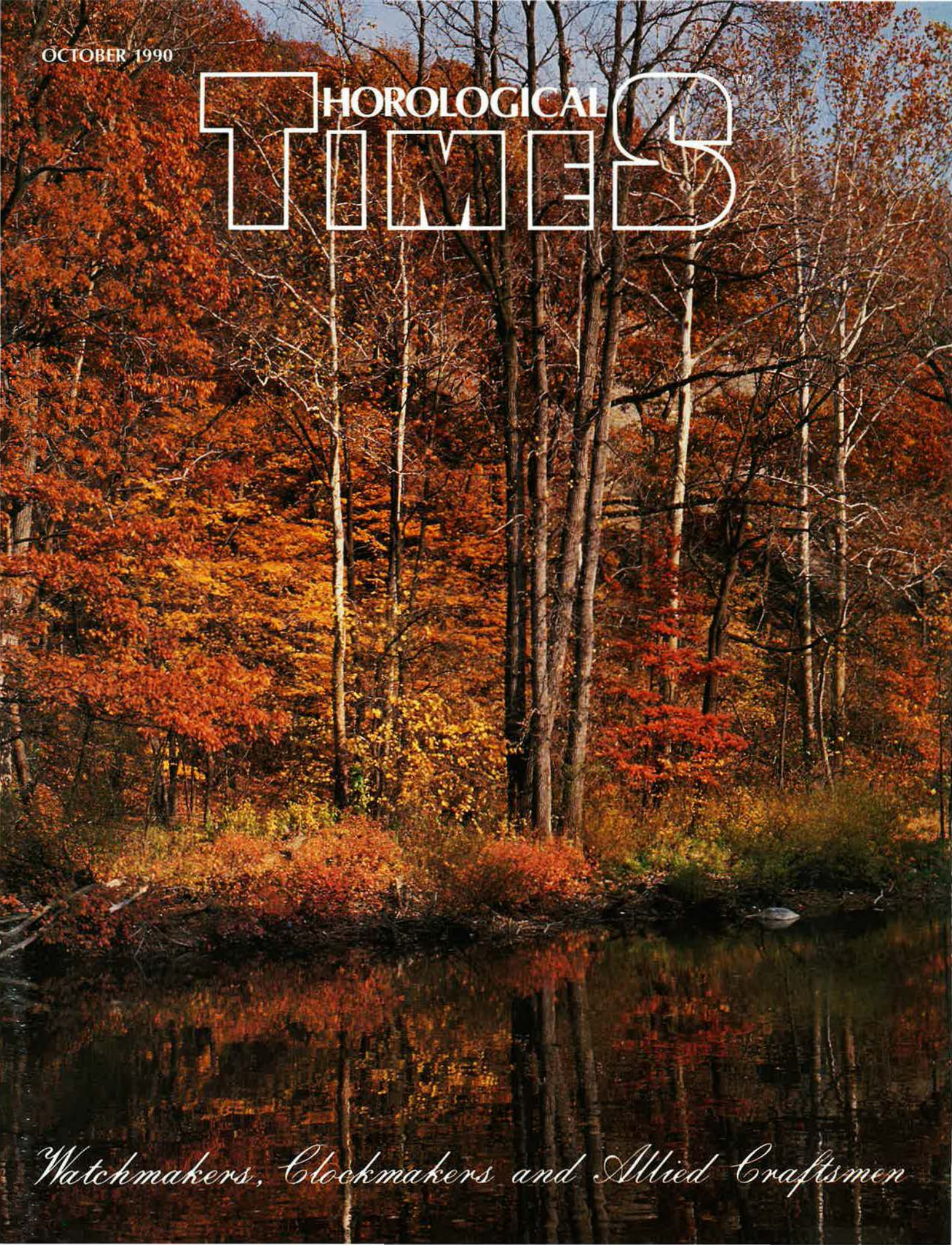
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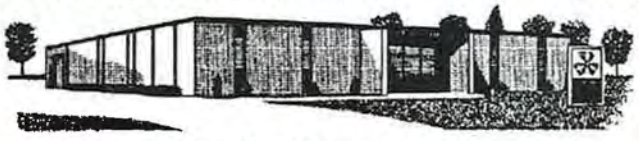
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VOLUME 14, NUMBER 10 OCTOBER 1990

HOROLOGICAL TIMES™

Official Publication of the American Watchmakers Institute

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President's Message



AN OPEN LETTER TO RICHARD ROY

Dear Richard:

I want to thank you for your phone call. You asked me some questions that you said you could find nothing written about. I would like to try to answer them.

First, how can you become more involved in AWI? The best way to do that is to become involved in your local guild and your state association.

I recently had the privilege of introducing six speakers at a Regional Seminar. Five of the six were past presidents of their local guild, and five were past presidents of their state associations. Of course, they held many positions in each of the local organizations, such as secretary, vice president, treasurer, delegate to AWI meetings, etc., but this was how they got started.

One way to REALLY become involved is to be a delegate from your state association to the AWI meetings. All delegates are asked to fill out a sheet stating which committee he/she would like to be put on. Don't be shy about asking to be put on a committee. You'll be working with people all across the country. By the way, you don't have to be a delegate to attend the AWI meetings. You only have to be a delegate to be able to vote. (For years our vacation has been to attend the AWI meetings.)

You said you didn't have a local organization or a state organization. Why not start one? It takes a minimum of 15 members to become an AWI affiliated chapter. If you are interested, contact the New Guild Liaison Chairman, James Adams; AWI Central; or me, and we'll help. We will set up organizational meetings and guide you through forming an organization, electing your officers, and getting you started.

I would like to encourage you in your desire to become more involved. Where else can you work with people with such experience, willing to help their fellow horologist? Those AWI speakers I had the privilege to introduce had a total of 260 years of experience between them, all specialists in different areas. Look at the wealth of information available to AWI members for the asking!

I look forward to hearing about your progress in getting an organization started in your area and would encourage others to do the same.

Sincerely,

Alice B Carpenter

ON THE FRONT: *This warm Autumn scene was photographed by Myron Palay, a resident of Cleveland, Ohio.*



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SPAN-GAP

For more than a year, Hal Herman has chaired a committee examining the need and practicality of providing assistance to members of our profession who are new and inexperienced. This committee was known as the Intern and Mentor Assistance Committee. The concern of the committee was the void that seems to exist when a new watch- or clockmaker first enters the trade on a professional basis and is suddenly responsible to produce a reasonable income from his/her efforts.

The committee determined that most students who complete formal horological training from one of the schools offering such training, for the most part, enter the trade with an adequate knowledge of the principals involved. This is true to a lesser degree of the student who has embarked on a self-study program. Regardless of training, the committee determined that these new craftsmen find it difficult to complete all tasks required in a speedy and profitable manner. Frequently they are required to spend many hours solving a problem that they are experiencing for the first time. This tends to diminish their employment opportunities and restrict the earning ability of the self employed.

In years past it was practical to place a new craftsman with a person who had many years of experience. This person served as a mentor who was able to draw upon years of experience to help the new craftsman solve those "first-time" difficulties so he/she didn't have to agonize for hours over the problem. These new craftsmen could learn from their mentor, resolve the problem, and move on to continued productivity. Unfortunately, the opportunity of working with an experienced, craft-wise mentor seldom exists today.

In presenting his committee's report to the Board of Directors, Herman proposed, and the Board approved, the establishment of a program designed to provide craft-wise mentors for those who are entering the trade. They decided to call this project "Span-Gap." The program calls for experienced, craft-wise persons across the country to come forward and agree to serve as a volunteer mentor. The success of the project will be determined by the number and quality of mentors who volunteer. Once an adequate list of potential mentors has been established, AWI can then offer to suggest mentors to AWI members who are new to the trade, and who seek such assistance.

We would envision that in many cases a phone call to the mentor could solve the problem. In some instances, though, actual hands-on inspection would be involved. It will be necessary for the mentor and new craftsman to work out the details and limitations. The function of AWI will merely be to bring the two parties together. We stress that this program is to be on a volunteer basis; mentors are not to receive payment for this service.

If you are an experienced master craftsman who would be willing to lend assistance to a new craftsman in your immediate area, please make your availability known to AWI Central. We will compile a list of potential mentors. If the list contains enough mentors in many areas of the U.S. and Canada, we will move forward with the project and publish the areas in which potential mentors are available.

136

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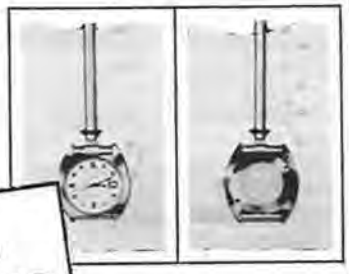


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Questions & Answers

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



A One-Year Differential Clock

Q We are writing on behalf of a customer of ours. I have enclosed photos and a brief explanation of the information he would like regarding the clock. I also was interested in this clock because I don't recall ever seeing one of this design that ran one year.

We are interested in the history of the manufacturer–the Differential Power Clock Co., 33-35 W. Kinzie St., Chicago, IL. Information such as when they were in business, numbers manufactured, and if it is a collector's item are some of the facts we are interested in. The dial printing calls it a One-Year Differential Clock, Pat. Oct. 25, 1910.

It came into the family of a client in 1926 during the remodeling of an office building in the Chicago Loop. The records show it was faithfully wound each year for many years until 1965. In January 1990 the case was refinished and the clock wound. It is now keeping excellent time after 20 years of inactivity.

Any information that you might be able to provide about the clock would be appreciated.

Steve Weatherly
Ft. Worth, TX









A *I have searched through my volumes on American patents and came up with the number of the patent on your clock. It was issued to the Differential Clock Co. on October 10, 1910. The patent number is 22,800.*

Brooks Palmer's book **The Book of American Clocks** *lists the home office as Grand Rapids, MI. The* **Jewelers Circular Buyers Guide** *of 1912 lists a Year Clock Company of New York and notes as of that year the company was no longer in business. It might have been a spin-off of the same company. At*

(Please turn to page 8)

Borel Quartz Crown Assortment

Borel has assembled the 45 most common dustproof and waterproof types used on today's quartz watches, which require smaller sizes and taps. Includes diameters: 2.50, 2.75, 3.00, 3.25, 3.50, 3.75 and Taps 10, 11, 12 & 13 This new updated assortment includes tap 13 sizes, more WP sizes and more tap 12 crowns than previous assortment. 1 each yellow and white of 40 numbers, plus 5 Blue Stone Crowns, yellow only. Total of 85 Crowns, in 60 bottle cabinet.



60 bottle cabinet.

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Newly updated 751/2 Asst. $90

Dustproof Type



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

Waterproof Type



Diameter	Tube	Post	Design	Tap 10	Tap 11	Tap 12	Tap 13
2.50mm	1.50mm	Flush	●	752/10	752/11	752/12	752/13
2.75mm	1.60mm	Flush	●	754/10		754/12	
3.00mm	1.60mm	Flush	●	756/10	756/11	756/12	
3.00mm	1.80mm	Flush	●	758/10			
3.25mm	1.80mm	Flush	●	760/10	760/11		
3.25mm	1.60mm	Flush	●	762/10	762/11		
3.50mm	1.80mm	Flush	●	764/10	764/11		
3.50mm	1.60mm	Flush	●	766/11	766/11	766/12	766/13
3.50mm	2.00mm	Flush	●	768/10	768/11	768/12	
3.75mm	1.60mm	Flush	●	770/10	770/11		

Assortment, now, includes 5 Blue Stone Crowns DP 3.00, 3.50, 4.00 and WP 3.00, 3.50.

Japanese Style Crown Asst. 951/2 Asst. $99



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J-506-2614	J-40M32	J-45M30	J-50D05	J-35D03	J-35N57
J-506-2847	J-40M24	J-45D01	J-45W29	J-35M82	J-35M68

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QUESTIONS & ANSWERS

(Continued from page 6)

any rate, a search through all of my many books on American clocks does not reveal much more.

I called the home office of the National Associaton of Watch & Clock Collectors and they have no record of patent no. 22,800. Perhaps if you wrote to the U.S. Patent Office, they might have a copy. The NAWCC did come up with a few patents of 400-day clocks. An inventor by the name of Mr. Busenbenz assigned his patent to the Differential Clock Co.

I do hope that I have been of some help.

Q Enclosed are photographs of a pocket watch. My customer would like to have it identified.









I would appreciate any history you could supply.

The watch is 16 size, sterling silver, open face, double back case. It is an apparent California watch. The serial number is 495116. There is a trademark showing the California bear and the dial states "The California Watch." The watch is in very good to fine condition. The movement keeps excellent time. There is nothing special about the watch except that I am unable to identify it. My customer is curious as to its rarity.

Robert M. Dearmin
Santa Rosa, CA

A *Your watch is Swiss of medium quality and of the late 19th century. It was marked to have some American buyer believe it was an American-made watch. This practice was rampant at that time until Congress passed a law forbidding the importation of any foreign-made watch bearing the false name of an American city, etc.*

Henry B. Fried

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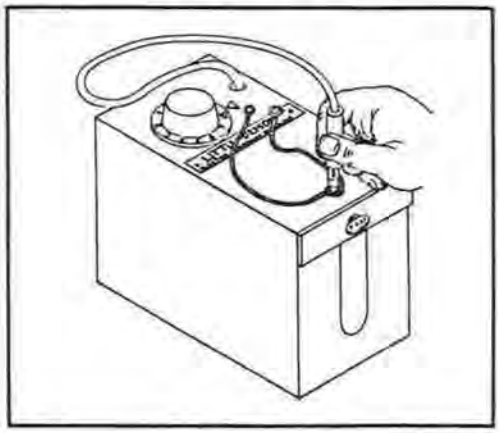
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Bench Tips



Joe Crooks

RECOVERING A QUARTZ AMPLIFIER

This month's tip is from Richard Meador of Akron, Ohio.

I have an L&R T300 Quartz Tester that stopped working. I traced the problem to the induction pickup, and after reading the August 1990 bench tip (page 10) I was able to replace the pickup.

I used a Radio Shack telephone pickup #44-533 ($1.99), and the tester works better than new. Instead of soldering the pickup directly into the P.C. board, I soldered in a Radio Shack chassis jack #274-251 and attached it to the case of the tester. That way if the pickup should break, it's just a matter of plugging in a new one.

An induction mike picks up electric sounds and will not amplify the noise that a mechanical watch or clock makes. You need a dynamic mike for that. Also, an induction mike is easy to break if it is dropped and banged sharply against some object.

Roughly the way an induction mike works is it has a coil of copper wire, a space, then a tube of ferrite powdered iron in the plastic tube and a cone-type amplifier. An electronic sound excites the ferrite induction pickup which is magnetized when current goes to the coil. This amplifies many times more through the electronic listener.

Do not leave the listener on overnight. If the volume is up high, it will drain the battery all the way down.

NOTE: This $1.99 phone pickup just went up to $2.89 . . . It must have something to do with the price of oil. It's affected everything else, hasn't it?

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

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ROCK QUARRY *et tu*

Fred S. Burckhardt



A Toast to Angel

It was one of those hot summer days so I decided to close a little early and stop on the way home to partake of the environment of Phil's Suds Emporium. The thing I like about Phil's is the homey type of atmosphere. It's sort of like Ma and Pa Kettle's farmhouse.

I ordered my usual flagon of ale. It used to be called a glass of beer up until Phil saw the movie about the Three Musketeers and decided to upgrade the place. He even wears one of those fancy hats with a plume and carries a sword. Talk about a classy place.

Phil and I got to talking and he told me that he also was a watchmaker but he decided to go for the money and went to bartenders school. He said it was a tough decision since the girl he married, Angel Flutelmeier, was also a watchmaker. They enjoyed working together, so now she has her bench at the end of the bar and fixes watches while Phil serves the suds. Phil got busy with other customers so I went down to talk to Angel.

As I approached her I could see why they named her Angel. She had long, beautiful blonde hair that reached down to her knees. It would have been a lot prettier if it had been growing from the top of her head instead of her shoulders. I asked her how she got started repairing watches. She told me she went to a Catholic school, Our Lady of Intensive Care, and decided to become a nun after she graduated. When she applied to the nunnery, they told her it wouldn't work out because she was Jewish and they didn't think she would fit in. She was heartbroken until Sister Mary got her a job working for her brother who was in charge of a watch repair shop in Nusa Tenggarra in Indonesia. She saved her money for the trip and worked in the shop for several years. Upon returning to the states, she met Phil and it was love at the first battery. They decided to straighten hairsprings together for life. I got choked up and ordered another flagon.

When Angel saw that I had regained my composure, she went on with her story. She and Phil worked side by side until their baby girl was born. They couldn't think of a name for her so they decided to use the first letters of their names, A&P. It was shortly after this that Phil completed his six years of training at bartenders school and opened his own bar.

After A&P was old enough to go to school, Angel moved her bench to the far end of the bar. You might say she passed the bar. Business was good from the start. She even taught A&P how to change batteries and a few other minor jobs.

Suddenly everything changed. One day a stranger came into the bar and offered Angel a deal she could hardly pass up. He was from one of the battery companies. He heard of her reputation and knew she was the type of person they needed. He couldn't tell her what the job was because of the people in the bar so he left her a tape to play when she got home. He warned her to use an old recorder because the tape would self-destruct in five seconds and burn up the recorder too.

After work, Angel rushed home and played the tape. It was an offer that was hard to refuse. The pay was far above any amount she ever dreamed of making as a watchmaker. If she took it she would be separated from Phil and A&P for a period of six months. Because of this, she refused the offer. The company was nice about it and even paid for the damage caused by the fire when the tape self-destructed.

Angel agonized for several months wondering whether or not she did the right thing by passing up the offer, but then she suddenly realized that by doing so she was helping watchmakers all around the world. You see, what they wanted her to do was to design a new battery package. The one they were using made it very easy to get the battery out of the package. This was unacceptable to the battery cartel members and they demanded a change.

It's nice to know there are still those blessed souls who are looking after our interests. I must return to Phil's and raise a few more flagons to show my appreciation to Angel for placing our profession above her own interests.

NOTES ON THE UPCOMING 1991 AWI TOUR

Among the proposed sites on the 1991 AWI Tour will be the Basel Watch, Clock and Jewelry Fair, with its more than 2,000 exhibitors. The museum in the same city houses some very rare horological clocks, and Dr. Geschwind, a noted authority, has promised to be our guide through that museum. Also, we will make visits to the International Watch Company Factory, the Rolex Watch Factory, and the Patek Philippe Museum and workshops.

On the French border with Switzerland is the Parrenin Factory as well as a fine watch museum (Villers le Lac). Also, near the Swiss border is the well-known maker of carriage clocks and platform escapements ("Le Epee"). We'll visit Besancon, horological capitol of France. We'll take a short bus ride up the Rhine from Basel to Strasbourg with its famous monumental clock and now the home of a watch producer.

Across the Rhine in West Germany are many familiar watch and clock factories and excellent museums. And now, for the first time in almost 50 years, East Berlin and East Germany are open to us. There we can visit the horological museum and watch centers in Glashutte, and possibly Dresden, and a trip to nearby Prague. Glashutte is well remembered from the Adolf Lange watches and the world-renowned horological school founded there by Grossmann.

It is felt that this tour may be oversubscribed and those who are interested should notify AWI headquarters of their intentions. The time will be mid-April to coincide with the dates of the Basel Fair. As usual, the tour organizer and leader will AWI's Technical Director, Henry B. Fried. HT

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Novice Watchmaker

James Adams, CMW, FBHI



Brass Setting Cap Jewel

Let's pick up where we left off last month. We've got the outside diameter of the brass rod turned to the correct size. The preliminary center hole has been drilled. Now you need to sharpen a piece of pegwood to a point and cut the point off and with a piece of beeswax, attach the cap jewel to the pegwood (Figure 1). The pegwood becomes the handle to control the cap jewel.

Now reverse the direction of the lathe turn. That is where the work stock normally turns toward you from top to bottom; we now want it to turn away from you. We want the work stock to turn into you from the bottom direction to the top. Why? Well, we are now going to cut a jewel

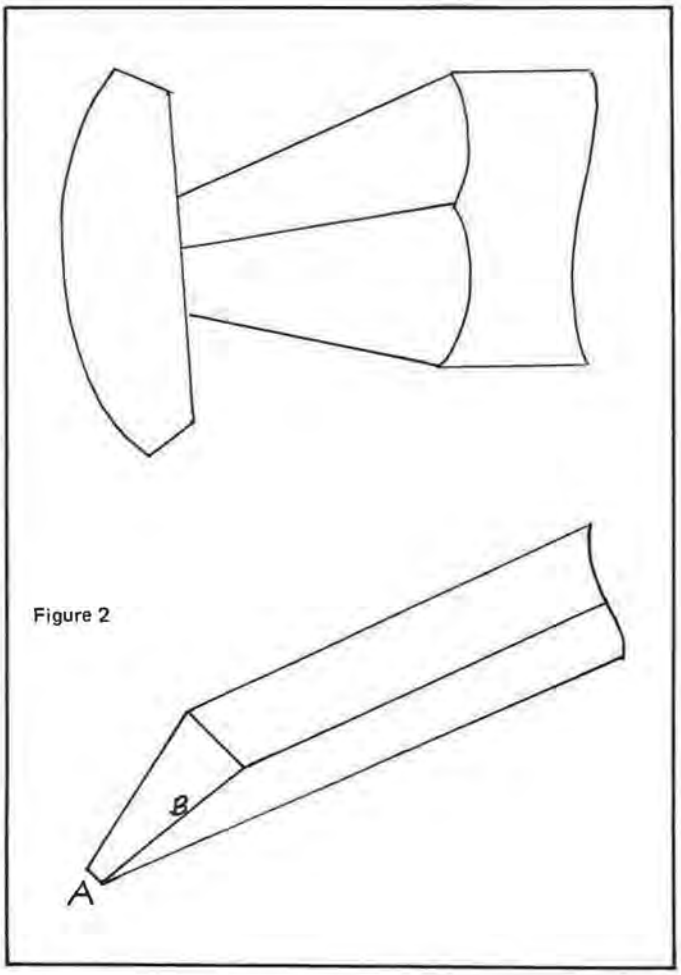


Figure 2

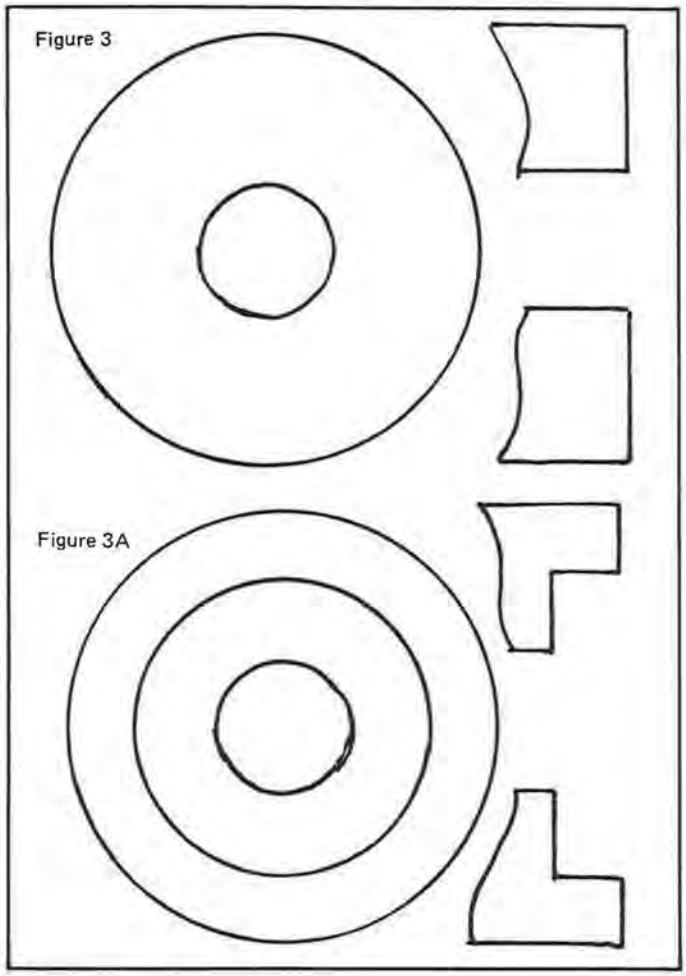


Figure 3

Figure 3A

seat inside the brass stock. We do this by using a graver against the inside wall of the brass stock on the far side of the inside hole. In this cutting stance the inside hole is turning downward into the cutting graver. With a seat cutting graver (Figure 2), enlarge the stock hole to the diameter of the cap jewel and about 1 mm deep, with a square shoulder inside the hole. The cap jewel should be able to slip in and out of that hole without binding (Figure 3). With the same graver (Figure 2), cut a taper inside the stock hole (Figure 3A) forming a shoulder for the cap jewel to rest on. Now, again using the seat cutting graver shown in Figure 2, cut about a 30 degree angle on that internal square shoulder (Figure 4). With the graver, cut a taper deep inside the jewel bushing (Figure 4A), leaving just enough taper from Figure 4B to act as a jewel seat, and insert the cap jewel (Figure 4B).

Figure 4

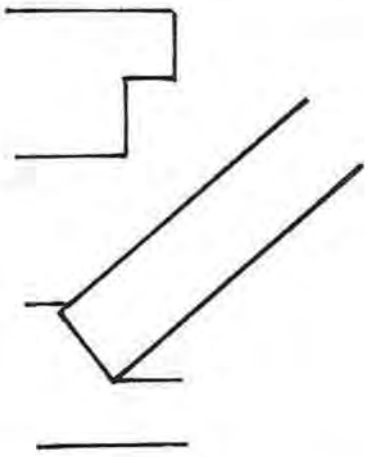


Figure 4A

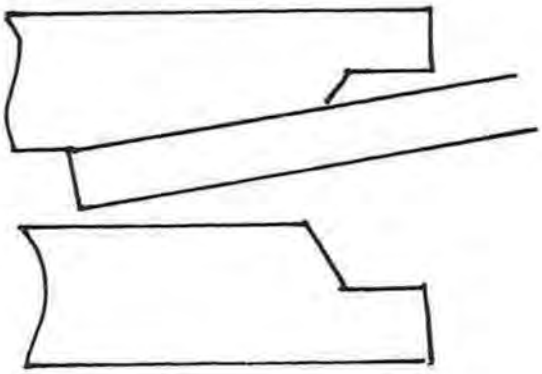
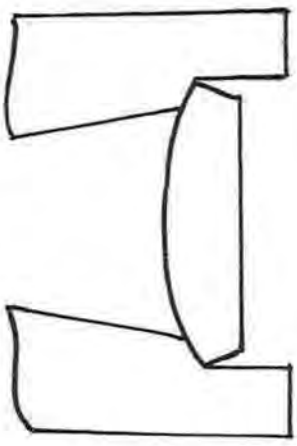


Figure 4B



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321	.44	387	.69
323	.52	388	.69
325	.46	389	.43
329	.61	390	.49
333 (42)	7.50	391	.41
335	.92	392	.26
339 (52)	2.50	393	.43
341	.91	394	.48
343	.41	395	.40
344	.68	396	.42
346	.99	397	.41
350	.87	399	.41
354	.64	RENATA	
357	.65	44	8.75
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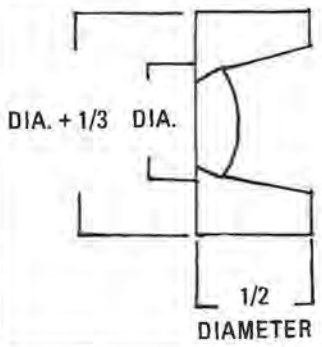
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Reverse the turn direction of the lathe so it's in the normal turn direction; that is, turning from top to bottom. Turn the face of the stock so the cap jewel is just under or below the surface of the brass setting (Figure 5). With your first graver, turn a notch into the stock face (Figure 6). With the setting burnisher you made and while the cap jewel is seated in the brass stock, burnish the brass metal over the jewel so it looks like Figure 7. It goes without saying, the lathe is turning the stock in a normal fashion. Your stock is turning and your cutters and burnisher are steady on the tee rest. I really shouldn't have to say that, but sometimes the simplest, most logical things are the most difficult to grasp. Anyway, when that has been done, you face off the excess brass down flush with the flat face of the jewel and turn a slight bevel on the outer diameter of the setting (Figure 8). Now we have half of the cap jewel setting made.

Cut the half jewel setting free from the brass rod about 2 or 3 mm back from the face of the jewel. Careful now, here is where you can flip and lose your hard-earned jewel setting. I'd like to say it has never happened to me . . . but . . . as a dues paying member of our fraternity, well . . . Anyway, being the professional you are, you have that little gem safely in a material pan on your bench, unless you've accidentally bumped the pan and there goessss that little - - - - - off into the maws of the great watchmakers' unknown, only to mysteriously reappear nine days later right in front of you. Novice, until that has happened to you, you haven't



For this and other lathe projects you will also need a millimeter micrometer. Make this finished brass cap jewel setting one third larger than the diameter of the cap jewel. The thickness of the finished brass setting should be half the diameter of the brass setting. These dimensions are only for practice use. Actual finished dimensions are computed from the actual movement.

experienced the gross pits of watchmaking. Back to business! Chuck up a cement brass chuck, which is no more than a flat brass disk mounted on an arbor. The half-finished jewel setting is then shellacked, flat finished side to the cement brass chuck (Figure 9), and then is centered. While the cement chuck is heated with an alcohol lamp, the shellac is kept soft and tacky, so as to reposition the jewel setting into the center of turns of the lathe. When satisfied that the jewel setting is properly centered, let it cool. All that's left to do is to turn the brass setting to proper depth and taper the inside of the setting (Figure 9), and voila! Eureka! You did it! See, I told you guys and dolls, it's fun.

What say we keep the fun rolling and next time whip out a brass-set balance hole jewel. Come on, people—you can do it!

Figure 5

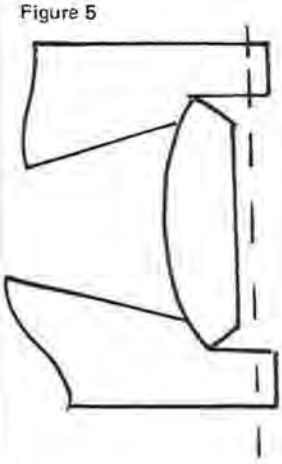


Figure 6

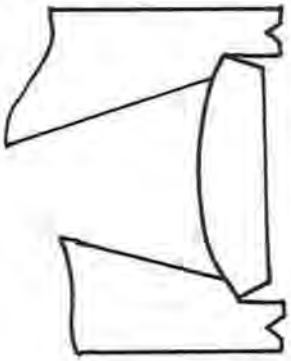


Figure 7

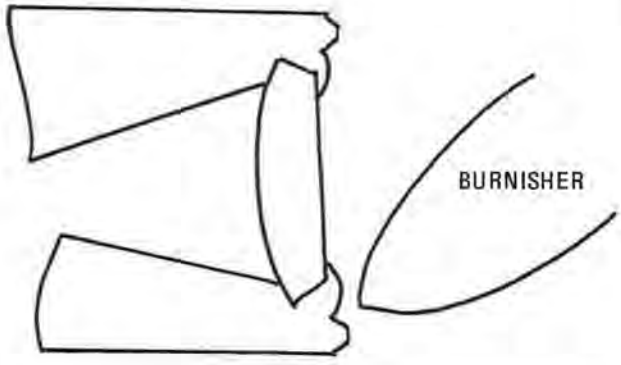


Figure 8

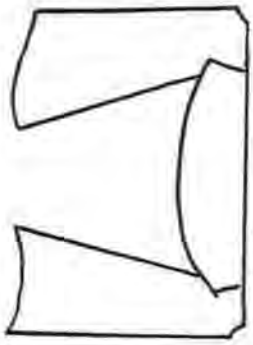


Figure 9

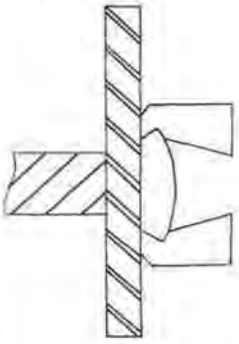
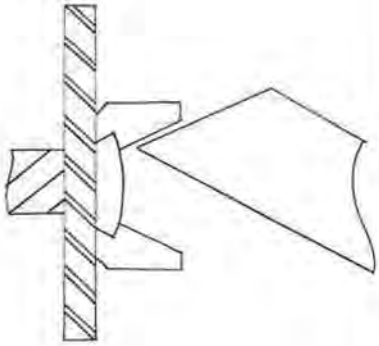


Figure 9A



Seeking Prospective Candidates

For AWI Board of Directors

The committee involved with securing candidates to run for the AWI Board of Directors is seeking recommendations from the membership. If you plan to suggest a possible candidate, please send that individual's name and background to: Mr. Robert F. Bishop, Chairman, Nominations for Board of Directors Committee, AWI Central, 3700 Harrison Avenue, Cincinnati, Ohio 45211.

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

Mr. Bishop must receive all recommendations before December 31, 1990 to be considered for the 1991 election.

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Seiko Automatic Chronograph

PART 3

This article concludes the series on the Seiko 6139A. It describes the final phase of adjustment and repair of the chronograph.

It may now be necessary to adjust the chronograph finger. It is located on the chronograph center (fourth) wheel. Inspect the locking contact by turning the chronograph finger forward while it is in the locked position. Check the degree with which the chronograph finger contacts the intermediate minute recording wheel.

The amount of contact should be more than one quarter but less than one half the size of the flat end of the chronograph finger; see the inset view in Figure 24. In this view, the chronograph finger travels counterclockwise. It should not make deeper or shallower contact with the intermediate minute recording wheel than that shown. Also, make sure the finger does not contact the other teeth on either side while it contacts this wheel.

To adjust the chronograph finger, straighten it—the portion shaded in Figure 25—and bend the base at the circled position to affect the desired contact.

If the position of the chronograph finger is incorrect, the forwarding of the minute recording hand becomes confused around the "0" second.

CHECKING: After resetting the hands, check the peak of the tip of the chronograph finger. It must point straight between the space of two opposite teeth of the intermediate chronograph wheel (Figure 26).

To adjust its position, place the hammers in a depressed position and turn the adjusting pin of the chronograph finger (attached to the second heart) until the correct position of the finger is obtained (see "A," "B," and "C" in Figure 26). Be very careful that, during this adjusting, you do not break the pivot of the center chronograph wheel by pressing on this pin too strongly.

CONTACT OF HAMMER AND HEARTS

When the hands are reset, there should be no clearance between the hammer and the second heart. Suitable clearance between the setting surface of the hammer and the minute heart, however, is 0.02 mm. If this clearance is excessive, the hands will not be reset to the "0" second.

It is difficult to actually see this clearance. Observe

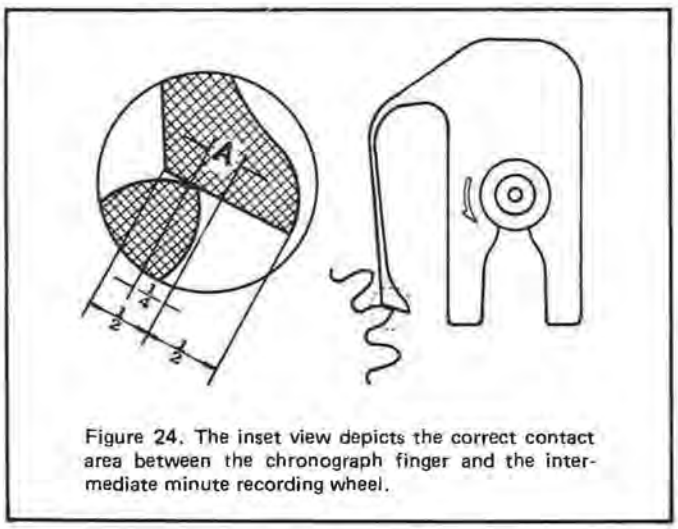


Figure 24. The inset view depicts the correct contact area between the chronograph finger and the intermediate minute recording wheel.

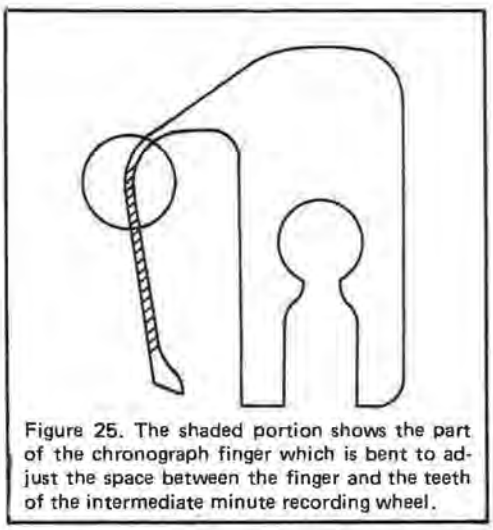


Figure 25. The shaded portion shows the part of the chronograph finger which is bent to adjust the space between the finger and the teeth of the intermediate minute recording wheel.

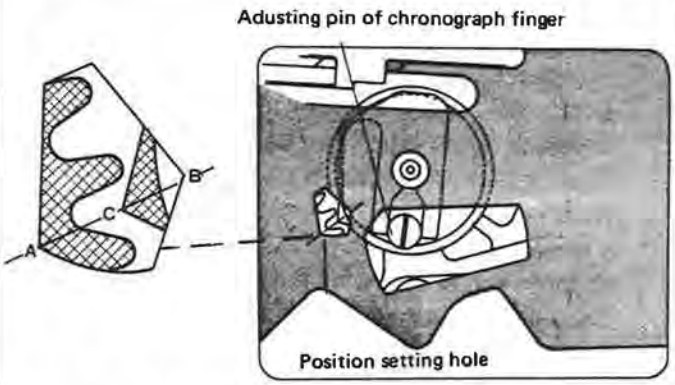


Figure 26. This figure shows that the tip of the chronograph finger must point straight between the space of the teeth of the intermediate chronograph wheel.

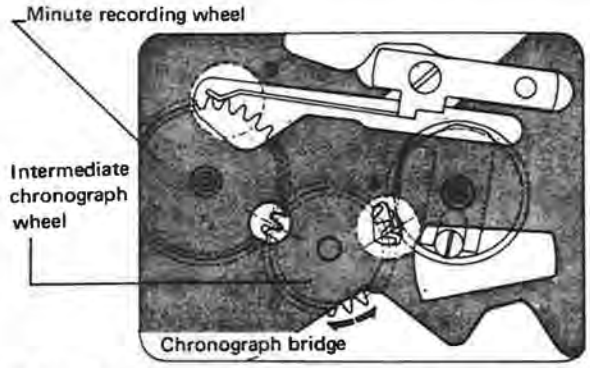


Figure 27. The intermediate recording wheel, the minute recording wheel, and the center chronograph wheel are shown in their correct original positions.

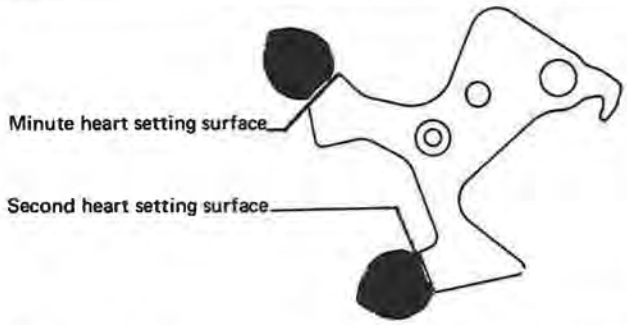


Figure 28. The hammer which touches the second heart, as shown here, must be polished to a mirror finish if adjustment is being made.

the degree of shake when the intermediate minute recording wheel, the minute recording wheel, and the center chronograph wheel are reset to their original positions, as shown in Figure 27.

Adjust the clearance between the second heart and the hammer zero position. When the hammer is depressed and the hammer and hearts are in contact, no shakes should occur while you move the chronograph wheel to the right or left.

Check the clearance of the minute heart by turning the minute recording wheel to the right and left. Keep the hammer depressed and be sure that the teeth of the intermediate minute recording wheel do not pass over the crest

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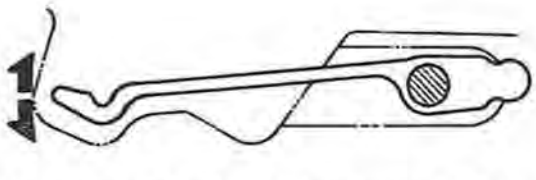
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Adjusting:
Bend tip of the hammer click by holding the pit portion. Do this carefully; the parts are apt to be damaged when it is bent too much.

Figure 29. Shown here is the correct method of checking the strength of the second (fly-back) button spring.

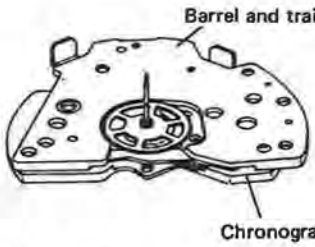


Figure 30. Shown is the correct starting position of the fourth wheel with the bottom side of the barrel and train wheel bridge facing upward.

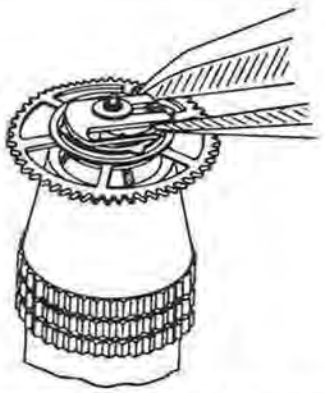


Figure 31. Replacement of the chronograph finger using a hand remover is shown.

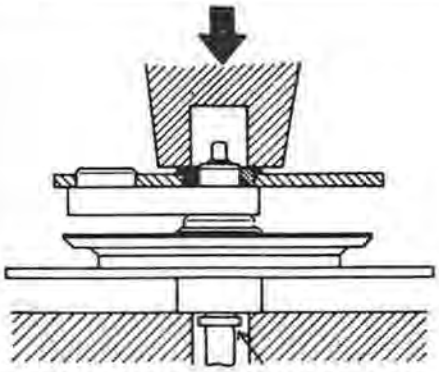


Figure 32. The fourth wheel pinion should not touch the chronograph axle, as shown by the small arrow at the bottom of this figure.

of the chronograph finger. Also, the teeth of the minute recording wheel should not pass over the crest of the minute recording jumper.

ADJUSTMENT

If there is sideshake in the second heart during the testing described above, polish the setting surface of the hammer contacting the minute heart. When the shake of the minute heart is excessive–that is, when it passes over the crest–polish the setting surface of the hammer which touches the second heart. When polishing this hammer, slightly grind the point parallel to the setting surface and finish it to a mirror polish (Figure 28).

SECOND (FLY-BACK) BUTTON

After you install the movement and the buttons on the case, check the pressure strength of the second, fly-back button (Figure 29). Adjust this strength as you did the first button. Do not make this pressure too great because this would damage the chronograph mechanism.

REPAIRING THE MECHANISM

When repairing the chronograph mechanism, follow these steps:

1. Check the center chronograph wheel for: a) a broken clutch spring; b) inadequate strength of the clutch spring (in this case, the chronograph second hand fails to move or moves irregularly); c) a broken chronograph finger (the second hand does not advance). In a, b, and c it is advisable to replace the center chronograph wheel, check its parts, and adjust its function as outlined earlier.

2. Check for a loose chronograph second hand. If the chronograph second wheel does not reset to the zero position when the button is depressed, check to see if the second hand moves when the second button is pressed. If it does move, the cause is loose contact of the second hand and the center chronograph wheel axle. To correct this loose contact, reinsert the second hand so it does not catch onto anything.

3. Check for poor revolving efficiency of the fourth wheel. If the gear train is not working properly in a (chronograph) stopped position, the ordinary watch train mechanism is at fault.

Check the endshake of the train wheels and escapement. Check for friction between each wheel, and check the revolving condition of the fourth wheel. To check this fourth wheel, install the chronograph bridge so that the coupling levers are secured to the barrel and train wheel bridge. Then, as shown in Figure 30, set the fourth wheel in a starting position; that is, the bottom side of the barrel and train wheel bridge (built into the chronograph bridge) should face upward.

Next, confirm the clearance between the fourth wheel and pinion. With a soft brush, check the ease with which the wheel can be turned. If rotation is defective, clean and lubricate the fourth wheel and pinion; then recheck it.

4. Replace the chronograph finger. To replace the chronograph finger, put the chronograph wheel axle in a pin vise. Slowly remove the finger, together with the remainder of the chronograph finger. This is shown in Figure 31.

5. Attach the chronograph finger. To attach the

new chronograph finger to the fourth wheel, place the center chronograph wheel on the staking set die so that the lower hole of the staking set receives the bottom surface of the fourth wheel pinion (see Figure 32). Then set the new chronograph finger, covering it with the rest of the chronograph finger by pushing it on. Make sure that the fourth wheel pinion does not make contact with the chronograph axle, as shown by the small arrow at the bottom of Figure 32.

When disassembling and assembling the chronograph finger, be careful *not* to damage the center chronograph wheel axle clutch ring.

6. Check for a loosened chronograph hand. If the chronograph second wheel does not reset to the zero position when you depress the button, confirm the following: a) Slightly move the second hand with the second button depressed. If the second hand moves, the cause is a loosened hand and the center chronograph wheel axle. b) Confirm the position of the second hand; reinsert it so it is not obstructed.

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Marshall F. Richmond, CMW

A BEGINNER'S COURSE IN JEWELRY CRAFTING AND REPAIR

TEN MAIN STEPS TO SOLDERING

Since jewelry repairing and crafting is done largely using gold, silver, nonferrous base metals, and even stainless steel, there are many things to know to make these repairs and to craft fine jewelry. In my many years of experience I have learned many of these things, but there is not enough time in a lifetime to learn all about this subject, and there is still much that I don't know. I want to pass on the things that I have learned, hoping to help my fellow craftsmen do a better job and make a better living.

The following ten main steps to soldering should explain to a novice the basics on how it is done, and hopefully some of the more experienced jewelry craftsmen can also benefit from it. These steps can be modified to fit almost any jewelry work which requires soldering. In some work some of these steps can be omitted, and in other cases other steps may need to be added.

NO. 1 CLEAN

Clean the work after analyzing the repairs to be made. If you are working with stone-set rings there is usually a buildup of soaps, detergent residues, body oils, and dirt in the crevices. These must be removed if heat is to be applied; otherwise, it will burn into the metal or on the stone and create an even more difficult cleaning job than cleaning the original dirty residues. This cleaning can usually be done in an ultrasonic tank using a strong commercial solution, or a solution can be made using strong soap and strong ammonia. If no ultrasonic cleaning equipment is available, it can be cleaned using a stiff-bristled brush, such as a stiff toothbrush, with the aforementioned solutions. If this does not remove all the crud, then the piece of jewelry can be boiled in a pickling solution and rinsed in water, and then cleaned again in the soap and ammonia solution. This should result in a clean removal. If the work is not clean when solder is applied, it can result in the solder not flowing properly and leaving weak and/or pitted solder joints.

NO. 2 PREPARE

If the solder is to be used in a simple ring sizing job or a similar job where there is no danger of the heat reaching dirty areas, the first step can be omitted. The job should then be prepared for soldering by sawing, filing, or whatever step is necessary to make the place to be soldered fit tightly and allow the solder to flow to both sides. If a visible crack is left showing, the solder will have a tendency to flow to one side or the other. If a break shows jagged or porous ends before applying solder, these ends should be filed smooth. Foreign matter imbedded in the pores will leave a weak and pitted solder joint and will show when polished, which is an indication of poor workmanship.

NO. 3 FLUX

Flux for jewelry repair work is listed in the suppliers catalog, and there are several brands listed. For silver, gold, platinum, or other nonferrous metals using hard solder, I've always used "Batons." For any ferrous metal such as steel or stainless steel, "Aircosil" works well. Regular borax mixed with water will work as a flux for gold or silver soldering or for hard soldering on most any nonferrous metal. Soft solder (lead base) will solder most metals except aluminum with a small amount of heat, but for best results a flux made of zinc dissolved in hydrochloric (muriatic) acid works well. However, prepared solutions of zinc chloride are available which give you the same approximate flux as the zinc dissolved in hydrochloric acid.

IN SOFT SOLDERING ELECTRICAL CONNECTIONS, NEVER USE A FLUX THAT CONTAINS ANY KIND OF ACID OR ACID SALT. The reason for this is that internal corrosion can be caused that can break the contact and not even be visible. For electrical connections use a flux of solder paste which can be purchased at most any hardware store, or use resin core solder. These are noncorrosive to elec-

trical connections. Before hard soldering it is a good idea to dip the article of jewelry to be soldered in a solution made up of boric acid and alcohol, then ignite it and burn off the alcohol. This leaves a protective coating of boric acid on the entire article which protects it from oxidizing from the heat, and will eventually need to be polished off. This coating can easily be removed by soaking or boiling in water; however, since most articles are pickled after soldering before finishing, this will also remove the flux.

An article containing stones that will not stand heat should have the stones shielded by wrapping the item in wet tissue (paper toweling, toilet paper, or other paper tissue). Or you can use a heat-shielding putty, or imbed the stones in wet sand if the solder joint is not too close to the stones. If the soldering must be done close to stones that will not take heat, either shield it or remove it.

NO. 4 APPLY SOLDER

The exact spot to be soldered needs to be fluxed and the flow of solder can be controlled by the flux and how the heat is applied. The joint to be soldered can be heated by applying the flame of the torch before fluxing. Just make it hot enough to sizzle and turn the flux white. This flux can be applied with a flux brush. If the spot to be fluxed is too small to control with the flux brush, a piece of sharpened pegwood works well when soaked in liquid flux. I use this pegwood application when building up prongs or beads on diamond rings.

(Please turn to next page)

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The solder can be put on the fluxed joint in the form of a chip with the flux brush in most cases, but on prongs or beads it is best applied by heating the chip after fluxing it until it forms a ball. Then pick it up with a solder pick and transfer it to the exact place to be soldered while heating with the torch. In replacing a complete prong with wire, the solder can be picked up from the bench heating pad by fluxing the end of the wire, placing it on the chip of solder on the pad, and then heating it until it flows on the end of the wire. The prong wire can then be placed in a position to solder in place. When using soft solder with a soldering iron or soldering gun, the solder can be flowed onto the tip of the iron or gun and then transferred to the place to be soldered.

NO. 5 APPLY HEAT

Now that the solder is in place and ready to flow, the next step is to apply heat. The weight of the metal surrounding the place to be soldered, and how good a conductor of heat this metal is can determine the size tip needed and how hot a flame will be necessary to flow the solder. In soldering silver, much more heat is needed to make the solder flow than on gold or other metals used in jewelry. This is because silver is a much better conductor of heat and can carry the heat away from the point of application fast. Enough heat must be applied to overcome the loss of what is carried away and quickly flow the solder where you want it. Solder will flow to the hotter side of a joint, so to make it flow evenly to each side, both sides must be heated so that they reach the temperature of flow at the same time. By shifting the flame of the torch, solder can be pulled away from the joint to each side and will not leave a lump or glob. Excessive heat can cause the solder to boil, which will result in a weak or pitted and brittle joint.

With practice you can learn by observing when a solder joint is correct, underheated, or overheated. Sometimes solder will not flow when the heat is applied due to dirt or not enough flux. Usually if more flux is added it will overcome any dirt or oxidation caused by lack of enough flux, and when heat is reapplied it will flow. Shielding, when necessary, must be done before any heat is applied (this involves the stones, enamel, or whatever you are trying to protect). Time is of the essence when applying heat to an object that is shielded. The solder must be flowed and the heat removed before it evaporates the moisture in the shielding material. This allows the solder to be flowed where needed before enough heat reaches the parts being shielded.

NO. 6 PICKLING

Pickling can be done by using a diluted solution of sulphuric acid. For using a cold solution, mix 20% of acid with 80% water; for a hot or boiling solution mix 10% of acid with 90% water. **WHEN MIXING, ALWAYS POUR THE CONCENTRATED ACID IN WATER, AND NEVER POUR WATER IN CONCENTRATED ACID!** Sulphuric acid in concentrated form is hazardous, and even when diluted it can eat holes in clothing or cause chemical burns to human skin. If water is poured into concentrated acid it will splatter and damage most anything it lights on. If any makes contact with your skin, flush immediately with plenty of water. This is the best way to neutralize almost any concentrated acid.

There is an alternative to use for a pickle which removes the hazard from having to mix it from acid. "Sparex" is a manufactured pickle that comes in powdered form and is mixed with water. It can be used hot or for boiling, or used cold if articles to be pickled are left in the solution for a longer period of time. Heated pickle pots can be purchased from regular jewelry supply sources. For limited use, a small crock pot can be found in most any local hardware, drug, or variety store for ten or twelve dollars which will keep the solution warm enough to pickle the articles by dipping, with no soaking necessary. I never felt the need for a pickle pot when working by myself, so I use a pickle pan that is copper and can be filled with pickling solution, held over the flame of the torch, and brought to a boil in a few seconds. This is long enough to remove any oxides or residues left from soldering. I have two sizes—one that will hold two or three small ladies' rings, and a larger one for larger pieces of jewelry.

One point to make in using pickling solutions is that sulphuric acid will dissolve any ferrous metals which not only damage the metal but also will contaminate the pickling solution. This is the reason that pickling solution should only be contained in glass or ceramic material and the articles boiled in a copper container and handled with copper tweezers. The copper is not affected by sulphuric acid or its salts.

NO. 7 BURNISHING AFTER PICKLING

After pickling, while the article is still wet from the rinsing in cold water, a bronze bristle brush on the polishing motor will remove any loosened oxides or residues left on the article. This will leave it bright and shiny and ready to prepare for polishing.

NO. 8 PREPARING FOR POLISHING

When the solder joints are checked for good flow and coverage, the excess solder should be removed by filing. In case of added metal such as prongs, a shank, or even an enlargement, they should be shaped. Then the file marks should be removed with emery cloth or buff sticks. It is wise to always reshape an article to as near its original state as possible unless you are repairing or correcting a weak point of the original shape. In this case, you might need to leave it heavier for strength. A quick way to remove the file marks is by putting an emery cone on a felt inside finger ring buff. These emery cones are available from your jewelry supplier. Or a ¼ sheet of emery cloth can be wrapped around the inside ring buff and held in place with a size ten to twelve plain ring slid over the wrapped emery cloth to hold it in place. This will quickly remove the file marks inside or outside the ring. The article should now be ready to polish.

NO. 9 POLISHING

Polishing can be a trade in itself. However, if we're a one-man jeweler, we must learn to do a satisfactory polish on any jewelry that we make or repair. Tripoli and rouge do a satisfactory job for polishing gold, silver, or platinum jewelry, even though there are many prepared abrasives that can be

purchased from your supplier. Experience and experimentation will tell you which ones you can use.

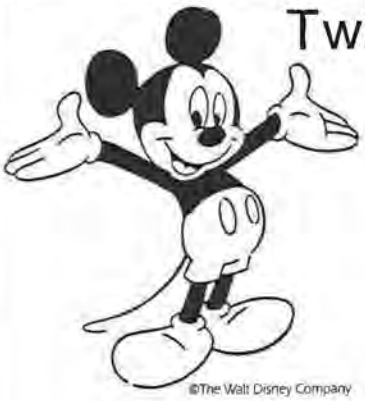
A polishing motor is necessary with a tapered spindle that allows a quick change for the polishing wheels and attachments. For a motor with a shaft on each end, these spindles can be purchased with right-hand and left-hand spirals. A minimum of buff wheels should be bronze brush wheel, steel brush wheel, two cotton or muslin buffs (4" diameter works well), two small and two medium size inside felt ring fingers, one hard felt wheel 3" in diameter and 3¼" thick, two bristle brush wheels 3" in diameter with four rows of bristle. The reason for two of each is that one is for tripoli (a coarse abrasive) and the other for rouge (a fine abrasive used in final finishing). It is wise to have an assortment of hard buff wheels varying in size from one inch in diameter to three in knife edge, flat, or other shapes that can be helpful in polishing in different situations. Small buffs and brushes to be used in the flex-shaft tool are also very helpful in polishing hard-to-get places. Even a piece of cord string can be charged with abrasive, put through a hole, and by rubbing the article up and down the string, the inside of the hole can be polished. Use your ingenuity, but always try to make the job you are working on better than the last one. This way you will not only maintain a standard of quality, but you'll keep improving your skills.

NO. 10. CLEANING

The final step is cleaning. No doubt the best and most efficient way of cleaning is with an ultrasonic tank and a good cleaning solution. If no ultrasonic tank is available, the articles can be scrubbed with a washout brush, such as a stiff-bristled toothbrush, rinsed (preferably in hot—not boiling—water), and dried with a hot air blower or under a heat lamp. If no commercial jewelry cleaning solution is readily available, a solution of soap and detergent mixed with strong ammonia will do an excellent job by hand or in the ultrasonic tank. Boiling in the soap and ammonia solution will also do an excellent job of cleaning, but caution must be used on pearls, mother of pearl, and plastic enamels. Also, some soft stones can be damaged by boiling.

After cleaning and drying, it is always wise to give the work a final inspection under magnification to see that the job is as it should be. Although we are sometimes limited by the request of the customer or the revenue that we can get for the job, we should always turn out the best finished work that we are capable of doing.

Next month's article will cover a step-by-step procedure for making a brass ring and sizing it larger and smaller.



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Ask Huck

CLOCKMAKING BITS

By J.M. Huckabee
CMC, FBHI

About...



THE STRAP TYPE VERGE and ANTIQUE ALARM CLOCKS

Q. Can I reasonably expect a replacement strap type verge to fit and work in my antique clock?

A. First, this is an improper name for our clock component, but by common usage we all understand the term quite well.

The answer is yes and no, with the probability being closer to no. However, that should not deter the use of these parts; they are great cost and time savers. They just require a little fitting.

Our escape wheel is old, worn, and possibly with other flaws, so the piece will not fit perfectly. Our redeeming factor is that most replacement pieces are hardened only on the active surfaces. That permits easy reshaping of the piece in its nonactive area to achieve an excellent result. The original piece was totally hard with the attendant possibility of fracture during adjustment. The new one is an improvement indeed.

The new piece may require pivot or pivot hole adjustment, crutch wire length and shape adjustment, and possibly other things. Study a text on the escapement type at hand and the fitting adjustments will only require a few minutes.

Q. Some replacement verges do not have enough length in their crutch wire. How do you cope with that problem?

A. True. A few clocks require an extra long wire for the crutch. Wires are often spliced, and some of the methods I've observed are a shame to our trade. On the other hand, others are so excellent that the splice goes undetected.

I use a similar piece of wire and do a butt-splice with silver solder. This makes a very nice job and is very easy to achieve. Square the ends for a close joint, use a very small piece of solder, flux well, and heat until the solder flows. Even a hand-held propane torch from the hardware store will do the job nicely. Flux an area large enough that there will be no remaining fire-scale on the piece. Drop the piece in water while it is still hot, and the borax flux will scale off in about five minutes. The process works well on brass and steel wire, each being left soft but adequate for the application. On tapered rods I usually make two joints so that the thin end of the wire is retained at the crutch loop.

Q. Can you offer a suggestion on restoration of antique alarm clocks? I have trouble obtaining an adequate degree of balance wheel motion.

A. I assume you are talking about those with a balance assembly with conical pivots.

First we should have the obvious things in order—clean train pivots in good order and the escapements in proper adjustment. Often we do these things and it appears that the mainspring is weak, with the balance motion less than nominal. Let's consider lubrication. Oil suitable for larger pendulum clocks may be too heavy for the alarms. Be sure you are using a suitable lubricant.

Now let's talk about a more likely possibility—worn balance pivots and pivot screws. Examine these with a 10X glass. Look for pockets within the screws where the pivot tip has rested for many years of use. This wear point, a dimple, can even be detected with the touch of a needle point.

Now look at the pivot tip. The end is worn away, rounded off, and even to the extent that it is off center. We can realize the wheel is out of poise; contact is over a greater area and friction has greatly increased. Spin the wheel between your fingertips. You may even feel the off-center pivot tips! Remove the lever and hairspring, place the balance and screws in their original position, and give the wheel a spin. Note how quickly it stops. This tells us we have a serious friction problem. What can we do about this? My method is to chuck the wheel in the lathe, support the outboard pivot in a steady rest, and grind the pivot to a new true point. I use a hand-held motor tool with a wheel of the Bright Boy type- an abrasive in a rubber-like disc. Don't grind too fast, as the pivot tip is easy to burn. In less than a minute the pivot will be like new.

Replace the screws if a suitable substitute can be found. Be sure the pivot only rests on its tip. If no screws are available, turn the old ones to a new position. This may have been done before—look first.

You will find this technique very effective where balance wheel friction is the culprit.

If you have a subject that you would like J.M. Huckabee to address in a future article, send it to "Ask Huck," c/o *Horological Times*, 3700 Harrison Ave., Cincinnati, OH 45211.

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

Please contact the AWI Movement Bank if you can supply any of the following items we are searching for. These items are not sought for donation; you will be compensated for them.

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M-2 Tavannes Admiral, 991, 19 ligne, series 195: stem.



M-6 Admiral, 16 size, balance staff. Basic cal. 998 Devons.

M-9 Movement or spare parts for an 18 size Manhattan Watch Co. watch.

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Quartz Movement Interchangeability Chart

In quartz watch repairs (especially for movement replacement jobs), it is necessary to know what movement we should use to replace that old one. This is especially true when we are going to substitute a movement where the original brand or model is not available, when we desire to use a better movement, or when we are using a quartz movement to replace the original mechanical.

This chart was composed by using information from all available supplier sources. We thank them for this information. We noticed a few minor variations from the different sources, but basically this information is correct and updated to the present time. There are lots of discontinued movements listed, in which case we hopefully have suggested a good substitute.

This chart shows relative dial feet placement (in column G). Those with the same letter will interchange. Example: C will interchange with C, F with F, etc.; however, dial feet may need to be shortened in some cases. Also notice column H–Hands. The same letter will indicate that both the hour and minute hand will interchange. Example: The letter C shows that movement FE 6820 uses the same hands as ESA 588.001.

Hands are grouped and measurements are as follows: A = 45-90, B = 50-100, C = 55-100, D = 60-110, E = 60-120, F = 65-110, G = 70-120, H = 80-130, I = 90-150, J = 100-180, K = 110-190, and L = 60-100. The first measurement is the minute hand followed by the hour hand, all metric.

Notice that in the H column (Hands), the letter preceding the number indicates the measurements shown above. Example: C55-100 indicates that the minute hand is 55 and the hour hand is 100. The letter C helps us to locate other letter Cs if we are looking for a match.

This chart shows movements to and including 5½ ligne. Next month this will be extended to include other sizes.

On the discontinued models shown, some components are available, and if not, their suggested replacement is shown.

You will notice that column A is reserved for our personal use. We may number this column to correspond to our cabinet drawer, thereby making it easy to locate the movements that we carry in stock.

A OUR NO.	B LIGNE WIDTH	C LIGNE LENGTH	D THICK-NESS	E MODEL NUMBER	F FEATURES OR INTER-CHANGES	G DIAL FEET POS.	H HANDS	I AWI CELL NO.
	3 3/4	6	1.90	MIYOTA 2N50			40-80	S52
	3 3/4	6	1.90	PUW 211			C55-100	S52
	3 3/4X	8 3/4	2.25	ESA 202.001		A	C55-100	S 34
	3 3/4X	6 3/4	2.00	ESA 280.001			C55-100	S 34

A OUR NO.	B LIGNE WIDTH	C LIGNE LENGTH	D THICK-NESS	E MODEL NUMBER	F FEATURES OR INTER-CHANGES	G DIAL FEET POS.	H HANDS	I AWI CELL NO.
	3 3/4X	7 3/4	2.80	Y 434	SAME AS SKO 1320A		A45-90	S 14
	3 3/4	8 3/4	2.25	ESA 202.001			C55-100	S34
	3 3/4	10	3.50	ESA 102.001			C55-100	S30
	4 1/4		2.80	ESA 101.001				

A COUR NO.	B LIGNE WIDTH	C LIGNE LENGTH	D THICK-NESS	E MODEL NUMBER	F FEATURES OR INTER-CHANGES	G DIAL FEET POS.	H HANDS	I AWI CELL NO.
	4 1/4		2.25	ESA 201.001				
	5 1/2X	6 3/4	3.60	FE 6820	AS1012, Seiko-11A	C	C	S 12
	5 1/2X	6 3/4	3.60	ESA 301.001/2	DISC. USE FE 6820			
	5 1/2	6 3/4	3.50	BUL. 2500			C55-100	S14
	5 1/2	6 3/4	3.50	BUL. 1000			C55-100	S14
	5 1/2	6 3/4	2.50	BUL.2750.10			C55-100	S34
	5 1/2		3.60	ESA 301.002		C		
	5 1/2X	6 3/4	2.50	FE 5020	USE HAR. 3572		C55-100	S 14
	5 1/2X	6 3/4	3.60	ESA 588.001	USE HAR. 3572	D	C55-100	S12
	5 1/2X	6 3/4	3.60	ESA 977.001	USE HAR. 3572	D	C55-100	S 12
	5 1/2		3.60	JUNGHANS 640.21		D		
	5 1/2		3.55	PUW 2500		E		
	5 1/2		2.70	RONDA 572		F		
	5 1/2	6 3/4	2.50	RONDA HQ751-2				S56
	5 1/2	6 3/4	2.50	RONDA 753				S56
	5 1/2	6 3/4	2.65	Y588			A45-90	S34
	5 1/2	6 3/4	2.65	Y590	DISC. USE Y588		A45-90	S14
	5 1/2	6 3/4	2.45	Y591 (5421A)			60-110-20	S54
	5 1/2	6 3/4	2.60	3220(3N20)			50-100	S14
	5 1/2	6 3/4		Y432	DISC. USE Y588..V235			
	5 1/2	6 3/4		V230	DISC. USE V237		A45-90	S56
	5 1/2	6 3/4	2.50	V232			A45-90	S56
	5 1/2	6 3/4	3.00	V237			A45-90	S56
	5 1/2	6 3/4	3.00	V234(V235)			A45-90	S56
	5 1/2	6 3/4	2.50	V238	S.S.		L45-90-20	S56
	5 1/2	6 3/4	3.00	V239 (V236)			L45-90-20	S56
	5 1/2	6 3/4	2.85	2Y51	S.S.			S54
	5 1/2	6 3/4	2.85	2950	DISC. USE 2Y51			S54
	5 1/2	6 3/4	2.60	CITIZEN 3220				S54
	5 1/2	6 3/4	2.10	RICOH 5650			G70-120-19	
	5 1/2	6 3/4	2.50	FE 5120			G70-120	S56

A COUR NO.	B LIGNE WIDTH	C LIGNE LENGTH	D THICK-NESS	E MODEL NUMBER	F FEATURES OR INTER-CHANGES	G DIAL FEET POS.	H HANDS	I AWI CELL NO.
	5 1/2	6 3/4	3.60	FE 6820			C55-100	S12
	5 1/2		2.70	RONDA 3572	BUL 5AH	F	C55-100	S 14
	5 1/2	6 3/4	3.00	ESA 924.001	USE927.001	F	C55-100	S14
	5 1/2		2.95	ESA 927.001/2		F	G70-120	S 14
	5 1/2	6 3/4	2.95	ESA 927.101/2		F	G70-120-20	S 14
	5 1/2	6 3/4	2.95	ESA 927.602			C55-100	S12
	5 1/2	6 3/4	1.95	ESA 976.001			C55-100	S34
	5 1/2	6 3/4	3.60	ESA 977.001			C55-100	S12
	5 1/2		2.30	JUNGHANS 644.40		G		
	5 1/2		2.30	JUNGHANS 644.41		G		
	5 1/2		2.30	JUNGHANS 644.42		G		
	5 1/2		2.30	JUNGHANS 644.45		G		
	5 1/2		2.30	JUNGHANS 644.46		G		
	5 1/2		2.50	ESA 978.001		G		
	5 1/2	6 3/4	2.50	ESA 978.002	REPLACES 578.002	G	C55-100	S14
	5 1/2	6 3/4	2.20	ESA980.001/4			G70-120	S52
	5 1/2	6 3/4	2.20	ESA980.101/5			G70-120	S52
	5 1/2		2.50	JUNGHANS 640.22		G		
	5 1/2		2.50	PUW 512		G		
	5 1/2	6 3/4	2.90	ESA 578.001		G	C55-100	S14
	5 1/2		2.90	ESA 578.002		G		
	5 1/2	6 3/4	2.50	ESA 578.004			C55-100	S14
	5 1/2	8	2.95	ESA 927.401		F		
	5 1/2	8	2.95	ESA 927.601	REPLACES 924.601	F	C	
	5 1/2	6 3/4	2.65	ORIENT 5FB			F65-110-20	S56
	5 1/2	6 3/4	2.50	PUW 500			G70-120	S14
	5 1/2	6 3/4	2.50	PUW 510			G70-120	S34
	5 1/2	6 3/4	2.50	PUW 512(5120)			C55-100	S34
	5 1/2	6 3/4	3.60	A.S. 1977 A.S. 1980	MECHNICAL MECHNICAL			
	5 1/2	6 3/4	3.60	A.S.277.001 A.S. 577.001	MECHNICAL MECHNICAL			
	5	7	3.55	MARVIN 160	MECHNICAL			

By John Plewes
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Restoring Clock Dials

PART 1

There are many types of clock dials and their restoration involves a variety of methods. The oldest dials likely to be encountered are those of the early English longcase clocks. These are made of beautifully engraved brass, and most of the seconds bits, date bits, and chapter rings were originally silvered. This is not always apparent, as the silvering is very often entirely worn away. Resilvering solutions are available, along with black wax for the numerals; however, black paint may also be used.

The dial must be taken apart and each piece cleaned, polished, and lacquered separately. It is best to use a cleaning machine for the spandrels and bits (the seconds and date dials).

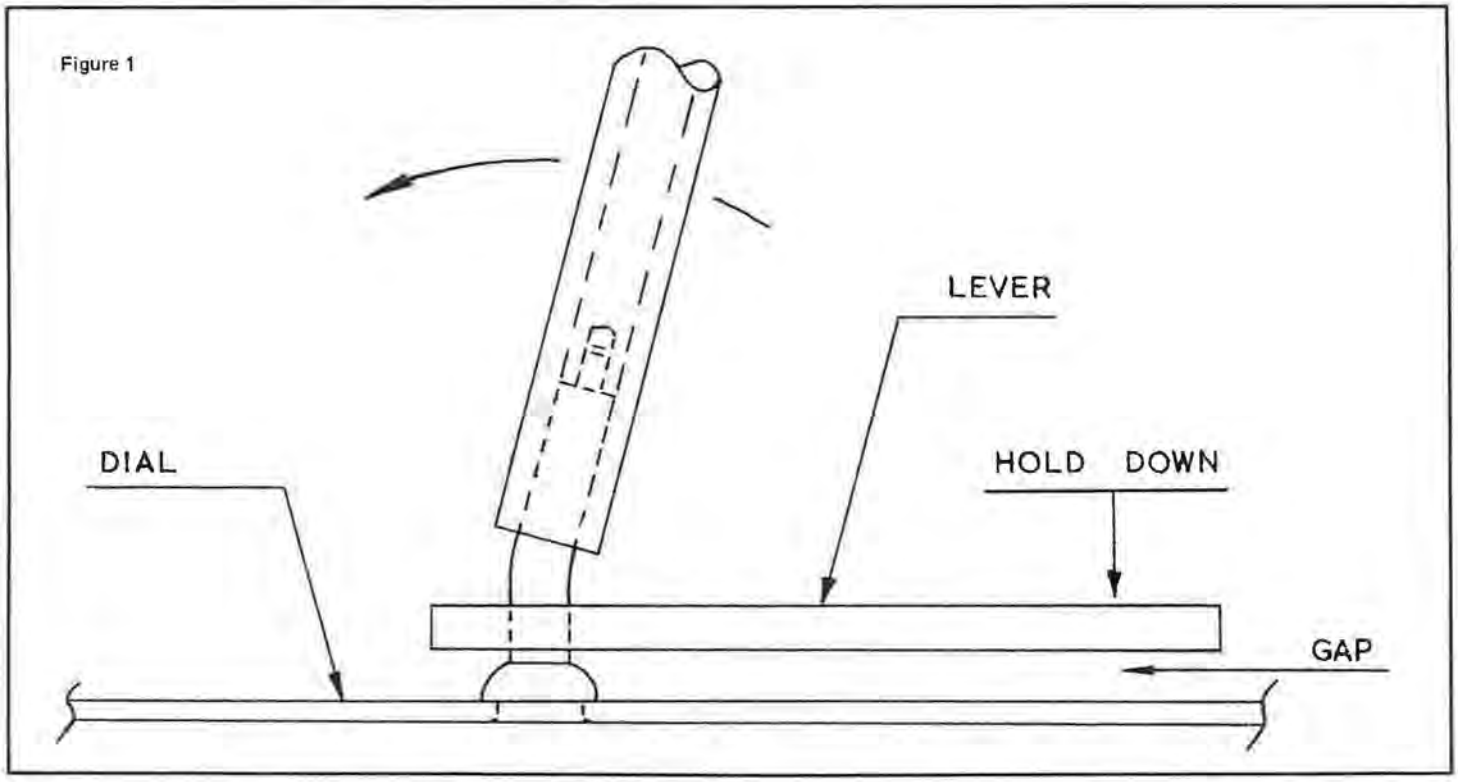
After 1770 the white painted steel dial replaced the brass one, and as white dials were made in considerable numbers, they are more common today. Painted wooden dials are also to be found, such as those of American clocks of 1800 vintage. Painted zinc dials took over from the early wooden ones, and printed paper dials came to be common later, doubtless as a cost reduction measure.

German clocks of about 1880 often had porcelain dials, whilst a few were of chased or pressed brass. After 1900 the plainer box clock came along with a simple dial of silvered brass sheet. When the thin silvering wears off these dials, resilvering is probably the best course of action, but a spun brass finish with fine emery paper is also a possibility.

LONGCASE WHITE DIAL REPAIRS

Painted clock dials, whilst indicating the passing of the hours, also often show the ravages of the years. Due to many decades of polishing and dusting, the edges of the numerals and other details on a longcase clock dial slowly wear away. The maker's name often disappears, and with it a good chance of accurately dating the clock via one of the

Figure 1



books which list old clockmakers. Often when no name is evident, it can be picked out as a faint, slightly raised, white-on-white series of letters which are shinier than the rest of the dial. Although no black paint remains, it protected the underlying paint, leaving an outline which can be seen when light is shone on it at certain angles. It always pays to make a search for this both before and after the dial has been cleaned. Remove the dirt from the dial by rubbing it lightly with a fine household cleansing powder, used wet. The central area of the dial, and also in the break arch, are the best places to look for the name of the maker.

It is almost always preferable to restore an old long-case clock dial rather than to strip it and repaint it. Background damage must be dealt with first. This is commonly found in the areas of the dial pillars as any applied stress will loosen the riveting and break out the brittle dial paint.

A bent pillar can be straightened by drilling a close fitting hole in a piece of ¾" x ¼" mild steel bar and using it as a lever against a suitable pipe or tube as shown in Figure 1. Never attempt to straighten a bent pillar without supporting it as it will usually pull right out. When the pillars are straight, rivet them tight again using a well-fitting hole in an anvil. Check that the pillars fit into the front plate correctly and adjust them with the lever and pipe as necessary. The hand arbors and winding squares must locate centrally in their dial holes.

Riveting usually knocks out a little more loose paint from the dial and this must be replaced before any artwork can be done. The two problems associated with this are matching the color and levelling the repaired area with the surrounding surface. Color matching is a matter of trial and error. In most cases, a very small drop of black and a tiny amount of green, added to the basic cream or light yellow, will effect a good match. Matching is complicated by the fact that paint changes color slightly as it dries, and allowance must be made for this.

It takes several coats of paint to build up the required thickness. When the repair is level, smooth out the last coat with a wet fingertip. This will obscure the outline of the repaired area. Small quantities of oil-based hardware store paints or enamels mix well and dry in a reasonable time. It is feasible to use fairly thick coatings initially, but each one, including the final one, must be rubbed down with fine wet-or-dry emery paper and water. To avoid runs, always lay the dial flat to dry it. An overnight stay in a warm place, such as on a hot air duct, will ensure good drying. Artists' oil colors may seem to be a natural choice, but for most people they take much too long to dry and harden. Even with the paints advocated above, several days are required to restore the background so that the repaired areas are satisfactorily hidden.

Touch up the colored areas of the dial where necessary, taking care to tone down the shades to match the original colors. Avoid bright colors as they stand out as an obvious repair. If considerable repainting and reconstruction of the break arch and spandrel scenes is necessary, a knowledge of drawing and painting is required.

Provided that you have a strong desire to do so, there is generally no good reason why you should not learn to draw and then to paint. Always ignore anyone who down-

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grades your abilities or potential; just go ahead and study what you want to learn. Perspective is the key to good drawing and its importance cannot be overemphasized. Composition, light and shade, etc. must also be studied. Only when you can draw well should you attempt to paint. *Perspective Drawing* by E. Norling, published by Walter T. Foster, is an excellent and inexpensive book on the subject.

There is much to know about painting, but no matter how good the finished product may be in terms of concept—drawing accuracy, definition, and execution—it is still a mosaic of small colored areas cleverly shaped and positioned on a flat surface. We need to be reminded of this, for our eyes have been trained so long to see pictures as representations of scenes, etc. that they no longer see what is really there—a mosaic. Study the details of these small colored areas on a sharp, well-executed picture and see how they blend to give an impression of depth and distance and so create a three-dimensional illusion on a two-dimensional surface.

Much of the missing artwork was evidently done in India ink, or its early equivalent, and this must now be replaced. To do this it is necessary to determine the center of the dial. Cut a piece of flat lumber as big as possible, whilst still fitting inside the dial pillars, and bond it to the dial with two-sided masking tape. The thickness of the wood must be greater than the length of the pillars so that the dial pillars do not touch the bench.

Using a beam compass and any still extant reference circle such as the minute ring, determine the center of the dial by trial and error. Set one leg of the compass very lightly into the wood which shows through the center hole of the dial, and adjust and readjust until a radius and a center are found which satisfy the reference points all round the dial. Deepen the center so found for future use.

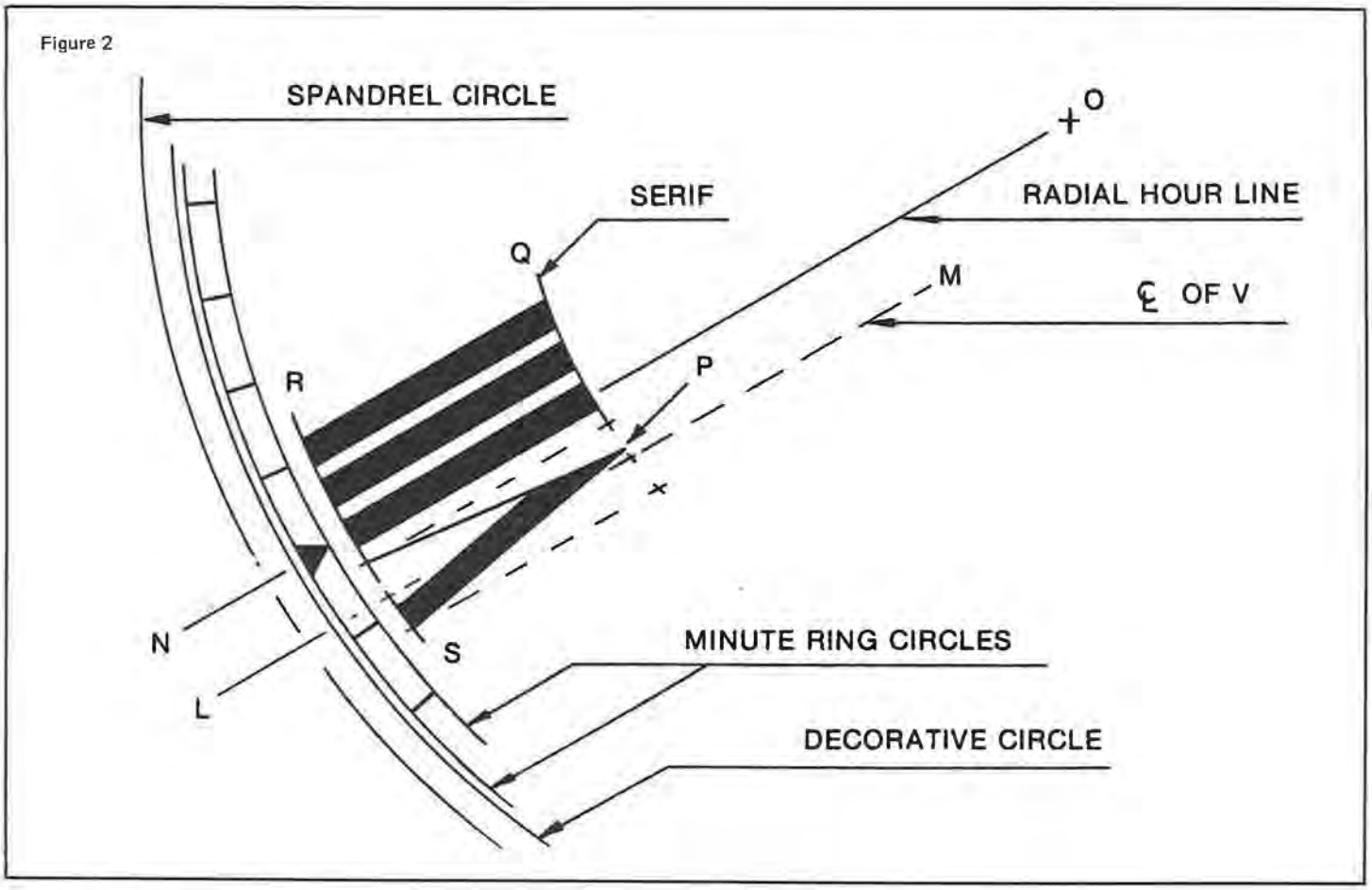
Examine the dial carefully from various angles for traces of once-present black circles, etc. which, like the maker's name, may only be present as a fine, slightly raised, shiny line inside or outside the minute ring. Such lines may be missing from the concave inside edge of the spandrels; for example, in some instances these may be gold or silver in color.

Keep the dial free of grease and wax or the ink will bead and skip. Use a piece of paper so that your hand does not touch the dial and give all the areas to be inked a light prior rub with a soft eraser to ensure good adhesion.

Replace any missing minute marks using a radially-held rod or raised straightedge; non-radial marks are readily apparent. Check the center and the beam compass radius and then draw in the missing circles and any missing segments using a good grade of waterproof drawing ink. Avoid making the lines too thick or they will stand out too much. When inking in the serifs of the Roman numerals, work from the ends toward the middle. Any excess of ink which is left behind when the pen is lifted from the dial will then tend to merge with a thick stroke of the numeral. Both Roman and Arabic numerals deserve more than a passing glance if they are to be drawn well.

Figure 2 shows a typical Roman numeral of average width where the V and the X are about as wide as a minute space. The serifs shown are traditional and should be copies;

Figure 2



however, they do vary a little sometimes according to the taste of individual artists. Continuous serifs, for example, look well also, though they are seldom found. The curves RS and PQ would then be continuous, but the line QP must not overshoot P.

There is a surprising amount of detail to note in a Roman dial. Note that the "I"s do not have radial sides; they are all parallel to the radial hour line NO. Remember this and draw all these edges in anew for they will be mostly worn away like other inkwork. This is best done with a ½" diameter round plastic rod (or a round ruler) and a steel pen. Do not attempt to lay out these lines by measuring them; do it by eye with the assistance of a few pencilled guidelines which can be erased later. Examine a sharp, clear Roman dial and practice laying out dials to match it; note that each numeral is centered on an hour marker.

The X always lies in a rectangular frame; it does not taper towards the center of the dial. Two "I"s occupy rather less than a minute space and each is wider than the gap between them. In Figure 2 the center line of the V, LM is parallel to NO; however, the tip of the V, point P, is sometimes moved slightly off the line, as shown, to reduce the visual isolation of the V. Extending the serif to the tip of a symmetrical V does the same thing.

The diamonds, triangles, blocks, dots, etc. which mark the hours give an indication of the clock's age. These and other details, such as the minute figures 5, 10, 15, etc. changed considerably over the years. Dials with heavier than average Roman numerals tend to look clumsy, but the narrower, slim line type which is sometimes found on both wall and mantel clocks is attractive and gives the dial a refined look. The length of the numerals is unchanged in this type, but all thicknesses are roughly halved. They are rarely found on longcase clocks.

Arabic numerals look best when they are upright on a clock dial, as normally written, but they never seem to achieve the neat, radial appearance of the more popular Roman numerals. It is as well, however, that Roman numerals are largely confined to clock dials!

Treat the seconds and date dials in the same way as the main dial, ruling in the seconds marks, etc. and renewing the Arabic figures by means of pen and ink or a little paint on a tiny brush, whichever you prefer. Do the same with the maker's name; however, this requires great care if it is to look good, for such lettering is not easy to do. If the name is surrounded by engrossing, practice long and hard elsewhere before you attempt to fill in the gaps. Engrossing is rather like engraving, in that it requires the swift, sure touch of a master who has had years of continual practice. Like good handwriting, it is a rare accomplishment, and as relatively few clock dials require such work, very few people learn to do it.

When all the ink work is satisfactory, touch up the black paint of the numerals and the hour markers. Give the dial about a day to dry thoroughly, and then erase all pencil guidelines. Remove any small outcrops of paint with a sharp knife so that all edges are sharp. When all artwork is satisfactory, spray the whole dial with a durable clear lacquer such as the acrylic final varnish which is used as a finish for oil and acrylic paintings. This will even out the differences between old and new paint and also protect the dial and slow its aging process.

If it is necessary to repaint the whole dial, the bare metal should be treated with a rust preventative and given at least five coats of cream or off-white oil base paint. Each coat must be allowed a day to dry in a warm place, and then rubbed down flat with fine wet-or-dry emery paper and water. The final coat is to be finished in the same way until it is flat, matte, and free of discoloration and blemish.

Select the center and, with a beam compass, pencil in the spandrel areas and paint them in. Acrylic paints may be used for this provided the dial background is prepared as above and is allowed to dry thoroughly beforehand. As spandrel scenes changed every few decades, take care to date your clock and paint in the correct type of scenes to match its age. *The White Dial Clock* by Brian Loomes, published by David & Charles, is a very useful reference book. For instance, gold and silver paints were only used extensively (in the break arch) when the English longcase clock was waning, chiefly from about 1840 to 1870. These last clocks were somewhat ill-proportioned and over-embellished.

WOODEN DIALS

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2	3.0 MM	11	1.60 MM	YELLOW	14	3.0 MM	11	1.60 MM	WHITE
3	3.0 MM	12	1.60 MM	YELLOW	15	3.0 MM	12	1.60 MM	WHITE
4	3.5 MM	10	2.00 MM	YELLOW	16	3.5 MM	10	2.00 MM	WHITE
5	3.5 MM	11	2.00 MM	YELLOW	17	3.5 MM	11	2.00 MM	WHITE
6	3.5 MM	12	2.00 MM	YELLOW	18	3.5 MM	12	2.00 MM	WHITE
7	4.0 MM	10	2.00 MM	YELLOW	19	4.0 MM	10	2.00 MM	WHITE
8	4.0 MM	11	2.00 MM	YELLOW	20	4.0 MM	11	2.00 MM	WHITE
9	4.0 MM	12	2.00 MM	YELLOW	21	4.0 MM	12	2.00 MM	WHITE
10	3.5 MM	10	2.00 MM	YEL SAPP	22	3.0 MM	10	1.60 MM	YEL SAPP
11	3.5 MM	11	2.00 MM	YEL SAPP	23	3.0 MM	11	1.60 MM	YEL SAPP
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PART LVIII

MAKING BEVEL WINDING PINIONS

Bevel winding pinions have been made in two types, the male type and the female type. The male type is shown in Figure 1, View A. This type of bevel winding pinion is used in some of the older American watches which are lever set. A female stem is used in the watch case to fit the male square on the arbor of the bevel winding pinion to allow the watch to be wound by turning the crown. The beveled teeth on these winding pinions match the beveled teeth of the mating main winding wheel. The style of these winding pinions is made very similar by each watch company.

The second type of bevel winding pinion is shown in Views B, C, and D of Figure 1. View B shows a style which is used in pendant set watches. By using the plunger pen "a" through the hole in the center of the bevel pinion, the winding mechanism is shifted from winding to setting. This action takes place through the action of the pin "a" against the shipper lever. The headed end of the pin "a" works against the shipper lever and the winding stem works against the other end of the pin. Note: The dotted lines show the hole for the pin "a" and the square hole for the winding stem. When the stem is pushed in against the end of pin "a", the watch goes into winding position, then as the stem is pulled out, the pin "a" relaxes its pressure on the shipper lever which allows the mechanism to shift into setting position. This type of mechanism is a negative winding and setting mechanism. This same bevel winding pinion without the plunger pin "a" can also be used for lever set watches.

The bevel winding pinion that is shown in View C, Figure 1 is used in lever set watches. In this case, the pin "a" is only a bearing pin which gives the bevel pinion support between its plates at the toothed end of the pinion. The dotted lines show the hole in the end of the pinion for the bearing pin "a" and the square hole in the other end of the pinion for the winding stem.

View D, Figure 1 shows another style of bevel winding pinion that is used in lever set watches. In this case, there is not a moveable pin in the winding pinion. The pin is solid with the bevel winding pinion and serves as a bearing for the pinion. The dotted lines show the square hole for the stem and the pilot hole for the square hole.

Figure 1

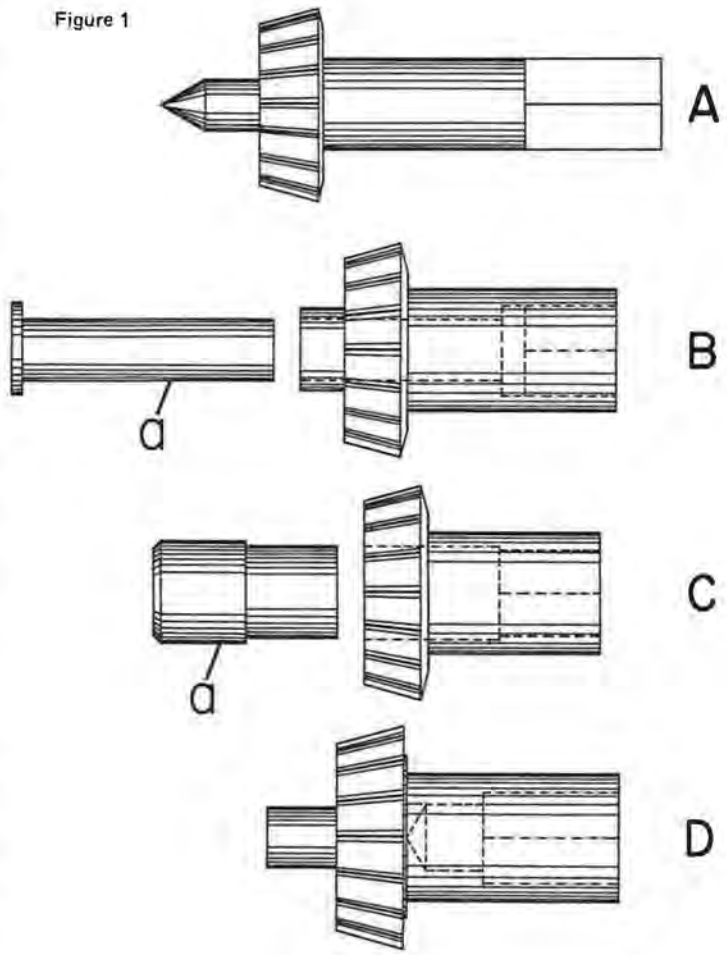


Figure 2

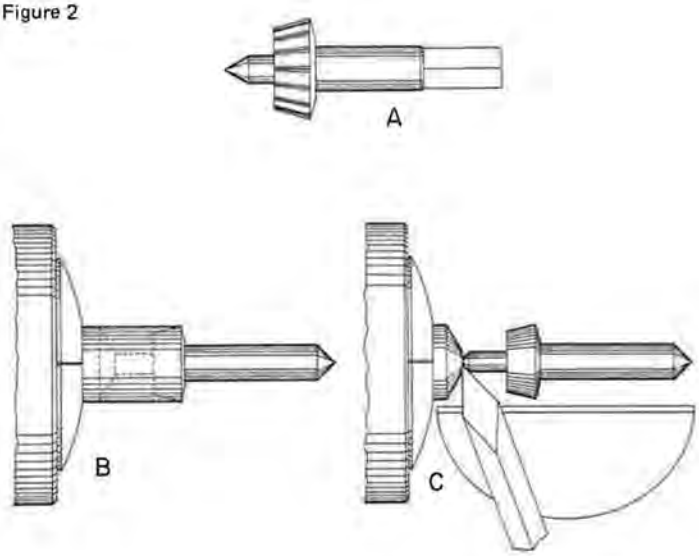
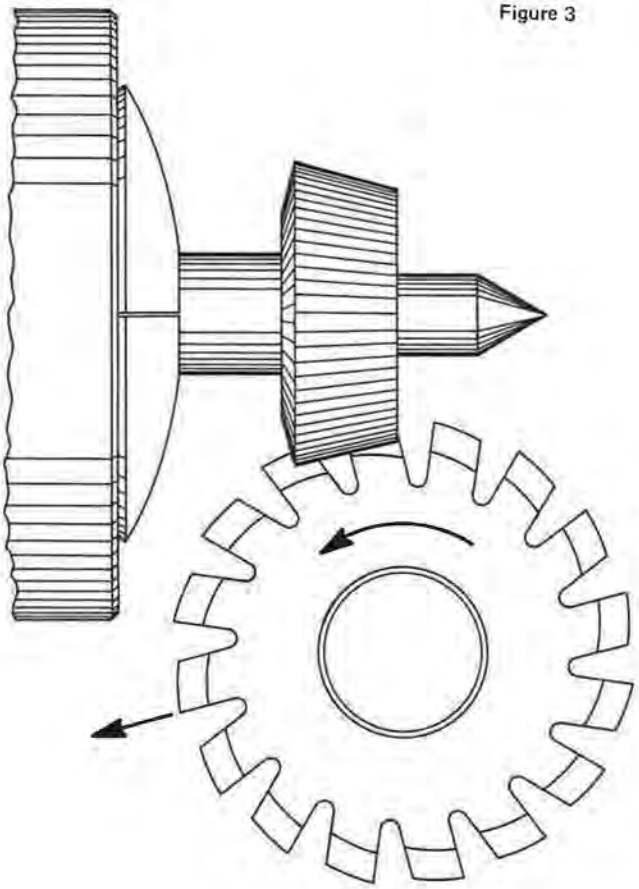


Figure 3



MAKING THE PINION BLANK

Figure 2 shows how the blank is made when making the male type bevel winding pinion. View A shows the finished male bevel winding pinion. View B shows how the blank is formed. The blank is made from a piece of high carbon water hardening steel rod. The diameter of the rod should be slightly larger than the finished pinion head. This is to allow for turning the head true just before cutting the teeth. The rod is chucked true in a split wire chuck. The rod should extend from the chuck far enough to make the complete blank without disturbing the rod in the chuck during the making of the blank. The diameters should be left slightly oversized to allow for finishing the surfaces. These surfaces are given the final finish to size after the teeth have been cut and the pinion has been hardened and tempered. The long shank part of the blank is first turned as shown in View B, Figure 2. Then the rest of the blank is formed as shown in dotted line. After this, the graver is used to cut the blank from the rod as shown in View C, Figure 2.

CUTTING THE TEETH

Next the blank is chucked true by its shank in a wire chuck for cutting the beveled teeth. This is shown in Figure 3. The head of the blank must be far enough away from the wire chuck to allow the teeth to be cut without running into the chuck or lathe spindle with the cutter. There should be a stop on the slide of the slide rest to prevent the cutter from going into the chuck or lathe spindle while cutting the teeth. Just before cutting the teeth, the pinion head is turned to diameter and to shape. It is a good idea to leave the diameter of the pinion head about .05 mm oversized for cutting the teeth. The spindle of the milling attachment is set in a vertical position and the slide rest is swiveled the proper number of degrees to match the angle of the pinion. The cutter must be centered with the lathe center. When cutting the teeth, the cutter should turn in the direction of the curved arrow, and the cutter should be fed through the blank in the direction of the straight arrow. After the cutter is fed through the blank, it is brought back through the space to its starting point before the blank is indexed to the next position.

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Figure 4

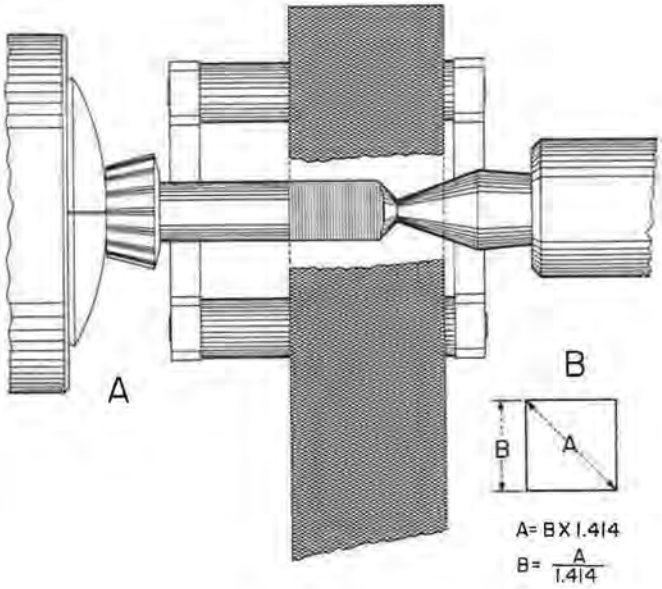
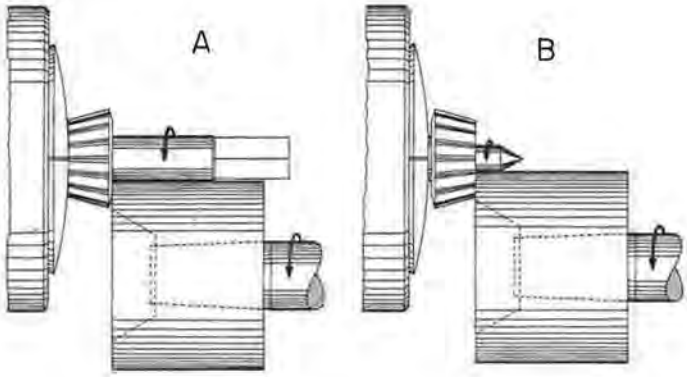


Figure 5



FILING THE SQUARE

After the teeth have been cut, the square is filed on the end of the pinion arbor. The square can be made by milling or grinding, but the most common method used by the watchmaker for making the square is by filing. View A, Figure 4 shows the square being filed. The stem is chucked by the pilot of the pinion, and the arbor end of the pinion is supported by the tailstock spindle which has a female center to fit the male center of the arbor. The female center must be slender enough to allow the square to be filed without the file touching the center. The top part of the center can be ground away as one would do with a center that is used for supporting a pinion blank while cutting the pinion leaves. This would provide more than enough clearance for the underside of the file while filing the square. The file used to file the square should be a pillar file with a Number 6 cut. A filing rest is used to support the file while the square is being filed. The headstock index pin can be used in the holes of the lathe pulley for indexing to each position for filing the square.

CALCULATING THE SQUARE SIZE

To calculate the square, one would use the following method. (See View B, Figure 4.) The diagonal diameter (A) of a square equals the thickness (B) of the square times 1.414, and the side (B) of a square equals the diagonal diameter divided by 1.414. If one needs to make the largest size square for a given diagonal diameter, then the following example is given:

Diagonal Diameter (A) = 1.88 mm

Then: Size of Square (B) = $\frac{1.88}{1.414}$ = 1.329 or 1.33 mm.

If one knows the size that the square needs to be and needs to know what the diagonal diameter (A) should be to form that size square, the following example is given:

Size of Square = 1.33 mm

Then: Diagonal Diameter (A) = 1.33 X 1.414 = 1.88 mm.

Once it is determined what both the diagonal diameter and square size are, then subtract the lesser from the greater to determine the difference between the two. In this case the difference would be:

1.88 — 1.33 = .55 mm.

Now, when we file the square, one half of this difference is removed with the file from opposite sides of the pinion shaft to obtain the proper size square.

$$\frac{.55}{2} = .275 \text{ mm.}$$

In other words, we would remove .275 mm from one side of the shaft which would leave a diameter of 1.88 — .275 = 1.605 mm. Then we would index the pinion 180 degrees and remove .275 mm from that side which would bring the two opposite sides to 1.605 — .275 = 1.33 mm which is the proper size for the square. Now, repeat these steps on the two remaining sides to complete the square. The sharp corners of the square should be removed with a fine Arkansas stone slip by drawing the slip lengthwise on the corners.

POLISHING THE BEARING SURFACES

After the square has been completed, the pinion is hardened and tempered to first blue, and then the bearing surfaces are ground and polished to size with a pivot polisher. The male center at the end of the square is removed and the end of the square is also polished.

The grinding and polishing of the bearing surface is shown being done in Figure 5. View A shows a lap being used to finish the bearing surface on the pinion shaft as well as the top end of the pinion leaves. View B shows the pilot

Figure 6

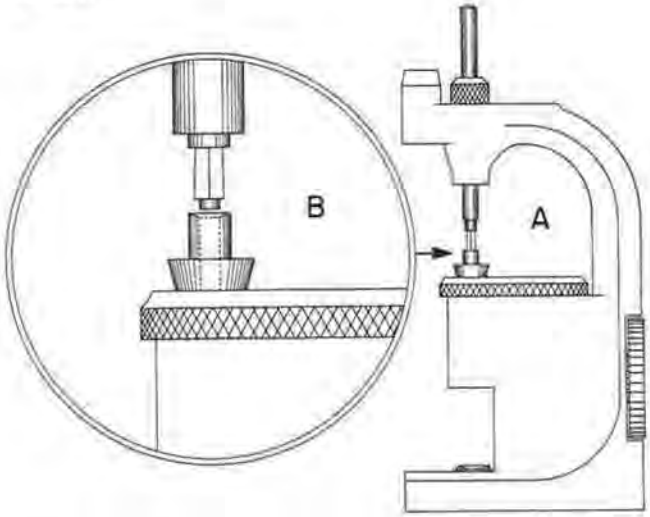
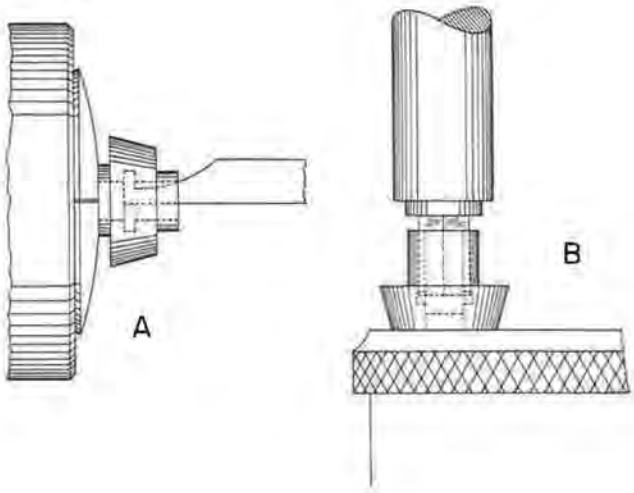


Figure 7



and the lower end of the pinion leaves being finished. Different laps are used for grinding than the ones used for polishing. Also, different materials are used on the different laps. The grinding laps are made of materials such as cast iron, soft steel, copper, bellmetal, and brass. The polishing laps are made of materials such as tin, lead, zinc, ivory, and boxwood.

The grinding compounds are abrasives such as Arkansas oilstone powder and the coarser grits of alumina powder (aluminum oxide). The polishing compounds are fine abrasives such as tin oxide, red rouge, Diamantine, Linde A, and fine diamond paste. Another very good grinding and polishing compound is Clover® lapping compound which comes in different grits. Grit size 600 is good for fine grinding and grit 1000 is good for polishing.

When using the pivot polisher, the grinding and polishing materials are mixed with some watch or clock oil to form a thick paste. The paste is applied very sparingly to the surface of the lap. The lap should turn in a direction which causes the lap's surface to oppose the surface being ground or polished. This is indicated by the arrows in Views A and B of Figure 5. The speed of the lap should be much faster than the speed of the work.

When the pinion shaft is being ground or polished, the spindle of the pivot polisher is moved back and forth in its bearings and when the ends of the pinion leaves are being ground and polished, the spindle carrying the lap is rocked back and forth with the rocking bar which is attached to the spindle housing. The lap is set on center with the lathe center for these operations.

Any time a different lap and compound are used, the article being ground and polished should be cleaned, especially when going from a coarser lap and compound to a finer lap and compound. This is a very important factor when trying to obtain a nicely finished surface. It is also very important not to disturb the article being worked on in its chuck any time during the grinding and polishing sequence. The lathe headstock can safely be removed from the lathe bed, but the article should not be disturbed in the chuck. The cleaning of the article can be done with pithwood which has been dipped in a solvent. For other information on the pivot polisher, see *Horological Times*, October 1983.

MAKING FEMALE WINDING PINIONS

When making a female bevel winding pinion, the teeth are cut in the same manner as the teeth are cut on the male bevel pinion. The difference in making the two pinions is in the making of the pinion blank. When making a female bevel winding pinion blank, one must be prepared to punch a square hole in the pipe end of the blank. This can be done using the method shown in Figure 6. This method requires a special made square punch and a staking tool frame.

PUNCHING THE SQUARE HOLE

View A, Figure 6 shows the pinion blank resting on the die plate of the staking tool frame. The blank has been drilled with a pilot hole that has a diameter equal to the side of the square. This view also shows the special square punch used to punch the square hole. The punch has a round pilot at the end of the square to guide the punch and keep it centered with the hole in the blank. The square on the punch has a very slight back taper for clearance as it punches the square hole. The round shank of the punch fits closely in one of the larger hole punches of the staking tool. View B, Figure 6 shows an enlarged view of the blank and square punch. The dotted lines on the blank show the pilot hole through the blank and also show how the end of the hole is beveled where the punch starts the square hole.

The square on the punch can be ground, milled, or filed. If the square is filed and a filing rest is used, the filing rest should be tilted slightly toward the lathe headstock by placing a shim under the edge of the filing rest holder between the holder and the lathe bed. This is to tilt the filing rest slightly so the square will be filed with a slight back taper.

When punching a square hole, it is a good idea to punch the hole through part of its length, remove the punch, clean out the hole with the drill which was used to drill the pilot hole, and then finish punching the hole. If the punch should get stuck in the hole, it can be removed by removing the punch and pinion blank from the staking tool punch, then the shank on the square punch is placed through a hole in the staking tool die plate with the blank resting on the die plate while a thin punch is used to punch the square punch

(Please turn to page 39)

BULLETIN BOARD

A. NEW REQUESTS

MAAR AUTOMATIC CAR WATCH COMPANY
August Wernstrom, Grand Haven, MI, is seeking service information or the distributor of a clock which he identifies as:

Maar Automatic Car Watch Co.
Swiss Unadjusted
STB
242
Maar Patent
Made in Switzerland 56391

WATCHMASTER TIMING MACHINE GRAPH PAPER
Gilbert Healy, Denver, CO, is seeking a source for the graph paper for one of the older Watchmaster Timing Machines. If graph paper is no longer available, perhaps someone can provide information about where to obtain one of the plastic drums which was used as a substitute for the paper. The graph is printed directly on the drum.

LUMINOUS DIALS & HANDS
We have a request to name the materials used to produce luminous dials and hands. An old report (1960) indicates that radium, in very small amounts, was still being used at that time. The report states that in one gram of paint there is only several millionths of a gram of radium. AWI would be interested to know if different materials are currently being used.

SETH THOMAS ELECTRIC CLOCK LOSES TIME
Steve Guthrie, Arlington, TX, has a Sessions Westminster electric clock No. 1700 series which loses one minute a day even after he replaced the motor. Other than the train not being free or bearing wear, we could think of no other reason for the clock to lose this time. Have any of our readers had a similar experience which they solved?

XOTICLOX CO.
Gil Margolis, Riverdale, NY, is seeking service information or a source for a new movement for a timepiece that he describes as: 19 ligne, 8-day, marked XOTICLOX Co., 15 jewels, model XZC.

COCCI LORENZO WATCH
Dan Sherred, Decatur, IL, has a Cocci Lorenzo watch which needs a new faceted crystal. He is seeking the name of the U.S. distributor or service agent for Cocci Lorenzo watches.

HIOJIRI QUARTZ WATCH
Michael Mazzocco, Sr., Republic, PA, needs service information for a watch he identifies as being marked:

Japan, VP33 HIOJIRI

Can anyone supply the name of the U.S. distributor or service agent?

WD-40 REMOVAL
R.W. Dietzel, Albuquerque, NM, would like to know what procedure clock shops use to remove WD-40 and the effect this material might have on a clock movement.

B. RESPONSES

We continue to receive responses on many of the items listed for the past few months, namely: Removing Soft Solder, E & M Associates, Chicago School of Watchmaking, and others. Since we have reported on these previously we will not add to them, but if any reader requires information we will be happy to share it.

L&R TICKOPRINT WIRING DIAGRAM
Robert Leach, Urbana, IL, and John Lelievre, Natick, MA, both sent schematic diagrams and information for the L&R Tickoprint Timing Machine for Steve Spinner, Eureka, IL.

WATER-HARDENING STEEL
We have had a number of responses for sources for water-hardening steel and have compiled a list of sources. If anyone wants a copy of the source list, send a stamped, self-addressed, business size envelope along with your request.

C. ITEMS STILL NEEDED

ELMA STAR TIMING MACHINE
David Andersen, Ferndale, CA, is seeking an instruction manual for an ELMA STAR watch timing recorder. We fail to find a current address for Elma. If anyone can supply a current address, or even better, an instruction manual which we could copy for Mr. Andersen, your help will be appreciated. We will return your manual to you.

ITALIAN LOUIS XIV BIM BAM CLOCK
Gerald Niesen, Hollywood, FL, has an Italian clock which is described as Louis XIV. The movement looks very much like a Kieninger, but we fail to find it in any of their literature. It has a bim bam strike and contains the markings "GSI" and "GD13." Mr. Niesen needs to identify the maker so he can order a barrel and 2nd wheel.

TRIUMPH ULTRASONIC CLEANING MACHINE
Richard McClure, Paris, TX, seeks a wiring diagram and any other information you might have on the cleaning machine shown in these photos. He identifies it as a "Triumph" ultrasonic watch cleaner manufactured by Borg Equipment Division and distributed by Swartchild & Co. of Chicago, IL. AWI is trying to track down information from Borg Warner, but if someone has a wiring diagram it may save Mr. McClure some time. Since this was distributed by Swartchild, there are bound to be a number of them "out there."



FABERGE WATCH MATERIAL
Tim Morris, Judson, TX, seeks a source for service or spare case parts for a Faberge watch. We were able to trace through the public library the New York address and phone number of Faberge USA, but when we tried to make contact we found they are no longer there. We would welcome information or an address for this firm.

CLOCK WHEEL BLANKS & UNFINISHED PINIONS
J.M. Huckabee, Austin, TX, is seeking sources for clock wheel blanks and unfinished cut pinions in sizes other than those offered by LaRose and Timesavers.

VIBROGRAF V100, V200
Donald Homfeld, Redwood City, CA, needs a schematic and servicing manual if possible for the Vibrograf V100, V200.

SETH THOMAS REGULATOR NO. 3
Norman MacKenzie, Oxford, MA, has a Seth Thomas Regulator No. 3 clock which has both time and strike. The strike train is missing, and Mr. MacKenzie would like to know the wheel and pinion tooth count for this train.

DO YOU HAVE INFORMATION REGARDING THIS MONTH'S REQUESTS?
DO YOU NEED INFORMATION ABOUT ONE OF THIS MONTH'S RESPONSES?
If so, send a self-addressed stamped business-size envelope and your request to the address below

BULLETIN BOARD
Horological Times
3700 Harrison Avenue
Cincinnati, Ohio 45211

TECHNICALLY WATCHES
(Continued from page 37)

from the blank. If some cutting oil is used on the square punch when punching the hole, the job will be easier and the results will be better. The end of the punch should be left dead hard. If the punch is tempered any, it should only be the shank and where the square joins the shank. This is to give strength and help prevent breakage. The punch will cut the square hole easier if the very end of the square (where the pilot joins the square) is undercut with the graver when the punch is made. Note: The winding pinion blank should be left oversized to allow for truing it up with the graver after the square hole has been punched. To true up the blank after the hole has been punched, the blank is held on a square mandrel which fits the square hole in the pinion blank snugly.

When making a female bevel winding pinion blank like the one that is shown in View B, Figure 1 where the hole for the plunger pin "a" is smaller than the diagonal of the square, one should use a boring tool in the slide rest to turn a groove in the pilot hole at a point where the square hole will end. This is to provide clearance at the end of the square hole for the shavings created by the square punch when punching the hole. This is shown in Figure 7. View A shows the boring tool cutting the groove and View B shows the square hole being punched. Note the dotted lines showing the end of the square punch and how its end has entered the groove which was cut by the boring tool. This groove should be slightly larger in diameter than the diagonal diameter of the square.

"Antique Watch Restoration" will continue next month.

Support

The AWI–ELM TRUST SCHOLARSHIP PROGRAM

BY SENDING YOUR OLD WATCH BATTERIES TO THE

AMERICAN WATCHMAKERS INSTITUTE
3700 Harrison Avenue
Cincinnati, Ohio 45211

Has Your Address Changed?

Please Notify

AMERICAN WATCHMAKERS INSTITUTE
3700 Harrison Avenue
Cincinnati, Ohio 45211

Name _____

OLD ADDRESS

Address _____

City, State & Zip _____

NEW ADDRESS

Address _____

City, State & Zip _____

SCHOLASTICALLY SPEAKING

Arnold Van Tiem



Schools of Horology

Today there are still many horological schools in the United States as well as around the world. However, many of these schools are not current members of the American Watchmakers Institute Research and Education Council. As chairman of the REC, I would like to see more horological schools involved with the AWI-REC committee.

The purpose of REC is to upgrade our trade, educate, and promote watch and clock repair. Only by getting together with other instructors and sharing ideas, methods of instruction, certification tests, etc. can we do this.

If there are any horology schools that have interest in the REC, please contact the AWI for further information. Remember, if 60 percent of your horology students are members of AWI, you, the instructor, are entitled to $200 from AWI to cover some of the expenses needed to attend the annual REC meetings.

The following is a current list of the 24 horological schools that are REC members in the United States, Canada, and Switzerland.

ALABAMA

MOBILE
Southwest State College
925 Dauphin Island Parkway
Mobile, AL 36605
(205) 471-7476

COLORADO

DENVER
Emily Griffith Opportunity School
1250 Welton Street
Denver, CO 80219
(303) 572-8218

FLORIDA

MIAMI
Lindsey Hopkins Tech. Education Center
750 N.W. 20th Street
Miami, FL 33127

WINTER PARK
Winter Park Adult Vocational Center
2250 Lee Road, Suite 100
Winter Park, FL 32789
(407) 647-6366 (ext. 12)

ILLINOIS

CHAMPAIGN
Parkland College
2400 W. Bradley Avenue
Champaign, IL 61820
(217) 351-2288

QUINCY
Gem City College School of Horology
7th and State Streets, P.O. Box 179
Quincy, IL 62306
(217) 222-0391

MICHIGAN

PLAINWELL
State Technical Institute & Rehab. Center
Rt. 3 - Pine Lake, Alber Drive
Plainwell, MI 49080
(616) 664-4461

STERLING HEIGHTS
Career Prep Center
12200 Fifteen Mile Road
Sterling Heights, MI 48077
(313) 979-6510

MINNESOTA

ST. PAUL
St. Paul Technical Vocational Institute
235 Marshall Avenue
St. Paul, MN 55102
(612) 221-1408

MISSISSIPPI

ELLISVILLE
Jones County Jr. College
Ellisville, MS 39437
(601) 477-9311

MONTANA

GREAT FALLS
Great Falls Vocational-Technical Center
2100 16th Avenue South
Great Falls, MT 59405
(406) 791-2100

NEW YORK

BROOKLYN
Geo. Westinghouse Voc-Tech High School
105 Johnson Street
Brooklyn, NY 11201
(212) 625-6130

WOODSIDE
Joseph Bulova School of Watchmaking
40-24 62nd Street
Woodside, NY 11377
(212) 424-2929

OHIO

CINCINNATI
Ohio Valley Watchmaking Institute
10600 Springfield Pike
Cincinnati, OH 45215
(513) 771-4800

OKLAHOMA

OKMULGEE
Oklahoma State Unversity of Tech. Training
Okmulgee, OK 74447

PENNSYLVANIA

LANCASTER
Bowman Technical School
220 W. King Street
Lancaster, PA 17603
(717) 397-7484

JOHNSTOWN
Hiram C. Andrews Center
727 Goucher Street
Johnstown, PA 15915

TEXAS

HOUSTON
Houston Technical College
1301 Waugh Drive
Houston, TX 77019
(713) 529-8143

KILGORE
Kilgore College
1100 Broadway Blvd.
Kilgore, TX 75662
(214) 984-8531

PARIS
Paris Jr. College
2400 Clarksville Street
Paris, TX 75460
(214) 785-7661 (ext. 116)

WASHINGTON

SEATTLE
North Seattle Community College
9600 College Way North
Seattle, WA 98103
(206) 527-3600

TACOMA
Bates Vocational Tech
1101 South Yakima
Tacoma, WA 98405

CANADA

TROIS-RIVIERES, QUEBEC
Polyvante Ste-Ursule
1725 Boul. du Carmel
Trois-Rivieres, Quebec
Canada G8Z 3R8
(819) 379-3644

SWITZERLAND

NEUCHATEL
Watchmakers of Switzerland Technical & Educational Program (WOSTEP)
Case Postale 118
2006 Neuchatel, Switzerland
038/304830

ASSOCIATION NEWS

NEW JERSEY
The Watchmakers Association of New Jersey's 51st annual dinner dance will take place on Saturday, November 17, 1990 at the Holiday Inn (Top of the Meadows) from 7:30 to 11:30 PM. It will feature a sit-down dinner, a four-piece band for dancing, and an open bar. The Holiday Inn is located at 2750 Tonnele Ave. (Rt. 1 & 9), North Bergen, NJ.

For more information contact John Prellberg, (201) 861-3500.

NORTH CAROLINA
The Triangle Guild of the North Carolina Watchmaker's Association hosted the annual convention on June 1-3, 1990 at the Holiday Inn North, Raleigh, NC.

Friday evening an auction was held as a fund-raiser for the association. Several material houses supplied tools or parts to the NCWA. Each member had to bring an item in order to participate.

Saturday morning Ron Iverson, AWI bench course instructor, presented an excellent slide program on the restoration of a French striking clock. Questions were answered during and after the presentation. In the afternoon, Fred Burckhardt presented a business and personnel management program. The guest speaker for the Saturday evening banquet was Fred Burckhardt.

On Sunday, Buddy Carpenter delivered "Basic Introduction of Electronics" for watchmakers. This was an excellent program with many questions asked and answered. The new officers were installed after the luncheon banquet. Prizes donated by advertisers and watch companies were presented.

OHIO
The Watchmakers Association of Ohio will hold an auction on Sunday, October 14, 1990 at 1:00 PM. It will be held at the American Legion Hall, Southway Post 144, 3253 South High Street, Columbus, Ohio.

Auction items may include just about anything connected with the trade. Any item you wish to sell should be brought the day of the sale. Bring these items early so that potential bidders will be able to look them over prior to sale time. The hall will open at 9:30 AM.

For additional information contact Karl Farnlacher, Dayton Ohio, (513) 275-3172.

UPCOMING EVENTS

Central Illinois Watchmaker's Association
Annual Convention
October 19-21, 1990
The Sheraton — Normal, IL

Florida State Watchmakers Association
Annual Convention
October 26-28, 1990
Holiday Inn Airport — Tampa, FL

We Salute These New Members!

BAKER, Richard A.–Anchorage, AK
BALDASARRO, Phil–Henderson, NV
BARTON, Daniel J.–Chatham, NY
BENNET, Kevin E.–San Antonio, TX
BETZ, John H.–Denver, CO
BLACKWELL, Dana J.–Naugatuck, CT
BLAIR, Jeffry D.–Ackley, IA
BRADSHAW, Ashlyn–Raleigh, NC
BRADSHAW, Robert W., Dr.–Pasco, WA
BROWN, Jerry–Houston, TX
BROWN, Nigel–Iroquois, Ontario, Canada
BUCHAN, Walter–Norton, MA
Sponsor: Burton Walker–Lincoln, RI
CARLTON, Gloria–Rankin, TX
CATLETT, Robert E., Jr.–Roanoke, VA
CHOI, Duk J.–Colorado Springs, CO
CHOW, John–New York, NY
CLAYTON, C.W.–Birdsboro, PA
CLEPPER, Lynn–Houston, TX
CLINE, Dudley E.–Brandon, VT
CODY, Robert–Somerville, MA
COLLINS, Jeffrey D.–Chesaning, MI
COX, William L.–Charleston, SC
DEGENHART, Daniel–Columbia, MO
ENSOR, John–Pasadena, MD
FAY, Joe M.–Fairfield, OH
FEINBERG, Robert M.–Swansea, MA
Sponsor: Frank Feinberg–Fall River, MA
FERTENBAUGH, Creedon J.–New Cumberland, PA
FRANK, Wallace J.–Alma, MI
FRYJOFF, Chet–Amherst, NH
FUDULI, Frank A.–Oakland, NJ
GABY, Donald C.–Miami, FL
GARNICK, Paul H.–Lowell, MA
GAYHART, Manford–San Ramon, CA
GILGUN, Chris–Warwick, MA
GRAVES, Wendell K.–Savannah, GA
GULI, Robert–Rego Park, NY
HART, James W.–Mountain Home, AR
HATTEN, Michael B.–Greenville, NC
HAWN, Kimberly–Bracebridge, Ontario, Canada
HAZARISINGH, Chatterpaul–Richmond Hill, NY
HERRIN, Seabie J.–Houston, TX
HILL, Tom Edward–Blossom, TX
HORNSTEIN, David–New York, NY
HOSTETTER, Gary G.–Shrewsbury, PA
HOY, Carroll E.–Linthicum, MD
HUSSEY, Wayne–South Mills, NC
JACQUES, Felix–Livermore Falls, ME
Sponsor: G.H. Botka–Livermore Falls, ME
JOHNSON, N. Page–Dallas, TX
JUDGE, William F.–Wichita, KS
KELSEY, Stephen E.–Salt Lake City, UT
KENNISON, Dana Y.–Pepperell, MA
KOFFLER, John–Mandan, ND
KWON, Tae Ryoung–Auburn, GA
LA GRUTTA, Gregory–Hayward, CA
LEPIE, Michael–Boston, MA
LONG, Sam N., Jr.–South Mills, NC
MARRS, Bruce–Nitro, WV
MAZE, Vitaly–San Francisco, CA
MITCHELL, Louis A.–Lubbock, TX
MAC AVOY, Wayne–Columbus, OH
Sponsor: John P. Kenyon–Columbus, OH
MC CALL, Tamara–Royston, GA
MC COLLUM, Roger–Houston, TX
MC HONE, Gary W.–Pfafftown, NC
MC WILLIAMS, Scott J.–Linwood, NJ
NELSON, Travis D.–Broken Bow, OK
NGUYEN, Christopher–Cupertino, CA
NGUYEN, Mao–Fredericksburg, PA
Sponsor: Ceylon Leitzel–Myerstown, PA
OLSON, J.D.–Eugene, OR
OLSON, Mark–Albuquerque, NM
PENTTILA, Vaino A.–Virginia Gardens, FL
PICADO, Carlos A.–W. New York, NJ
PLANK, Chris–San Jose, CA
QIN, Xiao Ka–San Francisco, CA
RAYMAN, Neil W.–Friedens, PA
REICHRATH, John, Jr.–Cincinnati, OH
REITZLER, Nancy–Montclair, CA
Sponsor: Ivan Godwin–Running Springs, CA
ROBERGE, Paul E.–Duncan, B.C., Canada
ROBERTS, John S.–McKeesport, PA
ROLLERT, Scott–Colorado Springs, CO
Sponsor: Chas. Oyler–Colorado Springs, CO
SAENZ, Fermin–Madrid, Spain
SCHREINER, David E.–Sharonville, OH
SECRETAN, Frank–Santa Ana, CA
SHKYMBA, Peter–Brooklyn, NY
SINGER, Joseph J.–Mayfield Heights, OH
SMITH, Leland Hedgecock–Mardela Springs, MD
SMITH, Thomas J.–Houston, TX
SNYDER, James D.–Santa Maria, CA
STANDRIFF, Robert J.–Cincinnati, OH
STINE, Raymond O., Jr.–Norwood, OH
STONE, Gale–Channelview, TX
STROBLE, Richard J.–Lindenhurst, NY
STRONG, Julie–Myerstown, PA
Sponsor: Ceylon Leitzel–Myerstown, PA
STULL, Michael–Texas City, TX
SWINFORD, Stanley–Erlanger, KY
SWORDS, Herman G.–Lancaster, PA
SZYMANSKI, Edward J.–Raleigh, NC
TAM, Kwok Yee–Conyers, GA
THIELEN, Peter–Woodside, CA
Sponsor: Scott Hampton–Lafayette, CA
THOMAE, Gerald P.–Shipman, IL
TYNDALL, William C., Jr.–Naples, FL
WAGNER, Richard J.–Barrington, IL
WALLING, David P.–Ovid, MI
WEINLE, David–Cleves, OH
YEGERLEHNER, Michael L.–Huber Heights, OH
YELVINGTON, Leland–Cary, NC
ZIGLEK, Richard N.–Miami Shores, FL

BOOK REVIEW

BRITISH LONGCASE CLOCKS by Derek Roberts, 9"x12", hard covers, 373 pages, 512 illustrations. Pub. 1990 by Schiffer Pub. Ltd.

The longcase clock, now commonly known as the grandfather clock, is a native of England and as such has been a staid part of the English home. Mr. Derek Roberts has authored some books on various sections of horology as well as operating a well-known antique clock business in Tonbridge in Kent.

The author prefaces the text in stating its purpose, which is to have the reader learn how these clocks work, their required maintenance, origins, and their 300 years of evolution, as well as their proper appreciation. He classifies the subject into its initial period before 1700, precision timekeeping, astronomical clocks, along with numerous technical details. Rather than concentrate on the finest London clocks of famous makers now in private collections or in museums, he devotes some space to country clocks–even those of 30-hour running time–showing that these too can be quite interesting.

This book, however, is an encyclopedic collection of all types of tall clocks covering the products of famous makers as well as those whose names may not be familiar to many readers. All types of clocks are included, from seemingly plain types to those with elaborate cabinetry. Still others are featured with complexities and astronomical indications. The photographs are uniformly excellent, many in full color. Where the author deems proper and important to the exposition, he has enlisted the skill and artistry of David Penny, the well-known horological artist to illustrate the pertinent mechanical details and escapements of these clocks.

In discussing the origins of these statly timepieces, Mr. Roberts mentions the 1637-39 records of Gallileo's experiments with the pendulum, and the possible work of Johann Treffler in 1656 a bit later, yet before Huygens–who, with Samual Coster, introduced the first pendulum clock a year later.

It is generally acknowledged that Fromanteel was the first to use the pendulum in England as well as designing the first longcase clock. Roberts also mentions that Robert Hooke, together with Clement, introduced the long or "royal" pendulum that beat seconds.

The longcase clock, thus, was an evolutionary necessity to protect the pendulum. Roberts traces the first of these with their styles, sizes, and six-foot cases, which changed rapidly in their first generation into the 18th century, taller-cased clocks.

Some early longcase clocks had square dials and the author devotes one of the 19 chapters to these and their decorations and early verge escapements. A great many of these clocks are shown with their movements in separate views, dates, and proveniance. Where the case construction is of importance, close-up sections are shown in sharp detail.

Clocks from the shops of obscure as well as the famous makers are included. Veneers, marquetry, and parquetry (inlaid geometric patterns) are also viewed here in excellent detail and in color.

The chapter on rare clocks includes those of long-running, some of year duration, grande sonnerie, night clocks, and those exhibiting their seconds hands and dialettes in the arch of the case. In this section, the movements, their driving forces and wheel train counts, are included. The views of the movements and dial details are commendable.

Other chapters deal with astronomical and equation-of-time devices in these clocks. At the end of each chapter, the author supplies the names of other books which specialize in detail the subject matter of the preceding chapter.

In a book of 512 illustrations, it is expected that a great variety of such clocks will be pictured and discussed. In this respect, the author doesn't disappoint the reader. The enlarged close-ups of dials and movement details are excellent, and many a researcher and restorer should be grateful for this inclusion.

Case designs and the types of woods used are shown with the dates, makers, and influences. Lacquers and "chinoiserie" are explained in another chapter. London-style cases, chiming and musical clocks, brass-faced, eight-day clocks, country-made mahogany clocks, silvered dials, and white dials with beautifully painted scenes in the corners and arches are attractive and the subjects of other special chapters.

While early lantern clocks required rewinding twice a day, running time for clocks to 30 hours was introduced about 1660, and Mr. Roberts shows how to date these. To the new viewer, most 30-hour clocks may appear quite plain, but the author expertly points out the subtle and interesting differences. Others had seconds, moon, and calendric services.

The decline of the longcase clock started at the end of the 18th century. By the 1820-30 period the production of these, it is noted, almost stopped. Derek Roberts points out that imports from Europe and America caused this decline. The popularity of the mainspring-driven shelf clock and its cheaper price also could have been responsible for the decline.

Despite it, though, Victorian designs, chiming clocks, and short grandmother clocks (5-6 feet) are typical of the 19th century. A number of these are pictured.

The tubular chimes of the latter part of the 19th century are shown. Many authorities attribute the resurging popularity of the longcase clock to the best-selling song, "My Grandfather's Clock," which also gave these clocks their newer name. The products of Elliott of London, which the author terms "Edwardian," are also shown. Some with tubular chimes are almost monumental, elaborately carved mahogany cases, in which, as the author puts it, "nearly every feature has been taken to excess." In this chapter, movements and dials also get their share of separate views. Clocks made after 1945 are included by makers who are still producing.

One of the chapters is an informative highlighting of "Regional Characteristics" which includes Scottish, Irish, and general areas in England. *(Continued on page 49)*

WATCHES Inside & Out!



Robert D. Porter, CMW

A WILLIAM ELLERY FROM BOSTON

The American Watch Company, Boston, Massachusetts, produced this 18 size, 7 jewel, hunting case watch shown in Figures 1, 2, and 3 around 1862. It was named after William Ellery, one of the signers of the Declaration of Independence.

It is remarkable that this veteran of the Civil War era has survived for well over a century and a quarter with only a bent hour hand, some dirt, and rust on a few of the steel parts. It must have taken many a licking and came out ticking during that long period of time—a tribute to its rugged American character.

Figures 4 and 5 illustrate the removal of the balance bridge, giving us a look at the undersprung balance wheel assembly. The hairspring stud screw is being backed out in Figure 6 to allow the balance assembly to be removed. Figure 7 shows the underside of the wheel and the long groove in its rim which was the means used to poise (or balance) the three-spoked balance wheel used in many early watches.

The single screw holding the movement in the case is being backed out in Figure 8. Figures 9 and 10 illustrate the pulling of the hands by using two different types of hand removers.

One of the three dial retaining tapered pins is being levered out of the dial foot in Figure 11. Figure 12 shows the mechanism under the dial.

The power is being let down in Figure 13 by allowing the winding key to slip through the fingers as the combination click and spring is being held



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9

away from the ratchet wheel with tweezers. The click should be carefully expanded away from the ratchet wheel just enough to allow the mainspring to be let down because the click could be easily broken if expanded too much. This operation is similar to letting down a clock mainspring.

The bar bridge has been removed in Figure 14. The ratchet and click shown is a very simple and efficient mechanism. The remaining screw holding the barrel bridge is being taken out in Figure 15. The other two plate screws were removed and the main plate was carefully lifted off the watch and then the train wheels, with the exception of the center wheel, were removed for cleaning. Figure 16 shows the center wheel being lightly tapped out of the cannon pinion.

The two screws holding the lower balance hole and cap jewels in place are being taken out in Figure 17. Figure 18 illustrates the use of a jewel pusher to remove the jewels.

The oilstone powder used to remove rust from the various parts is shown in Figure 19. The powder was mixed with grease until a dab of thick paste was formed. A toothpick was used to apply the polishing paste to remove the rust, as illustrated in Figures 20 and 21. Wet or dry silicon carbide abrasive paper in 600 grit was also used to remove the rust from the hairspring stud and regulator by sliding the parts in a straight line on the paper.

Figure 22 is a good look at the underside of the balance wheel. The hairspring stud has been removed for rust removal and cleaning.

The movement was then cleaned ultrasonically. Figure 23 illustrates the pulling of the mainspring through lubricant that has been applied to watch tissue. Figures 24, 25, and 26 show the winding and insertion of the mainspring into the barrel. A couple of drops of lubricant was also applied to the inside of the barrel after the mainspring was in place.

The cannon pinion is being tested for tightness in Figure 27. Figure 28 shows how the center wheel arbor is being "ovalized" slightly to increase cannon pinion friction. Care was taken not to bridge the two diameters of the



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17



Figure 18



Figure 19



Figure 20



Figure 21



Figure 22



Figure 23



Figure 24



Figure 25



Figure 26



Figure 27

arbor to keep the flat-faced punches from bending or breaking it.

The train layout of the Ellery (Figure 29) is straightforward and functional. This is a good time to determine the vibrations per hour the balance wheel should make by counting the wheel teeth and pinion leaves. Many of these early watches have slow trains. The vibrations per hour value is calculated as follows:

$$\frac{\text{Wheel}}{\text{Pinion}} \quad \frac{C(64) \times 3rd(60) \times 4th(63) \times E(15) \times 2}{3rd(8) \times 4th(8) \times E(7)}$$

$$= \frac{7257600}{448} = 16{,}200 \text{ vibrations per hour}$$

The number of teeth and leaves in each wheel is:

	Wheel	Pinion
Center	64	not considered
3rd	60	8
4th	63	8
Escape	15	7
Number of impulses to balance wheel per tooth of escape wheel	2	

We now know that our timing



Figure 28

machine should be set for 16,200 vibrations per hour so the rate of this watch can be checked, although a variation in rate of several minutes per day should be considered excellent timekeeping for these early watches because the balance wheel is not temperature compensated.

Just for fun, we may as well go ahead and see how the 12 to 1 ratio between the minute and hour hands is achieved:

$$\text{Wheel} \atop \text{Pinion} \quad \frac{H(42) \times M(48)}{CP(12) \times MP(14)}$$

$$= \frac{2016}{168} = 12$$

The hour wheel (H) has 42 teeth and the minute wheel (M) has 48 teeth. The cannon pinion (CP) has 12 leaves and the minute wheel pinion (MP) has 14 leaves.

Figure 30 shows how a small piece of Rodico® is used to hold the escape wheel and pallet fork to the

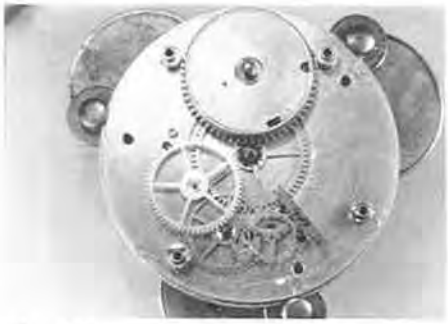


Figure 29



Figure 30



Figure 31



Figure 32

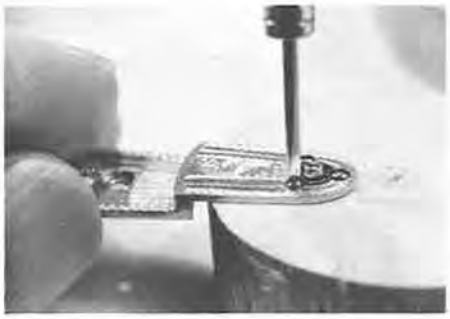


Figure 33



Figure 34



Figure 35



Figure 36



Figure 37



Figure 38



Figure 39

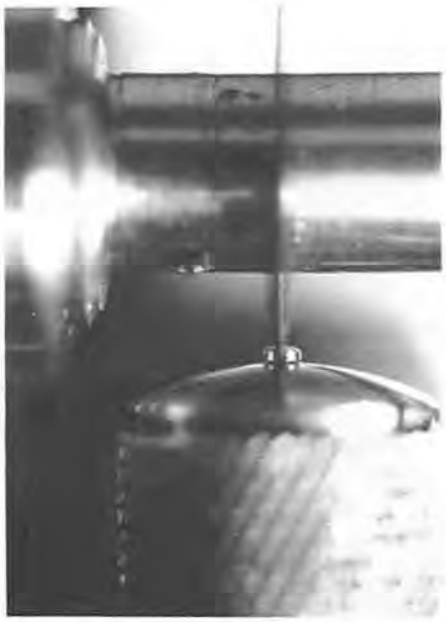


Figure 40



Figure 41

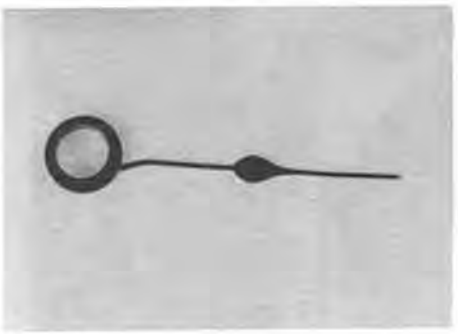


Figure 42

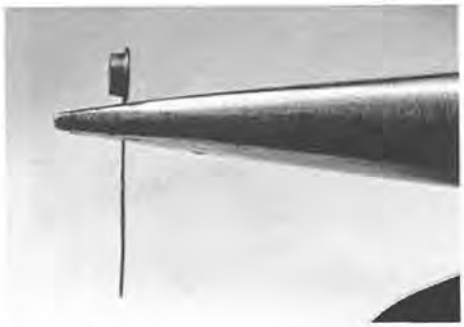


Figure 43

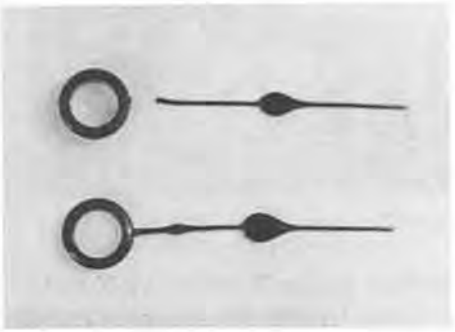


Figure 44



Figure 45



Figure 46



Figure 47



Figure 48



Figure 49



Figure 50

underside of the upper plate before assembly. Figure 31 illustrates how the upper and lower plates are easily assembled using this method. Please note that this method of assembly differs from setting the wheels and pallet onto the bridge and then guiding the main plate over the wheels and pallet. The train wheels and pallet fork are all in place in Figure 32. The Rodico has been pulled out with tweezers. (This is great stuff and has a lot of uses such as vacuuming lint, dust, or fingerprints off the movement.)

The upper balance hole and cap jewels have been put back into the balance bridge and the screws are being tightened in Figure 33.

It is exciting to see one of these old-timers run again as it was wound in Figure 34. This is also a good time to

check for overbanking by interrupting the balance motion by momentarily holding the pallet fork against one banking pin and then the other with tweezers. Sure enough, the watch overbanked, meaning that the upright guard pin was not set close enough toward the roller allowing the slot in the pallet to miss the roller jewel causing it to lock up on the outside of the pallet. A slight adjustment of the banking pins and pallet fork guard pin solved this problem.

The three flat-headed screws holding the key well and dust cover (Figure 35) are obvious replacements and are not in keeping with the period of the watch. One of the screws was tried in a die (Figure 36) to determine the thread size so replacements could be made.

Figures 37, 38, 39, and 40 show the making of the screws which were then blued in a parts tin lid over a gas flame. The screws are in place in Figure 41.

Our next job was to try and straighten the hour hand shown in Figure 42. A pair of smooth jaw pliers (Figure 43) was used to try and squeeze the hand straight. Figure 44 shows that it didn't work. A replacement hand was found before the attempt to straighten the old one was made—luckily I had one in stock. An escapement file was used (Figure 45) to dress the hand to more nearly resemble the old one.

Figure 46 shows the dial and hands in place. The size of the watch is illustrated by the scale which has millimeter divisions on top and inch values on the bottom.

The newly restored Ellery is pictured in views 47, 48, 49, and 50. It is a pleasure and a privilege to restore these pioneering examples of early American watchmaking. They provide us with a clear look into a misty past. You can bet this William Ellery from Boston will keep on ticking for many years to come.

BOOK REVIEW
(Continued from page 43)

Precision timekeeping tall clocks and their historical and technical features include the 17th century Jost Burgi's cross-beat and rolling ball clocks. Advances which enhanced the technology of timekeeping precision are illustrated. Temperature adjustments, maintaining power, Riefler barometric compensation, and some escapements are included. A short biography of such makers as Fromanteel, Graham Clement, East, Tompion, and Graham are examples. Christopher Pinchbeck–known best for his zinc and copper alloy "Pinchbeck Gold"–is here revealed as an important maker of elegant and elaborate musical and astronomical clocks. Some authors also credit him with having taught King George III the art of engine turning and button making. Ellicott and his serialized production numbers and dates, Eardley Norton, John and Thomas Windmills, Clay, and others are biographically sketched in this same chapter.

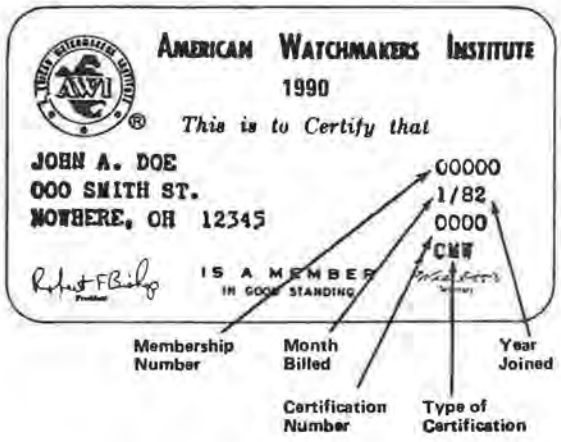
The remaining chapters cover and picture hands and spandrels, care of clocks, setting up a tall clock, and there are maps and lists of place names in the Appendix. There is a good glossary of terms used with clocks and a makers' index, as well as a general index which concludes the book.

This is a desirable addition to the library about British clocks. It is authoritative, carefully researched, and meticulously produced. It should serve as a fine reference of longcase clocks from the British Isles.

Henry B. Fried

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New Products and Literature

GESSWEIN'S POWER HAND 1X

Gesswein's newest member of the popular power hand line is designed specifically for jewelers. Power Hand 1X is a comfortable, flexible, and affordable alternative to flexible shaft machines. It includes a variable speed controller with a precise running, well-balanced 35,000 rpm handpiece. This durable and reliable unit offers smooth starts and quick stops and is perfect for all bench work needs.

For further information contact: **Gesswein, P.O. Box 3998, 255 Hancock Ave., Bridgeport, CT 06605; (203) 366-5400, ext. 284.**



Gesswein

MOVADO'S "COLLECTION 1881"

"Collection 1881" from Movado features exact replicas of models in the company's catalog during the 1940s. At left in the photo is a full calendar model with a 33 mm, water-resistant, 18K gold case containing a self-winding movement. Shown at right is an elongated, rectangular model with cambered dial in 18K gold with handwound mechanical movement.

For more information contact: **Movado Time Corp., 125 Chubb Ave., Lyndhurst, NJ 07071; (313) 561-3883.**



L & R'S NEW DESIGN FOR DELUXE JEWELRY CLEANER CONTAINERS

L&R Manufacturing Company recently introduced a newly designed package for its popular jewelry cleaning solutions. The new packaging features a printed sleeve fitted around the container, replacing the previous method of screening the graphics right on the container. The color-coded labels make it easy to differentiate solutions without reading the labels.

The new packaging features the product's classic script lettering for all three varieties: Ellanar Deluxe Jewelry Cleaner Concentrate Non-Ammoniated, Ammoniated, and Premixed Ammoniated.

For a free catalog featuring L&R's complete line of ultrasonic cleaning machines, solutions, and other accessories, contact: **L&R Manufacturing Co., 577 Elm St., Kearny, NJ 07032; or call (800) LR-CLEAN in eastern states; (800) 325-2627 in western states; (201) 991-5330 in New Jersey.**



L&R

FREE WATCH BATTERY LOUPE FROM BATT-TRONIC

The size of the watch battery replacement market is increasing each year, although the batteries are getting smaller and smaller. For example, the tiny SR416SW is only 4.8 mm in diameter by 1.6 mm in height. This newest trend of super-micro cell batteries is becoming more and more popular. To enlarge the battery numbers of these tiny cells, Batt-Tronic is offering retailers a free 5X Watch Battery Loupe. "Accurate battery identification is key to proper replacement," said Harry Hillson, President of Batt-Tronic Corporation.

The free Watch Battery Loupe is available exclusively from Batt-Tronic, and is included free with your order of 100 or more watch batteries until Oct. 31, 1990. For more information contact: **Batt-Tronic Corp., (800) 431-2828; in NY state (800) 942-1944.**



5X Watch Battery Loupe



BULOVA INTRODUCES UNIQUE ANNIVERSARY CLOCK

Bulova Corporation's Clock Division debuts the "Magdalen," a uniquely designed anniversary clock. The solid brass case is plated in a rich nickel finish, highlighted with goldtone accents.

The porcelain dial features black Roman numerals set against a white face and accented with decorative gold leafing. The pendulum is made from Swarovski full lead crystal which reflects light from the clock base's highly polished nickel surface.

A glass dome protects this Bulova quartz clock, which comes with battery included. Dimensions are 6" dia. x 9" high. Model number is B8814, and the clock has a suggested retail price of $165.

Contact: **Clock Division, Bulova Corporation, One Bulova Ave., Woodside, NY 11377; (718) 204-3300.**

SEIKO CELEBRATES FANTASIA'S 50th ANNIVERSARY

Seiko joins the Walt Disney celebration of Fantasia's 50th anniversary with the introduction of a new timepiece picturing the Sorcerer's Apprentice on its dial. This fun and colorful watch is crafted in sizes for both men and women. Featured is lovable Mickey Mouse beaming and appropriately dressed as the Sorcerer. Black hour markers and a classic black leather strap complement the rectangular dial. The men's version also features a second hand. Suggested retail price is $150 (men's), and $135 (ladies).

For more information contact Seiko's nationwide network of distributors.



Seiko

NEW JAZ PARIS STRAP PAIR WITH DAZZLING BLUE DIALS

Of the new Jaz Paris introductions for Fall 1990 is this matching pair of strap models, 1850B and 7850B, featuring a unique French flavor in dial design. Brilliant galvanized blue dials with a "soleille" finish (in French meaning "sun effect"), creates an exciting sunburst look from the reflected light on the dial. The goldtone case includes gilt Arabic numerals at twelve, three, six, and nine o'clock. Polished gilt markers enhance these sophisticated timepieces. Priced at $195 suggested retail, each model features a mineral crystal and a stitched black crocograin strap for extra durability.

For more information, contact: **Jaz Paris, 1111 MacArthur Blvd., Mahwah, NJ 07430.**



JAZ Paris

CASIO'S SPORT WATCH

Casio's 200 meter water-resistant sport watch (AW-400) is a digital/analog combination timepiece featuring 12/24 hour time format, daily alarm, and an LCD display of hour, minute, second, month, date and day. The AW-400 sports a new look for selected Casio watches—an attractive resin case and band with goldtone metal accents. Suggested retail: $119.95. Contact: **Casio, Inc., 570 Mt. Pleasant Ave., P.O. Box 7000, Dover, NJ 07801; (201) 361-5400.**

Casio



ATTRACTIVE CHRISTMAS BOX COMBINATIONS FROM KASSOY

Combination jewelry box and tree ornaments, perfect for the Christmas season, are now available from Kassoy. The Christmas ball/ring or earring box combo (2¼" dia.) comes complete with red velvet pad and braided string. Gold and silver colors are available.

The Christmas bell ring or earring box combo comes in red only and is 3½"H x 2¼" in dia. It comes with a braided string and velvet pad. All are $18.95 per dozen.

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



Kassoy

MECHANICAL WATCH FROM REVUE THOMMEN

This self-winding mechanical watch with complex auxiliary mechanisms from Revue Thommen features a full calendar with date shown by means of a pointer and the days and months in separate apertures. A subdial located at 6 o'clock provides the time of a second timezone on a 24-hour dial. The gold-plated case has a beaded, stepped bezel.



Revue Thommen

For more information contact: **Revue Thommen SA, 2300 La Chaux-de Fonds, Switzerland; (039 26 4646).**



Vacheron Constantin exhibited these water-resistant, 18K yellow gold designs from its "Phidias" collection at Basel '90. The men's model has extra-thin, self-winding movement, and case and bracelet set with 5.35 carats of round diamonds. For women: extra-thin quartz movement, case, and bracelet enlivened with 2.30 carats of round-cut diamonds. Twelve round diamonds in 18K gold settings enhance the dials; domed sapphire crystals. For further information, contact: **Vacheron & Constantin, Inc., 608 5th Ave., Suite 910, New York, NY 10020; (212) 757-3152.**

News in the Trade

PIN LAPEL WATCHES FROM CARAVELLE

Caravelle debuts its two pin lapel watches to its 1990 collection. The round goldtone case is attached to a matching curved-edge bar pin and chain. The white dial has black Arabic numerals; smaller numbers closer to the center indicate military time. Triangle markers at each hour position and goldtone hands tell time with sweep second quartz precision. The goldtone model (48J76) retails at $49.95. The watch is also available in silvertone (47J18), and has a suggested retail price of $44.95.

Contact: **Caravelle Division, Bulova Corp., One Bulova Ave., Woodside, NY 11377; (718) 204-3300.**



Caravelle

JAEGER-LE COULTRE'S "GEOGRAPHIQUE" WRISTWATCH

This self-winding timepiece from Jaeger-LeCoultre provides a permanent indication of the hour, minute, second and date, and simultaneously shows the time of any other timezone. An open window in its dial displays the name of 24 cities around the world, selected by means of a crown, and automatically shows the corresponding local time on a secondary dial with mention of day and night. The automatic movement features a power-reserve indicator.

Contact for more information: **Jaeger-LeCoultre SA, 980 Brooke Rd., P.O. Box 1608, Winchester, VA 22601; (703) 665-0300; (800) JLC-TIME.**



Jaeger Le-Coultre

11TH ANNUAL NAWCC SEMINAR TO BE HELD OCTOBER 25-27, 1990 IN HOUSTON, TEXAS

The NAWCC and Houston's San Jacinto Chapter 139 will present the 11th annual NAWCC Seminar October 25-27, 1990 in Houston, TX.

This year's seminar theme, "The Evolution of Mass Production in Horology," will trace the transition from hand to some type of mass production in clock- and watchmaking, and will examine and contrast American and European experiences in the evolutionary process.

Seminar sessions are open to the public and will be held at the J.W. Marriott Hotel where special rates will be arranged for participants: (800) 228-9290 or (713) 961-1500. The Marriott is located at 5150 Westheimer.

Highlights of the three-day meeting include "The James Arthur Lecture" presented by Henry B. Fried, plus presentations by nine other guest speakers, all very highly regarded for their expertise on the topics selected, a tour of the Sam Houston Historical Park and the Museum of Texas History, an exhibit of fine American clocks, a Bayou Bend Museum tour, and an optional Galveston tour.

For registration information, call or write: **Ralph Pokluda, 2222 Westheimer, Houston, TX 77098; (713) 523-8148.**

SAN FRANCISCO DIAMOND & JEWELRY MART FORGES TRADE RELATIONSHIP WITH TAIPEI

Far East jewelers now have a "golden opportunity" to develop and expand their operations in the U.S., according to Robert Lee of San Francisco's Diamond & Jewelry Mart (SFDJM), which unveiled a "how to" seminar at the Taipei International Jewelry and Timepiece Show at the Taipei World Trade Center September 17, 1990.

In conjunction with the China External Trade Development Council (CETRA), the Mart outlined a trade industry networking system as well as presented a market review for Pacific Rim jewelry and timepiece retailers, wholesalers, and manufacturers who have indicated interest in entering into the American marketplace.

Lee, SFDJM Director of Far East Operations, represented the Mart in a marketing booth at the four-day show. Working with CETRA representatives W.M. Chang and Thomas Tsou, as well as SFDJM Far East Marketing Rep Jeff Ting, Lee presented the seminar on the West Coast marketplace, outlining Mart amenities and disclosing the details of an SFDJM-organized tour to California which is slated for later this year.

In May 1990, Lee and SFDJM Managing General Partner Barry Scherman met with heads of commerce, industry, and trade in Taipei to plant the seeds of trade exchanges between the two cities. They found that there was a keen interest in their trade proposals, as many manufacturers interested in expanding to the West Coast were unable themselves to make the necessary arrangements to move in that direction. In their meetings with key officials, Scherman and Lee discussed the establishment of a satellite base which would utilize the Mart as a launching pad and thereby accommodate the transition of Pacific Rim companies into the U.S. market.

Several noted Far East manufacturers have already indicated their commitment to participate in the proposed U.S. tour.

For more information, contact: **Diamond & Jewelry Mart, 999 Brannan St., San Francisco, CA 94103.**

CARL E. ROSEN NAMED VICE PRESIDENT BULOVA CORPORATION

Carl E. Rosen has been named Vice President, Management Advisory Services for Bulova Corp., it was recently announced by Herbert Hofmann, President and Chief Executive Officer of Bulova.

Mr. Rosen, who joined Loews Corp., the parent company of Bulova, in 1980, has served in various managerial positions. In 1988 he was named Executive Director of Systems Development for Loews Corp., and he will continue to serve in that capacity. He holds a B.S. degree in Civil Engineering from Tufts University and an M.B.A. from the Wharton School of the University of Pennsylvania. Mr. Rosen is a resident of Stamford, CT.



Classified Ads

REGULATIONS AND RATES

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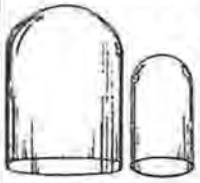
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OCTOBER 1990

5-7—New York State Watchmakers Association Annual Convention; Sheraton-Canandaigua Inn on the Lake.

7—Retrofitting, Casing & Coil Repair Bench Course (AWI); James Broughton, instructor; Denver, CO.*

12-14—Advanced Clock Repair Bench Course (AWI); John Kenyon, instructor; Winston-Salem, NC.*

13-14—Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Salt Lake City, UT.*

13-14—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Boston, MA. * (COURSE IS FULL)

14—Auction sponsored by the Watchmakers Association of Ohio, 1:00 PM, American Legion Hall, Southway Post 144, 3253 South High Street, Columbus, OH. For information: Karl Farnlacher (513) 275-3172.

14—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Scranton, PA.*

14—Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Portland, OR.*

19-21—Introduction to Clock Repair Bench Course (AWI); Roland Iverson, instructor; Boston, MA.*

19-21—Central Illinois Watchmakers Association Annual Convention; The Sheraton; Normal, IL.

20-21—400-Day Clock Repair Bench Course (AWI); John Nagle, instructor; Baltimore, MD.*

21—AWI North Central Regional Seminar; Denver, CO.*

26—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Tampa, FL.*

26-28—Florida State Watchmakers Association Annual Convention; Holiday Inn Airport; Tampa, FL.

NOVEMBER 1990

2-4—Advanced Clock Repair Bench Course (AWI); John Kenyon, instructor; Bay Area, CA.*

3-4—Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Charlotte, NC.*

3-4—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Nashville, TN.*

10—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Atlanta, GA.*

10-11—400-Day Clock Repair Bench Course (AWI); John A. Nagle, instructor; Ft. Myers, FL.*

11—Retrofitting, Casing & Coil Repair Bench Course (AWI); James Broughton, instructor; Oklahoma City, OK.*

11—Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Toledo, OH.*

11—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Columbia, SC.*

17—Watchmakers Association of New Jersey's 51st Annual Dinner Dance; Holiday Inn, 2750 Tonnele Ave., North Bergen, NJ. For information contact John Prellberg (201) 861-3500.

JANUARY 1991

11-13—Advanced Clock Repair Bench Course (AWI); John Kenyon, instructor; Houston, TX.*

12-13—Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; San Diego, CA.*

12-13—400-Day Clock Repair Bench Course (AWI); John A. Nagle, instructor; Tucson, AZ.*

13—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Los Angeles, CA.*

13—Introduction to Quartz Watch Repair Bench Course (AWI); Buddy Carpenter, instructor; Miami, FL.*

19-20—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Baton Rouge, LA.*

20—AWI Southeast Regional Seminar; Charlotte, NC.*

FEBRUARY 1991

9-10—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Albuquerque, NM.*

13-14—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Phoenix, AZ.*

16-17—Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Austin, TX.*

16-17—Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; San Diego, CA.*

17—Useful Techniques: Mechanical Watch Repair Bench Course (AWI); James Adams, instructor; Pensacola, FL.*

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22-24—Advanced Clock Repair Bench Course (AWI); John Kenyon, instructor; Phoenix, AZ.*

23-24—400-Day Clock Repair Bench Course (AWI); John A. Nagle, instructor; Los Angeles, CA.*

***For more information on AWI Bench Courses and Regional Seminars contact AWI Central, P.O. Box 11011, 3700 Harrison Avenue, Cincinnati, OH 45211; (513) 661-3838.**

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2-4—Advanced Clock Repair—Bay Area, CA
3-4—Cuckoo Clock Repair—Charlotte, NC
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JANUARY 1991
11-13—Advanced Clock Repair—Houston, TX
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12-13—400-Day Clock Repair—Tucson, AZ
13—Useful Techniques: Mechanical Watch Repair—Los Angeles, CA
13—Introduction to Quartz Watch Repair—Miami, FL
19-20—Repair of the Atmos Clock—Baton Rouge, LA
20—AWI Southeast Regional Seminar—Charlotte, NC

FEBRUARY 1991
9-10—Repair of the Atmos Clock—Albuquerque, NM
13-14—Repair of the Atmos Clock—Phoenix, AZ
16-17—Cuckoo Clock Repair—Austin, TX
16-17—Repair of the Atmos Clock—San Diego, CA
17—Useful Techniques: Mechanical Watch Repair—Pensacola, FL
17—Introduction to Quartz Watch Repair—Bay Area, CA
22-24—Advanced Clock Repair—Phoenix, AZ
23-24—400-Day Clock Repair—Los Angeles, CA

MARCH 1991
9-10—Repair of the Atmos Clock—Cincinnati, OH
15-17—Advanced Clock Repair—Alexandria, VA
16-17—Cuckoo Clock Repair—Oklahoma City, OK
16-17—400-Day Clock Repair—Mobile, AL
17—Useful Techniques: Mechanical Watch Repair—Phoenix, AZ
17—Introduction to Quartz Watch Repair—Nashville, TN