "Constellation" to George Corsiglia of Lane Jewelers, Nutley, NJ. Corsiglia was the winner of a dealer promotion which was conducted by Omega during its timing sponsorship of the One Lap of America automobile endurance rally earlier this year. By guessing the timing score closest to that of the winning team's completion of 8,600 miles over the course of eight days, Omega jewelers qualified for the prize, and Corsiglia's prediction was within four seconds of the 1986 One Lap winning time.



Gerry Hansen, president of the Jewelry Industry Council, accepts a check for \$10,000, proceeds from the recent Morris B. Zale Awards Dinner held in Dallas from Dallas Market Center vice president Jan Potter. The dinner, to honor outstanding jewelry retailers for their contribution to the industry, made the contribution to the Council to aid that organization in its nationwide consumer publicity program to promote jewelry and tabletop industries.

# Classified Ads

## REGULATIONS AND RATES

Ads are payable in advance \$.50 per word, \$.60 per word in bold type. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are \$4.00 additional for postage and handling. Classified Display Ads are \$25.00 per column inch. The first of the month is issue date. Copy must be received 30 days in advance (e.g. February issue closes for copy on January 1).

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**MOVED**—Wheels, Pinions, Barrels, or whatever, repaired or made new. Repivoting of arbors. I will accept orders for complete restorations and clock making. **NO watch parts. KEN LEESEBERG**, RR 4, Box 286, P.O. Box 447, Montello, WI 53949.

**CUTTERS** cycloidal for clock wheels and pinions. Module 0.2 to 1.0. Constant profile producing traditional square bottomed teeth, 104 sizes. Escape cutters: recoil (set of seven sizes), Dead beat (set of four sizes), Ratchets 60° and 70°. All cutters made in 8% cobalt M42 High Speed Steel, and heat treated under vacuum. Also cutter grinding wheels, Grit and CBN. Send for Information Sheet, prices and order forms to: P.P. Thornton (Successors), Ltd., Horological Cutter Makers, The Old Bakehouse, Upper Tysoe, Warwickshire, CV35 0TR, England. (tf)

Chains Soldered; Beads & Pearls Strung; Ring Sizing; New Shanks. Send for price list. Vicki Elia, Victoria Jewelers, 689 N. Cass, Westmont, IL 60559; (312) 654-2055.

**CLOCK and MUSIC BOX** parts, mainsprings, material and tools. Custom made to order or repair of gears, pinions and parts. Catalog \$2.00. **TANI ENGINEERING**, Box 338, Atwater, OH 44201. (216) 947-2268. (tf)

**NEW SWISS QUARTZ MOVEMENTS CUSTOM FITTED** to Diamond, Gold, Antique, Sentimental Watches and Pockets—all sizes. Rolex, Omega. Longines, LeCoultre, Girard Perregaux, Bulova, Elgin, Gruen, Accutron, Hamilton, Movado. Service and Quartz Conversion. **ALFONSO ZAMORA**, 395 Bernhardt Drive, Buffalo, New York 14226; (716) 839-5091.

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## BOOKS

**WRISTWATCHES,** History of a Century's Development, **H. Kahlert, R. Muhe, G. Brunner,** with a Price Guide by Gordon Converse, 300 pages, 1829 watches illustrated, 6" x 12", first time in English. January delivery: \$50.00. **MASTERS OF TIME,** Second Volume of Ore d'Oro, 360 pages in color with 1986 prices: \$132.00, \$3.50 UPS. **AMERICAN REPRINTS CO.,** P.O. BOX 379, MODESTO, CA 95353; (209) 667-2906.

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## SCHOOLS

Correspondence courses in Quartz-Accutron-Watchmaking-Jewelry-Lost Wax Casting and Rubber Mold Making. Free folders. Watchmaking Institute of Canada, 1012 Mt-Royal St. East, Montreal, H2J 1X6; (514) 523-7623. (tf)



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- 8—Retrofitting Bench Course (AWI); James Broughton, instructor; Baltimore, MD.
- 13-17—INHORGENTA '87, Munich Trade Fair Centre. For information call (201) 652-7070.
- 27-1—Minnesota Watchmakers Association Annual Convention, Radisson South, Bloomington, MN.

## APRIL 1987

- 12—Iowa Jewelers & Watchmakers Association Spring Seminar, The Highlander Inn, Iowa City, IA.
- 26—Ontario Watchmakers Association 50th Anniversary Annual Meeting & Banquet, Loews Westbury Hotel, Toronto, Ontario. For more information: R.R. 1, Cookstown, Ontario L0L 1L0. Phone (705) 458-9221.

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