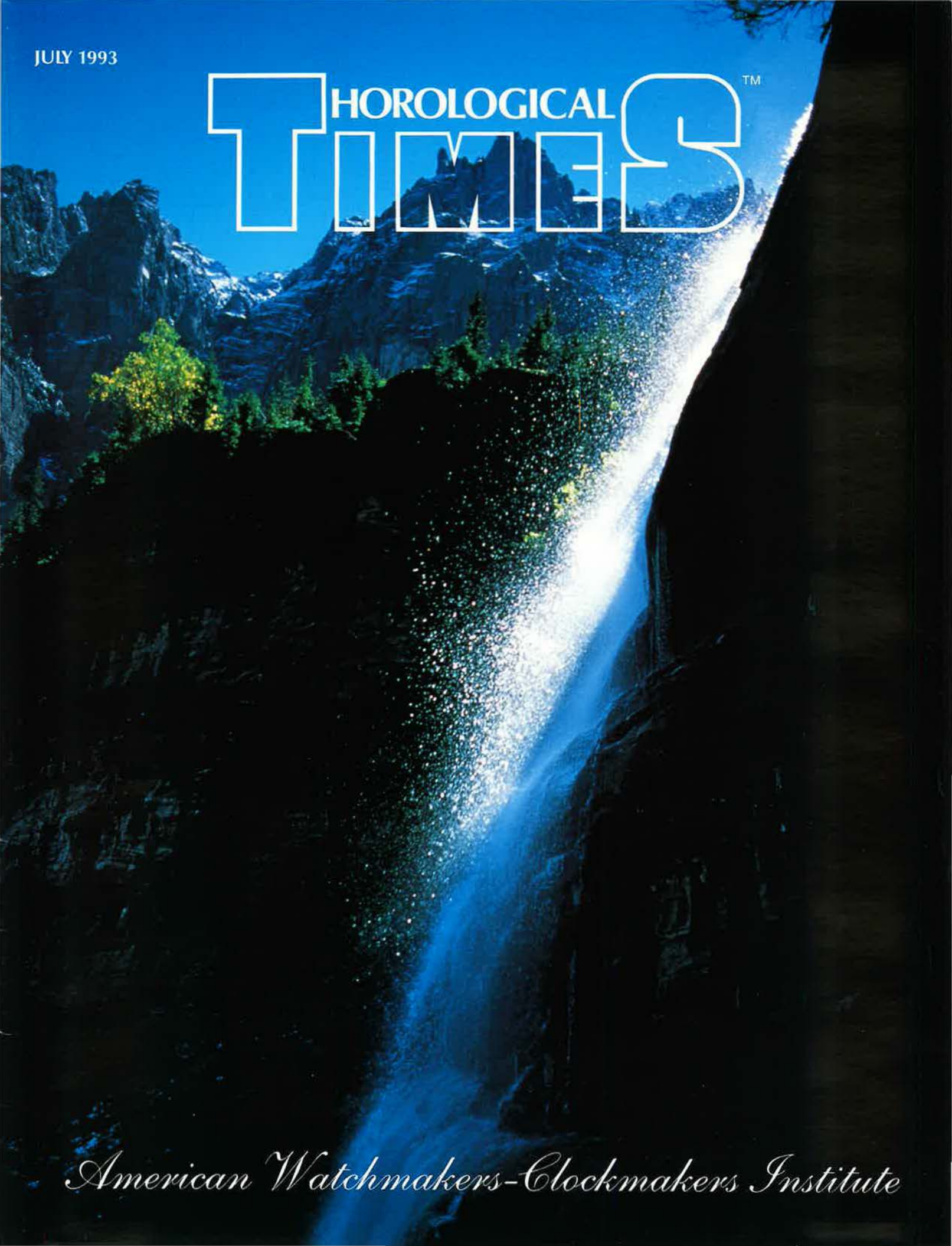
JULY 1993

HOROLOGICAL TIMES™



American Watchmakers-Clockmakers Institute

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2	2.75mm	11	YGF	14	3.25mm	11	YGF
3	2.75mm	12	YGF	15	3.25mm	12	YGF
4	2.75mm	10	WGF	16	3.25mm	10	WGF
5	2.75mm	11	WGF	17	3.25mm	11	WGF
6	2.75mm	12	WGF	18	3.25mm	12	WGF
7	3.0mm	10	YGF	19	3.50mm	10	YGF
8	3.0mm	11	YGF	20	3.50mm	11	YGF
9	3.0mm	12	YGF	21	3.50mm	12	YGF
10	3.0mm	10	WGF	22	3.50mm	10	WGF
11	3.0mm	11	WGF	23	3.50mm	11	WGF
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1100-0039	180N09AN	45R09N	351110	1100-4309	RE3N25AN	45001N	351110	1100-5590	SA9N63AN	45001N	351110
1100-0450	130N03AN	50005N	351110	1100-4580	ES1N49GN	45001N	351110	1100-5599	SA9N63AN	45001N	351110
1100-0459	130N03AN	50005N		1100-4600	SA3N33GN	50005N	351110	1100-5600	SA1N09AN	45001N	351110
1100-0540	140N07AC	45R09N	351110	1100-4750	RE3N71AN	45001N	351110	1100-5610	SA9N77AN	45051N	351110
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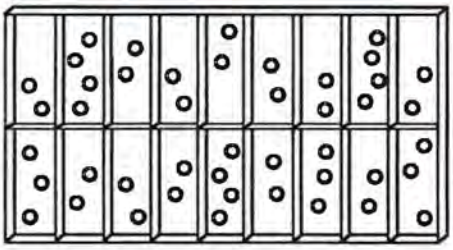
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VOLUME 17, NUMBER 7 JULY 1993

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Official Publication of the American Watchmakers-Clockmakers Institute

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HOROLOGICAL TIMES (ISSNO145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 3700 Harrison Avenue, Cincinnati, Ohio 45211, for $45.00 per year ($4.50 per copy in the United States and $50.00 per year, $5.50 per copy outside the U.S.) Second class postage paid at Cincinnati, Ohio. POSTMASTER: Send address changes to *HOROLOGICAL TIMES*, P.O. Box 11011, Cincinnati, Ohio 45211.

OFFICE HOURS: Monday through Friday 8:00 AM to 4:00 PM (Eastern Standard Time). Closed on all national holidays. PHONE (513) 661-3838, AWI HOTLINE: (513) 661-4636 (24-hour recording), FAX (513) 661-3131.

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President's Message



I have enjoyed this past year as your President. It has been a busy year with lots of traveling around the country visiting and speaking at guilds, conclaves, and conventions.

My first thought was to write about all of these experiences. Somehow I would summarize these experiences and include them in this month's "President's Message." Maybe it's still a good idea.

There is an old saying, "If we visited 100 businesses we would see 100 different bench arrangements." Some of our tools would be the same; however, some would be different. Regardless of these differences, we have a lot in common. We are in the same basic industry and we all have mutual interests. We probably even have the same goals of desiring to be successful.

Success may have a different meaning to each of us. My word finder thesaurus says *success* means *favorable result*. Synonyms for success are *prestige, fame, position, prosperity, status, victory, achievement,* or *wealth*. Some of the synonyms for *successful* are *winning, conquering, triumphant, undefeated, victorious,* and *wealthy*.

So, take your pick. What does "success" mean to you? Success may be building store after store or just working in a store. It may be having a small repair business, either retail or a trade shop operation. Some of us repair clocks, some repair watches, some jewelry, while others are into gems, etc.

Many have come into our trade after retiring from another (unrelated) job. Some of us are very young and just getting started while others fall into that "older" class and are either still working or are ready to retire or have retired.

If we mix together all of the above, we have the purpose of AWI. That purpose is to serve all of our members. This includes those that have an interest in just one special facet of our business and those who have a more general interest. We must also give special attention to those new members who are just coming into our horological field. (Notice, we did not say "young" members; we have many older people who are new members and these are the ones we are talking about now.) All of these "newer" members (regardless of age) must be given the help necessary for them to reach their goals too.

Naturally, we need to also encourage all of our young friends to take up our trade. We need to change the saying, "we need a few good men" to "we need a lot of good men and women."

To fulfill our obligation to our members, we must hear from any member who has desires which have not yet been fulfilled.

It has been a pleasurable and educational experience to have traveled around this past year meeting our members. It is important for all of us to meet each other and exchange ideas for our mutual benefit. If I haven't met you, I hope I will.

Wes Door

ON THE FRONT: The cascading Bear Creek Falls above Telluride, Colorado. Slide by Mr. Mike Butterfield of Albuquerque, NM.



The professional touch

JANICE WILLIAMS
Senior Technical Assistant
Eveready Battery Company, Inc.
Technology Laboratory
Westlake, Ohio

Janice Williams came to Eveready 5 years ago with a degree in Microbiology from Penn State and a love for things scientific and mechanical. Her current responsibilities include both. Outside of work, Janice's interests revolve around a son and daughter, ages 8 and 6—plus sewing, bowling and regular workouts at a gym near the plant.



The attributes of Lithium make it an important element in current and future Eveready® watch battery technology. Its use has given a new definition to the word "care". Lithium must be handled in a *totally* dry environment because moisture inhibits proper battery operations. Consequently, the skilled hands of Janice Williams and her team receive material from a "dry room" and assemble experimental batteries in a "dry box" while wearing special gloves built into the box to seal it against outside air.

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Questions & Answers



A French Watch, Maker Unknown

HENRY B. FRIED
CMW, CMC, FAWI, FBHI, ★FNAWCC

A Could you please give me some information on the watch (pictures enclosed)?

Ralph C. Buyer

Q *I have examined the photos of your movement. I only wish that you had included good photos of the case in which this movement is housed since this allows me to determine its age more closely.*







From the movement alone, I can tell you that it is French of the late 18th century. Most likely made in Paris, the movement's very high decoration is unusual for one in which the maker does not place his name upon it. There were thousands of watchmakers in Paris and in the rest of France who made watches, but when the watch is as highly ornamented as yours, the maker would certainly place his name on the movement among the scrollwork.

The dial does not appear (to me) to be original, as it is not in keeping with the period of the watch. Neither are the hands original. To have such a fine movement and such plain, low-grade hands on an inferior dial is not at all in keeping with the general grade of the movement.

Since you did not send photos of the case, its pendant, nor informed me of the metal content of the case (hallmarks or stampings on the inside back cover), I cannot venture more reliable information. The style and state of the art of the movement is about 1790. I cannot tell whether your movement has been recased or not.

I hope that at least you will learn something from the above information.

Henry B. Fried



Q I'd like to request any information possible on the Birge & Fuller 8-day, triple decker (dates, info on clock, history on makers). Anything would be welcomed.

Samuel Tipton
Maryville, TN

A *Your question was referred to me for a reply. Birge & Fuller was one of the ventures in which John Birge was involved in Bristol, CT. The firm known as Birge & Fuller operated from 1844 until Thomas Fuller died in 1848.*

While known particularly for sharp gothic clocks with wagon-spring or fusee movements, they continued to make triple deckers of the type associated with John Birge such as those bearing Birge & Gilbert or Birge, Gilbert & Company labels. They often have brass "strap" type movements, since rolled brass for such large movements was not available when Birge started to make clocks.

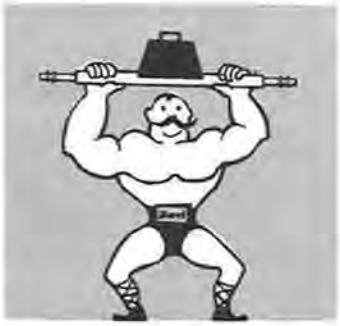
Dana J. Blackwell

❑

GOT A QUESTION?
Send it in, along with an SASE, to:
"Questions & Answers"
c/o AWI
P.O. Box 11011
Cincinnati, OH 45211

When submitting a photo with your question, please be sure the glass has been removed as well as photographed against a solid, colored background. Be sure to include any and all numbers and markings with their location on the movement or case.

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DOUBLE SHOULDER
1/4
5/16
3/8
7/16
1/2
9/16
5/8
11/16
3/4
13/16
7/8

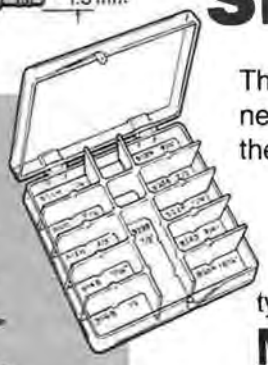
DOUBLE FLANGE
5/8
11/16
3/4
13/16
7/8

THIN 1.5mm
1/2
9/16
5/8
11/16
3/4
13/16
7/8

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7/16
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9/16
5/8
11/16
3/4
13/16
7/8

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RARE OPPORTUNITY

by J.D. Olson

A.W.I. #22128

He walked into the room and it was a clock collectors dream. Everywhere he looked, there were clocks. Old clocks, old-old clocks, some not so old, but rare, some old and rare. Some large, some small. But all of them were clocks, and wonderful. And there it was. Sitting on a special stand, right in the middle of all those other beautiful clocks. "That's it, That's the one I want!" he exclaimed. "Oh Yes" was the reply. "That one is not for sale. That's a limited edition Atmos," he continued, "I purchased it back in 1984 for only $2,950.00, but I understand it is worth about $6,000.00 today." This proud owner seemed to glow as he continued to explain about his prize. "You see, only 750 were set aside for North America. There is only one of these marvelous 150th Anniversary Atmos Clocks for every 341,000 people in the United States. There are about 36,000 registered clock collectors in the U.S. And over 35,000 of these collectors will never be able to own one of these clocks. "It runs on air!" Boasted the proud owner. "No way!" replied the visitor. "Oh yes!" was the quick response. "A temperature change of 1°f lets the Atmos store enough energy for 48 hours. It's called the "Atmos" for "Atmosphere." According to the maker, the energy it takes to light one 15 watt bulb, would be enough to keep 60 million Atmos mechanisms in motion."

"Each revolution of the pendulum takes a full sixty seconds. The glass dome is hand blown, And every piece of brass is plated with 24K gold." At this point the visitor can only say "Wow!" "But there's more," exclaims the owner, "according to it's manufacturer, every Atmos began as ten pounds of brass, steel, glass, gold and jewels. There were over 2,000 steps in all, and they were done by hand. It required eight months of patient effort by approximately thirty Swiss craftsmen, many of whom had college degrees in their specialities."

By now the visitor is convinced he must have this clock, but the proud owner is just as sure that he will keep it. "It's NOT for sale."

In 1928 an engineer by the name of J.L. Reutter devised the first Atmos. A clock that incorporates an ingenious feature doing away with the need for manual winding. It derives all the power it needs from minute fluctuations in room temperature. It has been made in Le Sentier since 1930 and has been a symbol of Swiss watchmaking skill.

In 1984 to mark their 150th anniversary, the company introduced a limited edition reproduction of the original Atmos. The few that were made for North America were all sold out several years ago.

I have a few of these beautiful pieces of Horological history. They are still in their original, factory sealed cartons, just as they were received from the Swiss factory in 1984. I plan to keep a clock for myself, and have made the rest available to my friends and fellow members of the A.W.I., for a very special price of only $2,200.00, shipping included. I accept Master Card and Visa, so for your 150th Anniversary Limited Edition Atmos, contact J.D. Olson at 1011 Valley River Way in Eugene, Oregon 97401 or phone (503) 344-3445 to take advantage of this rare opportunity.



13-1/2" HIGH 8-1/2" WIDE

SCHOLASTICALLY SPEAKING

The History of The National Watchmakers' Institute

By Gilles Chevalier

The Trois-Rivières School Commission's Watchmakers' Institute was founded on the 4th of March, 1946. Its founder was Mr. Jacques Giroux who was both a watchmaker and a teacher.

The school's first students were recruited from among World War II veterans. In fact, for the first four years of its existence, the watchmakers' school trained former war veterans exclusively and their courses were payed for by federal government grants.

At the outset, the watchmakers' school was located in one of the school commission's buildings on Hart Street. Four years later it was transferred to the same school commission's technical school on Saint Francois Xavier Street in Trois-Rivières.

In those days, students had to supply their own tools to carry out their formation. Their basic training called for a full year of apprenticeship at the end of which an optional year of supplementary training and instruction was offered.

In September 1973, the watchmakers' department moved to Saint Ursule School situated at 1725 boulevard du Carmel and it is in this professional formation center in Trois-Rivières that the National Watchmakers' Institute is presently lodged.

To better understand our institution's evolution throughout the years, it may be helpful to emphasize the dynamism and foresight which characterizes our institution's program. As of 1978, a series of formal collaborations were undertaken between our school and different organizations and institutions around the world.

Our institute's international flavor began with a twinning up project with a watchmaker's school in France. This was followed by a series of exchanges between our school and watchmaking industries as well as training schools and institutions in France, Germany, and Switzerland.

Since 1978 our own teachers and visiting personnel from the European community come and go in a teacher exchange program wherein both teaching techniques and state-of-the-art formation are advantageously exploited. Official links exist between our institution and the Lycèe Edgar-Raure in Mortéau, France as well as with the technical school in La Chaux-de-Fonds, Switzerland.

The Swiss Watch and Clockmakers Industry (ETA) has formally recognized our institution as one of its pedagogical associates and interlinked institutions. As one of their official ports of call, we have become an important point of entry into the Swiss watchmakers industry not only in the educational sphere but also in matters pertaining to references and resources.

The Trois-Rivières School Commission's National Watchmakers' Institute is the only such center dispensing these services both in Quebec and in Canada.

In the watchmaking industry, just as in many other trades and professions, we have witnessed the times when shoddy assemblage techniques tried to replace true craftsmanship for a throw-away society, but the pendulum has fortunately returned to products and services of quality. This points to a future filled with legitimate and realistic promise for those people whose time has come to become competent and professional watchmakers.

Although most of our students are from the province of Quebec, our institution is definitely open to all students applying from other provinces or countries.

Our institution has an enviable reputation both within the province of Quebec and in international circles, and bolstered by these facts we find reason to be proud of our organization.

❑

WHOOPS!
In last month's issue on page 39, this photo was in *backwards* . . .



Back row: Harry Hinzy, Woody Woodward, Sam Hodge, Ken Pell, Ken Setser, Toby Witherspoon, Chuck McKinney, Brian Murphy, David Mulliken. ***Front (right):*** Arnold Van Tiem, Robert David, Michel Plourde, Tony Knorr, Wit Jarochowski, and Remy Waelchli.

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AWI Represented at Recent College Fair

Indianapolis, IN

Submitted by Bob Bradley, CMW, CMBHI

AWI encourages other guilds to sponsor a booth at Educational Fairs of this type in their area. AWI will provide the necessary brochures that you may need.

Three professional horologists from the Indianapolis Horological Association represented AWI at the College Fair held at the Indianapolis Convention Center on April 18, 1993. They were the following:

Robert B. Bradley, President of the Indianapolis Horological Association, who operates a full-service jewelry store in which repairing is one of the elements of the business;

Ray T. Vance, Program Director, who operates a full-time trade watch repair shop that is not open to the public; watch repairing is his sole business; and

Bill Moore, Secretary, who operates a full-service clock shop, working on clocks exclusively, including in the home.

Thus, three different facets of horology were represented by these three individuals. They also represented a broad age spectrum.

Description

The area available was about 12 feet wide with a table about 8'x3' in size. We attached the AWI banner to the front of it. The items we had on display were the following:

- a grandfathers clock with the dial removed, running;
- a microscope with a quartz movement in clear view and touchable so that it could be turned over or removed from the field of view, if desired;
- a quartz movement with an easily visible sweep wheel connected to a tester such that the pulsation of the hand on the meter could be correlated to the stepping of the wheel;
- a quartz watch laying on a Polytest so that the movement of the hand could be observed and correlated to the beeping of the tester (demonstrations were done on this device with attendees' watches);
- several types of movements, components, and parts to be freely handled (tweezers were provided for this);
- an album of illustrations showing a variety of watches, parts, and problems;
- a self-contained slide projector showing a modern, fully equipped watch repair shop, test equipment, and movements. That which attracted the most interest was the sequence of disassembling a quartz watch movement and the problems that were found. (An interesting note on this was that some of the visitors were very impressed that these photos were originally made for the purpose of helping other watchmakers.)

(Continued on page 12)



From left to right: Bill Moore, Robert Bradley, and Ray Vance.



Sandy Merritt shows us her "real" watch.



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Y 572 (no stem)	11 1/2 ligne 3 hand	18.95
Y 149	11 1/2 ligne 3 hand	24.95
Y 106 (no stem)	10 1/2 x 12 3 hand	18.95
Y 653 (Digi-Ana)	12 1/2 ligne 3 hand	18.95
Y 771	12 round Digital	18.95
Y 789	11 1/2 round Digital	12.95
V 242	6 3/4 x 8 3 hand	18.95
V 103	11 1/2 round Digital	12.95
RONDA 7775	10 1/2 round 3 hand	44.50
ESA 255.411	10 1/2 round 3 hand	75.00
ESA 255.111	11 1/2 round 3 hand	85.00
ESA 255.483	11 1/2 round 5 hand	85.00
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COLLEGE FAIR
(Continued from page 10)





Comments & Observations

We couldn't set up before Sunday morning because the room was occupied; however, this did not create any problem. We did have some work to do in preparation. The day was not entirely hectic, but it was tiring. And although we did not have a prime spot, it still turned out well.





More than an adequate supply of our handouts were taken home by many visitors to our booth. Our booth was the only table of its kind: plus, our display featured actual hands-on hardware and demonstrations.

Watches received more attention than clocks at this Fair. The major attention-getter was the operation of a quartz watch. We were asked to participate in the College Fair next year.

Overheard in the Crowd

Some of the typical comments from our visitors were the following:

- "You mean you repair these?"
- "I didn't know a watch was this complex!"
- "This is so intriguing."
- "These guys are magicians."
- "Did you ever see anything like this?"
- "Then you people are like doctors; some of you specialize, and some of you are general practitioners."
- "I always wondered what was behind the dial on a clock."
- "All the displays should be like this one, showing how something actually gets done."
- "Awesome!"
- The most frequently asked question was: "What does the quartz do in a watch?"

* * * * *

In summary, we feel that public awareness of our profession is very important. We were somewhat surprised and indeed gratified to see the interest that was shown by attendants of the Fair. We recommend that other guilds, associations, and affiliate chapters might benefit from this type of promotion in their area. ❑

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J.M. HUCKABEE'S
"Random Clock Talks"

The series of 37 "Random Clock Talks" videotapes listed below are available for loan to AWI members from the AWI Audio Visual Library. The tapes vary in viewing time from 1.25 to 2.00 hours and are available in the VHS format. A service charge of $5.00 each is to accompany requests to borrow a tape; only one tape is loaned at a time. The service charge covers AWI's production and shipping costs. Tapes should be returned to AWI within 7 days after receipt, insured for $30.00. Please order tape by number along with your name, address, and $5.00 service charge. Send to: **AWI Audio Visual Library, 3700 Harrison Ave., Cincinnati, OH 45211.**

TAPE 1: Approximately 2 hours
SUBJECT MATTER: A brief view and discussion of a variety of clocks and tools used in the Huckabee shop.

TAPE 2: Approximately 2 hours
SUBJECT MATTER: Demonstration and discussion on using various tools and lathes to make and fit a clock bushing.

TAPE 3: Approximately 2 hours
SUBJECT MATTER: Discussion and demonstration on lathe operation using the Boley watchmakers lathe and the C&E Marshall watchmakers lathe.

TAPE 4: Approximately 1.50 hours
SUBJECT MATTER: An analysis and work with the Urgos 21/42 8-day trapezoid time only clock.

TAPE 5: Approximately 2 hours
SUBJECT MATTER: A demonstration and discussion about drilling the arbor using Huck's "turning in a box" method and making a pivot.

TAPE 6: Approximately 1.75 hours
SUBJECT MATTER: A demonstration of wheel cutting using clear plastic and a Mosley watchmakers lathe. Huckabee cuts four gears such as those required in the AWI certification examination.

TAPE 7: Approximately 1.75 hours
SUBJECT MATTER: The Birge & Mallory Striker Clock—a complete study and analysis of the Birge & Mallory Striker and the clock with its strap plates and roller pinions, circa 1841.

TAPE 8: Approximately 2 hours
SUBJECT MATTER: Making a great wheel and mounting the great wheel on its arbor.

TAPE 9: Approximately 1.75 hours
SUBJECT MATTER: Making and fitting a replacement pinion for a clock wheel.

TAPE 10: Approximately 1.50 hours
SUBJECT MATTER: Correcting problems caused by an elongated pivot hole by bushing with a solid bushing and the use of a "preacher" to relocate center distance.

TAPE 11: Approximately 2 hours
SUBJECT MATTER: Huckabee discusses the IBM #37 Master Clock Movement and IBM 90 Series Clock Movement.

TAPE 12: Approximately 2 hours
SUBJECT MATTER: Using a custom-made attachment to make wheels and index plates on the Unimat lathe. The custom-made attachments can be made from drawing available from AWI upon request (cost to cover printing and postage is $2.00).

TAPE 13: Approximately 2 hours
SUBJECT MATTER: Cutting clock wheels—a demonstration of cutting the wheels used in the AWI CMC examination.

TAPE 14: Approximately 2 hours
SUBJECT MATTER: Using an inexpensive quartz analog clock movement, Huckabee disassembles the movement and provides an in-depth explanation of each component and their function in the operation of the timepiece.

TAPE 15: Approximately 2 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion on the design of cutting tool bits, both hand-held and those held in the tool post rest. Also a discussion of steel—its composition and characteristics.

TAPE 16: Approximately 1.50 hours
SUBJECT MATTER: Huckabee presents an in-depth discussion about hairsprings. He also demonstrates how to vibrate a clock hairspring.

TAPE 17: Approximately 1.75 hours
SUBJECT MATTER: Huckabee goes through the process of making a knurled nut, one like those used as hand nuts in Early American kitchen clocks. He demonstrates a simple way to knurl the nut.

TAPE 18: Approximately 1.75 hours
SUBJECT MATTER: Huckabee demonstrates the process of inserting a tooth into a clock wheel to replace a broken or damaged tooth.

TAPE 19: Approximately 2 hours
SUBJECT MATTER: Pivot work in the American antique Sessions, count wheel, and clock movement.

TAPE 20: Approximately 2 hours
SUBJECT MATTER: Continuation of work with the Sessions clock used in Tape 19. Complete restoration work on the movement and treating a worn great wheel.

TAPE 21: Approximately 2 hours
SUBJECT MATTER: Making an American clock verge. Huckabee demonstrates how to select and work raw materials into a verge for an Ingraham miniature kitchen clock—time only.

TAPE 22: Approximately 2 hours
SUBJECT MATTER: Completion of making a verge for an Ingraham kitchen clock from Tape 21. Also random tips and cutting a 32-tooth recoil escape wheel for an Ansonia kitchen clock.

TAPE 23: Approximately 2 hours
SUBJECT MATTER: Pivot and bushing problems and their repair.

TAPE 24: Approximately 2 hours
Not available at this time.

TAPE 25: Approximately 2 hours
SUBJECT MATTER: Clock mainspring and barrel work.

TAPE 26: Approximately 2 hours
SUBJECT MATTER: Clock mainspring ends and barrel teeth. Huckabee demonstrates how to replace teeth in the barrel of an Urgos 8-day modern clock. Huckabee also fashions a new hole end for the mainspring.

TAPE 27: Approximately 2 hours
SUBJECT MATTER: Understanding the antique American clock time train and repairs to it and using the Unimat lathe to polish pivots.

TAPES 28 & 29
Not available at this time.

TAPES 30-34: Approximately 2 hours each
SUBJECT MATTER: A series of five tapes designed as a teaching exercise which encompasses every facet of lathe work encountered in the clock shop. Produced in conjunction with a series of drawings which are provided by AWI when you borrow the first tape in the series. Upon completion of the work you have a set of excellent useable lathe accessories for use in your shop.

TAPES 35 & 36: Approximately 2 hours each
SUBJECT MATTER: Two tapes which demonstrate the use of the lathe accessories produced in the Series 30-34. This encompasses all facets of pivot work encountered in the clock shop.

TAPE 37: Approximately 2 hours
SUBJECT MATTER: A companion tape to the Huckabee book "How to Build a Regulator Clock." All components and details for their construction are discussed in detail. It is recommended that the viewer have the book at hand when viewing this tape.

Timelocks

David A. Christianson
CMC, CMBHI
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The Diebold Family of Timelock Movements From the St. Blaise Factory

Written in collaboration with Mr. Walter Bruggeman, CPL, watchmaker and timelock specialist.

A most interesting group of timelock movements that we'll call the Diebold Family of Movements has evolved over the years from its early beginnings in the E. Howard Watch Company to its recent manufacture in the St. Blaise Watch Factory in Switzerland (Figures 1a, b, and c).

In the latter half of the 19th century, the Diebold Lock and Safe Company contracted with the E. Howard Watch Company to produce a timelock movement to fit Diebold's new timelock mechanism (Figures 2 and 3). In the very early part of the 20th century, Diebold again approached E. Howard for another movement style (Figure 4).

For whatever reason, Howard lost its contract in the very early 20th century, and Seth Thomas Clock Company was retained to produce movements for Diebold (Figure 5). Built to the same physical parameters and performance specifications, the Seth Thomas movements resemble E. Howards and interchange with E. Howards of the same shape.

The larger square-bottomed movement (Figures 3 and 5) and the round-bottomed (coffin) movement (Figure 4) from E. Howard were used by both Diebold and by the Yale Lock Manufacturing Company over the years. Seth Thomas produced their version of the movements for both companies, also. Details of both the square-bottomed and coffin movements used by both Diebold and Yale can be found in previous articles in the *Horological Times* (see June 1990, pp. 32-35; July 1990, pp. 30-33; and February 1991, pp. 40-45). Many of these movements are still in use to-

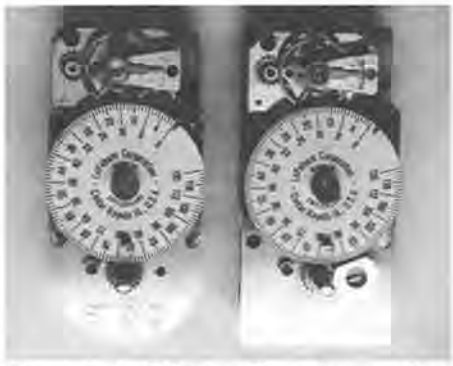


Figure 1a. LaFebure coffin and square-bottomed type timelock movements from St. Blaise of Switzerland.

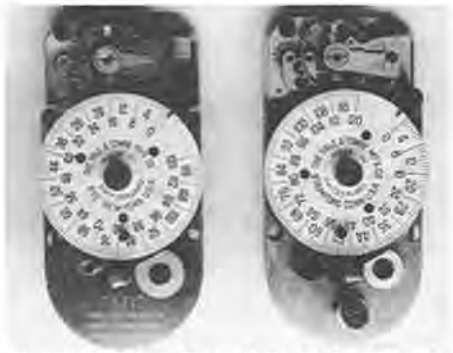


Figure 1b. Yale coffin style timelocks, "S" style from St. Blaise of Switzerland.

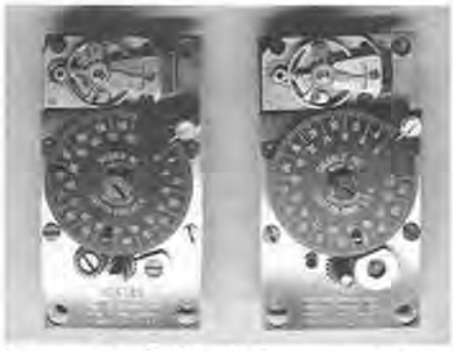


Figure 1c. Diebold timelock movements from St. Blaise of Switzerland.



Figure 2. Two Diebold movements from E. Howard Watch Company. Note plain plate and damascened plate. The plain plate is a right-hand movement and the damascened plate is a left-hand movement. These two movements would be incompatible in this timelock mechanism because they would run down in opposite directions, jamming the mechanism.



Figure 3. E. Howard's original version of the Diebold timelock movement.

day and are in restorable condition by the competent watchmaker.

Around 1965, the St. Blaise Watch Manufacturing Company provided movements for Diebold and Yale through its U.S. agent, Herman D. Steele of Philadelphia.

The larger square-bottomed movement (Figures 6a and b) is made for and used exclusively by Diebold. The round-bottomed style (Figures 4, 7, and 8) is still being used by both Diebold and other private label companies, such as LeFebure Corporation of Cedar Rapids, Iowa (Figure 8), as is the smaller St. Blaise square-bottomed movement (Figure 9) used by many different safe and vault manufacturers, including LeFebure.

This recently produced portion of the Diebold Family of Movements (Figures 1a, b, and c) is very sturdy and capable of excellent performance. Their only drawback is that they cannot be reset readily if they are overwound. If you remember from an earlier article (*Horological Times*, April 1992, pp. 10-13), a resetable



Figure 4. The Diebold style coffin movement by E. Howard, dubbed the Yale "S" style and used by many different timelock manufacturers under many different trade names.



Figure 5. The square-bottomed Diebold movement by Seth Thomas Clock Company.



Figure 6a. Larger square-bottomed Diebold movement by St. Blaise of Switzerland. Right-hand style.

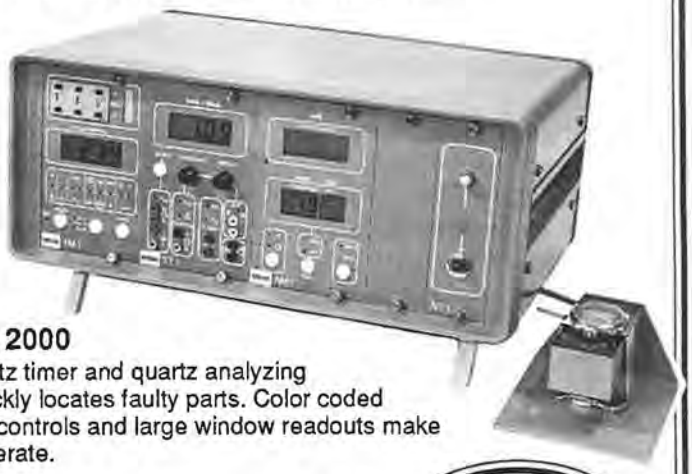
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Figure 6b. Larger square-bottomed movement by St. Blaise, left-hand style.



Figure 7. Round-bottomed (coffin style) by St. Blaise and used by many different timelock manufacturers.



Figure 8. Coffin style movement made for LaFebure of Cedar Rapids, Iowa, is the same as Figure 7 and made by St. Blaise, also.



Figure 9. Smaller square-bottomed St. Blaise movement used by many different timelock manufacturers, including LeFebure.



Figure 10. An old Diebold timelock showing the interchangeability of the E. Howard on the left, the St. Blaise and the E. Howard on the right.

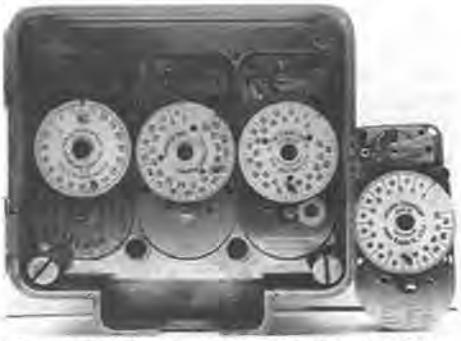


Figure 11. Timelock case showing the interchangeability of E. Howard coffin style on the left; Seth Thomas, St. Blaise, and another St. Blaise style on the right.



Figure 12a. Two different St. Blaise movement, Yale "S" style.

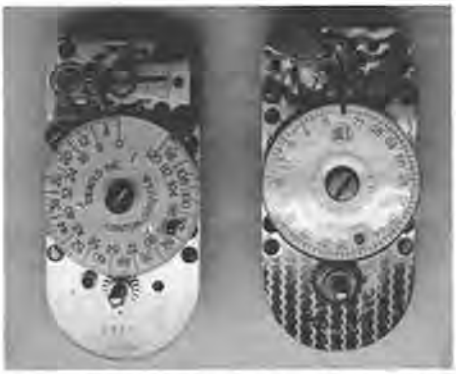


Figure 12b. Seth Thomas "S" style on the left and E. Howard "S" style on the right.



Figure 13a. Sargent & Greenleaf timelock, current style.

movement is one that can be simply turned backward to the correct opening time by turning the winding arbor backward to indicate the correct time in the event the opening time has been set later than desired. Because they cannot be reset and cannot be converted to a resetable movement, these movements are no longer being manufactured.

However, just because a family of timelock movements is no longer being manufactured, it doesn't mean that they are obsolete. Parts interchangeability in this recent part of the family (Figure 1) is not a problem, and the platform escapement is identical with each of the six movements.

The Diebold Family of Movements will be around for a long time because:

1) Parts interchangeability as described previously is no problem, and

2) Most importantly, this group of movements will interchange with most movements used in bank vaults and money chests today (Figures 10, 11, 12, and 13); both antique and modern (with the exception of those made by Mosler).

Disassembly Procedure

1) Remove the dial screw and dial.

2) Loosen the platform escapement mounting screws one-half turn each.

3) Hold back the main train of wheels with a clip or piece of Rodico®.

4) Remove the platform mounting screws and slide out the platform escapement.

5) Let the movement train run down by controlling the speed release with a winding key on the winding arbor and allowing the key to slip slowly in your hand.

6) Remove the mainspring by removing the mounting screws that hold the mainspring barrel to the lower plate. Holding the winding arbor in a bench key, rotate the barrel clockwise to disengage the inner terminal of the spring from the winding arbor.

7) All five train wheels can now be removed and inspected for any wear or possible damage to pivots, teeth, or pinions.
8) Remove the balance from the platform for cleaning.
9) Remove the balance caps and hole jewels for cleaning, inspection, and pegging.

Cleaning and Assembly
Unless the timelock is exceptionally dirty or very old, the mainspring need not be removed from the barrel. Completely disassemble this movement and clean the movement using standard, acceptable watch cleaning procedures. *Do not* clean the platform escapement in the same solutions as are used for the plates and train wheels; the solutions for the platform should be fresh and uncontaminated.

The escapements using a shock-protecting system such as Incabloc and Incaflex may not need to be disassembled and cleaned by hand. But this is a judgement call. Some prefer to take the extra time to disassemble the cap and hole jewels, dip in One Dip™, peg, and then hand-oil. I find that, more often than not, a film of dried oil remains even after ultrasonic cleaning, and this can cause difficulties in bringing the movement into proper regulation, not to mention causing accelerated balance pivot wear.

However, many fine craftsmen have found that this is not necessary and, unless the movement is excessively dirty overall, the balance jewel assemblies do not need to be disassembled and cleaned separately.

Don't forget to consider removing, cleaning, and lubricating the mainspring, even though some make claim to a "lifetime" of lubrication. After all, this movement is going to be locked away in a vault and will be depended upon to function properly. Any extra effort you take to insure this proper functioning (including the hand-oiling, hand-cleaning of balance jewels, and cleaning of the mainspring) will pay off in the long run for both you and your client.



Figure 13b. View of current S&G timelock case with interchangeable St. Blaise movement on the left with two Sonceboz SA movements and an Argentinian Rench movement installed in the timelock case.



Figure 15. Top plate removed from the St. Blaise coffin style movement.

Reserve Power
With the dial removed, wind the winding arbor 3-1/2 turns, replace the dial with its stop pin placed adjacent to the stop pin on the movement top plate. The dial will indicate zero or slightly less than zero.

To Remove an Overwind
Method A: To remove an overwind, simply hold back the main train of wheels with a piece of Rodico®. While holding back on the let-down key, remove the platform escapement and allow the train to run down slowly, controlling its speed with the let-down key (as when releasing power) until the train runs down and the dial pin stops any further release of power (dial indicating zero). Replace the platform escapement and wind to the proper opening time.

Method B: For movements that have not been serviced for years and have stopped running: Loosen the barrel retaining screws. Grip the barrel and movement in one hand, remove the retaining screws, and let the barrel slip (unwind) in your other hand, controlling the speed with your fingers.

This method will prevent additional pivot scarring that would result if you let the highly contaminated and dry train run down as in Method A.



Figure 14. Top plate removed from an E. Howard coffin style movement.



Figure 16. Two St. Blaise timelock movements, coffin style (Yale "S" style); right-hand movement on the left and left-hand movement on the right.

Testing the Movement
With reserve power applied to the movement but the dial top pins preventing the movement from running (i.e., dial indicating zero hours and no power coming through the train), check the alignment of the roller jewel pallet arbor and escape arbor to see that the escapement is in theoretical "beat." Wind the dial to about four hours. The movement should start on its own and run down to zero time, whereupon it will stop.

While the movement is running, check its rate on the timing machine. Regulate the timing of the movement to run between a one- and three-minute per day gain. Using a paper graph on your timing machine will not only tell you that the escapement is in beat, but will help you analyze the condition of the escapement, also. ❑

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Part LXXXXI

Repairing the Duplex Escape Wheel

ARCHIE B. PERKINS
CMW, FNAWCC, CMBHI
(All rights reserved by the author)

The duplex escape wheel has a very complicated and fragile design which necessitates that it be handled with care so it will not become damaged. The most fragile part of the escape wheel is the delicate locking teeth. If these teeth become bent, the escapement may not function at all or, if it does, it will not function correctly.

Figure 1 shows a correct clearance between the impulse lever and the impulse teeth of the escape wheel. View A shows the impulse lever entering the escape wheel while turning in a clockwise direction. The dotted line shows the path of the end of the impulse lever. While this is taking place, a locking tooth of the escape wheel is locked on the locking roller. There must be sufficient clearance between the end of the impulse lever and the impulse teeth. This clearance must be checked on every tooth of the escape wheel.

View B, Figure 1 shows how the end of the impulse lever must clear the impulse teeth as the lever is entering the escape wheel. The impulse lever is turning in a counterclockwise direction and the locking tooth is in the notch in the locking roller ready to leave the notch. When the locking tooth leaves the notch in the locking roller, the impulse lever is impulsed by an impulse tooth in a counterclockwise direction. The instant that the locking tooth leaves the notch in the locking roller, the impulse lever should be 10 degrees in front of the impulse tooth. This means that the drop of the impulse tooth onto the impulse lever will be 10 degrees. If the impulse lever should not enter the wheel correctly from either direction, one would look for bent locking teeth on the escape wheel.

Bent locking teeth

Figure 2 shows the effect that bent locking teeth has on the free entry of the impulse lever into the escape wheel impulse teeth. View A shows the tip of a locking tooth which is bent in a clockwise direction. The bent locking tooth is resting on the locking roller. In this case, the escape wheel is backed up the amount that the tooth is bent. This places an impulse tooth in the path of the impulse lever preventing the lever from entering the wheel, especially if the tooth is bent very much. If the locking tooth is bent only slightly, the end of the impulse lever may only touch the impulse tooth enough as it passes by to reduce the motion of the balance and affect the timing of the watch.

View B, Figure 2 shows a locking tooth of the escape wheel which is bent in a counterclockwise direction. This type of bend is critical when the bent tooth is acting in the notch of the locking roller. In this case, when the impulse lever is turning in a counterclockwise

Figure 1

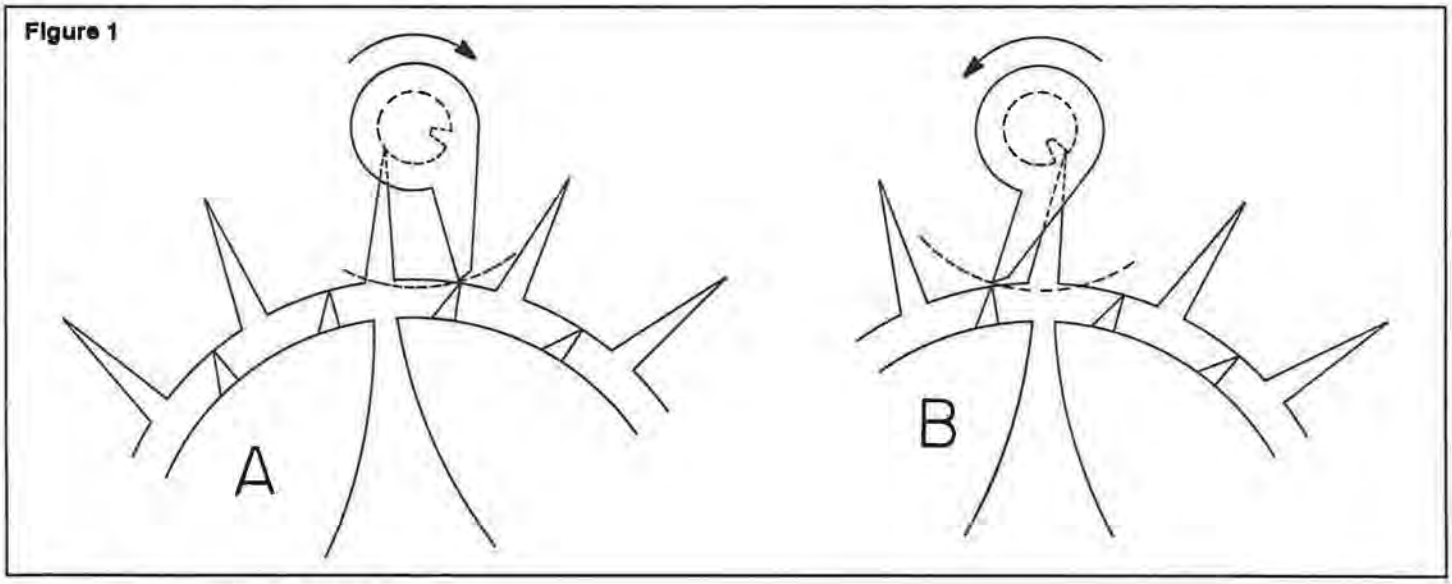
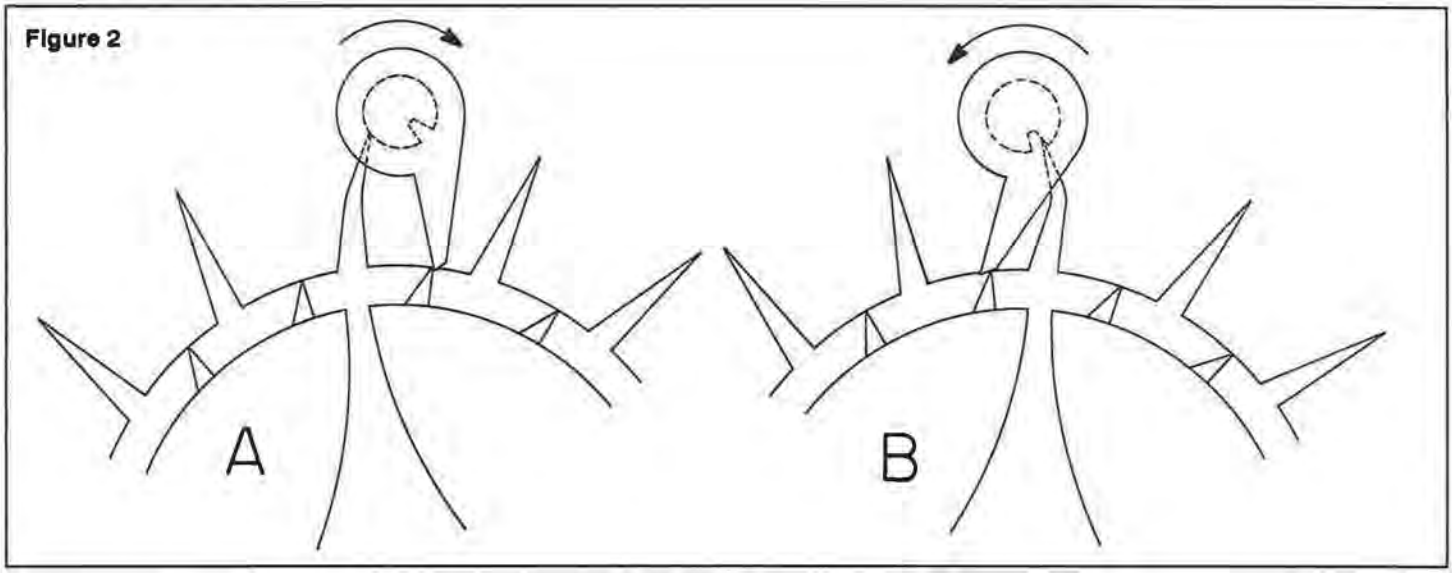


Figure 2



direction and the bent tooth is leaving the notch in the locking roller, the impulse lever is likely to lock up on the impulse tooth as shown. If the locking tooth is bent less than is shown, the impulse lever may just touch the impulse tooth as it goes by. This could decrease the motion of the balance wheel and cause the timing to be bad.

Straightening bent locking teeth

Figure 3, View A shows how to straighten bent escape wheel locking teeth. The bent teeth are straightened with a pair of brass or German silver pivot straightening tweezers like the ones shown in View B, Figure 3. This tweezer can be made from an old worn-out pair of #11 or #12 Dumont German silver tweezers.

Point "a", View A, Figure 3 shows the tweezers being used to straighten a tooth which has a sharp bend. In this case, the end of the tweezer jaw must be placed on the tooth at the exact point of the bend; otherwise one may wind up with two bends in the tooth. When straight-

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Figure 3

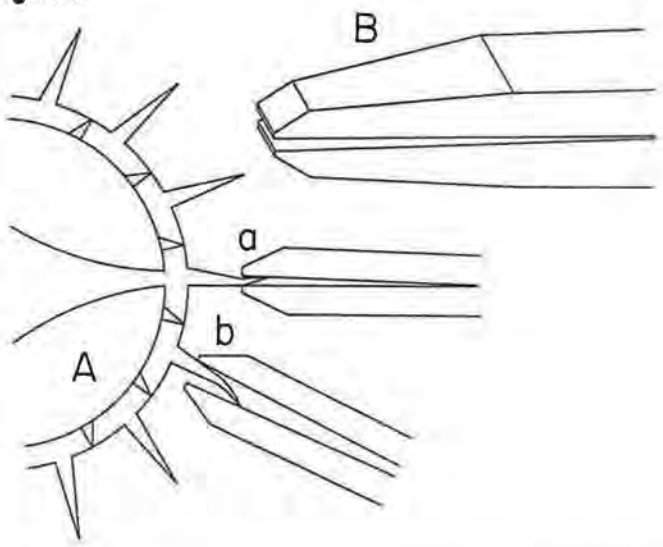
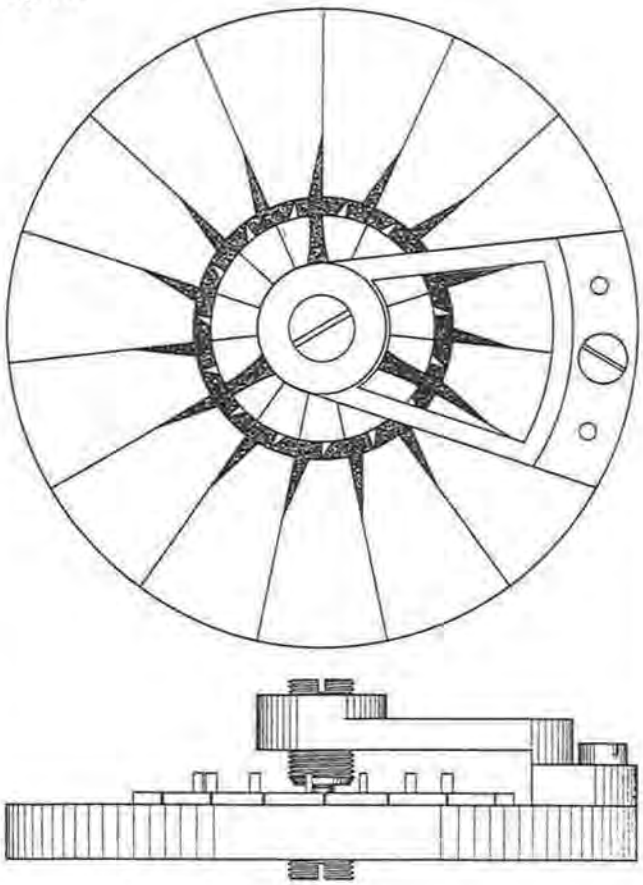


Figure 4

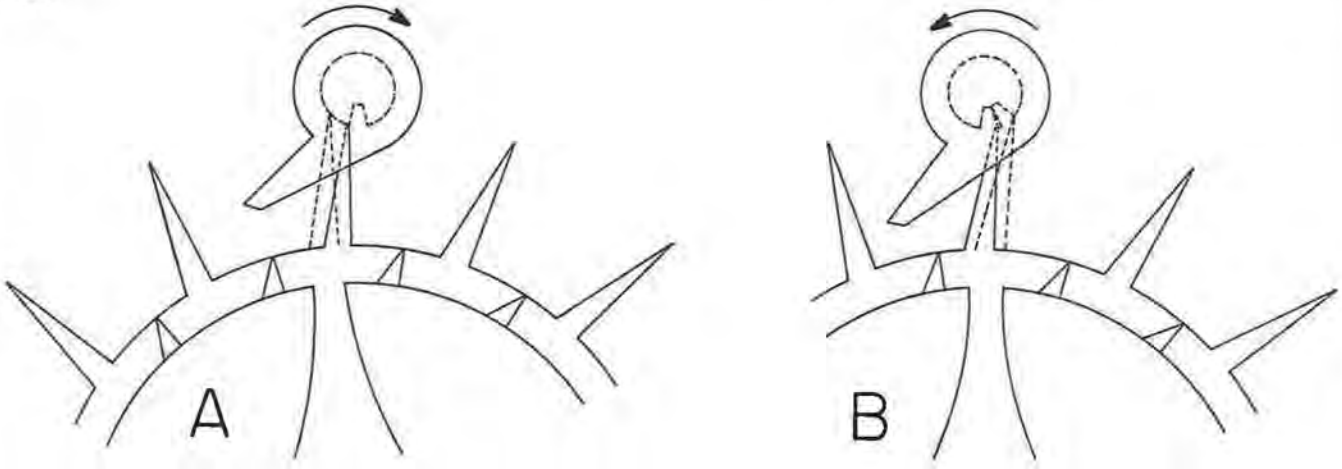


ening a bent tooth, the tweezer is placed on the tooth at the proper position and squeezed between the thumb and forefinger. Point "b", View A, Figure 3 shows a tooth being straightened which has a gradual or curved bend. In this case, the end of the tweezer jaw is placed on the tooth beyond the bend. Then the tooth is squeezed lightly with the tweezers as the tweezers are pulled outward on the tooth until the tooth appears straight.

Checking escape wheel teeth for straightness

Some means should be used to check the teeth of an escape wheel to make sure that the teeth are straight. With this in mind, a tool for checking duplex escape wheels was designed and made up by the author. This tool is shown in Figure 4. It is called a duplex escape wheel tooth indicator. A description of this tool follows. The base of the tool is a brass disc which has had 15 radial lines milled into its face. These lines extend from the edge of the disc to the exact center of the disc. A milling attachment was used with a 30 degree milling cutter to mill the lines. The blank disc was held in a wheel chuck in the lathe headstock. An index plate was used on the lathe spindle and an index latch was used to index the lathe headstock. The center hole in the disc was threaded for a screw. The screw used is brass and has had a jewel fastened into its end to support the lower pivot of the escape wheel pinion. After this, a cock was made to support the upper pivot of the escape wheel pinion. The cock was threaded for a screw like the one used in the disc. A jewel was set into the end of this screw also. One can make up four or five sets of screws with

Figure 5



different size jewel holes which will take care of most situations. The screws must fit their threaded holes very closely without shake, and they should be fairly easy to turn but must stay where they are turned.

Using the escape wheel tooth indicator

To use the tooth indicator, one would turn the lower screw deep enough into the lower plate so the escape wheel will not rest on the plate when the lower escape wheel pivot is in place in the lower jewel. Then, with the lower pivot in the jewel hole of the lower screw, the lower screw is backed up until the escape wheel rests flat on the plate of the tool. Next, back up the upper screw in the cock and then fasten the cock into position on the plate of the tool. Now lower the screw and its jewel over the upper escape wheel pivot, leaving a slight amount of endshake in the escape wheel pinion. Then the escape wheel is turned until the teeth line up with the radial lines milled in the plate. One can immediately see the relationship of all of the escape wheel's locking teeth to the lines on the plate.

One can also inspect each tooth individually for being bent. To do this, one would observe a certain tooth in relation to its line on the plate. Then back the wheel up slightly so the tooth is slightly back of the line. Now turn the wheel forward and, at the same time, observe the space between the tooth and the line as the space closes up. Any bend or damage to the tooth will show up when this is done. A bent tooth can usually be straightened while the wheel is positioned in the tool if the wheel is held down on the plate and supported with the finger. If a tooth is bent badly, one should straighten the tooth before placing the escape wheel in the tool. After all of the locking teeth have been indicated in the tool and found to be correct, the escape wheel should be placed in the watch and each tooth checked for correctness in the watch.

This type of tool is excellent to use for checking English ratchet tooth escape wheel teeth. When making up a tool for ratchet tooth escape wheels, the lines are milled 24 degrees off center on the plate of the tool. These lines will then correspond to the undercut on the locking faces of the ratchet teeth of the escape wheel. This tool can also be made larger for checking clock escape wheel teeth.

Correcting short escape wheel teeth

Another problem which is sometimes encountered with the duplex escape wheel is a short locking tooth. This can affect the operation of the escapement greatly. Figure 5 shows two examples of the effect a short escape wheel locking tooth has on the correct functioning of the duplex escapement. View A shows a short locking tooth locked on the locking roller. Also shown (in dotted line) is a locking tooth of the correct length. As can be seen, the short tooth lets the escape wheel go forward of the normal locking position. Note that the short tooth is at the edge of the notch of the locking roller ready to enter the notch; whereas, the correct length tooth shown in dotted line is not nearly ready to enter the notch. This

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Figure 6

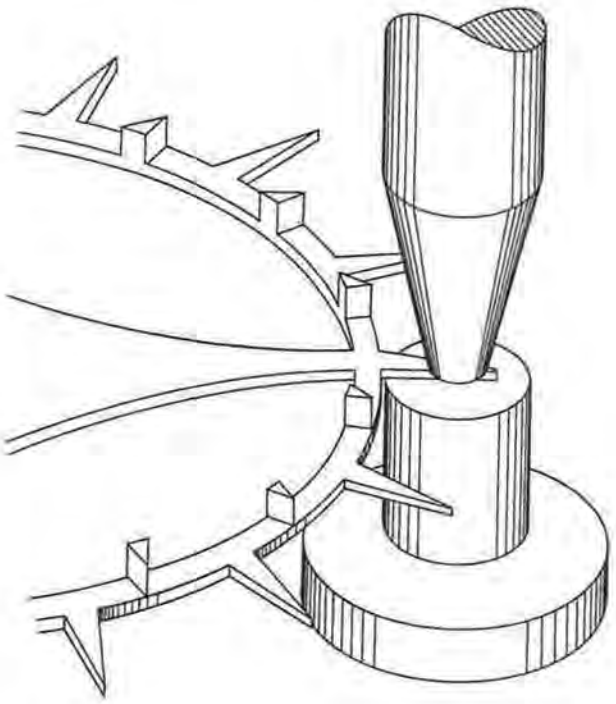
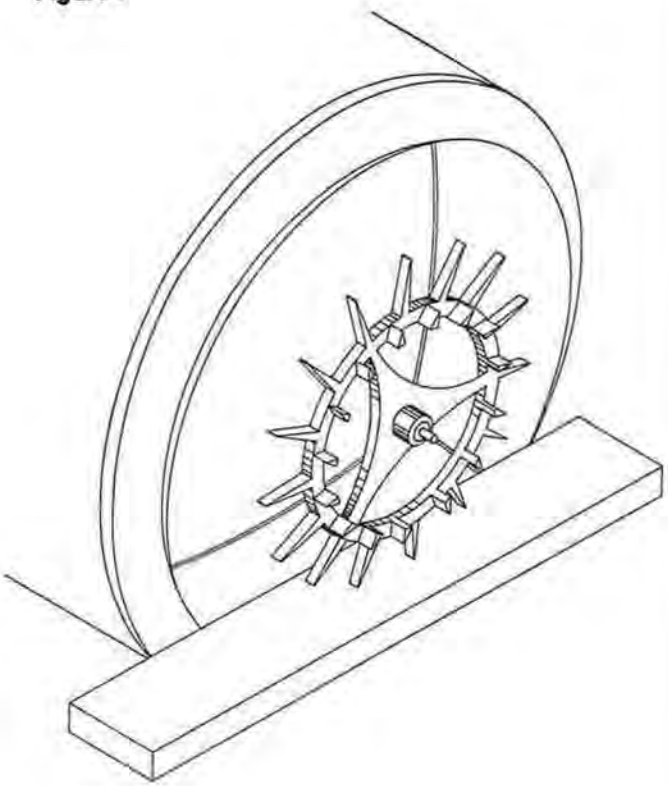


Figure 7



means that the short tooth will enter the notch prematurely as well as leave the notch prematurely. There is danger of the short tooth skipping past the notch before the impulse lever can get into position in front of an impulse tooth so it can be impulsed. This is especially true if the pivots on the balance and escape wheel fit loosely in their holes. There is also the possibility that short locking teeth and loose fitting pivots can cause the escapement to run and damage the other locking teeth on the escape wheel.

View B, Figure 5 shows a short locking tooth ready to leave the notch in the locking roller. Also shown is a correct length locking tooth ready to leave the notch in the roller (shown in dotted lines). This shows that the short tooth would leave the notch sooner than a tooth of normal length. Therefore, by leaving the notch prematurely, the impulse lever has not turned far enough to get into position in front of an impulse tooth to be impulsed. The short tooth needs to be lengthened by stretching it to its correct length.

Stretching a locking tooth

Figure 6 shows how a locking tooth of a duplex escape wheel is stretched. The tooth needing to be stretched is placed flat on a flat solid staking tool stump. The punch used should be a solid flat-faced punch which is larger in diameter at its end than the width of the locking tooth being stretched. The stump is placed in the proper hole in the die plate of the staking tool and centered up. The punch is held in the staking tool frame. The punch is tapped lightly with a small brass hammer. The stretching should be done at different places along the tooth and not just in one place on the tooth. Care must be used to avoid over-stretching the tooth. After a tooth has been stretched, it should be checked for straightness and tried in the watch for length.

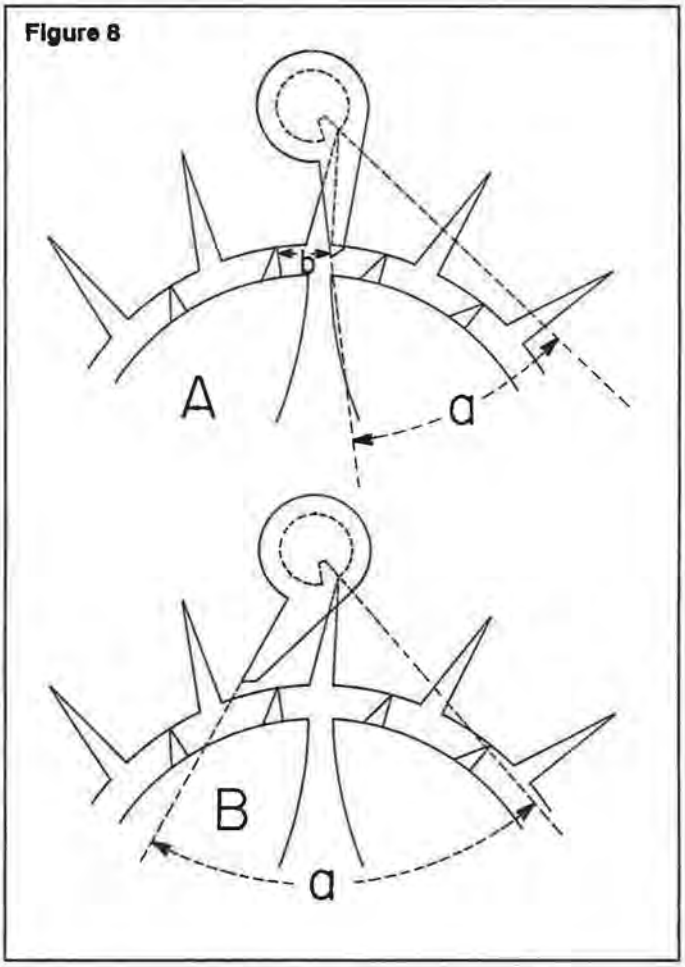
Rounding up a duplex escape wheel

Sometimes the locking teeth of a duplex escape wheel have such irregular lengths that the wheel teeth need to be rounded up so all of the teeth have the same length. This is shown being done in Figure 7. To round up an escape wheel, the wheel is chucked by its pinion in the lathe, making sure that the pinion and escape wheel run absolutely true. A hard flat Arkansas stone slip is held firmly in the hand and is applied lightly to the escape wheel teeth while the escape wheel is turning fast in the lathe. One should avoid removing any more material from the tips of the teeth than is necessary to make the teeth all the same length.

After the wheel has been rounded up, any burs should be removed from the tips of the teeth. Any bluntness at the tips of the teeth should be corrected by stoning the backs of the teeth. A sapphire burnisher is an excellent tool for stoning the teeth. The front (locking face) should not be changed to correct blunt teeth. Only remove the burs from the front face at the ends of the teeth.

After the escape wheel teeth have been made the same length, they will be shorter than original which will require that a larger locking roller be made to compensate for the shorter teeth. If the watch is of the

Figure 8



Waterbury design, a new balance staff will need to be made which has a larger roller section.

Correcting the drop

Figure 8 shows examples of too little and too much angle between the let-off corner of the notch in the locking roller and the acting face of the impulse lever. View A, Point "a" shows an angle which is too small. As a result, the escapement will have too much drop. The drop occurs just after the tooth escapes from the notch in the locking roller. The drop should be only 10 degrees, and the amount shown is considerably more than this as can be seen at Point "b", View A, Figure 8. To correct this excessive drop, one would turn the impulse lever on the balance staff clockwise until the impulse lever is 10 degrees in front of the impulse tooth when the locking tooth leaves the notch in the roller.

View B, Point "a", Figure 8 shows too much angle between the let-off corner of the notch and the acting face of the impulse lever. This condition eliminates the drop. In fact, the angle is so great in this case that by the time the tooth leaves the notch, the impulse lever will be back of the impulse tooth and not in position in front of the impulse tooth to be impulsed; therefore, the balance cannot be impulsed. To correct this situation, one would turn the impulse lever counterclockwise on the balance staff the correct amount.

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Joseph Presti, President of Vibrograf USA Corp., announced the availability of a new dual function dry waterproof checker for the watchmaking industry.

The VP-2000 can perform a pressure test to 330 feet and a vacuum test for location of the slightest leaks. Its three controls make operation extremely easy.

For more information, contact: **Vibrograf USA Corp., 504 Cherry Lane, Floral Park, NY 11001-1696; (516) 437-8700.**



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It is Bio-Lite's patented circuitry engineered into the lamp itself which converts alternating household current into direct current. This innovation eliminates the subtle "flicker" found in standard incandescent and fluorescent lights that is a major cause of eye strain. Bio-Lite's continuous, direct current provides full-spectrum lighting with a large "red" region which enables colors to appear as vibrant or as delicate as in natural sunlight.

Even though Bio-Lite utilizes an ordinary 60-watt bulb, its unique circuitry converts AC to DC and provides light which is substantially brighter than standard lighting, and is easy and relaxing on the eyes. It is ideal for professionals whose work is sensitive to light or color. It is priced at $199, and is available exclusively through Biovation Products at **(516) 628-8155.**



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For more information, contact **Tony Voight, (800) 882-7977.**



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MAXELL'S HEAVY-DUTY MANGANESE BATTERIES "SUPER POWER ACE"

Maxell Corporation of America's Battery Division has redesigned the packaging for its line of heavy-duty manganese dry cell batteries to complement and conform with the changes made recently to the packaging for its entire line of high-tech batteries.

The new red, black, and white blister carded packaging boldly designates



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the manganese batteries as "Super Power Ace" batteries especially designed for heavy-duty use. All the batteries in the line are similarly labelled in red or black colors. The packaging also features the internationally recognized green tree symbol of environmentally-friendly products in the upper right-hand corner.

The batteries, previously labelled "Heavy-Duty Plus," are available in blister packs, shrink wraps, and Max Pax in AA, AAA, C, D, N, and 9-volt sizes.

For more information, contact **Maxell Corp., 22-08 Route 208, Fair Lawn, NJ 07410.**

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BULOVA PROMOTES AGUILAR

Bulova Corporation has announced the promotion of Magdalen Aguilar to the position of Sales Vice President/National Accounts. In making the announcement, Mr. Thomas Fosorile, Vice President of Sales for Bulova, stated: "Ms. Aguilar's highly developed merchandising and sales skills, combined with her innate ability to master and successfully execute company objectives are key to her success."

Ms. Aguilar's previous position was Manager, National Accounts/Clocks and Director of Merchandising for Bulova's Clock Division. In her new position, she will be in charge of major national accounts. "We are confident that Ms. Aguilar will continue to distinguish herself and be an important part of the Bulova team," said Mr. Fosorile.



Magdalen Aguilar

UTAC AMERICA ANNOUNCES NEW MANAGEMENT TEAM

UTAC America, Inc. has named David K. Marold, Executive Vice President, General Manager and John J. Mercer Executive Vice President, Chief Financial Officer; both men to be in charge of all operations.

"David and John bring a wealth of knowledge and experience to their new positions, and it gives me tremendous pleasure to make this announcement," said Patricia A. Granger, President/CEO. "Regretfully, I am also announcing my own resignation in order to pursue other interests, which are of great personal importance to me."

"But with David Marold as the guiding force behind Bertolucci and Breguet," continued Ms. Granger, "UTAC America will continue to be a major player in the luxury watch market for years to come."

"Pat Granger has set high standards for all of us at UTAC America," said Mr. Marold. "Both John Mercer and myself will strive to build on her accomplishments, and we intend to start with a major emphasis on customer service and support."



David Marold (right) and John Mercer (left) of UTAC America.

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Ask Huck

CLOCKMAKING BITS

By J.M. Huckabee
CMC, FBHI

About . . .

THE USE OF A BROACH

and

MACHINE SCREWS



Q. Please give some guidelines on using a broach. What are the merits of the cutting broach versus the smoothing broach?

A. A broach in simple terms is a reamer. In clockmaking we use two types--a cutting broach which is used to rapidly enlarge a hole, and the smoothing broach for finishing, polishing, and work hardening. There are used mainly for working pivot holes to size in clock plates. These tools are suitable for use on brass and other materials of similar hardness.

Broaches are available in a wide range of sizes and forms. For the clockmaker, I find the tools with a knurled handle to be the most useful. Sizes are usually stated in drill sizes. Numbers 30-60 cover most of the mid-range clock needs.

The cutting broach is usually made with five sides with the size number representing the large end measurement. The smoothing broach is round with a textured surface much like a fine burnisher.

A new pivot hole may be broached to size, namely enlarged to size. I do this work alternately from the two sides of the plate. That technique forms an hourglass shaped pivot bearing. The finished hole should then have its oil sink formed and any bur that may have formed should be removed.

By spinning the cutting broach between a thumb and forefinger and slacking pressure as you approach size, you can cut a very clean hole. In fact, the hole can be made so clean that the need for using the smoothing broach is even questionable.

The smoothing broach is used to enlarge a hole very slightly and to polish its surface. This is the tool to use to "iron out ringing" caused by scored pivots. Another use is to work harden the hole surface. In some cases this may be capricious because this was probably not done when the clock was built. I usually reserve this for the finest grade of work. A further use is to wring the broach into a pivot hole and view the squareness of the hole to the plate. View the broach from several angles. It's best to do this as you approach the finished hole size. And still another use is to measure the hole size, any hole. Slip the broach into the hole and measure the broach diameter at the hole mouth. I frequently measure pivot holes on each side of the plate with a dial caliper. There is some error due to taper of the broach, plus thickness of the caliper jaw, but a mean of the two readings is a very good indication of the hole diameter.

Cutting broaches work best with a little lubricant. Most any lightweight oil works nicely. WD-40® via its red tube works nicely and also washes away the cuttings. This may not be best, but it sure is convenient. Be sure to lube the smoothing broach for work-hardening service. Brass will ofttimes gall to its surface when used dry.

Q. It is very difficult to find screws and nuts to fit clocks. How are these items identified and where do you obtain screws and nuts?

A. This is one of the serious problems of our trade. Many of the older clocks were built before any form of fastener standardization was adopted. Fasteners were unique to that clock company.

Clocks built outside of the USA and in the era since WWII are pretty much standardized in the metric system. You are more likely to find fasteners in repair assortments for this clock group. American and English built clocks probably will not be in metric sizes. Beware of American names on imported movements. These are likely to be metric sizes.

Older American clocks are difficult to cope with. Some sizes of American machine screw threads are

pretty close fits on this clock group. These threads are based on size zero being 0.060 inch. Each size number increase adds 0.013 inch. Study the accompanying table to understand the progression. I find sizes 2-56, 4-40, 5-40, and 6-32 most usable. For instance, #2-56 approximately matches the threaded minute hand shaft on old American clocks. Often you can run a die over a damaged thread and then use a machine screw size.

When making screws, the blank should be sized about 2% smaller than the tabled diameter. It is unnecessary and impractical to size screws to full diameter.

When making nuts, be sure the hole size is correct. This is of utmost importance with the smaller sizes to avoid tap breakage.

Size numbers tell the diameter and thread count. A 5-40 is number five size with 40 threads per inch. Diameter 5 means 5 x 0.013 plus 0.060 equals 0.125 inch, etc. From this ground rule it's easy to make a mental calculation and know the diameter of any machine screw.

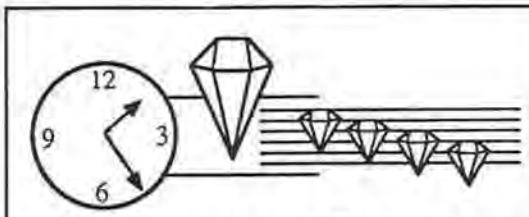
Screws are identified by use of a screw pitch gauge and diameter measurements. Remember that commercial screws are usually sized about 2% undersize from the tabled diameter. This is for practical reasons in manufacturing and use.

MACHINE SCREW DIMENSIONS

Size	Diameter	Threads per Inch	Tap Drill
0-80	0.060 inch	80	0.050 inch
1-72	0.073 inch	72	0.062 inch
2-64	0.086 inch	64	50 number
2-56	0.086 inch	56	50 number
3-48	0.099 inch	48	47 number
4-40	0.112 inch	40	43 number
5-40	0.125 inch	40	38 number
6-32	0.138 inch	32	36 number
8-32	0.164 inch	32	29 number

❑

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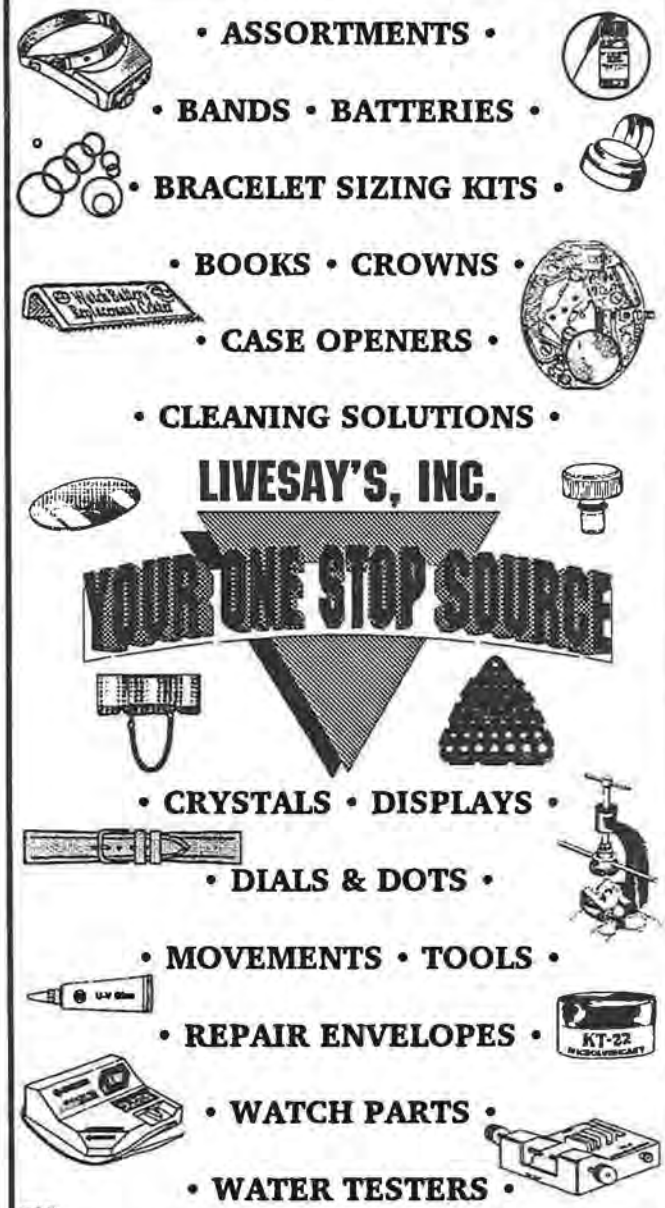
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Shop Talk

Crystal Cutting Machines



Wes Door, CMW

As we discussed last month, there is a real need to have the in-store ability to cut glass watch crystals. Most of us are a long way away from our supply house and have to depend on the mail to deliver our watch material to us. Many crystals have been discontinued. Also, many times the crystal needed is for an oddball watch with no listing.

Blank Crystals

First we need some blanks, and the fancy-shaped blanks are available through our wholesaler. Although we may purchase these in various sizes, we will still need to finish grinding them down to fit into the watch bezel.

Glass Cutter

The simplest tool we can use is a glass cutter as shown in Figure 1A. It will take some real practice, but it can be done. Figure 1B shows the needed crystal outline drawn on a crystal blank with a permanent felt pen. Notice the dotted lines indicate the cuts to be made with the glass cutter. We cannot cut real close to the tonneau-shaped lines of the new crystal; therefore, we will still need to grind to finish.

Using a glass cutter and grinding away all of the unwanted area is quite a job, but it can be done. Time is our biggest consideration, but one question remains. Is it worth it?

Our Grinder

Our grinder can be store-bought or homemade. Here is where we have many choices and maybe many problems. We need to choose a wheel coarse enough to get the job done in a reasonable amount of time, and yet be fine enough to prevent the crystal or the crystal edges from breaking. A number 600 grit seems to work well. These wheels also come with a coarser grit numbered down to 200. The 200 grit is very coarse, cuts extremely fast, but leaves a very rough finish. I bought one of these to try because it came in a small 2-inch diameter which I found was ideal. Unfortunately, this ideal 2-inch diameter wheel was not available with 600 grit. (See Figure 2A.) This 2-inch diameter wheel is ideal for other reasons. It does not vibrate. It can be mounted in a secure manner without any quiver and without loosening up while in use. Also, this wheel is smaller than the motor, thus the motor does not need to be raised for wheel clearance and does not require any motor mounting screws to hold it down on the bench. We do need a pad of some reasonable thickness to place under the motor. Even though we say this motor mounting is not necessary, it is a good idea to mount it anyway to prevent the possibility of an accident.

The reason that I am explaining this is to save someone the trouble of making all of the mistakes that I made to get the ideal grinding combination equipment. There is another reason. In earlier *Horological Times* I wrote about and showed sketches of my grinding equipment. In these articles I showed this ideal 2-inch wheel with a fine grit. I had purchased the wheel with an arbor unit attached to the wheel, but unfortunately it is not available. I pur-

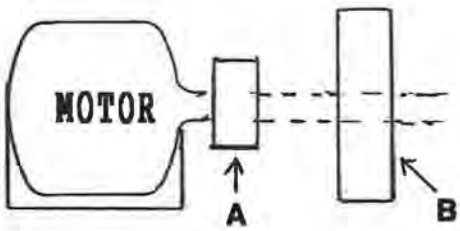
Figure 1



chased it several years ago from Mayer Bros. in Seattle, Washington who are now out of business. I have played detective by checking with previous employees. I have given up. That's the bad news. The good news will follow in a few minutes, but first I need to continue in the drama of "the quest for the proper wheel".

Figure 2B shows a 6-inch wheel. This is the smallest I could find with the proper 600 grit. The advantage of a larger wheel is that its circumference is larger and therefore it travels (turns) at a higher speed. The disadvantage is that it may set up an undesired vibration and, of course, the motor needs to be mounted securely.

Figure 2



Motors

Motors can vary a lot and still work for our purpose. A 1/3 H.P. is plenty large and even a much smaller one will do our job. The RPM (revolutions per minute) also is not too critical. Most of the larger motors will turn at 3450 or 1725 RPM. We actually do not need all that speed. The disadvantage with this high speed is noticed when we apply the water by the drip method onto the wheel. Of course water is cheap, and a little spattering to our face probably won't hurt us too much.

The motor spindle size is generally 1/2-inch diameter. Most wheels come with large center holes, but they also come with several sleeve spacers to step down to our needed 1/2-inch motor spindle diameter.

New Grinders

Naturally the easiest thing to do is to simply buy factory ready-to-use grinder equipment. There are several available through our jewelry supply houses. Some of these are horizontal instead of vertical. Some feel this is better and easier to control. I am familiar with this type of wheel due to my previous experiences with gem cutting. In gem cutting, a 350 to 500 RPM was considered good. The liquids or paste that were added to the wheel would not be thrown off very easily at that reasonable speed. Also, all stones, from hard corundum (rubies and sapphires) down to quartz (amethyst, citrines, etc.), could be easily cut at this speed; therefore, our glass mineral crystals should cut with ease.

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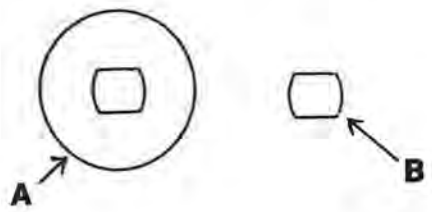
Crystal Cutting Machines

There have been several machines advertised recently in the *Horological Times*, some of which cut and grind the complete crystal. Others are just grinders; some of these are vertical and some are horizontal types. Three of these are made by the American Perfit Crystal Corp. and sold through most wholesalers. They are called the Retail Grinder, the Pro Grinder, and the Kronoglass. This last one is quite automatic, or at least semi-automatic. After one makes a mold of the bezel, this mold is used as the master to make an exact crystal to match the original. I understand it can even put a bevel on the edge when necessary. Of course this is the most costly of the three models. Some suppliers use this machine to make crystals for those who do not have one and do not want to set up for their own crystal making.

Another grinder shown in the *Horological Times* is marketed by Schohl to finish the crystal after using their Crystal Cutting Machine. This grinder uses a 5-inch horizontal diamond-impregnated wheel with 600 grit and turns at a reasonable 240 RPM. A light spray of window cleaner is all that's needed according to the manufacturer. This seems to be a good speed since this is just used for finishing touches after using the Crystal Cutting Machine which "blanks out" the crystal to close tolerances.

The Schohl Crystal Cutting Machine uses all 40mm round mineral crystal blanks. These come in several thicknesses. To use the machine, one of the crystal blanks is placed on the left side of the machine and the watch bezel to trace is placed on the right side. The machine tracer is placed into the bezel. We apply cutter tension with our finger as we turn the crank (that's in front of the machine). This allows the crystal to be cut as the tracer follows the inside of the bezel. When we remove the crystal blank from the machine we see the cut in outline of our new crystal etched into this blank. (See Figure 3A.)

Figure 3



Next we need to pull or break away the outside unwanted area. Now we have just the crystal left. (See Figure 3B.) Then we finish off the rough edges with our grinder, and the job is finished.

Crystal fitting must be fast enough to be profitable, and with the "right stuff" it can be.

❑

1993 Election Results

AWI BOARD OF DIRECTORS

The count of the ballots in AWI's 1993 election for the Board of Directors has resulted in the following members being elected to serve a three-year term: **James H. Broughton,** Columbus, OH; **Alice B. Carpenter,** Tarboro, NC; **Joseph L. Cerullo,** Cranford, NJ; **Wes Door,** Kennewick, WA; and **Marvin E. Whitney,** Alexandria, VA.

Thanks to all the members who voted in this year's election! Our thanks also go out to the candidates for allowing their names to be placed in nomination. All of them were eminently qualified and have already contributed to the progress of the Institute. We look forward to utilizing their special talents as we strive to better the field of horology for the members of the American Watchmakers-Clockmakers Institute.


James H. Broughton


Alice B. Carpenter


Joseph L. Cerullo


Wes Door


Marvin E. Whitney

TESTING THE 2V LITHIUM BATTERY

In response to a number of inquiries we've had on handling procedures for lithium batteries, we solicited information from Renata. This is their response.

Generally, Renata does not suggest that new batteries be tested prior to installation. It is important to remember that these 2V batteries are very tiny and that each test consumes a slight amount of an already very limited and relatively expensive battery capacity.

Watch battery testers available on the market today simply draw a current which is much too high, causing an undefined voltage drop. (If too much of a load is placed on the battery, it will appear to quickly die. It is not really dead, just temporarily shut down. If left alone for a few minutes, it will return to its normal state.) Therefore, Renata's 2V lithium watch batteries should not be tested on today's watch and alkaline battery testers.

Voltage readings may only be taken on a ***high impedance (1 mega-ohm) voltmeter.***

The discharge curve of CuS-Lithium batteries shows an increased initial voltage. Thanks to this physical effect provoked by free oxygen inside the battery, the battery freshness can be checked. After 2% of discharge, the no-load voltage is reduced to 2.12V at room temperature.

NO LOAD VOLTAGE
2.12V -- FULL CAPACITY

On a slow discharge, after having reached the rated capacity, the battery voltage will drop to a second level of 1.75V. The capacity of the lithium material is calculated so as to supply another 10-20% of the rated capacity at this lower voltage level.

MEASURING THE
INTERNAL RESISTANCE

The impedance of these batteries is dynamic, i.e. depends on the current applied. A meaningful reading can only be obtained by a method simulating the actual use of the battery (impulsions of the stepping motor). The time during which a load is applied is also of significance. As a lower tolerance, the following value can be indicated (as per our spec sheet):

Minimum battery voltage under a load
of 1500Ω during 10 milliseconds: 1.2V

---

*Members wishing additional facts about batteries and their characteristics can contact: **RENATA U.S., 2263-C Valdina Street, Dallas, TX 75207; (214) 630-2563; (800) 527-0719, and ask for their bulletins: "Testing Watch Batteries?" and "Renata Batteries: A Technical Introduction."***

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MILITARY TIME

WALTHAM WRISTWATCH

Part II

6/0 Size, Sweep Second, 16-Jewel,
Comparing Watch, Model 10616-C-S-12,
Type A-11, Navigation Watch (Hack).
Also known as Model 6/0B-ss-16-Jewel.



Marvin E. Whitney
CMW, CMC, FAWI

The Waltham 6/0 type A-11 navigation (hack) watch was encased in either a three-piece base metal screwback and bezel or a screwback waterproof case. Several different markings were stamped on the exterior back of cases, depending on the branch of service making the purchase. Markings which I noted while testing many of these watches during my tenure at the Naval Observatory were: U.S. Navy, BUSHIPS; USN, BUSHIPS; ORD DEPT, USA, OF-serial number; TYPE A-11, SPEC. NO. 94-27834-B, SER. NO. AF-44-66736, MFR'S PART NO. 10616, ORD. W-30-053ac-1320, WALTHAM.

The dial was black with white minute/second line marks and figures 1 through 12 indicating the hours. The minute/second graduations were marked with small numerals at each 10-minute/second interval.

The movement was fitted with Waltham's monometallic balance wheel and Conel hairspring. The sweep second mechanism was of the indirect drive type. However, instead of a separate sweep second wheel or center seconds wheel (Waltham's nomenclature) being mounted on the extended upper pivot of the third wheel, the sweep second wheel was an integral part of the third wheel. It meshed with the sweep second pinion and arbor which passed



Figure 4. Type A-11 waterproof navigation watch--Waltham.



Figure 5. Type A-11 dustproof navigation watch--Waltham.

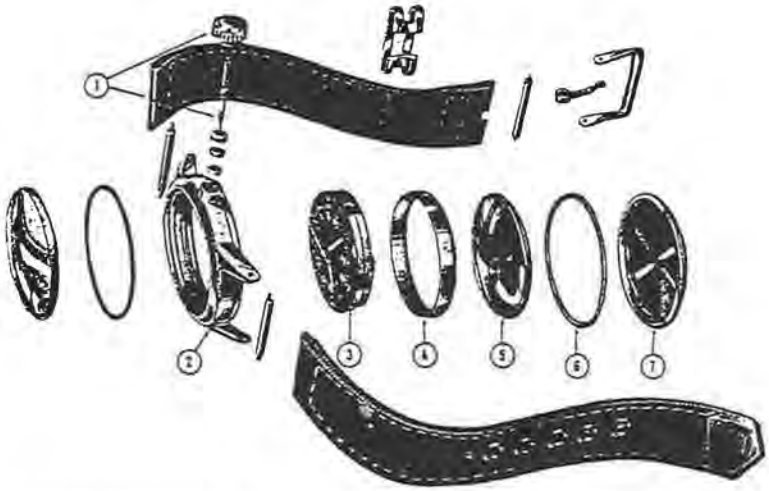


Figure 6. Exploded view of waterproof case and movement assembly (Waltham): 1) winding arbor and crown; 2) case center; 3) movement; 4) movement ring; 5) inside dust cover; 6) case back gasket; 7) back.

through the hollow center wheel and pinion arbor. To prevent the jerky motion of the sweep second hand, a small, thin friction spring was installed under the sweep second pinion and arbor.

The sweep second or center second wheel bridge was stamped "Waltham, USA, 6/0 '42, 16 jewels." However, on some movements, "Premier" was also stamped, just above 6/0 '42.

The price per unit for the first lot purchased was $13.64.

❑

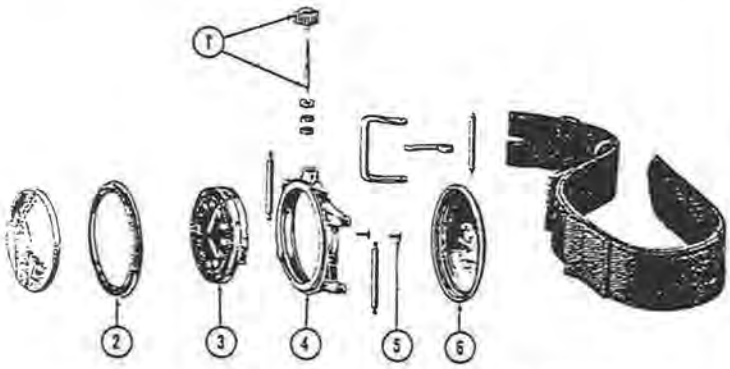


Figure 7. Exploded view of dustproof case assembly (Waltham): 1) winding arbor and crown; 2) bezel; 3) movement; 4) case center; 5) case screw; 6) back.

(Continued on page 35)

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Our Readers Write

In 1992 I had the good fortune of participating in two technical seminars conducted under the sponsorship of AWI. One was on complicated watches by Antoine Simonin at the AWI facility in June. The other was on antique watch restoration by Archie Perkins in October at the Illinois Watchmakers Convention sponsored by Central Illinois Watchmakers Association.

These two seminars have in common a factor which is not always common to training endeavors. They were of the highest calibre I have ever experienced in any training endeavor.

I give Tony Simonin my highest respect for his knowledge and ability, both to do and to convey information to others.

Archie Perkins has been an acquaintance and personal friend of mine for a number of years. We both attended Elgin, though not at the same time. Archie is also an instructor of the highest calibre. His knowledge of the subject is vast and seems to know no limits. He can tell you how and show you how. Particularly, I appreciate the fact that his standards are very high. In several instances he suggested the use of more than one method so as to provide alternate ways to accommodate a variety of equipment. Further, Archie has the ability to convey information to others in such a way as to relate to their level of skill and understanding of the subject. This quality, along with the high level of knowledge and experience he possesses, enables him to make technical presentations of the highest calibre.

I convey to you, and to staff, officers, and directors of AWI, my sincere appreciation for the part AWI has in making such presentations possible.

Laurence A. Blanchard
Kokomo, IN

I've been reading the *Horological Times* since 1990 when I joined AWI. In "President's Message" of the February '93 issue I read about a member who has complained. How can this be?

There isn't a part of AWI--in the instructors, staff, or the articles published in the *HT*--that warrants a complaint. Those who complain must have nothing else to do but sit around and try to find something to complain about.

There are so many positive things that AWI does for its members. Maybe the complainers are know-it-alls and don't need a tech sheet (free) or a hard-to-find part. They probably have never been to Project Extend (free), never needed help with a problem watch (hot-line--free), never been to AWI Central to see the watches in the museum (free), or called AWI to ask for a printed article from an old *HT* (free), or rented a book or video tape (free). They've also probably never talked to the staff at AWI Central who will try to help in any way they can (free).

As far as I can see, there is no room for complaint about AWI. Also, it is true that the first article I read is "Rock Quarry" by Fred Burckhardt.

And don't forget: Bad language is a weak mind trying to make itself understood forcefully.

Robert J. Standriff
Cincinnati, OH

TYPE A-11 NAVIGATION WATCH (HACK)

WALTHAM Model 10616-C-S-12

6/0s 1942 Sweep Second 16J. Comparing Watch

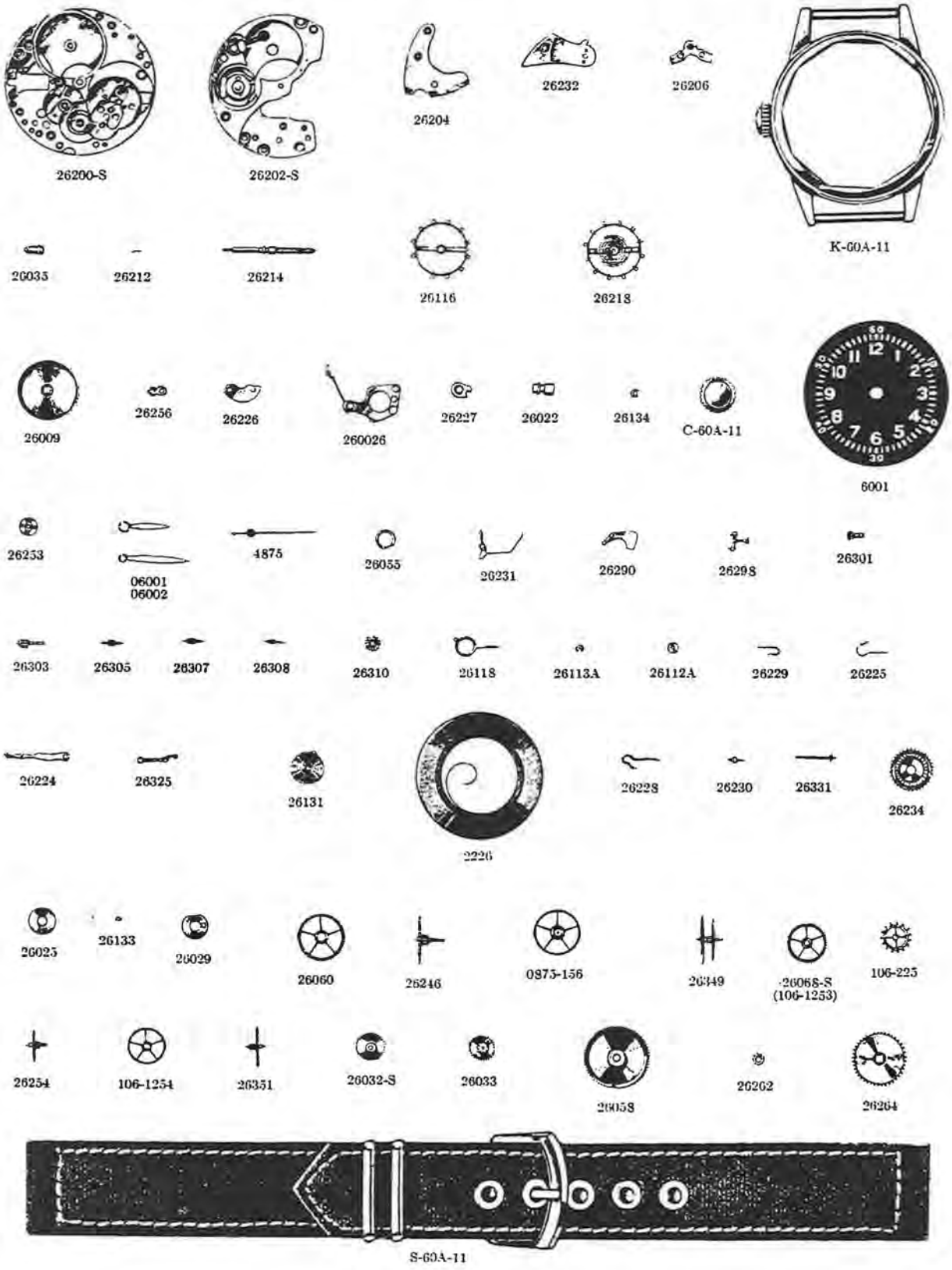


Figure 8. (Waltham Watch Co., Waltham, MA).



Figure 9 (above and right). Waltham Model 10616-C-S-12, 6/0s, 1942, sweep second, 16-jewel, type A-11 navigation watch (hack). The direct drive sweep second movement was mounted in a knurled screwback and bezel base metal case, made by Keystone Case Co.; movement # 31,441,064.



9



Figure 10 (left). Waltham Model 10616-C-S-12, 6/0s, 1942, sweep second, 16-jewel, type A-11 navigation watch (hack). The only difference between the movement here and the one shown in Figure 9 is that the word "Premier" was stamped on the train bridge. Movement # 31,196,846, housed in a waterproof, base metal case made by the Keystone Case Co. Back of case stamped: "ORD DEPT, USA, OF-50861."



10





Figure 11. Waltham Model 6/0-D, A-17, 17-jewel wristwatch with hacking device. Nickel-plated, screwback and bezel. Non-waterproof. U.S. Army Air Corps (Dr. G.W. Huckaba, Memphis, TN).



Figure 12 (right). Waltham type A-11, Model 6/0B, 16-jewel, watch navigation (hack), movement # 32,028,735, serial # AF-44-9532, with its original shipping carton. Movement was housed in a two-piece, screwback, chrome-plated case. Back of case is stamped: "AF U.S. Army, Watch Navigation (hack), type A-11, specification # 94-27834B, serial # AF-44-9532, Mfr's. part # 10616, order # W33-038-AC-6601, WALTHAM (Fred C. Hougham, Daytona Beach, FL).

Pickle Barrel

JEWELRY CRAFTING & REPAIR

The Solder Pick, Care, and Uses



MARSHALL F. RICHMOND
CMW

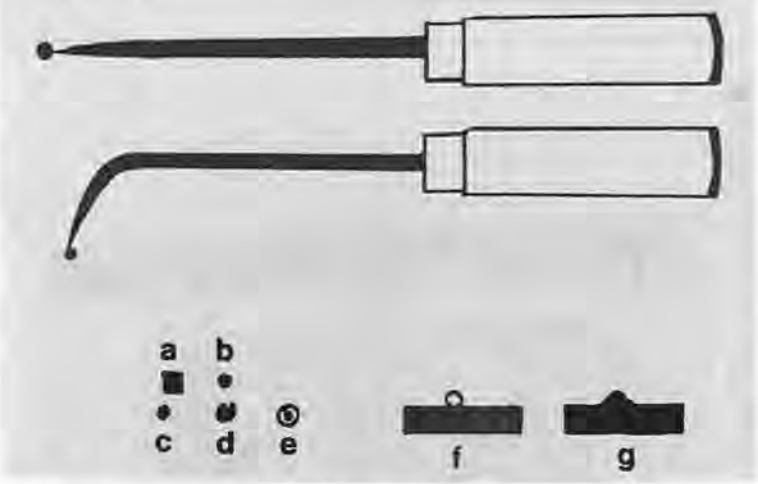
There is more to the solder pick than meets the eye. In addition to using it for the purpose of transferring solder from the bench heat pad to the work, the solder pick helps make small solder repairs that without it would be impossible. This article will discuss how to use the solder pick as well as why the solder will stick to it, and why it will be released from the pick at an exact location. We'll also cover how to use solder and 14K gold to replace a missing bead on a flat diamond setting.

Figure 1 shows two solder picks, one with a straight pick and the other which is bent on the end. Tool catalogs only show the straight pick, but I prefer the curved one because it has some advantages over the straight in steadying the hands when doing bead work on small diamonds (2 point or smaller). The picks shown in the catalogs claim to have metals onto which hard solder will not flow; in fact, the newest catalog I have lists the metal as titanium.

I have always made my own pick, and I have found that a small round tapered needle file works well. However, to bend the end, you must heat it red-hot while bending, which also anneals it if slow-cooled. As the end becomes oxidized from heating, it can be filed to a sharp point. Stainless steel also works well, because solder will not flow on it using regular flux. However, if using Aircosil® flux, hard solder will flow on the end of the pick and not release in the place it is to be applied.

When using the pick to place solder, a chip of solder can be placed on the bench heat pad and fluxed. When heat is applied, a small ball or sphere will form, and when fluxed again it can be picked up on the point of the pick while being heated. The flux acts as an adhesive to hold the solder ball to the end of the pick. When placed on the exact spot where it is needed, while applying heat the flux melts or burns off, and the solder (not having melted yet) sticks to the flux that has been applied to the spot where it is placed. If this is a solder tip on a prong end, enough heat should be applied to bond it to the prong end. By moving the heat, it can be pulled down just over the edge of the stone. Too much heat can pull it down too far toward the base of the prong, so it is good to know when to get off of it. This can only be learned with practice and experiment.

FIGURE 1



Replacing a missing bead on a flat or pavé setting can be done using the solder pick. I have heard this referred to as "sweat soldering" on a bead. My understanding of sweat soldering is to solder two pieces of metal having the same melting point with a metal (solder) that has a *lower* melting point. Therefore, sweating on a bead means using the same metal it is to be put on to form the bead and then installing it with solder. To do this, a small piece of solder must be fluxed on the bench heat pad, and fluxed. As most flat settings are 14K white gold, we will assume we are using white gold and white gold solder. Even though both the 14K gold and the 14K gold solder are both labeled "14K," due to different metals being alloyed with the gold, the melting point of the solder is less than the melting point of the 14K metal. As we have the 14K chip of solder on the pad (Figures 1a and 1b show the chip of solder before and after heat has been applied), and when heated, it becomes a ball or sphere (Figure 1c shows a small chip of 14K white gold; 1D shows it being put next to the ball of solder and after the heat has been applied, which causes the solder to surround the ball of 14K gold). The 14K gold chip can be cut from a piece of 14K white gold wire with cutting pliers.

For extremely small pieces for making very small bead replacements, I use kidney earring wires. These are made of about .6 mm wire, and it is suitable to cut very small pieces from its ends. This ball of metal surrounded by solder can be picked up with the pick after it has been fluxed. Figure 1 shows the two picks, each with a ball of metal on the tip. This can be placed on the spot where the bead is missing which should be well cleaned, and then a spot of flux placed on this. I use a sharpened piece of pegwood which will put the flux in the exact spot where needed. (Figure 2a shows the broken bead and 2b the metal and solder

sphere put in place with the pick.)

When the pick is removed, the sphere should stay in place while enough heat is applied with the torch to flow the solder. This will make a firm bond on the metal where the bead is missing. Any excess solder can be removed with hand gravers or cup burs, and the bead can be made to match the other beads with either cup burs or beading tools. Using this system of melting a piece of 14K gold first into a ball and then putting it on a chip of 14K solder leaves a bead of 14K metal, which is no doubt harder than a solder tip and will stay in place and wear longer.

When tipping several prongs with only solder, heat has to be removed when the solder makes a domed tip. Sometimes heat being applied to the next prong which is close will cause it to carry over to the prong already tipped, melting it and flowing the solder down the prong--this will have to be done over. Using the sweat bead or tip is less apt to create problems, and usually will make a better and more uniform, attractively finished job. If less than all the prongs need replacing, make the new ones heavier than the rest. Then, should the ring be returned at a later date, the work you performed can be easily identified.

The use of the pick is in no way intended to take the place of the flux brush in placing solder on work to be soldered. In most cases, the flux brush is the fastest way because you have to flux the work and the solder, so the flux brush is already in your hand. Flux brushes are available with a quill handle or a tin handle sold usually by the dozen. They have camel hair bristles which easily controls the amount of flux it carries and applies it where you want it. I trim the bristles to shape it so flux can be placed in a spot where the solder needs to flow. Also, it makes the transfer of chips of solder from the bench heat pad to the work easy and lets the solder chip release from the brush when it is in place.

There is a solder paste in hypo needles which has been on the market; it contains the gold solder and also the flux. It is available in yellow or white gold in 10K, 14K, and 18K. The 18K is only available in yellow. I have found this to make chain repair much easier, but the only fault found is that when it is squeezed out of the nozzle of the hypo it wants to stick to the nozzle instead of the work. With a little experimenting I have been able to overcome this, and I'm sure you can also. It is not a replacement for regular gold solder, but is quite useful for many repairs.

In making repairs with solder, being conservative with the amount of solder used is usually an asset in strength as well as saving the removal of excess. However, in making solder tips or sweating beads or tips, the amount used should be gauged to the size needed to match the other prongs or beads. This can be done by experiment. A good procedure for this is to cut a chip of solder and place it on the heat pad, flux and apply heat, and it will form a ball. If too large, use a smaller chip of solder. This can be transferred to the tip of the prong, and with the amount of heat used it can be formed to the shape needed for a prong tip.

For a sweat bead or tip, first cut a piece of 14K gold and put it on the heat pad; flux and apply heat until it forms a ball. Check this for size. If this is on melee setting(s), it will need to be very small, but before soldering it should be as nearly the same size of the ones you need to match.

Next, cut a small chip of solder about the same size as the ball of metal and put it close to the ball; flux both pieces. With the solder pick in one hand and the torch in the other, apply heat.

BOOKS FROM AWI

QUESTIONS & ANSWERS IN QUARTZ WATCH REPAIRING- Alice B. Carpenter and Buddy Carpenter. A basic understanding of quartz technology. **$12.95**

GRUEN WATCHES: A SPECIAL COLLECTION--Robert D. Gruen. A collection of Gruen watches with photos and descriptions. **$6.95**

MILITARY TIMEPIECES--Marvin E. Whitney. Probably the most complete compilation on military timepieces to date. **$75.00**

HOW TO BUILD A REGULATOR CLOCK--J.M. Huckabee. Shop drawings with critical drawing notes, 82 fully illustrated pages. **$18.00**

TIMING MANIPULATION--James L. Hamilton. 63 pages plus three large charts for the serious student of timing mechanical watches. **$4.50**

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

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REPAIRING QUARTZ WATCHES--Henry B. Fried. Includes a basic course in electricity & electronic horology. **$26.00**

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

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

THE WATCH REPAIRER'S MANUAL--Henry B. Fried. The newly expanded and updated fourth edition of this popular textbook on watch repair. **$30.00**

If you are interested in any of the above books, please send your order along with a check or money order made payable to AWI Press. (U.S. Funds only.) Include your name, address, zip code, and phone number and send to: AWI Central, P.O. Box 11011, Cincinnati, OH 45211.

ALL BOOKS SHIPPED POSTPAID

Make sure both pieces are touching so when the solder melts it will completely surround the metal ball (this will make one ball a little larger than the metal ball). You can pick this up with the solder pick and place it on the setting where the bead needs to be (Figure 1f). Notice that the ball is just laying in place held by the adhesive qualities of the flux.

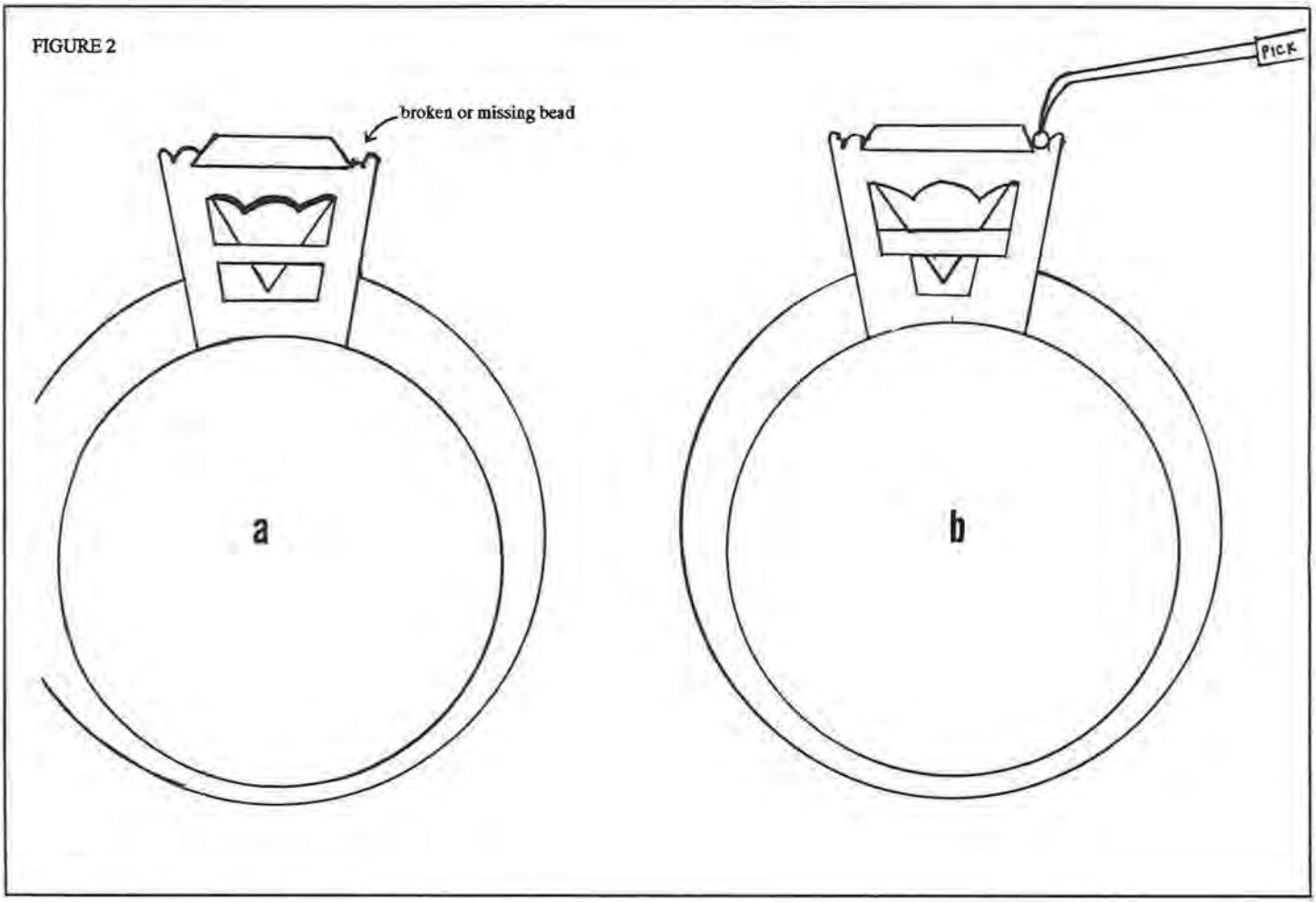
Next, apply heat until the solder flows, and move the heat to pull the solder down on the work. Figure 1g shows the solder being pulled down to the bottom of the ball and onto the work. The ball left protruding above the surface is the metal ball with a light coat of solder. The solder has flowed to the bottom of the ball and onto the work. The solder flows at a lower temperature than the metal and the metal ball has not melted after the solder was added. The solder pick is not only useful but necessary in making this kind of a repair. Today the solder pick was put into use in removing the remaining half of the lid hinge from a 14K gold watch hunting case in preparing for a new tube to be installed in repairing the hinge. The lid was held with weighted down soldering tweezers so that heat could be applied from under the broken hinge tube. When the solder holding it became fluid, the pick flipped it off with only removing the solder that stuck to the piece. There was enough remaining solder on the lid to install the new hinge tube. This is a better method than filing or grinding away the remaining metal from the broken hinge tube. The new tube can be placed in the exact spot where the old was removed, and with flux and heat applied the new installation can be made. This worked perfectly, and when installed on the case the lid opened, closed, and the catch worked as it should.

Care of the solder pick requires less effort than care of most any other tool we have since it is only a piece of metal rod in a handle. About all the maintenance it needs is to dress the point occasionally. From constant contact with heat carbon steel, stainless steel or titanium will become oxidized to an extant that sometimes it will not pick up the solder to be transferred; other times it may not readily release it. If it was only used for the quick transfer of solder, it would rarely have to be dressed. But being used to straighten metal while heating with the torch, the end sometimes becomes red-hot. That draws oxygen from the air to cause the two to oxidize. This is probably the least expensive and most used tool you will have on your bench when doing soldering work.

Practice and experimentation are the most important ingredients in soldering. I can explain much that is essential to know--even demonstrate how it is to be done--but in no way can I communicate the feel needed in applying heat. This sense of feel, as well as what is seen, can only be developed through practice and experimentation. Even after becoming proficient enough to be doing soldering for a livelihood, experimenting and practice can be done on every job. I don't claim to be a "master jeweler," only a student of jewelry crafting, because every day is a learning day for me. Everything that I write in this column is from my own experience, and the methods work well for me. If you find or have methods that work better for you, use them.

Next month's article will be devoted to watch case repairs that involve hard soldering. ❑

FIGURE 2



Book Review

COMTOISE CLOCKS, THE MORBIER, THE MOREZ by Francis Maitzner and Jean Moreau. English translation by Lawrence Seymour, FNAWCC. Hard covers, 449 pages, 474 b&w and colored illustrations. Pub. 1992 @ $110.00. Available from L.A. Seymour, 10847 Bill Point Bluff NE, Bainbridge Island, WA 98110.

This comprehensive book on the Comtoise clock, better known as the Morbier, was first published in the French language in 1976. Eleven thousand copies of that edition were sold. Now the English edition, translated by L.A. Seymour, FNAWCC, should make this needed volume available to the many collectors and repairers on this side of the Atlantic.

The two authors' credentials are impressive. The late Francis Maitzner was the fifth generation of clockmakers. Jean Moreau is Director of the School of Horology at Dreux, France, and is an acknowledged authority on such clocks and their restoration. Together they have compiled an impressive amount of information and photos of these unusual clocks in their many styles, movements, hands, dials, the peculiar striking systems, decorations, pendulums, and even automation. Their striking is best recognized that in a minute or so after their initial striking of the hour, these will repeat the striking. Thus, those awakened in the midst of the striking will know the true hour before dozing off to sleep again.

The pendulums of these clocks are of ornate but light, very thin brass, painted in bright colors. A few have animated action in the lower part of the splayed out ornate pendulum bob, activated by a knife-edge upset counterbalance of the mechanism in the back of the pendulum.

The book is divided into three main sections; the first is devoted to its history and types of that early period. The dial and the fronton or top front surrounding the porcelain dial is also of pressed, thin brass and the subject could be historic, patriotic, religious, or pastoral.

The many styles of hands and the many, many styles of these individualistic pendulums are shown in an encyclopedic amount of examples, many reproduced from early original catalogues. Most know these clocks as 'standing' free of a case and hung on walls. These were the favored choices of interior decorators in this country, especially in the 1950s.

Those cases where they have survived, however, as observed are most often in the country of their origin. These were cases of light wood and of various shapes, some ungainly and odd. Many of these survivors, with their movements and dials, etc. are pictured, some in color.

The second section of this book concerns itself with the technical aspects and descriptions of over 70 types together with their designs. The range of their manufacture span over 200 years. These are pictured and described in many photos and prints. Included are some dated by the authors as of the 17th, 18th, and 19th centuries and are illustrated beside their clock cases and their individual systems of striking in good photos and drawings. Alarm systems, when used, are treated and described as well. Others with more sophistication include calendric services, moon phases, equation-of-time, and astronomical complication. A few even supply melodic systems, and as mentioned earlier, automation with striking androids or in the base of their pendulums. Others strike the quarters on 2, 3, 4, 5 bells and with repeating as well. The rarer clocks would have grande sonnerie and odd construction details.

The spring-driven Morez wall clocks in picture frames, some with mother-of-pearl ornate wooden frames are discussed. The repairer should find the many diagrams and wheel counts most helpful. The numerous and varied types of striking arrangements are shown in professional drawings to assist the repairer.

The early clockmaking history of this region in France is shown in a 16th century tower clock made in Morbier by Mayet. Thiout, an inventive clockmaker, describes this clock as having a double-lever (hinged) escapement which he favored in his own clocks.

Many pages of photos of dials and their pressed-brass masks are shown. Linked pendulums and about 60 illustrations of some pendulums are pictured, a few with automation. Mention is made of a pin-wheel, center second, lyre pendulum, false gridiron with huge lenticular brass bob such as marketed by many Connecticut makers who did not acknowledge these clocks' French origin. More than 60 long-cased clocks are illustrated, some from original catalogues revealing a style unique to that part of France. Their cases are reminiscent of Scandanavian clock case shapes.

This book's technical section includes numerous drawings of movements and their identification with some methods of ascertaining their age. There are geometric drawings of the clocks' escapements and the various striking systems, including the vertical double rack. Earlier verge escapemented clocks are also shown with accompanying texts. There are wall frame clocks, some with pull-winding and of course mainspring powered, and others with mother-of-pearl inlays black-lacquered, polished wood cases.

A good index completes this 449-page thesis. It should provide very helpful information and instruction to the clock repairer and solve many collectors' problems. For those who do not have such a clock in their collection, this book is a reasonable substitute.

❑

The Apprentice Clockmaker

Clock Movement Maintenance
Part IV

Overhauling a Single Train 30-Hour Clock Movement



JOHN P. KENYON
CMC

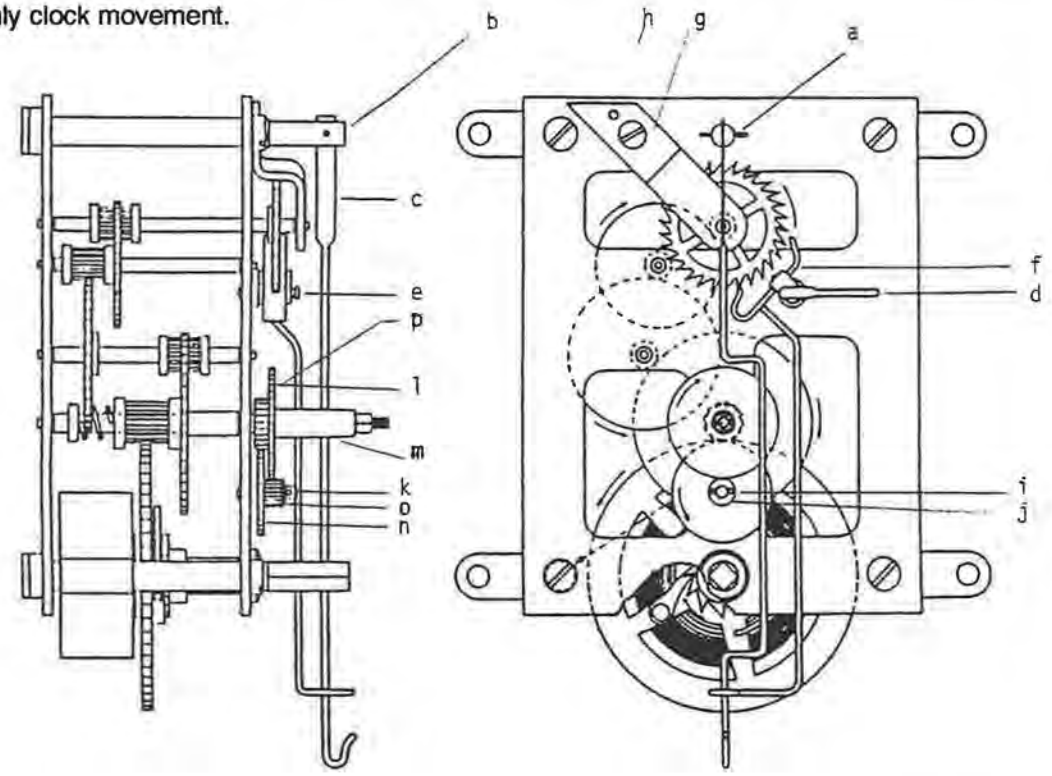
In the last installment we discussed how to let down the power of a clock mainspring and how to restrain the mainspring in a clamp. After this is accomplished, the front plate can be removed and the internal components of the movement examined for needed repairs.

Getting Started

During dismantling, the movement should be placed on some kind of a movement holder. Different types can be found in the tool catalogs. Some are round plastic discs in sets of four or five different sizes to accommodate different size movements. Others consist of steel posts with brass clamps that can be attached to a plate and positioned to hold the movement horizontally for disassembly and vertically on a hanger for test running. Some clockmakers prefer to use a small cardboard box or an empty coffee can. The rationale is to elevate the movement enough so that protruding parts will clear the bench top to protect them from damage.

FIGURE 1. 30-hour time-only clock movement.

a. taper pin
b. suspension block
c. suspension spring/ pendulum rod
d. upper verge bridge
e. verge post
f. verge
g. escape arbor pivot support bridge
h. position pin
i. taper pin
j. minute wheel post washer
k. minute wheel post
l. hour wheel
m. hour pipe
n. minute wheel
o. minute pinion
p. cannon pinion



It is a good idea to make a sketch of the movement at this point for later reference. If you must mark the plates, do not deface the movement with scratch marks. A pencil will do the job, and pencil marks can be removed later.

Outside the Plates

Remove taper pin (a) in Figure 1 that runs through the hole in suspension block (b) holding the suspension spring/pendulum rod (c) in position. Next, remove the suspension spring/pendulum rod from the slot.

Now, carefully lift the end of upper verge bridge (d) at verge post end (e), and turn it on the plate far enough to clear the post and verge (f). It will be noticed that this bridge is made from spring steel and is extended through a hole in the front plate. The spring action holds it taut while resting in position on the verge post, to prevent the verge from slipping off the post. Now the verge can be lifted off the post.

Next, remove the escape arbor pivot support bridge (g) by removing the machine screw that holds it over position pin (h) attached to the front plate. Now, the escape wheel arbor can be removed from the movement. In many American movements, this bridge is not removable and the escape wheel arbor must be removed after the plates are opened.

The next step is to remove taper pin (i) and minute post washer (j) from minute wheel post (k). With this washer removed, hour wheel (l) with hour pipe (m) attached will be clear to lift off the center arbor; then, minute wheel (n) and minute pinion (o) can be lifted off the minute wheel post.

Now, you will notice that cannon pinion (p) is tightly fitted on the center arbor. There are two schools of thought among clockmakers in respect to whether or not the cannon pinion should be removed. Some feel that it should not be unless work needs to be done on the center shaft, pivot hole, or cannon pinion. Their reasoning is that by disassembly, unnecessary wear or damage may result in a loose fit between the cannon pinion and center shaft. Others think that it should be disassembled, cleaned, and thoroughly checked every time the movement is dismantled, and part of the restoration is to ascertain a tight fit during assembly. I tend to go along with the latter technique since I feel that a thorough cleaning and examination of this area is essential. If looseness occurs after reassembly, steps can be taken to rectify the fit. This remedy will be discussed in a future installment.

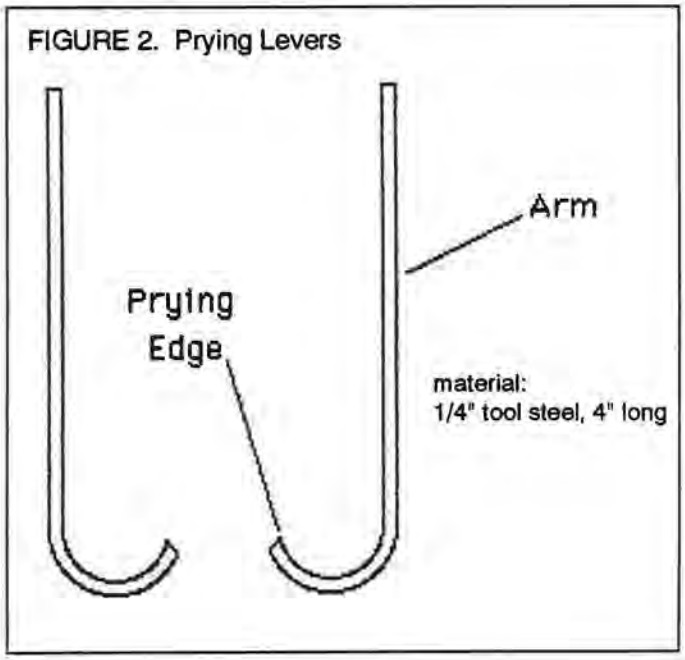
To remove the cannon pinion, a set of prying levers (Figure 2) should be used. These can be purchased from material houses, or easily made with hand tools in your own shop by cutting off two pieces of 1/4" tool steel about 4 inches long and forming the ends with a hacksaw and file as shown in the illustration. Smooth all rough edges, then harden and temper to "blue" as described in an earlier article.

To use prying levers, carefully insert the curved edges under opposite sides of the cannon pinion and gently apply even pressure until the pinion slides off. Screwdrivers should never be used for this purpose because they will mark the plate and can cause the center shaft to be bent.

Another method to remove a cannon pinion is done after the movement is dismantled by resting the back of the front plate close up to the pivot on a slotted or drilled bench block. Select a hollow punch that will fit over the end of the arbor and rest on the shoulder of the square. Tap the punch carefully with a hammer until the arbor slides out of the pinion. Whenever using a hammer and punch in clockwork, remember to tap the punch lightly. You will get better results from several light taps (instead of one hard tap), and have less damage to the parts.

Next, remove the four nuts or pins in the pillar posts at the corners of the front plate and carefully lift off the plate.

FIGURE 2. Prying Levers



Getting Inside

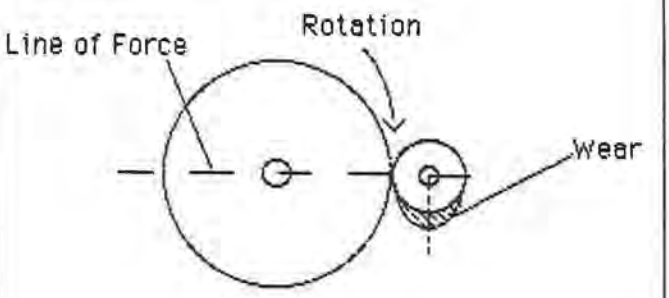
With the front plate removed, carefully study the location of the wheels and arbors. Make another sketch for further reference. Now remove the wheel/arbors from the back plate. You may want to use a piece of cardboard or styrofoam for storage of the arbors (in sequence) as they are removed from the plate.

Inspection for Repairs

Careful inspection is necessary to locate all defects and needed repairs. You do not want to risk having to take the movement apart again. This can be frustrating, costly, and abusive to the clock. Some of the more common problems to look for are:

(a) Click ratchet assembly for wear, click rivet for looseness, and click spring for tension.
(b) Mainspring (to be discussed next time).
(c) Wheels for bent or broken teeth.
(d) Pinions for dirt, wear, and damage.

FIGURE 3. Pivot Hole Wear



(e) Escapement for wear.
(f) Pivots for wear and other damage.
(g) Pivot holes for wear.
(h) Pillar threads or taper pin holes for damage.
(i) Winding arbor for wear.
(j) All previous repairs.

The above list covers most of the common defects, but there may be others. Procedures for these and other unit repairs will be covered in future installments.

Freedom in the Train

To test for freedom in the train, install the wheel/arbors in their respective locations between the plates. Leave out the mainspring and verge. Apply slight pressure to the first wheel and see if the train will spin to a gentle stop. If not, check for endshake at each pivot. Endshake is the up and down play of an arbor between the plates. An arbor with a tight pivot or no endshake will cause the train to come to an abrupt stop. It is difficult to define the proper amount of endshake. The seasoned clockmaker will say, "Be sure there is enough, but not too much," and that's it. At this point, just be sure there is freedom in up and down movement at each arbor. You'll quickly learn the correct amount from experience.

While the arbors are in position, hold the third (or escape) wheel rigid and turn the first wheel back and forth. Observe the pivot holes. When turning in the forward direction, pivot hole wear will be at right angles to the line of force, or in other words, a loose pivot will move toward the direction of wear (Figure 3). Make a note of locations that appear to have excess movement. Again, there is no cut and dry rule in respect to when a pivot hole needs to be rebushed. There has to be freedom, but it can't be a sloppy fit. One rule of thumb that sounds logical states that a bushing should be installed if the wear equals one third or more of the diameter of the pivot.

Next time we'll begin to cover individual unit repairs, starting with mainspring cleaning and maintenance.

❑

Association News

MISSOURI

The Missouri Jewelers & Watchmakers Association gathered in Jefferson City for this year's convention. The golfers arose early Saturday morning for the annual tournament. A shopping excursion to the Outlet Mall was enjoyed by those less inclined to play golf.

The Round Table Discussions got underway Saturday afternoon. There was a lot of good discussion and interaction among the jewelers.

Joe and Bert Franke of Campus Jewelers were honored during the banquet Saturday evening. They retired this year after devoting most of their lives to their business in Columbia, Missouri. Steve Lamm presented the Lifetime Achievement Award. Over the years, Mr. Franke has served as President, Treasurer, and has received the prestigious Bill King Award.

Alan Leopold, director of Member Services of JA in New York, was guest speaker. After showing a video titled "The New JA," Mr. Leopold brought everyone up-to-date on many new programs and issues of importance to the retail jeweler.

Serlender Glover told those in attendance about the new home study courses being offered by JA.

The Sunday morning breakfast was hosted by Barbara Hight of Diamond Promotion Service. Her topic, "The Energy of Synergy" included a video, ideas to increase traffic, image and sales through advertising, and motivation and purchasing attitudes of the consumer.

Andy MacCauley, Director of Advertising and Communications for Chippenhook, and Michael Coan of the Fashion Institute of Technology conducted a course on "Store Design and Display."

The 5th Annual Jewelry Design Contest awards were presented during the Sunday Luncheon. ❑

UPCOMING ASSOCIATION CONVENTIONS & MEETINGS

July 23-25	**Watchmakers Association of Ohio Convention,** Park Hotel, Columbus, OH. AWI Speaker: Joseph Cerullo.
August 21-22	**Watchmakers Association of Pennsylvania Convention,** Hiram G. Andrews Center, Johnstown, PA.
September 18-19	**Horological Association of Indiana Annual Meeting & Fall Workshop,** Indianapolis Motor Speedway Motel, Indianapolis, IN.
October 1-3	**New York Watchmakers Association Convention,** Holiday Inn, Seneca Falls-Waterloo, NY. AWI Speaker: Fred Burckhardt.
October 8-10	**Illinois State Watchmakers Convention,** Clock Tower Inn, Rockford, IL. AWI Speakers: Alice Carpenter and Buddy Carpenter.
October 29-31	**Florida State Watchmakers Association Convention,** Ramada Hotel Resort, West Palm Beach, FL. AWI Speaker: Ewell Hartman.

BULLETIN BOARD

A. NEW REQUESTS

BRANSON MODEL 52 SCHEMATIC
Richard Diefenbach, St. Johnsburg, VT, is aware that AWI has a number of schematics for Branson cleaners. Unfortunately, we do not have a schematic for Model 52. If you can supply, we will add it to our collection which consists of schematics for B-12, B-12R, B-12S, B-220, B-220R, and B-32.

B. RESPONSES

M. REID MATERIAL ASSORTMENT
We have had a number of responses from members sending copies of the charts for the Reid Assortment #20B. Because of the age of the original charts, many copies were of poor quality. We now have legible copies for both the #M20A and #M20B. Thanks to all who helped!

PORTESCAP VC-10
Brad Mathews, Davison, MI, and Richard Mazza, Atlanta, GA, have supplied operating instruction manuals for the VC-10. These contain some maintenance information but no schematic. We would still welcome a schematic for this equipment.

SALEM SHIP'S BELL CLOCK
Several members have offered advice on setting up the strike mechanism of the 7-jewel, 8-day Swiss-made ship's bell clock. We have sent the information to Wayne West in Rocky Mount, NC. Steven Conover advises us that several articles on the clock appeared in his *Clockmakers Newsletter*. Copies which contain Steve's excellent drawings for setting up the strike system have also been forwarded to Mr. West. If you are serious about clock repair, you should be receiving Mr. Conover's *Clockmakers Newsletter*.

6MM LATHE CHUCKS
C.L. Crooks, Jr., Statesville, NC, and George Cogby, Natrona Heights, PA, suggest that the following two sources may be able to supply these small chucks.

J. Mackinnon
13 Totand Ave.
Newynn, Auckland
New Zealand

Herr & Kline
1914 Grandy St.
Norfolk, VA 23517

TIMING WASHERS
Robert Little, Logan, OH, who originally had his timing washer problem solved by Tom Cook, has recently learned that S. LaRose now can supply an assortment ZX7-3M.

MAX BUSSE CLOCK - BERLIN, GERMANY
Alan Waytz, Lincolnwood, IL, offered to share information with Richard Landis regarding this clock. He has one like it.

C. ITEMS STILL NEEDED

PLANS TO BUILD WOODEN WORKS GRANDFATHER CLOCK
Jeffrey Smith, St. Louis, MO, is seeking a source for plans to construct a grandfather clock with wooden wheels.

PNEUMATIC MASTER CLOCK
C.L. Peterson, St. Paul, MN, seeks information on the Hahl Mfg. Co., makers of air clocks, pneumatic clocks, and automatic clocks. They are master clocks.

ULLMAN ELECTRIC CLOCKS
Martin Sarill, St. Petersburg, FL, is seeking the distributor of Ullman Electric Clocks which he says are Swiss made.

HENRICHS JEWELRY CO.
William J. Banner, San Diego, CA, writes as follows:

I have a problem that perhaps only a service such as the "Bulletin Board" has a possibility to solve. Permit me to explain.

About 30 years ago, in a small antique shop in Lake Geneva, Wisconsin, I purchased a Waterbury wall clock. It has a solid oak case called the HERON model. It has a 10-inch dial and is probably circa 1918. It is not the clock itself that concerns me, but rather the advertising inscription that has been placed on the lower glass. It reads:

HENRICHS
JEWELRY CO.
139 N. MAIN

What I am anxious to know is in what city did the Henrichs Jewelry Co. have a shop on 139 Main St.? There is a chance that one of your readers knows the answer to this question. It may just be not too late to discover the answer. So many cities and towns had Main Streets that it could be almost anywhere. Considering where I purchased the clock, it would be a good guess that the town is somewhere in the midwest.

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: "Bulletin Board," c/o AWI Central, 3700 Harrison Avenue, Cincinnati, OH 45211. ❑

CLASSIFIED ADS

REGULATIONS AND RATES

Ads are payable in advance $.70 per word, $.80 per word in **bold type.** Classified display ads are $30.00 per column inch, 2-1/4" wide. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are $4.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance (e.g. September issue closes for copy on August 1st).

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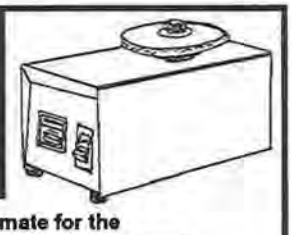
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23-25--Watchmakers Association of Ohio Convention, Park Hotel, Columbus, OH.

AUGUST 1993

15--Basic Pocket Watch Bench Course (AWI); Alice Carpenter, instructor; Pittsburgh, PA.*

21-22--Striking Clocks Bench Course (AWI); John Nagle, instructor; Austin, TX.*

21-22--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Seneca Falls, NY.*

21-22--Watchmakers Association of Pennsylvania Convention, Hiram G. Andrews Center, Johnstown, PA. For more information contact George Jones (814) 238-1668.

22--Servicing ETA Quartz Chronographs Bench Course (AWI); James Broughton, instructor; Nashville, TN.*

SEPTEMBER 1993

17-19--Advanced Clock Repair Bench Course (AWI); Roland Iverson, instructor; Des Moines, IA.*

17-20--Cross Slide Lathe Bench Course (AWI); Roy Hovey, instructor; Orange County, CA.*

18-19--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; New Orleans, LA.*

18-19--Hairspring Vibrating Bench Course (AWI); Joseph Cerullo, instructor; Pittsburgh, PA.*

18-19--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; New Orleans, LA.*

18-19--Horological Association of Indiana Annual Meeting & Fall Workshop, Indianapolis Motor Speedway Motel, Indianapolis, IN. For more information: Sally Jo Alexander, 208 Alcott Road, Louisville, KY 40207.

19-20--Mechanical Chronographs Bench Course (AWI); James Lubic, instructor; Tucson, AZ.*

19-20--400-Day Clock Repair Bench Course (AWI); John Nagle, instructor; Tucson, AZ.*

OCTOBER 1993

1-3--New York Watchmakers Association Convention, Holiday Inn, Seneca Falls-Waterloo, NY.

8-10--Illinois State Watchmakers Convention; Clock Tower Inn; Rockford, IL. For more information contact: Jack Donovan, 124 North St., Normal, IL 61761.

16-17--Hairspring Vibrating Bench Course (AWI); Joseph Cerullo, instructor; Denver, CO.*

22-25--Cross Slide/Arbors & Stems Bench Course (AWI); Roy Hovey, instructor; New York, NY.*

24--Servicing ETA Quartz Chronographs Bench Course (AWI); James Broughton, instructor; Austin, TX.*

29-31--Florida State Watchmakers Association Convention, Ramada Hotel Resort, West Palm Beach, FL.

30-31--Repair of the Atmos Clock Bench Course (AWI); Gerald Jaeger, instructor; Arlington, TX.*

30-31--Cuckoo Clock Repair Bench Course (AWI); James Williams, instructor; Minneapolis/St. Paul, MN.*

NOVEMBER 1993

6-7--Striking Clocks Bench Course (AWI); John Nagle, instructor; Salt Lake City, UT.*

13-14--Hairspring Vibrating Bench Course (AWI); Joseph Cerullo, instructor; Austin, TX.*

***For more information on AWI Bench Courses, Project Extend, and Regional Seminars, contact AWI Central, P.O. Box 11011, 3700 Harrison Avenue, Cincinnati, OH 45211; (513) 661-3838; Fax (513) 661-3131.**

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17-20--Cross Slide Lathe Course--Orange County, CA
18-19--Repair of the Atmos Clock--New Orleans, LA
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19-20--400-Day Clock Repair--Tucson, AZ
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16-17--Hairspring Vibrating--Denver, CO
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24--Servicing ETA Quartz Chronographs--Austin, TX
29--Basic Pocket Watch--W. Palm Beach, FL
30-31--Repair of the Atmos Clock--Arlington, TX
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Oct. 11-15	**Clock Case Repair**	**James Williams**
Oct. 25-29	**Clock V** (CMC Prep)	**James Lubic**