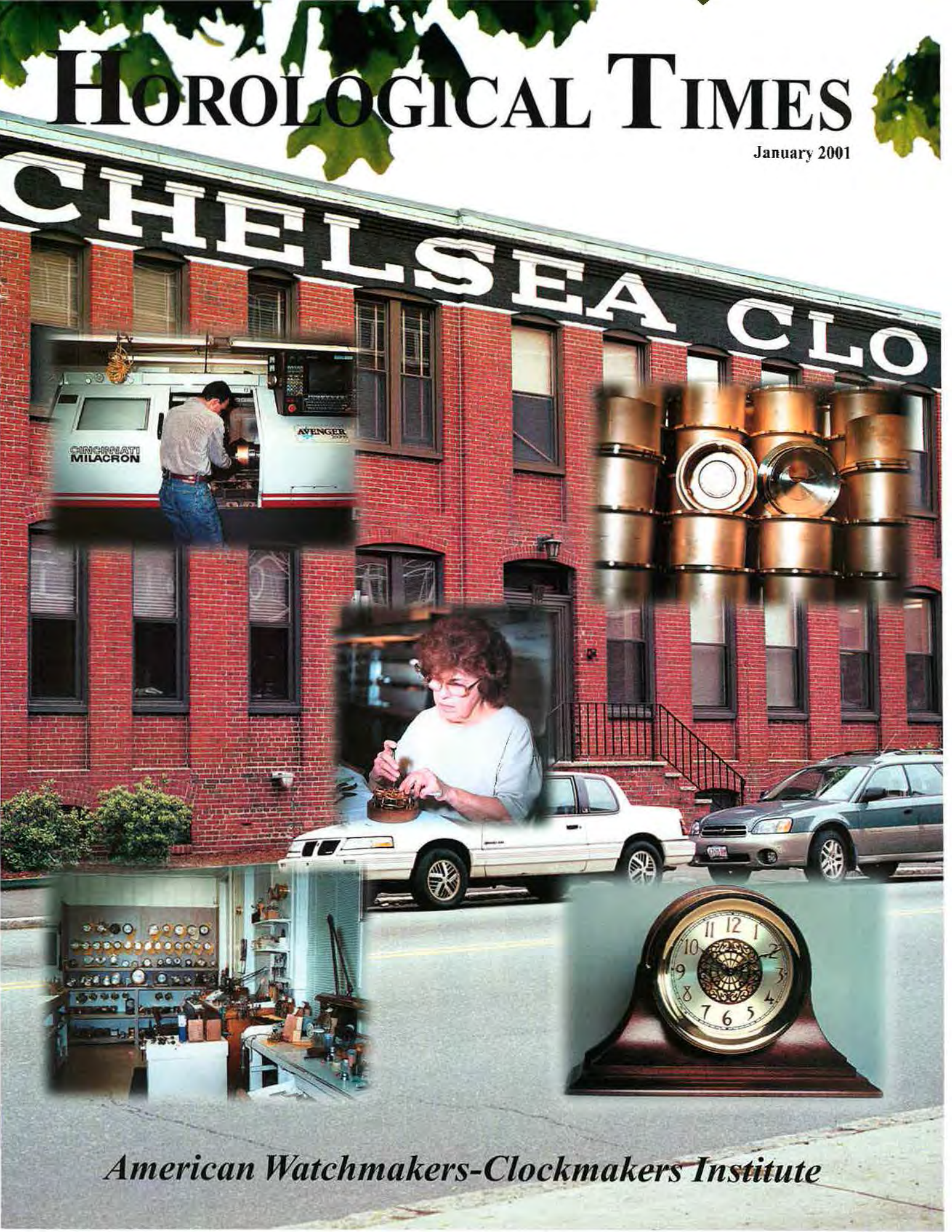


HOROLOGICAL TIMES

January 2001

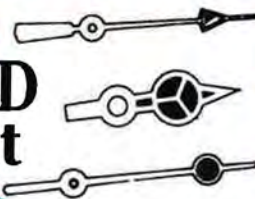
CHELSEA CLOCK



American Watchmakers-Clockmakers Institute

Get Your Hands on These Products!

LUMINOUS SPORT HAND Assortment



NEW

Esslinger & Co.
Luminous Sport Hands Assortment #86.705
Yellow & White
12 - Pair - hr/min
10 - Sweep hands

#86.705
\$24⁹⁵

Contains popular "Diver" and "Mercedes" style hands in ladies and mens sizes. Also includes two sweep-second styles. A total of 12 pair - hour/minute & 10-sweep hands in yellow and white.

Assorted Pocket Watch Hands



#86.244
\$18⁹⁵

Package contains hour and minute hands, mostly yellow with some blue, black and silver colors. A total of 144. Swiss made.

EXTRA FINE BROACH SET

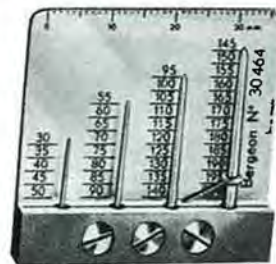


#15.140
\$16⁹⁵ (Reg. price \$19.95)

Features a miniature pin vise and 12 tiny broaches, ranging in size from .05mm to .55mm, made of high carbon cutting steel. Broaches are five sided for enlarging holes. Made in Germany.

B BERGEON PRECISION SWISS TOOLS HAND GAUGE

#30464
\$27⁵⁰



Made of polished brass with steel posts. Post sizes 0mm to 2.00mm to cover most hour and minute hands. Swiss made.

LUMINOUS PASTE

#5680A (Yellow)..... **\$11.50**
#5680G (Green)..... **\$11.50**
#5680W (White)..... **\$17.95**

For hands and dials. Available in green, yellow and white. Compound is diluted with water to make paste.



Presto #1 Hand Remover

#59.310
\$26⁹⁵

For wrist watches. Hands are held firmly and removed easily without damage. Swiss made.



 **Esslinger & Co.**
77 Years Young - And Growing

1165 Medallion Dr. • St. Paul, MN 55120
Toll Free Phone Orders 1-800-328-0205
Toll Free Fax Orders (24 Hrs) Fax: 1-800-548-9304

HOROLOGICAL™ TIMES

An Official Publication of the
American Watchmakers-Clockmakers Institute

EDITORIAL & EXECUTIVE OFFICES

AWI, 701 Enterprise Drive, Harrison, OH 45030
Phone: (513) 367-9800 Fax: (513) 367-1414
E-mail: awi@awi-net.org Web Site: www.awi-net.org
Office Hours: Monday-Friday 8:00 AM to 5:00 PM (EDT)
Closed National Holidays

Donna K. Baas: Managing Editor, Advertising Manager
Katherine J. Ort: Associate Editor, Layout/Design Associate
Stacey Hauck: Editorial Assistant

James E. Lubic, CMW: Executive Director &
Education & Technical Director

Thomas J. Pack: Finance Director
Stewart Lesemann, CW, CEWT: Instructor
Anthony W. DePrato: Audiovisual Manager
Nancy L. Wellmann: Human Resources/Adm. Assistant
Sharon McManus: Membership Coordinator
Mary Beth Huff: Shipping Coordinator
Marilyn Bunch: Education Coordinator
Melanie Frye: Receptionist/Secretary

HOROLOGICAL TIMES ADVISORY COMMITTEE

Linda Chrysler: Chairman
Chip Lim, CMW, CMC, CMEW
Stanley McMahan
Robert Ockenden, CMC

AWI OFFICERS

Ron DeCorte, CMW: President
Robert D. Porter, CMW: First Vice President
Jim Door: Second Vice President
Jack Kurdzionak, CW: Secretary
Fred Burckhardt, FAWI: Treasurer

AWI DIRECTORS

Alice Carpenter, CMW, CMEW
Joseph L. Cerullo, CMW, CMC
David A. Christanson, CMW, CMEW
Wes Door, CMW
Ewell D. Hartman, CMW, FAWI
Tamara Houk
Gerald Jaeger, CMW, CMC, CMEW, FAWI
Marshall F. Richmond, CMW
William O. Smith, Jr., CMW, CMC, FAWI
Milton C. Stevens, FAWI

Stanley McMahan: Affiliate Chapter Director
Frank Poye: Research & Education Council Director
Tony Riggio, CMW: Industry Advisory Board Director
David A. Christanson, CMW, CMEW: Immediate Past
President

FELLOWS American Watchmakers-Clockmakers Institute

Robert F. Bishop	J. M. Huckabee
James H. Broughton	Gerald G. Jaeger
Fred S. Burckhardt	Robert A. Nelson
George Daniels	*Hamilton E. Pease
*Henry B. Fried	Archie B. Perkins
Josephine F. Hagans	William O. Smith, Jr.
*Orville R. Hagans	Milton C. Stevens
Ewell D. Hartman	*Marvin E. Whitney
Harold J. Herman	*Deceased

Reprinting and reproduction is prohibited without written permission from the American Watchmakers-Clockmakers Institute. Copyright ©2001 by the American Watchmakers-Clockmakers Institute.

HOROLOGICAL TIMES (ISSN 145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 701 Enterprise Drive, Harrison, OH 45030-1696. Subscription price for the public is \$70.00 per year (\$6.50 per copy). Members subscription is \$25.00 which is included with annual dues of \$70.00. Periodicals postage paid at Harrison, OH 45030 and additional entries. POSTMASTER: Send address changes to HOROLOGICAL TIMES, 701 Enterprise Drive, Harrison, OH 45030-1696.

CONTENTS

VOLUME 25
NUMBER 1
JANUARY 2001

FEATURE ARTICLES

- Profile: The Chelsea Clock Company**, By Chip Lim 8
A 22 Function Quartz Watch Analyzer, By W. R. Smith 32
Part 1

COLUMNS

- The Modern German Clock Movement**, By Mark Butterworth 16
Movement Identification: Franz Hermle & Sohn, Part 9
Technically Watches, By Archie B. Perkins 22
Repairing the English Fusee Lever Watch (Continued), Part 32
As a Clockmaker Turns, By J.M. Huckabee 42
The American Clock Movement and Restoration Problems, Part 2
Repeater, Petite and Grande Sonnerie Clocks, By Leo A. Jaroslaw 46
"Embee" Hall Clock, Part 60

DEPARTMENTS

- President's Message**, By Ron DeCorte 2
Executive Director's Message, By James E. Lubic 2
Questions & Answers 4
Ask Huck, By J. M. Huckabee 6
Rock Quarry, By Fred S. Burckhardt 14
From the Workshop, By Jack Kurdzionak 20
Bulletin Board 45
Industry News 52
Classified Advertising 53
AWI New Members 56
Advertisers' Index 56

EDUCATION

- The Status of Our Watchmaking and Clockmaking Schools**, By Ken Pell 40
Education Update, By Stewart Lesemann 50
Bench Courses/AWI Continuing Education 51

SPECIAL INTEREST

- Nominations for Honor Awards** 19

COVER

This month's cover features the
Chelsea Clock Company, Chelsea,
Massachusetts
Photography: Chip Lim



President's Message

Ron Decorte, CMW

As the President of AWI it is my responsibility to look at our organization with open eyes and an open mind. I've received many letters, e-mails, and phone calls from the membership, some have been critical and others been full of praise but all have been welcome.

One thing has become perfectly clear over the past few months as President, we cannot be ignorant of the past or the needs of the future. We must build on the success of our past and learn from our mistakes in order to move into the future. And in order to move ahead we must be willing to accept change and all its uncertainties.

AWI has been very successful in providing technical information and training to its membership for more than 40 years. Our membership needs current and pertinent technical support and training that will help them on a daily basis. Admittedly we may have stumbled a bit in this regard lately but change is never easy. I assure you that AWI is making every effort possible in this regard.

For many years AWI enjoyed a close relationship with the horological industry. Industry provided us with important technical support and funding that has benefited every member of AWI from the past, present, and future. But this relationship has slowly dissolved as times have changed. We can no longer ignore the fact that industry is an important part of our profession. Re-establishing our connections with industry will not happen overnight but it is vitally important to our future and the future of horology in general. We cannot think of ourselves as an isolated island, we are part of a chain.

The cards of change and progress are on the table and the time has come to decide if we are willing to move ahead, or slowly die. The cost of progress is not cheap and we will all be required to pay our share.

I'm asking you, the membership, to be patient and understanding of the changes that are required within our organization and profession. Remember that the future is in your hands.

Respect for the past requires support for the future !



Executive Director's Message

James E. Lubic, CMW

First of all I would like to bring your attention to the two inserts you hopefully found in this month's envelope for the *HT*. One is a survey being conducted by the American Watch Association (AWA) which is explained further down in my message. The other is a "Groundhog Job Shadow Day" brochure which was complementary on behalf of an organization that AWI is a member of, American Society of Association Executives (ASAE). I hope everyone takes the time to look the information over and make an effort to get involved. This is a great way for us to expose a student to our profession.

The spare parts issue is the most important issue facing our profession. Looking back on the past few weeks, I have spent an overwhelming amount of time talking on the phone and answering e-mail concerning this problem. In last month's issue of the *HT*, President DeCorte explained the Institute's position on this very well in the last two paragraphs of his message (page 17).

There is also a press release in this month's issue (page 52) that gives the highlights of a meeting that President DeCorte and I attended with industry members on the invitation of the American Watch Association (AWA). This meeting was the beginning of our mission for industry recognition. Through these types of meetings industry has the opportunity to learn what AWI is all about, and we will have the same opportunity. AWI is the largest professional horological association in the world. That in itself is a big reason for industry to work with us. Industry has to be made aware of the standards that AWI has put in place regarding certification. And AWI has to listen to industry's needs. Through this type of open and honest communication we should be able to overcome the problems that face our profession. Education is the key, and industry must help. As President DeCorte said in his message last month this is going to take hard work, time, and patience on everyone's part.

Speaking of education, we have an updated Continuing Education schedule in this month's issue. There are clock courses taught by Laurie Penman, and watch and lathe courses taught by Stewart Lesemann. Most of the clockmakers know who Mr. Penman is, but very few of our members know Mr. Lesemann, so I am going to take a moment to give you some background on Stewart.

Stewart Lesemann graduated from AWI's Academy of Watchmaking in 1998. It was very apparent early in the course that Stewart was a rare talent. He made a balance staff for a pocket watch and had it in the watch and running before the first month of training was complete. After graduation Stewart was sent to WOSTEP to attend their "train the trainer" program in preparation for AWI implementing the WOSTEP 3000-hour program. He must have impressed Mr. Simonin, because he was then invited to attend the WOSTEP Course on Complicated Watches. He taught the complete Academy program last

(Continued on page 18.)

ROLEX BUBBLE-BACK CROWNS & TUBES

PINK CROWNS

Includes tube and gasket.
\$95.00 each

YELLOW CROWNS

Includes tube and gasket.
\$75.00 each

WHITE CROWNS

Includes tube and gasket.
\$50.00 each

BUBBLE-BACK TUBES to fit MODERN 5.3mm CROWNS

\$12.95 each
110.00 per dozen

BUBBLE-BACK TUBES ONLY

With gasket.
\$11.95 each
100.00 per dozen



BEZEL REMOVER FOR ROLEX

Remove bezels without damaging the case or the bezel, even solid gold! Watch bezels are easily pried off using four tapered knife-like lifters. With large, knurled knob for exacting control, and weighted base for increased stability.

No. MC-BRI \$175.00



MICRO-STELLA WRENCH

\$89.95

The Wm. S. McCaw Co. is not authorized by, nor affiliated with, Rolex Watch U.S.A., Inc.

ORDER TODAY! IN STOCK AND READY TO SHIP!

Now order via e-mail at mccawco@worldnet.att.net




The Wm. S. McCaw Company
WHOLESALE JEWELRY
Since 1913

1722 Madison Avenue
Toledo, Ohio 43624
Phone: 419-243-3720
800-472-0200
800-537-0343
Fax: 419-243-0321
800-245-6481



Wholesale Watch Materials • Tools and Findings • Jewelry • Boxes

Questions & Answers

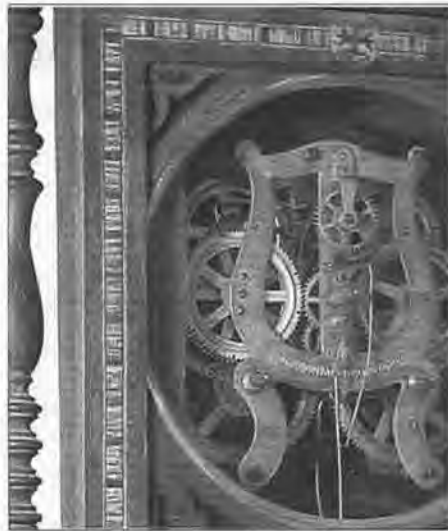
QUESTION

I have obtained this wall clock and I just don't know anything about it. The pictures will answer most questions you may have for me. The movement is marked "The Caledonian Registered". I would like to know the age, where it was made, does it have any value and



what kind of pendulum did it originally have? Any other information on this wall clock would be greatly appreciated.

John Ream, San Jose, California



ANSWER

The jury's still out on who made The Caledonian Registered clock. For a long time it was thought that the Caledonian Registered clock was the product of an enterprising Scotsman who imported an American movement, put it into an English or European case and then exported it to expatriated Scots living in Canada, England and other areas with larger Scottish populations. The name Caledonia was the Roman name for Northern Scotland and then became the poetic name for all of Scotland. It was thought that this enterprising Scotsman was playing to the emotional attachment of those living away from their homeland.

The movement definitely appears to be American in manufacture, but no hard evidence has come forward to support this notion. The prevalent theory now is that it is a product of an English manufacturer copying the American style. Some evidence even points to Chauncey Jerome and the New Haven Clock Co. as the maker of the Caledonian Registered clock movement that was then fitted to a European case.

I can, however, venture a guess that your clock was manufactured somewhere between 1875 and 1895. I would think that a clock in a case like yours would use a lyre pendulum; and there is some evidence in the literature to support this conjecture.

*David A. Christianson,
Technical Editor*

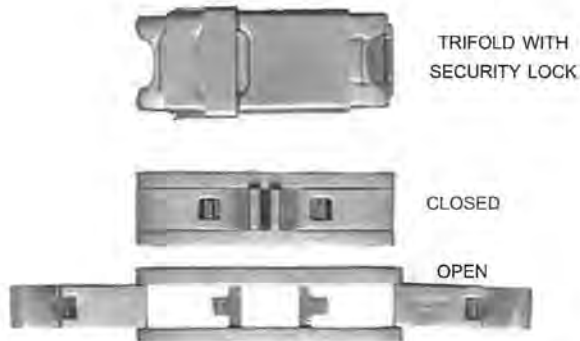



Borel

For the Latest in Watchmaker's Tools, Parts & Supplies

Borel

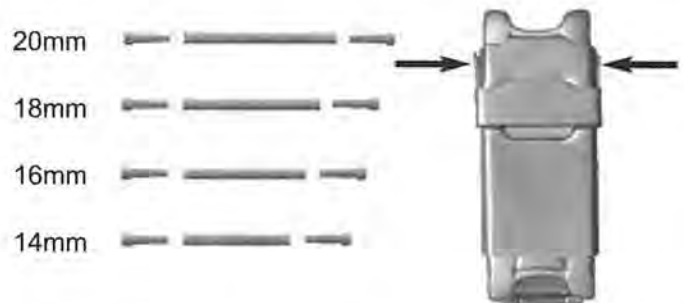
New Stainless Steel Trifold & 'Butterfly' Buckle Assortment



Contains 12 pieces, one each of the following;
10, 12, 14, 16, 18, & 20mm trifold buckle w/security lock,
12, 14, 16, & 18mm trifold buckle without security lock,
8, & 10mm butterfly deployment buckle.
Comes in a 12 compartment plastic box. 
All types & sizes are available individually.

#18A-270 12 pc. Buckle Asst. \$ 28.40

New Rivet Pin Asst. for Tri-fold Buckle Safety Locks



This new 120 piece assortment of rivet pins for divers buckle safety locks contains 10 sets each in sizes 14, 16, 18, and 20mm. End pieces push into center tube, friction fitting into place. Comes in a 4 compartment plastic box. Refills available.

#AC1420 Rivet Pin Asst. \$ 13.95

Case Wrench for Bulova Accutrons

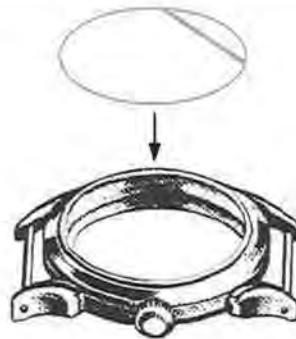
NEW



Easy to use, specially sized case opener for Bulova Accutron 214, 218, & 219's. Also fits most men's Accutrons & other 29mm notched case backs. Nicely made knurled tool is made in USA.

CO-ACC22 Case Wrench \$ 24.95

Watch Protecting Pads



Provide protection for your watches with these easy to apply clear plastic covers. Saves your watch crystal from scratches, dirt, & dust. 100 self-adhesive, transparent, protective round pads per package. Available in three sizes; 20, 28 or 34mm diameter.

<u>Stock #</u>	<u>Diameter</u>	<u>Price</u>
TA-M620	20mm	\$ 6.00/pk
TA-M628	28mm	7.00/pk
TA-M634	34mm	8.00/pk

Borel

Jules Borel & Co.
1110 Grand Boulevard
Kansas City, MO 64106-2348

Order Desk 800-776-6858
Order FAX 800-776-6862
Local 816-421-6110

Borel



J.M. Huckabee,
CMC, FAWI, FBHI

Ask Huck

The Watchmaker's Lathe for Clock Work

Question

What do you think about the watchmaker's lathe for the clockmaker?

Answer

I have some strong opinions on this subject. That is because I have six lathes: five trade names with bed lengths from 10 to 15 inches long, and with ball, steel, and bronze bearings. These are in four general construction types, and three collet-size types. Also, the accessories are essentially everything known to fit one of these machines.

Here is the bottom line—for the clockmaker, the watchmaker's lathe is hard to beat. I like the Mosely or WW style bed with tailstock. The 10-inch bed is a little short, but not bad. Collet sizes in the range of 20-64 are very useful.

Lathe work for clocks pulls heavy, use a non-elastic belt on the large pulleys. You will need lots of simple accessory items. Make them yourself. The real time-savers are unknown in the outside market.

Question

Do you recommend a countershaft for the watchmaker's lathe for clock work?

Answer

That depends on your personal choice, and the type of motor you use. I consider lathe spindle speeds above about 2,500 RPM to be of little value in clock work. Speeds with moderately high torque at 100-500 RPM are often needed. Most motors original to the watchmaker's lathe top out around 5,000-8,000 RPM. That means that their pulling ability at low lathe spindle speed is poor, which makes a countershaft very desirable. However, a countershaft causes start and stop times to increase. In serious lathe work you may start and stop a hundred times per hour. Productivity demands the shortest possible start and stop times.

I don't even own a foot rheostat. My lathes all have constant-speed motors with an on/off switch.

On the other hand, I recommend that you use what you have available and strive for time efficiency in all your lathe work. It's a very interesting facet of clockmaking.



THE AWI-ELM CHARITABLE TRUST

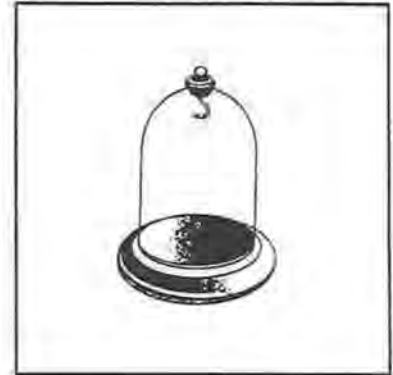
*Your donations support the education of the
watchmakers & clockmakers of the future.*

Pocket Watch Domes:

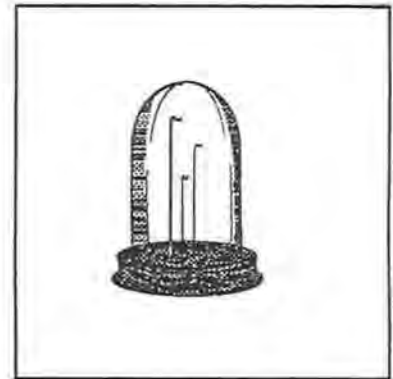
WT940.340	3 x 4 Oak	\$ 9.95
WT940.342	3 x 4 Walnut	\$ 9.95



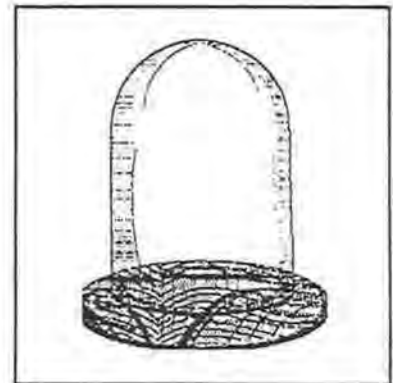
WT940.344	3 x 4 Oak	Top Hook	\$14.95
WT940.346	3 x 4 Walnut	Top Hook	\$14.95
WT940.348	3 x 3 Brass	Top Hook	\$19.95



WT940.470	4 x 7 Oak	1-Hook	\$14.95
WT940.472	4 x 7 Walnut	1-Hook	\$14.95
WT940.474	4 x 7 Oak	2-Hook	\$18.95
WT940.476	4 x 7 Walnut	2-Hook	\$18.95
WT940.480	4 x 8	w/o Base	\$18.95



WT940.511	5 x 11 w/o Base	\$19.95
WT940.512	5 x 11 w/ Base	\$24.95



Gaber & Company - Pittsburgh, PA

800-792-2820

Phone

800-322-8331

Fax

gabertools@AOL.com

E-Mail

www.gaberco.com

Web Site

Profile: The Chelsea Clock Company

Chip Lim, CMC, CMW, CMEW

“The reports of my death are greatly exaggerated.” This chestnut of Samuel L. Clemens could equally describe the almost daily response from employees at the Chelsea Clock Company (CCC) when people in the trade as well as members of the general public discover that they are still in business. Founded in 1897, the same year that the March King, John Philip Sousa, composed the “Stars and Stripes Forever!”, the CCC has weathered the Great Depression, four owners, two floods, one fire, the quartz timepiece revolution and the U.S. Luxury Tax, emerging as one of the few remaining American clock companies still domestically manufacturing a



Four-jewel Chronoquartz movement.



Wheel hobbing.

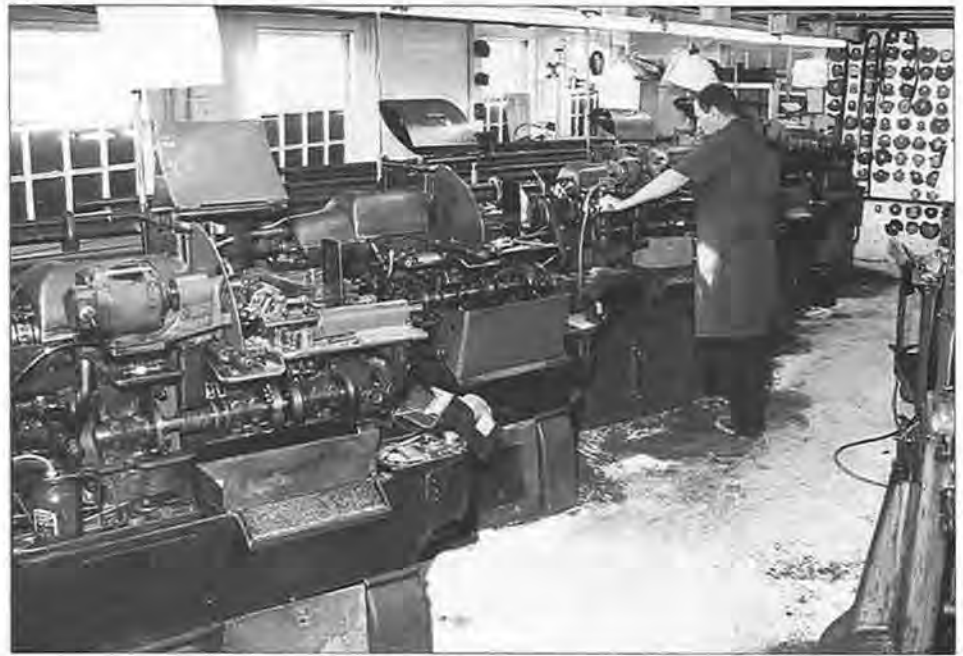
complete line of clocks. Their signature product continues to be the seemingly indestructible 8-day spring-wound ship's bell clock which was patented at the turn of the last century.

The 35-employee firm does not release sales figures, but the total number of pieces produced this year, both mechanical and quartz, is expected to be about the same as Patek Philippe. Like the latter, all movements with serial numbers are recorded by sales date and customer. It might be interesting to note that from 1897 through December, 1997, this information was entered by hand in hardbound ledgers. Post-1997 movements are now entered into a computerized data base; documenta-

tion of any subsequent maintenance completed during return factory visits is also annotated.

Manufacturing, sales, service and administration all occupy the original two-story red brick building erected by founder Joseph Eastman in Chelsea, Massachusetts, northeast of Boston. The author chose not to navigate Boston's leviathan Big Dig roadway construction project during his visit, instead relying on a more commuter-friendly alternative—the orange “T” line with a transfer to the #112 bus from the Wellesley station stops within one block of CCC on Everett Avenue.

Two-thirds of the 400-plus individual components in the ship's bell clock are made in the basement, a mix of old and new world machinery and processes. Purchased components include unfinished Pennsylvania-forged brass cases, hardwood bases from the Carolinas, Swiss-made platform escapements and Hermle movements for the popularly priced Shipstrike series. The brass dials are hand-silvered; hobbled teeth steel pinions and brass wheels, rather than the stamped out variety, are utilized. Steel screws are blued and brass plates are line finished and lacquered. Moving brass parts are sent out to be gold plated (for oxidation resistance). To achieve the desired degree of finish and structural integrity, a “raw” 8½ inch diameter dial forged brass case, as received from the foundry, has a mass of 28 pounds. After machining, it weighs 10 pounds. In the mid-1990s the Greater Boston Manufacturing Partnership (GBMP), a non-profit engineering and manufacturing cooperative funded by the National Institute of Standards and Technology (NIST), was enlisted to study and recommend improvements to the labor-intensive production processes at CCC. Members of the GBMP include the University of Massachusetts, MIT, and Northeastern University. With the subsequent adoption of automated (CNC) machinery, as much as a 60% increase in productivity has been realized. Jobs that formerly took three weeks to com-



Bob Eaton at Brown & Sharpe screw cutting lathe.

plete can now be done in as little as one week. Three CNC machines and a cadre of semi-automatic Brown and Sharpe and Swiss-made screw cutting lathes run on a shift-and-a-half basis

throughout the week to supply production requirements. Case polishing machines, a spray booth and behemoth 50 and 45 ton metal presses occupy the remainder of the production space.



Bhupat Patel checks a barometer against the reference standard.



Second generation Chelsea employee Margaret King.



Tillie Arsenault, Repair Department Manager, with movement record books and mentor John Mulloy.

Richard Leavitt has been the President of CCC since 1978 when he purchased the company from the Bunker Ramo Corporation. Formerly with the accounting firm of Price Waterhouse, he sees the two biggest challenges during his tenure as being the integration of new technologies of the industry, previously highlighted, and the rejuvenation of the U.S. retail network. CCC presently does not have any overseas representatives, and immediate plans do not include expansion into this market. The emphasis is currently on implementation of an e-commerce network tying its 740 accounts to the inhouse sales department. This program, whose goals are to provide "High Quality Brass Gifts At The Best Price Point," optimize inventory and provide just-in-time delivery of a range of almost 50 different products, was undergoing testing this past summer and should be fully

on line by year's end. Lisa Polidoro, Direct Account Manager, related that the company has experienced consistent double digit growth during the past few years, and is regularly setting new sales records. She estimates that 60% of sales are in the Northeastern region.

A project that Mr. Leavitt is particularly proud of is the reintroduction last year of the 8½ inch diameter dial ship's bell clocks, which he affectionately refers to as "my SUV collection". Like the sensation that George S. Parker created when he introduced the oversized Duofold fountain pen, it appears that "bigger is better" is back in style. Out of production for over 20 years, and under redevelopment by the foundry for over a year, a commemorative Millennium series of 1000 pieces was originally planned (the largest size normally produced has a six-inch diameter dial). Interest and demand has been so great

for this edition that three additional 8½ inch dial models have been added to the regular product line.

An avid *HT* reader, Mr. Leavitt regularly reads Mark Butterworth's column "The Modern German Clock Movement". He noted with interest the reference to the great number of clocks in the marketplace that are/will be in need of service, and like a true businessman, wondered how CCC might be able to tap into this area. Sounding like a potential member of the AWI Industry Advisory Board (IAB), he mentioned that he would like to explore the possible formation of an alliance to train and promote clockmaking in both the manufacturing and after sales service disciplines. Up until recently the CCC service department has had two second generation clockmakers on staff. Just moments before this article's press deadline, this writer learned that one of



Richard Leavitt, President.



Completed clocks ready for shipment.

them had left the company earlier in the week. Should any readers know of a clockmaker who might be interested in a position in the repair and restoration or manufacturing sectors at a dynamic small company, I am sure that Mr. Leavitt would appreciate hearing from them.

The repair department of CCC accounts for approximately 25% of the firm's revenues and has had a web presence since November, 1997 (URL: <http://www.chelseaclock.com>). The site provides an overview of services offered, answers frequently asked questions (FAQs) and provides contact information. Tillie Arsenault, Manager of the Repair and Parts Department is the person whom many of us are likely to have contact. Like most employees at CCC, Tillie wears many hats (often simultaneously). She oversees the receiving of as many as 50 timepieces

delivered for repair daily, sends out estimates, handles telephone inquiries and correspondence from the web page and other sources, tracks the progress of repairs, researches parts requests, and in her "spare" time has begun to transcribe the handwritten movement ledgers into the electronic database.

An average of 75% of repair estimates are accepted, and complete clock restorations have been running about one quarter of the jobs. There continues to be a healthy backlog of clocks awaiting service, everything from early pendulum regulators to quartz timepieces. Mechanical movements are completely disassembled, ultrasonically cleaned, pivots and bushings are inspected for wear and polished. Mainsprings, now prelubricated stainless steel, are installed as received. Whether it is a newly-manufactured movement, or one completing periodic service, all

Chelsea clocks undergo a two-week test period—one week out of the case, and the last fully cased. The daily deviation is noted, and corrections are made as required. A tolerance of ± 60 seconds per week is uniformly applied to all movements irrespective of age, and it is a rare specimen that fails to be at least one order of magnitude better. And what lubricants does CCC use? Perhaps not surprisingly, natural oils from Moebius: 8000 for the escapement, and 8040 for the train. The few remaining carbon steel mainsprings are wiped down with Dow Corning Molykote® (molybdenum disulfide).

Spare parts seem to be a perennial hot button issue. CCC is not adverse to supplying replacement parts; however, much of the spare parts inventory for early movements was lost during a 1978 fire that started in a neighbor's garage and spread to the detached storage

room. Components for post-1940 models can often still be supplied. Should one find themselves checking on parts availability, it is helpful to have the movement serial number handy to verify the part effectivity. And, for reasons listed above, Tillie kindly requests a little of that commodity that

is abundantly endemic to our profession—patience.

Nowhere is the subject of effectivity more applicable than with escapements. There have been over 50 variations used over the years, having been upgraded from 7 to 11 jewels, single to double roller table, and are now

equipped with Incabloc® shockproof devices. One thing has remained constant, however: they have all been a standard 18,000 beats per hour (bph). In the past there had been some discussion to increase the frequency, but the conclusion was “Why change a proven design?” The first escapements were made by the American Waltham and E. Howard Companies. This was followed by a succession of German- and Swiss-made platforms. The author still has fond memories of cutting his first balance staff (it only took two tries!) for one of these platforms after discovering that they were not listed in the Bestfit® catalog. I later found out that page 634 of *Military Timepieces* contains a chart of balance staff dimensions for some time-only models.

A discussion of modern escapements would not be complete without at least a mention of the often less-than-harmonious marriage CCC has experienced with the German Hermle Shipstrike movements and the Swiss platform escapements (which are a completely different type than those used in the ship’s bell movements). Bhupat Patel, Manufacturing Movements Manager, is keenly aware of this situation and has been diligently working with both parties to try to improve reliability. Until this is resolved, hopefully in the near future, older metal escapements can be serviced; plastic units should be replaced.

For some, a permanently engrained image of the definitive Chelsea clock is a black phenolic cased 8-day marine model. During the years of World War II when CCC’s entire production went to the war effort, over 100,000 of them were made. Today, sales of these time-only units has steadily declined to less than 1% of production, most are government orders. For those interested in a treatise on Chelsea marine, boat and deck clocks, which includes parts and serial number lists and the synchronization procedure for the ship’s bell model, chapters 9 and 10 of the late Marvin Whitney’s work *Military*



Final assembly.



The often overlooked crew of the shipping department.

Timepieces, available from AWI, is recommended reading.

Quartz timepieces in general have never been able to shake the public's perception of being low quality. Conceived in 1984, the *Chronoquartz* series attempted to challenge this notion. In characteristically robust CCC construction, the 2½ inch square movement has line finished and lacquered 1/16 inch thick brass plates held together with blued steel screws. Gold plated, cut brass wheels and hardened and polished steel pivots comprise the train in this four jewel movement. Its 32.768 kHz timebase with one-second step motor operate on an AA size battery for at least a year with stellar accuracy. Offered in the \$275-\$550 price range, sales over its ten-year production was a disappointing 500-600 units, and it was phased out in 1998. Bhupat Patel, one of the movement's staunchest promoters, was disappointed at its demise. He hasn't given up hope though that someday there will be a market for a repairable, non-plastic quartz movement. What do you readers think—is the public now ready for an American-made high-grade quartz clock?

A company's greatest asset is in its employees. From the reigning (and camera shy) Gladys Niestepski, whose tenure is more than half of the company's existence, to the newest employee, one senses a certain pride in craftsmanship throughout the 103-year-old facility. Space does not permit the retelling of the numerous anecdotes collected from staff members such as Jean Yeo (pictured on the cover), second generation employee Margaret King, or Bob Zagarella or Bob Eaton (two of the "five Bobs") during this correspondent's visit. As always, any readers wishing to experience some of this enthusiasm firsthand are welcome to visit CCC (it is best to call ahead). Additionally, I am told that Andy Demeter, Chelsea historian, is close to publication of a definitive CCC history.

As Richard Leavitt remarked: "The company's future is bright, and it has

come full circle in being able to offer a full product range, a concept which (second owner) George Pearson developed during the first part of the (20th) Century."

Chelsea Clock Company
284 Everett Avenue
Chelsea, MA 02150-1598
Telephone: (800) 284-1778
(617) 884-0250
<http://www.chelseaclock.com>

Photos by Chip Lim



Case polishing.



Rough and finished forged brass cases.



Fred S. Burckhardt,
FAWI

Rock Quarry

Eight Steps to Success for a High-Class Store

1. BE HUMBLE

Never act like you are better than the customers. Humility is a trait shown by a lot of humble people, none of whom are watchmakers and clockmakers. It is difficult for some to show humility, especially those who are truly great - like a lot of watchmakers and clockmakers. Be on constant guard not to let people know how wonderful you are. As an old sage once said, "Humility has its place and as long as it stays there, everything will be okay." This is why you don't see many old sages around anymore. They've all been ground up to use in poultry dressing.

2. BE DIGNIFIED

This includes not picking your teeth or dipping snuff while waiting on a customer. Snuff dipping isn't too bad as long as you don't drool a lot, in which case never wear a pastel colored shirt. Dark brown would be more suitable.

Also, never make a fool of yourself in front of a customer, like dancing on the show-cases, a la Gene Kelly musicals. If you must dance; at least do it with a little dignity (Looking back, did you ever notice how the music came out of nowhere and stopped when the dance was over? Very tricky!)

3. DRESS APPROPRIATELY

For example, a pretty dress or a skirt and blouse look nice, particularly on the female employees. Striped anklets worn with high heels are out. If you wear them with bright yellow jodhpurs it's all right, unless you are too heavy (fat) because this outfit could make you look like a taxi going down the street with both doors open! Cowboy boots are okay as long as you've cleaned off any remaining cow chips. For those of you from the city, cow chips are round things

left by cows all over the pasture. When they dry out, you can throw them like a Frisbee. One word of advice, be sure they are dried out completely.

Shirts open clear down to the navel, exposing three or four pounds of chest hair should not be worn in a high-class jewelry store, especially if you are a female employee with a hairy chest; or if you are a female employee with no chest; or if you are a male employee with no hair on your chest; or if you are a male employee with a chest like a female.

Never wear clothes that appear to be too pompous. Casual dress is fine, like a sport jacket with a scarf, sunglasses and a gold cigarette holder.

4. KNOW YOUR MERCHANDISE

Getting to know your merchandise is a lot more fun than getting to know some of your customers. But don't get too friendly with it or you'll hate to see it sold. As we all know, if you don't make any sales, you won't make any money. If you don't make any money, you'll end up in financial trouble, which is called bankruptcy. The bright side is, the attorney that handles the bankruptcy may take in payment some of the jewelry you hated to see sold, which caused you to get into this predicament in the first place.

5. DON'T GET TOO TECHNICAL

Most customers are not too interested in the critical angle of a Topaz or how fast a quartz crystal vibrates or in what key a gent's tuning fork hums. Save this valuable information until you are asked. When a customer starts to yawn, it means it is time for you to cease with the "pearls of wisdom" and get down to the business of making a sale.

6. RECOGNIZE AUTHORITY

Some personnel are not authorized to become authoritative. On the other hand, some act as though they are an authoritarian, which is entirely different from being an author. This should make things more clear for you. To put it in more simple terms, pay attention to what the boss says or you may be on the outside looking in!

7. COFFEE BREAKS

If you start work at 9:00 a.m., do not take a break until at least 9:30 and then don't take more than 45 minutes or it will interfere with your 10:30 coffee break, which you take you up to your lunch hour. During the afternoon, don't take more than four or five coffee breaks or the boss may say something about it. Keep one thing in mind, at today's coffee prices, do not go around breaking too much coffee. A lot of little pieces of coffee laying all over the place won't look nice and it will cut down on the profit sharing.

8. KEEP SMILING

Not only will this make the others wonder what you are up to, but it will disguise what a rotten day you are having. Always remember, regardless of how rotten things are today, tomorrow will probably be a lot worse.


MAINSRING ASSORTMENTS

White alloy pocket watch mainspring assortments in partitioned plastic boxes with charts.

	
ELGIN MAINSPRINGS	
1 dozen most often used sizes from 16-0 size.	
039335	\$32.50 asst.
WALTHAM MAINSPRINGS	
1 dozen most often used sizes from 18-0 size.	
039336	\$32.50 asst.
HAMILTON MAINSPRINGS	
9 most often used sizes from 18-0 size.	
039337	\$24.40 asst.
ILLINOIS MAINSPRINGS	
1 dozen most often used sizes from 18-0 size.	
039338	\$32.50 asst.
ASSORTED MAINSPRINGS	
Contains 1 dozen most often used Hampden, New York Standard, & South Bend mainsprings.	
039339	\$32.50 asst.

S. LaRose, Inc.

3223 Yanceyville St. • PO Box 21208 • Greensboro, N.C. 27420 USA
 Tech, pricing, & account info: (336) 621-1936 • Fax: (336) 621-0706
Orders only Toll FREE 1-888-752-7673
 Toll FREE Fax: 1-800-537-4513
 E-Mail: orders@slarose.com
www.slarose.com



S. LaRose, Inc.
 1-888-752-7673 • FAX: 1-800-537-4513
www.slarose.com
 Email: orders@slarose.com



BALZER FAMILY CLOCK WORKS

*Tower Clock Specialists
Manufacturing & Restoration*

We would like to thank all of you who have referred our name to potential tower clock restoration and manufacturing projects. Your efforts have contributed to a very busy year and we truly appreciate your support. We are currently involved in two E. Howard street clock restoration projects for the City of Boston. The two dial clock, still illuminated by gas, was literally disassembling itself. The four dial clock was designed by a local architect, which explains its unconventional style. We are in the middle of a restoration and manufacturing project for Hampton University, Hampton VA. We love these projects as it is the conversion of a failed electrified E. Howard timepiece back to the original weight driven, pendulum regulated mechanical operation and with the addition of our weight driven mechanically programmable chime unit. We restored and installed the four cast iron dials in October. Our thanks to "Clockworks" Will Rehea of Virginia Beach for all his help.

For photos of these projects see www.balzerclockworks.com "Current Highlights".

*1 Lady Slipper Lane
Freeport, Maine 04032*

www.balzerclockworks.com

207-865-3887



Mark Butterworth,
CMC

The Modern German Clock Movement

Movement Identification: Franz Hermle & Sohn, Part 9

One of the calls that a supply house least likes to get is “you sent us the wrong part (or movement).” Of course, the customer is always right but occasionally the customer received the wrong part because he/she did not supply the complete and exact information to the material house. Quite often they do the equivalent of saying “send me a crystal for my watch” without any information about the watch or the crystal. This is made worse by the fact that the order is often made by telephone. There is something about putting an order in writing that forces a person to think more precisely. This is a far cry from the time when my father and grandfather would get out the Swartchild or Swigart catalogue and specify on a postcard the exact manufacturer, model number, grade, part number, and name of a watch part they were ordering.

The six- or seven-digit number plus the pendulum length (cm #) plus included letter, if any, that Hermle uses on their units in 95% of the cases uniquely defines the engineering execution of the unit. These numbers and letters are critical as there have been changes in which the movements as a whole usually interchange but the internal parts do not always do so if the execution number is different. Your supply house should know the interchangeability if you correctly supply all the correct information.

Each of these numbers and letters is a code and together they specify: plate size and shape, winding arrangement (spring, chain, cable), train number (1, 2, or 3), Westminster or triple chime if three train, hammer arrangement, whether the striking/chiming is on bell, rod, or tube, handshaft length, whether pendulum, balance, or platform balance, beats per minute, if pendulum, whether the unit has a seconds hand, if the suspension bridge is high on an “A” frame or directly on the plate itself, and whether it is front or rear wind.

I think you can see from all of this that getting a number or letter wrong or omitting one is going to make a difference between getting the proper or improper part or movement.

Following is a chart which I hope you find interesting in “deciphering the Hermle.” Very fortunately Hermle has used the same code intact for nearly 40 years with very few exceptions.

As an example, in the number 1051-030A:
The “105” indicates plate size of 120 mm x 120 mm and that it is triple chime.
The “1” directly to the left of the “-” indicates pendulum execution.
The first “0” past the “-” indicates that it is spring driven.
The “3” indicates a side hammer arrangement.
The last “0” on the right indicates a handshaft length of 33 mm.

The letter “A” indicates that the hammer arrangement has been modified from the original execution and now starts on the middle of the side instead of the bottom of the side and that the internal parts do not interchange.

In addition, if the number underneath were as in the second example of $\frac{94\text{cm}}{66}$,

then the 94cm indicates the approximate pendulum length in cm measured from the suspension point to the tip of the pendulum and the 66 the number of beats per minute.

Of course there have been a couple of changes over the years to make life interesting. The 150 and 151 series (as in 151-030) were 7-day units and have been dropped. This old series has been replaced by the 140 and 141 series. This is an example in which the movements look the same and the new one will fit exactly

(Continued on page 16.)

DECIPHERING THE HERMLE

Hermle uses a 6- or 7-digit number code to designate whether it is spring, chain, or cable driven, the plate size, hammer arrangement, and the hand shaft length.

Example: 341-021
1051-030
A B-CDE

A: The series number which determines plate size, and how it is driven.

130	ROUND WITH 90 mm plates always time and strike.
140	PLATES 85 X 98 mm. 14 day T/S.
150	same except 8 day
240	same as 140 except weight driven
260	PLATES 87 X 87 mm. Always weight driven w/chains.
340	PLATES 100 X 100 mm. Spring wind Westminster.
350	PLATES 120 X 120 mm. Spring wind Westminster.
451	PLATES 120 X 120 mm. Weight driven Westminster.
461	PLATES 140 X 200 mm. Weight driven Westminster.
471	PLATES 152 X 220 mm. Weight driven Westminster.
1050	PLATES 120 X 120 mm. Spring driven triple chime.
1151	same size Weight driven triple chime.
1161	PLATES 140 X 200 mm. Weight driven triple chime.
1171	PLATES 152 X 220 mm. Weight driven triple chime.

B: 0 Indicates balance called floating.
1 Indicates pendulum.
2 Indicates platform balance as in ship's strike.

C: 0 Used for both spring and chain drive.
8 Used for cable drive.

D: 1 Indicates bottom hammer bim_bam.
2 Indicates bottom hammer all other. Except 130 series.
3 Indicates side hammer.
4 Indicates back hammer on gong.
5 Indicates separate back hammers for chime and strike.
6 Indicates single set back hammers at 45 degrees.
7 Indicates back hammer on bell.
8 Indicates top hammer.

E: 0 Indicates hand shaft length 33 mm.
1 Indicates hand shaft length 27 mm.
3 Indicates hand shaft length 53 mm.

NOTE: On older units 7 in the "C" code indicated calendar.
On older units 7 in the "D" code was used for both bell and gong strike.

The Back Plate:

77
HOWARD MILLER
1161-853
94cm
66

Wheels used in the 140, 150, 241, 351, 1051, 1151 series are interchangeable with 23 listed combinations.

the same in the case but the barrels and second wheels were changed to create a 14-day unit. We prefer not to tell the customer that as it does not always run the full 14 days and the customer forgets which week he/she wound the clock, but it does insure it runs the full 7 days.

In addition a "7" in the "C" code (the first number to the right of the "-") indicated a calendar unit. A calendar is now indicated by the letter "K" (for Kalendar if you are German) at the end of the number so that a 141-730 is now a 141-030K.

Also, a "7" in the "D" code (the second number to the right of the "-") used to indicate both a bell and gong strike. The "7" now indicates only a bell and a "4" is now for a gong strike. This change more uniquely identified the unit.

One great price advantage that Hermle gained over other manufacturers was due to the fact that there was more part interchangeability between the different series than with any other manufacturer in terms of the internal gears used in the various trains.

Executive Director's Update

(Continued from page 2.)

year with great success. He has also spent time under President DeCorte's tutelage working on repeaters.

What I'm trying to say is... AWI has two very talented instructors at our members' disposal. Both instructors are very eager to help you improve your skills, therefore improving your ability to make a living. I am not aware of any place else in the country where you can have this level of instruction at such an affordable price.

Last month I said that I was re-dedicating my efforts to make the Bench Courses work for our members again. I also mentioned a page on our web site that will allow you to vote for the courses that you would like to see in your area. This is now in the works. In the meantime you can refer to the list of courses that we have available on page 51, and contact me with your choices, or even suggest new ones. Marilyn Bunch (ext. 303), our Education Coordinator and I will do the best we can to get the courses that you desire scheduled for you.

For information purposes I want to let you know that after you attend one of AWI's training programs or pass one of AWI's Certifications including recertification, you may request that a press release be sent to your local newspaper with the details. This is a good way to get free publicity for your business. All you have to do is provide Marilyn with the proper contact information for your local newspaper.

We are in the process of developing a new Introduction to the Watchmakers Lathe course. There seems to

As an example, the internal wheels used in the following series are interchangeable with each other:

Series 130, 131, 261

Series 140, 141, 241, 351, 451, 461, 471, 1050, 1051, 1151, 1161, 1171.

The only exception in this series is that the second wheels for the spring wind do not interchange with the chain and cable wind. The interchangeability in this series allows Hermle to produce 23 different pendulum length units in literally hundreds of different execution possibilities from the 11cm mantle unit to the 114cm second beat pendulum by changing only three wheels.

I suspect that this is more than you possibly could want to know about the Hermle numbering system but to me it is an engineering marvel.

The next installment will deal with Urgos.

Final thought: *A man could live comfortably in his old age if he could sell his experience for what it cost him.*

-Anonymous



be a lot of interest in this program. Stewart Lesemann (ext. 309) is working on this in a one-day, two-day, and three-day format.

We have some more videos in the works. I hope to be able to advertise a video by Charles Cleves on *Identifying Fake Rolex's* on the envelope of next month's *HT*. Mr. Cleves is an expert in this field, and he has several different examples of fakes which the viewer can compare to a genuine Rolex. The editing is being done on a video of *Antique Horological Tools and Their Purpose*. This should also be an excellent video when completed.

If you haven't heard, the AWI books, *Questions and Answers of and for the Clockmaking Profession* and *Questions and Answers of and for the Watchmaking Profession* are available. Now you have the option of buying the material and putting it in your own three-ring binder in order to save a few dollars, or we can provide the binder for you. This will allow the Certification Committee to update the material faster and easier. When an update is completed you will only have to purchase the new material in order to keep your book up to date.

Work is continuing on a book by Archie Perkins. I know many of you have wondered when a book by Archie would be available. We hope sometime in 2001.

We are also in the process of developing display ads for the *HT* that will remind longtime members and inform new members of the many benefits that AWI has to offer.

There is a lot of activity at the Institute on a daily basis. If you want information on anything that I didn't touch on here, feel free to contact me at AWI.



NOMINATIONS FOR HONOR AWARDS

The AWI Honor Awards Committee would like to receive nominations for the "Fellow, American Watchmakers-Clockmakers" award. This award is conferred upon an individual who has enriched the field of horology by outstanding and meritorious contributions on a national or international level.

The committee would also like to receive recommendations for individuals who should be recognized for outstanding achievements or accomplishments in watchmaking or clockmaking.

Nominations or recommendations should include a brief background on the individual, along with details of the reason for recognition. They may be submitted to Ewell Hartman, Chairman; Daniel Fenwick; or Glenn Gardner, c/o AWI. They must be received by March 31, 2001.

Gasket Assortments Gasket Assortments Gasket Assortments

105 PIECE GENERIC CASEBACK GASKET ASSORTMENT TO FIT ROLEX®

3 ea. of 35 sizes.
Flat and O-ring.

GRG-2 list ~~\$65.95~~.....\$59.95

REFILLS AVAILABLE!

3/\$3.95..... 6/\$5.95.....12/\$9.95



BERGEON

FLAT RUBBER CASEBACK GASKETS

Popular Asst

2 ea. of 30 sizes

6630.....\$29.95

Master Asst

2 ea. of 60 sizes

6630-120 list ~~\$76.50~~.....\$59.95

REFILLS AVAILABLE!

3/\$3.00..... 6/\$4.00.....12/\$6.00

For waterproof watches.
Sizes from 15-37mm.



TWIN CITY SUPPLY

2230 Edgewood Ave. South
Minneapolis, MN 55426-2823

(952) 545-2725 FAX: (952) 545-4715 USA: 800-328-6009 FAX: 800-328-6001

Check us out on the web
www.twincitysupply.net



Jack Kurdzionak

From the Workshop

You Are Invited

Do you have a solution to a watch or clock repair problem that you want to share with our membership? Do you have a question about a repair problem you would like to ask? I invite you to participate in this column with your suggestions, questions, and comments. It's easy. Just e-mail me at AWI <magazine@awi-net.org> or write using the old standby known as the postal service. You can even fax me at 513-367-1414. I will do my best to help you help the membership. By sharing your questions and suggestions all of our members can benefit from our combined knowledge and experience.

Power Supply Part 3

Part 1 of this series covered the replacement of the mainspring. Part 2 discussed barrel repair or replacement. In this, the third and final installment, we will examine a few other power supply faults.

Watch for damaged barrel teeth, particularly when the mainspring has broken near the inner end. If this occurs when the watch is fully wound, the broken mainspring instantly releases its stored energy to the barrel as it attempts to drive the train backwards. In doing so it often damages the barrel teeth as well as some train wheels. Many early American watches were fitted with safety barrels or special center pinions to prevent this damage. Modern watches are not protected against this damage. Watchmakers must always examine the barrel teeth whenever replacing a broken mainspring in any watch. An excellent example of this situation is the Zenith caliber 30.5 also known as the Omega 625. This model seems to be particularly susceptible to barrel damage when the mainspring breaks. Check every one of these barrels. Someone else might have overlooked this fault.

Check for worn barrel teeth using your strongest loupe or even your Accutron microscope. Barrel teeth can wear on the tooth faces that drive the center wheel. I have seen this fault frequently on the Girard Perragaux caliber 31 also known as Zodiac 70 and its derived calibers. These watches are now over 30 years old and beginning to show their age. Barrels with worn teeth will not provide sufficient power to the movement.

The barrel arbor holes in the barrel bridge and the pillar plate can also cause power supply troubles. These holes should be closely fit to the barrel arbor to allow minimal side and end shake. Replacing the bridge is the best repair for worn holes in barrel bridges. Some bridges are fitted with replaceable bushings. These bushings can be replaced when worn. Installing a bushing can repair a worn bridge that has sufficient thickness to hold a bushing. Sadly, many bridges come to the watchmaker that have been hammered, distorted, or punched so that any attempt at repair is fruitless. These bridges must be replaced.

Do not ignore a worn barrel arbor hole in the pillar plate. Repair it by fitting a bushing to the hole. Ignore worn holes in the plate and bridge and you will have a watch with power supply problems. These two points of wear are so important that Rolex, along with several other manufacturers, has them fitted with replaceable bushings on many of their models.

The power supply for a watch is where it all begins. To assure yourself of an excellent repair, please replace the mainspring on every watch you overhaul. Repair or replace every worn mainspring barrel. Repair or replace every worn barrel bridge. Repair every worn barrel arbor hole in the pillar plate. Check and adjust, if needed, the shakes of the arbor in the barrel and between the plates. A watch with a dependable power supply will be a reliable timekeeper with a happy owner.

Jack Kurdzionak

Small, But Very Important

Every battery-powered watch requires some kind of electrical insulator made of non-conductive material to prevent short circuits between the negative cell connector and the positively charged plate. Any short circuit between these two parts will prevent the watch from running and also discharge the cell in a few seconds. These insulators are very thin (.05mm) and easy to lose, as they will attach themselves to any surface with a static electrical charge. They easily fall out of a movement when a cell is changed and can be nearly impossible to find on a floor.

Manuel J. Yazijian of Montreal has seen a number of watches come to his bench with missing insulators and phoned me recently to share his solution. When he doesn't have a genuine factory insulator available he has substituted the small circles of paper waste from a common paper punch. The punch makes a 6.5 mm circle of paper that will fit under the negative cell connector of many watch movements. Manuel reports that he has used them successfully as an acceptable substitute for the original plastic insulators when the originals are not available.

A Clean Sweep

This suggestion from our own shop is designed to help you spend less time on the floor. Every experienced watchmaker has spent part of his life on his hands and knees searching the floor for parts he has lost. It is said that if he hasn't done this, he really hasn't done any watch repairing. Every watchmaker has not only searched for missing parts but has sought an easier way to help locate those parts he has dropped to the floor. Our solution is rather simple. We squeegee the floor with a commercial type, 18-inch wide squeegee. This is not a window washer's squeegee but rather one designed for removing water from a floor. Instead of removing water we use it to help search for missing parts. It works very nicely on a smooth floor surface. Our technique is to use the squeegee to pull all of the lost parts, dirt, and anything else on the floor to one area. Then the accumulated pile of stuff can be examined in the hope of locating the lost part. See the accompanying photo. Unfortunately, this method does not work well on a carpet.

Jack Kurdzionak



The squeegee collecting some spilled minute wheels.

Your One-Stop Supply Warehouse

Order on the WEB at:
www.blackforestimports.com

Free
 Call for a Catalog Today!

(800) 824-0900

22865 Savi Ranch Pkwy., #D • Yorba Linda, CA 92887
 Fax: (714) 282-9115

Livesay's

Inc.

Wholesale Jeweler & Watchmaker Supplies
 Since 1969

3-in-1 Watch Analyzer

An all in one unit that tests gear train, watch batteries and coils! Before opening the watch you can determine if a problem is electrical or mechanical. Once the case is opened, you can test the battery and the coil. Easy to operate and a great value. It helps take the guess work out of repair estimates.

New!!

Stock #599.400

\$89.95



Now You Can Test:

- Gear trains
- Batteries
- Coils

All with one piece of equipment!

New Items!

Hard to obtain and obsolete watch material now available. Supplies are extremely limited, so act now!



Description	Caliber	Item#	Price
Rtcht Whl	Valj 230 & 720	415/674	\$15.00
Stem	Aude Piguet 2003	401/529	\$11.25
Stem	Vach Const 1001-1002	401/882	\$11.50
Stem	Vach Const 1003	401/529	\$11.25
Set Lever	Rolux 700	443/690	\$28.00
Set Bridge	Rolux 700	445/609	\$30.00
Date Disc	Rolux 3035 (Blk on Wht)	AUT/9064	\$35.00



*Livesay's wishes
 you a safe &
 prosperous New Year!*



Your Headquarters For Batteries, Watch Material, Tools, Findings,
 Bands, Jewelry Boxes, Casting Supplies, Watch Movements, and Much,
 Much More. Catalogs Available.



Phone Orders

(800) 476-2715

Toll Free 24 Hour FAX Orders

(800) 476-8016



01/01

Tampa (813)229-2715 Local Fax (813)221-8016



Technically Watches

Pocket Watches and Their Maintenance Part 32

Repairing the English Fusee Lever Watch (Continued)

Archie B. Perkins,
CMW, FAWI,
FNAWCC, FBHI

©2001 (All rights reserved by the author)

Making Links for Fusee Chains by Hand

When there is a need to make only a few fusee chain links, they can be made by hand as shown in Figure 1. First, a very fine light center line is scribed on the metal, one that will be easily removed when the surface of the link is being finished. Then, a light center punch mark is made on the center line a short distance from the end of the metal (enough to allow the forming of the end of the first link). Now, use a strong fine pointed divider to scribe off the distance between the holes in the links. This is done on the center line. As many links as will be needed can be laid off in this manner. Then use a very fine sharp pointed center punch to punch small centers at each point where a line has been scribed across the center line.

Another good method that can be used to punch the centers for the links is to make up a

two-pronged center punch which has two sharp centers spaced the proper distance apart to form centers for the link holes. This punch is then used on the center line to punch the centers. The first time the punch is tapped with the hammer, two centers will be punched; then the punch is swung around leaving one prong in the center previously spotted while the other prong goes on another point on the center line. Then when the punch is tapped, only one center will be spotted. This procedure is continued until all of the centers needed have been spotted. The material can be supported on a boxwood block while the centers are being spotted.

After the centers have been spotted, the holes are drilled. The holes are usually drilled by hand. The drill is placed in a pin vise which has a screwdriver head frictioned into its end. This device is used like using a watchmakers

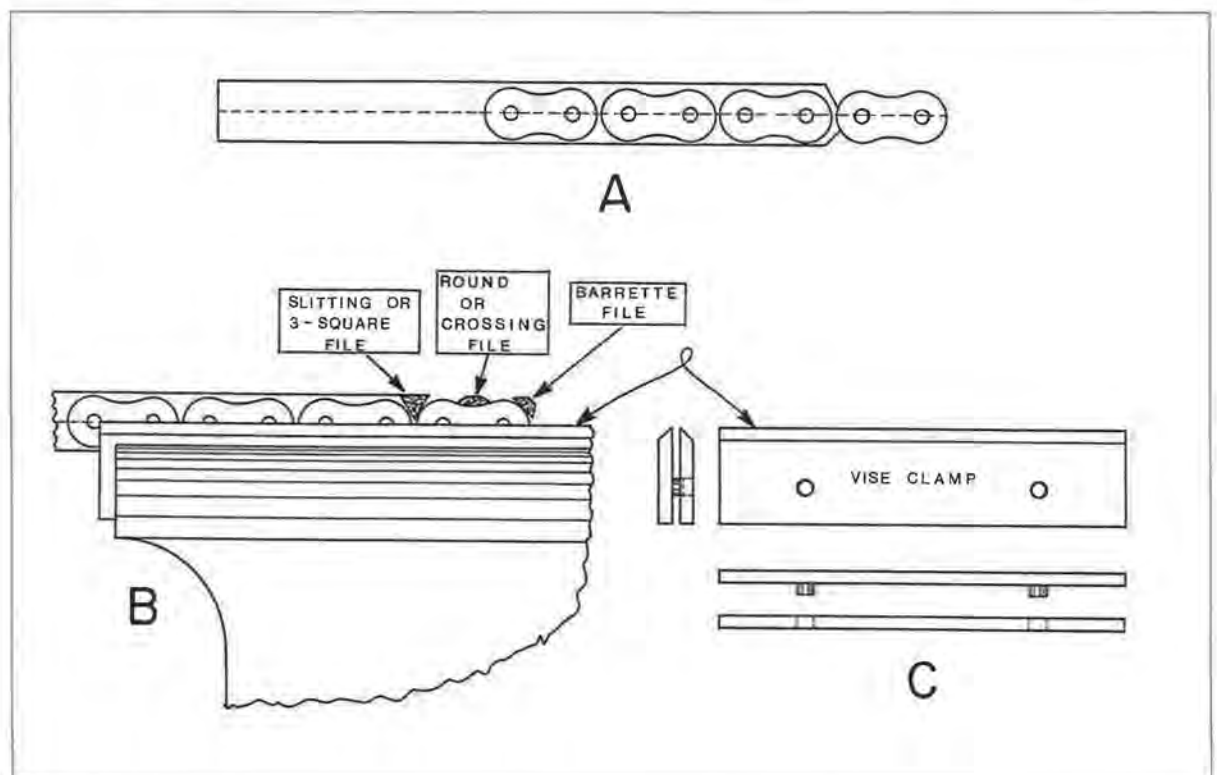


Figure 1

screwdriver to drill the holes. The material is supported on a boxwood block for drilling. After the holes have been drilled, an outline of the links is scribed on the metal as shown in View A, Figure 1. After this, the metal is placed in the bench vise or hand vise between the jaws of a brass vise clamp as shown in View B, Figure 1.

The vise clamp is shown in View C, Figure 1. This vise clamp can easily be made up by the watchmaker. The thickness of the brass used should be .0312" (1/32 inch). Two strips the same size are sawed out of the brass. Then a center line is scribed on one piece of the brass. Now, two centers are spotted on the center line for the guide pins. After this, the two strips of brass are placed together and lined up with each other and clamped in this position for drilling the holes through both strips at the same time. Taper pins are used for the guide pins. The taper pins are staked into one of the strips. Then the heads of the pins are cut off and filed flush with the strip. Now, the pins are cut off on the other end and the ends are filed flat. The length of the guide pins should be such that they will not protrude through the thickness of the jaw when both jaws are together. Now, with the jaws clamped together, the top edge of the jaws is beveled with a file as shown in View C, Figure 1.

When filing the links to shape as shown in View B, Figure 1, one edge of each of the links is filed, then the

strip is turned in the vise so the other edge of all the links can be filed. Then the links are divided from the material and the ends are finished.

Making Fusee Chain Hooks by Hand

Figure 2 shows a method that can be used when making fusee chain hooks. View A shows both hooks laid out on sheet steel. The sheet steel should be high carbon steel since the hooks should be hardened and tempered to blue. Hooks and links can be made from pendulum suspension steel of the proper thickness. However, the steel must be annealed enough that it can be sawed, filed, and drilled. Watch and clock mainsprings make good steel for making hooks and links after they have been annealed so they can be worked. Usually watch mainsprings can be found which are the proper thickness and width for making hooks and links. When sheet steel is used as shown in View A, Figure 2, strips the proper width can be sawed from the sheet for use in making the hooks or links.

The shape of the hook is scribed on the strip of metal after the hole has been drilled for the rivet. A small center is spotted for the drill to start in when drilling the hole. If a good hook is being used for copying, then the good hook can be pegged to the strip with a taper pin while its shape is scribed on the metal. It is best, whenever possible, to use a jewelers saw and a Number 8/0 saw

OILS & LUBRICANTS

*A complete line of oils and lubricants
for the watch and clock industry.*

Moebius La perle
Zenith Nye's
Vigor®

Bestfit®
products

GROBET USA™
For distributor in your area
or for more information
contact us at:

Phone: 800-998-4467
Fax: 800-758-4467
e-mail: bestfit@atl.bellsouth.net



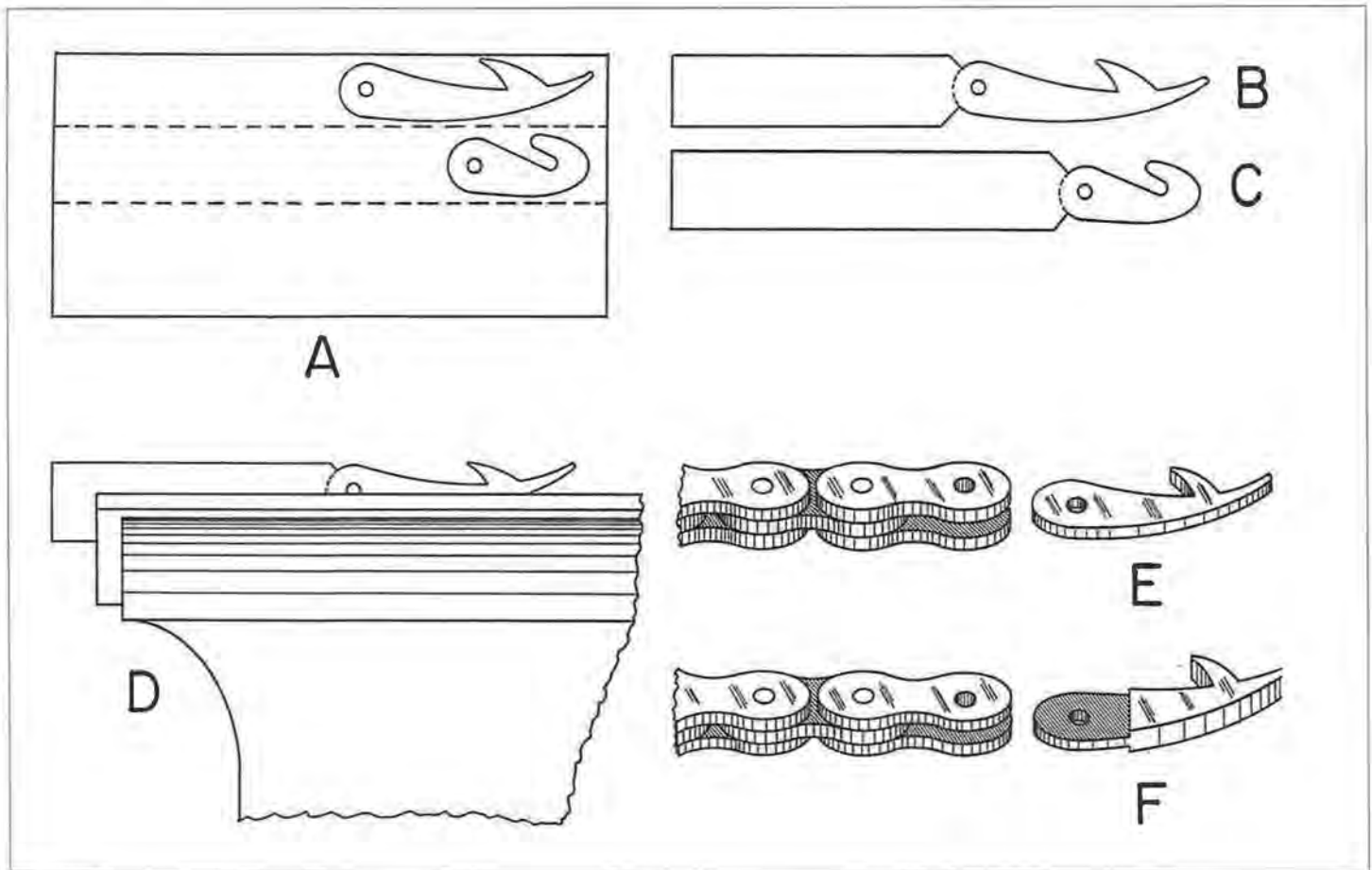


Figure 2

blade to saw away some of the excess metal as shown in Views B and C, Figure 2. Note: View B shows the barrel hook and View C shows the fusee hook. This leaves less material to remove with files when forming the hook. The hook is left attached to the strip as shown. This furnishes a handle to hold onto while the hook is being filed to size and shape. The strip of sheet steel is held in the bench or hand vise while the hook is filed to form. This is shown in View D, Figure 2. The strip containing the hook should be held in the vise jaws between two thin strips of brass. This not only protects the metal, but it allows it to be held more firmly than if it were held in the bare vise jaws.

The files used for filing hooks and links are the most delicate escapement files that can be found with a Number 6 cut.

After the hook has been filed to shape, it is removed from the strip and its end is filed to shape where it was attached to the strip.

Views E and F, Figure 2 show the hook in position for inserting between the two links at the end of the chain prior to inserting the pin. The thickness of the hook is very important. If the hook is too thick, it will be difficult to make a good joint as the rivet is formed. The chain will also be too thick at this point.

If the hook is too thick, it must be filed or milled down in thickness as shown in View F, Figure 2. The hook should fit closely between the two end links, but the two links should not be forced farther apart at their ends as the hook is inserted between them. Some hooks, especially the ones used on chains of clocks and marine chronometers, are made from material which is almost as thick as the chain. They are then milled down in thickness at the end as shown in View F, Figure 2 so they will fit between the links of the chain.

Note: This method of making fusee chain links and hooks with the use of the saw and files should be used when only a few links and hooks need to be made. When more links and hooks need to be made, it is recommended that they be made by the punch and die method. Also, the saw and file method is better adapted to larger chains such as the ones for the chronometer and the clock.

Making Fusee Chain Links Using the Punch and Die Method

Another method that can be used for making fusee chain links, especially if many links need to be made, is by using the punch and die method. This method can be used on all sizes of fusee chains; however, everything must

be more exacting when making small watch fusee chains compared to chronometer and clock fusee chains.

Holding the Punch and Die

Figure 3 shows how the punch and die method can be adapted to a small watchmakers staking tool frame for punching out links. This same method can be adapted to a clockmakers staking tool frame for punching out chronometer and clock fusee chain links.

To create this system of making fusee chain links, first obtain an old staking tool frame. These staking tool frames should not be difficult to obtain because many old staking tools are discarded due to the fact that the punches become damaged and lost which usually leaves a good frame without adequate punches. Next, remove the die plate completely. Now, make up a steel plug to fit into the center hole where the die plate locking bolt fits. The plug must fit friction tight into this hole. The plug should have a shoulder which goes against the staking tool frame where the die plate was seated. A large pivot with a large flat shoulder should extend up from the upper end of the plug for holding the lower guide bar to guide the punch. The lower guide bar is fastened to this pivot with a set screw. A guide pin is frictioned into the lower guide bar. This pin extends upward and goes through a hole in the upper guide bar. The upper guide bar is keyed

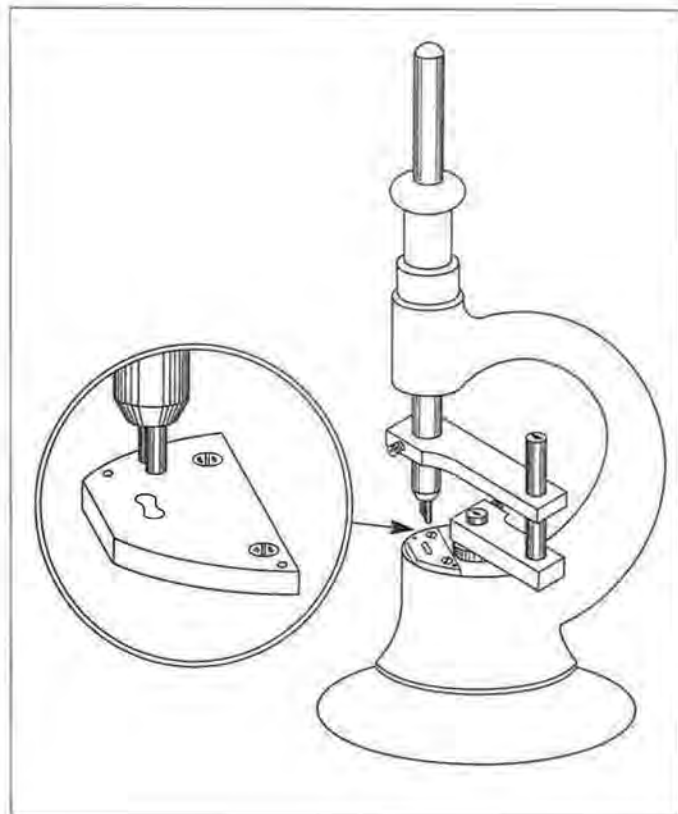


Figure 3



TIME FOR ACCURACY WITSCHI's waterproof tester — the ALC 2000

Tested in Europe and found to be the most accurate!

- user-friendly *fully automatic measurement programs*
- flexible – tests vacuum and pressure *vacuum (up to -0.8 bar) and pressure (up to 10 bar), separately or combined*
- programmable *10 customer specific test programs*
- multi-lingual *9 language choices: Eng., Fr., Ger., It., Sp., and the 4 Scandinavian languages*
- practical *automatic locking and release of the pressure chamber*
- fast *automatic or manual from 10 to 300 sec.*
- future-orientated *assured by a 16-bit processor*
- able to print results *WITSCHI printer (Citizen) or printer with serial interface*

Witschi Electronics USA, Inc.

700 Cinnaminson Avenue Suite 5 Palmyra, NJ 08065
Tel: 856-829-1179 • Fax: 856-829-2266
Tel: 1-800-882-7977 (U.S., Can. & Mexico only)
www.witschiusa.com • e-mail: voight@witschiusa.com

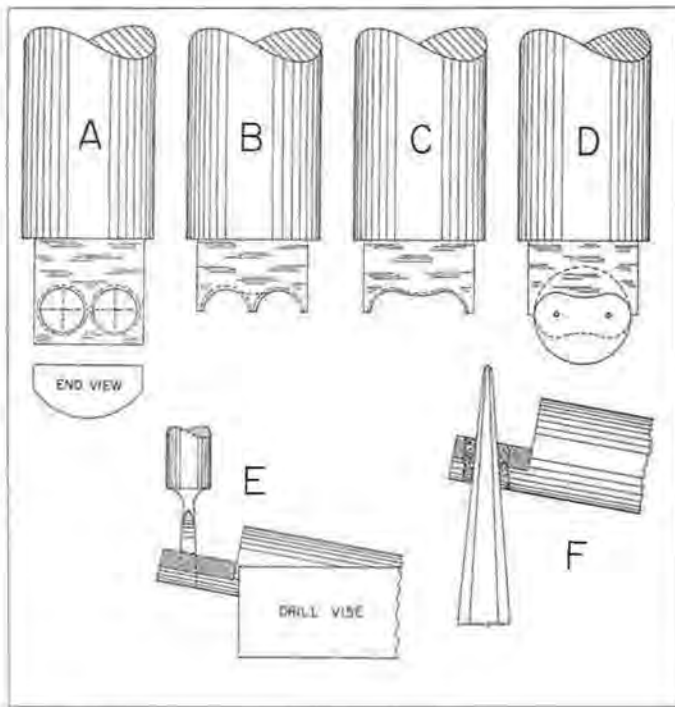


Figure 4

to the punch with a set screw. This system prevents the punch from turning in its hole in the neck of the staking tool frame as the punch is moved up and down. The die for the punch fits on the frame over the hole in the base of the frame directly beneath the end of the punch. The die is held to the base with steady pins and beveled headed screws. The die can be made of $3/32$ " flat ground high carbon tool stock.

Making the Punch

To make the punch and die set, first the punch is made. The high carbon steel rod for the punch should fit closely in the hole in the neck of the staking tool frame. The end of the punch is formed by turning and milling so it has the same shape at its end as the fusee chain link. Two holes are drilled for the guide pins before the punch is hardened. These holes should be the same distance apart and the same diameter as the holes in the sample chain link. The end of the punch is then hardened and tempered to a pale straw color. Then the punch is ground flat and square on its end. After the hardened and tempered punch has been used to make the impression in the die steel, the two tapered guide pins should be installed in the end of the punch. The punch is then placed in the staking tool frame and fastened in the hole in the guide bar with the set screw. Both guide bars are adjusted with the set screws so the punch will move up and down freely without any side motion; then both set screws are tightened so the guide bars cannot shift.

The following method can be used for making the punch. When using this method, a fly cutter is made

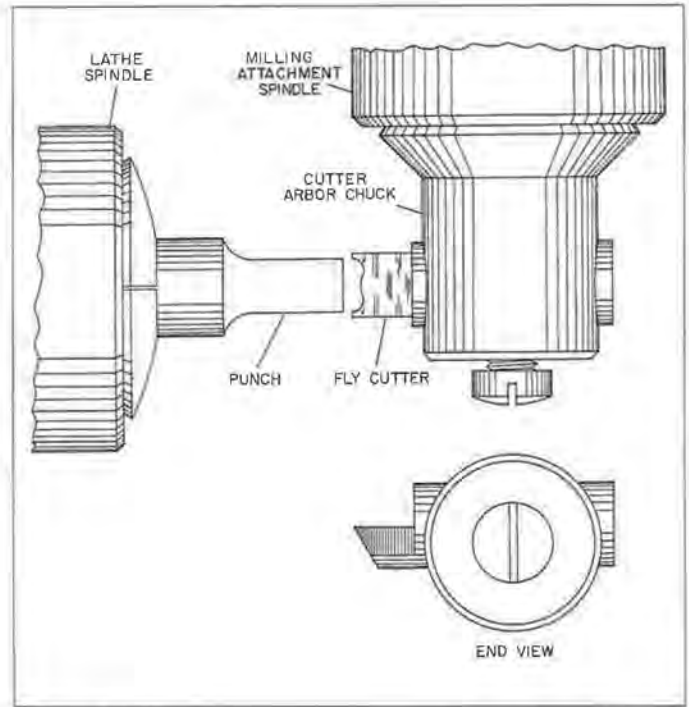


Figure 5

up to use in the spindle of the milling attachment for forming the shape of the end of the punch. The procedure used in making the fly cutter is shown in Figure 4. View A shows the fly cutter stock after it has been filed to shape at its end. Two centers are scribed on the flat face of the cutter stock as shown. These centers are the same distance apart as are the centers on the chain link that is to be duplicated. The distance from the center line to each center should be equal and the centers should be on a line that is square with the body of the cutter stock. After the centers have been spotted, two holes are drilled at a 5° angle through the cutter stock. The diameter of the drill should be equal to the diameter of the round sections at the end of the chain link.

To drill the holes at an angle, the cutter stock can be held between the jaws of a drill vise as shown in View E, Figure 4. After the two holes have been drilled, the holes are reamed out from the bottom side of the stock with a cutting broach such as a joint broach to give relief to the cutting surface of the fly cutter. This is shown in View F, Figure 4. Ream the holes just to the top surface. Do not exceed this amount; otherwise, the holes will be enlarged and spoil the cutter.

After the holes have been reamed, the end of the cutter is ground off just to the centers of the holes as shown in View B, Figure 4. The end of the cutter is ground off with a 5° undercut. This gives clearance at the end of the cutter. Next, the center part of the cutter is removed to finish shaping the cutter to conform to the shape of the chain link. This part is also shaped with a 5° undercut. View B shows in broken line the center part that is to be

removed and View C shows the cutter after the center part has been removed. Next, the fly is hardened and left dead hard. To harden the cutter, its cutting end is heated to a bright cherry red and quenched quickly cutting end first in cold tap water. The cutter must be very hard for it to hold up when cutting the high carbon steel rod for making the punch.

View D, Figure 4 shows how the fly cutter is used to remove material to form the end of the punch. The large circle represents the diameter of the end of the punch. The side of the punch shown in broken line is removed by the cutter to form one side of the punch. Then, by indexing the punch 180° or one-half turn, the other side of the punch is formed which shapes the punch to the shape of the chain link.

When cutting the shape of the end of the punch with the fly cutter, the speed of the cutter should be between 300 to 500 R.P.M. A light cut should always be taken from each side of the punch alternately until the end of the punch is shaped. The cutter should be fed very slowly through the material. The end of the punch material should be turned to a diameter that is equal to the length of the chain link being duplicated. Also, the end of the punch material must run true when the lathe is turning. It is very important that the cutter is absolutely centered with the end of the punch. If the cutter is not centered, the shape of

the end of the punch will not be the true shape of the chain link. See Figure 5 which shows the equipment set up for cutting the shape of the end of the punch. This illustration also shows the cutter when it is centered up with the end of the punch.

Making the Die

The material used for making the die should be high carbon tool steel. The die material is fastened into position on the staking tool frame as shown in Figure 3. Next, bring the punch down onto the die steel. Then, tap the punch so a slight depression is made on the die steel.

Figure 6, View A shows the die plate after an impression has been made on its surface by the finished punch. The material in the impression is to be removed to form the shape of the hole in the die. This is done by drilling holes inside of the outline of the depression. When removing the material from a large depression, small holes are drilled inside the depression outline as shown in View B, Figure 6. Then a jewelers saw is used to saw out the inside of the depression. When the depression is small, the material is removed as shown in View C, Figure 6. A larger drill is used to remove the material from the die which forms each end of the link, then smaller drills are used for the center section of the depression.



Vibrograf — introduces the first high accuracy dry water proof tester, priced under \$3,000. Now your shop can stay competitive.

- Tested at Europe's major watch factories
- User friendly — microprocessor controlled
- Fast test up to 165 feet depth
- Unsurpassed accuracy on all watches using space-age technology
- Small quiet air compressor
- Printer can be added



CALL TODAY!

Visit Our Website:
www.vibrografusa.com

VIBROGRAF USA CORP.

504 Cherry Lane • Floral Park NY 11001 • (516) 437-8700 • FAX (516) 437-8708

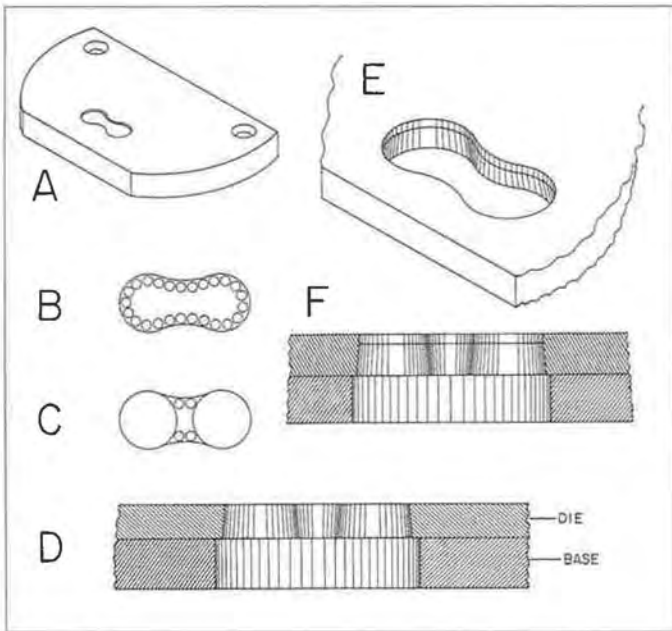


Figure 6

After the holes have been drilled, a jewelers saw is used to remove the rest of the material from the depression. Next, small files are used to shape the opening in the die to fit the punch. There should be little clearance between the punch and the opening in the die. This clearance is usually .05 mm for a punch and die of this size.

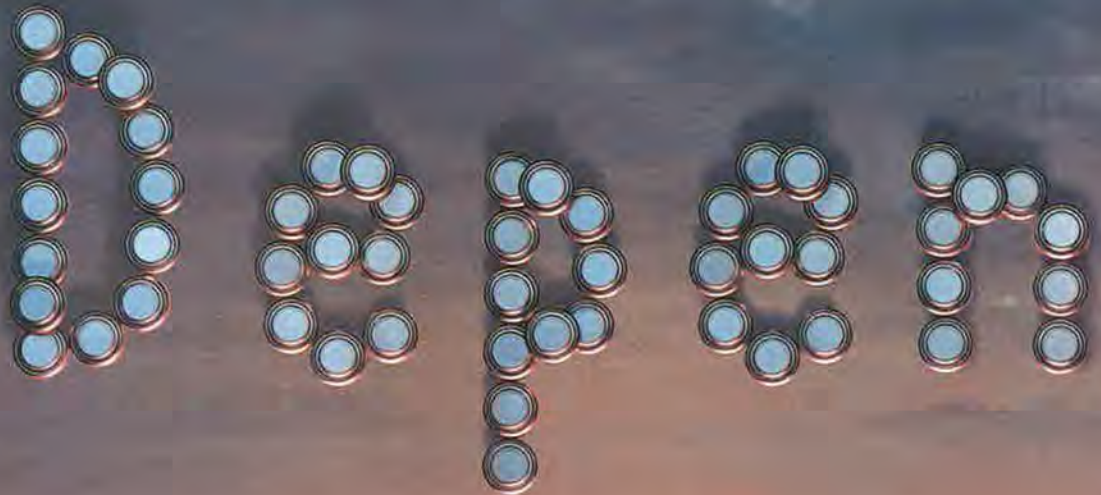
Then, the files are used to form a 2° to 5° relief to the opening underneath the top surface of the die. When the relief is made, the opening at the top face of the die must not be enlarged.

View D, Figure 6 shows a die seated on its base. This die has been relieved just to the top surface of the die. When this is done, the opening will get larger if the die face is resurfaced. A better method of relieving a die is shown in Views E and F, Figure 6. In this case, the upper one-fourth to one-third of the opening in the die is straight while the lower part of the opening is relieved at 2° to 5° . The top surface of the die can be resurfaced without changing the size or shape of the opening in the die when a die is relieved in this manner.

One reason for the relief in the opening of the die is so the punched out article will fall through the die freely without getting caught in the die.

After the opening in the die has been finished and fits the punch correctly, the die is hardened. The opening in the die is packed with fire clay before it is heated for hardening. The die is heated slowly to a uniform bright cherry red and then quenched in a strong salt brine if the steel is a water hardening type. If the steel is an oil hardening steel, it should be quenched in oil.

After the die has been properly hardened, its upper surface is brightened, then the die is tempered to a deep straw color.



Energizer® delivers the long-lasting power your

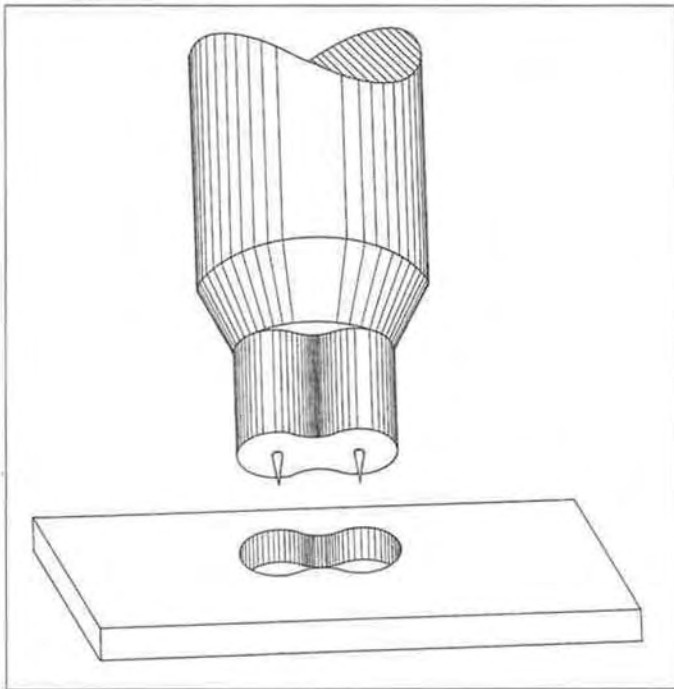


Figure 7

Next, the die is attached to the staking tool frame and the punch is checked for alignment in the hole in the die and realigned if necessary. The punch should not touch the sides of the hole in the die at any point. The punch and die are now ready to punch out fusee chain links. The

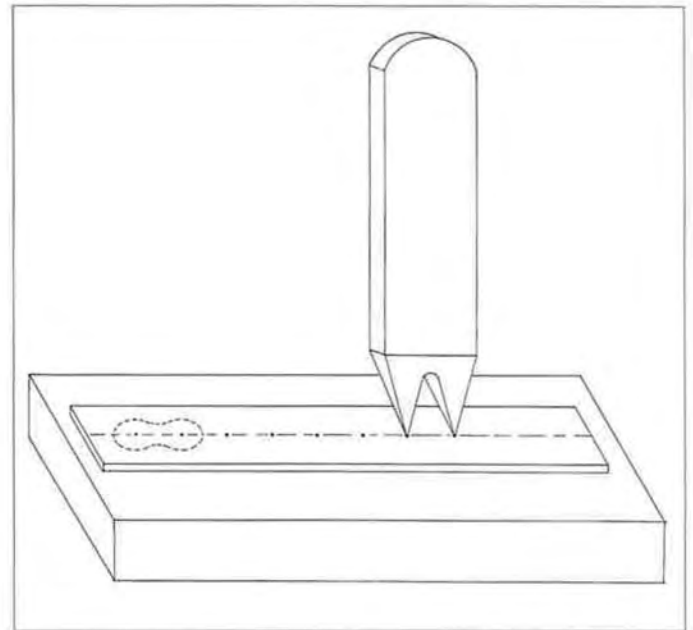


Figure 8

sheet stock should be cut in strips that are slightly wider than the links being stamped out. By making punches and dies, fusee chain hooks can also be stamped out with this method.

Figure 7 shows a better view of the punch and die set for fusee chain links. Also shown are the guide pins



customers can depend on day after day.

Energizer.
Standing the Test of Time.

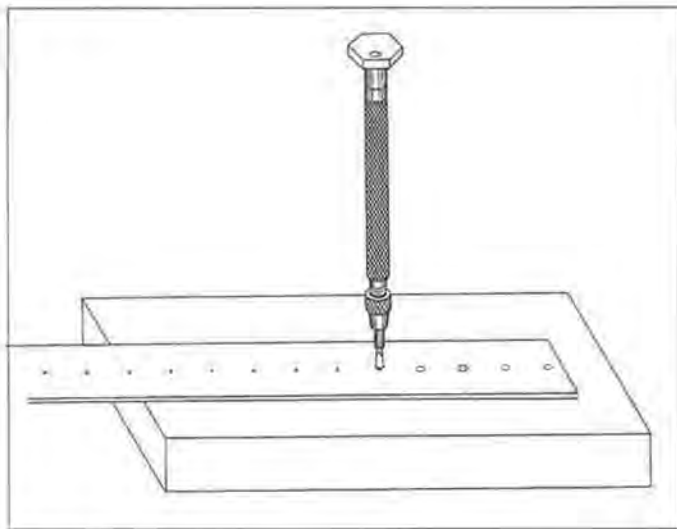


Figure 9

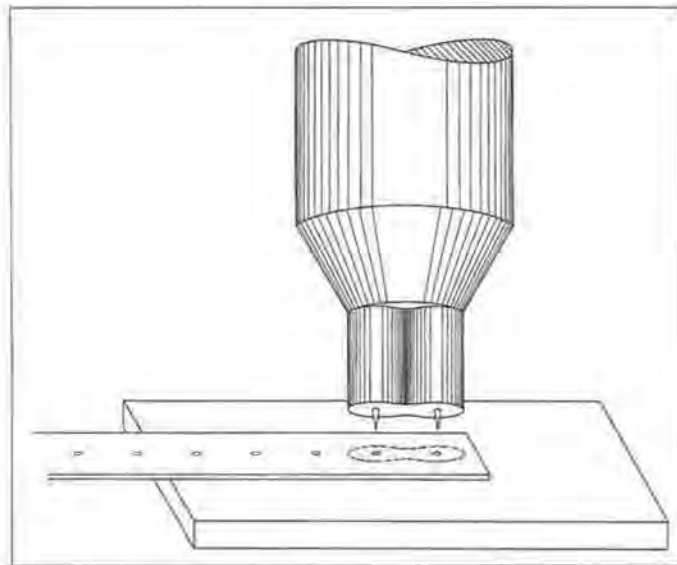


Figure 10

which are used to center up the link stock for each link punched out of the stock.

Preparing the Link Stock for Punching Out Links

Figure 8 shows how a double center punch is used to spot centers for the holes in the chain links. A light center line is drawn on the stock for lining up the centers. Two centers are first punched, then the punch is swung around while one point is still in a center for punching the next center. This is repeated until all of the centers are punched.

Next, the link stock is held on a wood block while a pivot drill is used to open up the holes in the stock where the centers were punched. The drill can be held in a screwdriver handle for drilling the holes. The drill should be the same diameter as the guide pins and the pins for the chain links at the face of the punch. This is shown in Figure 9.

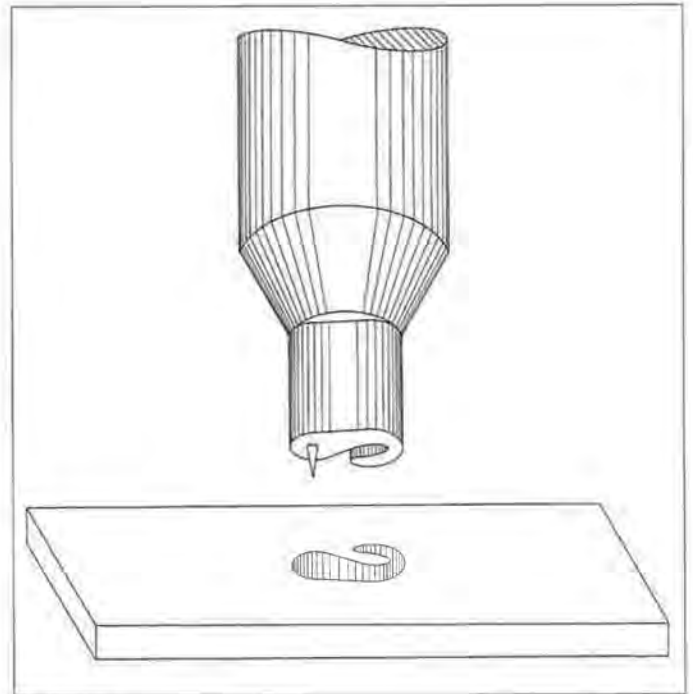


Figure 11

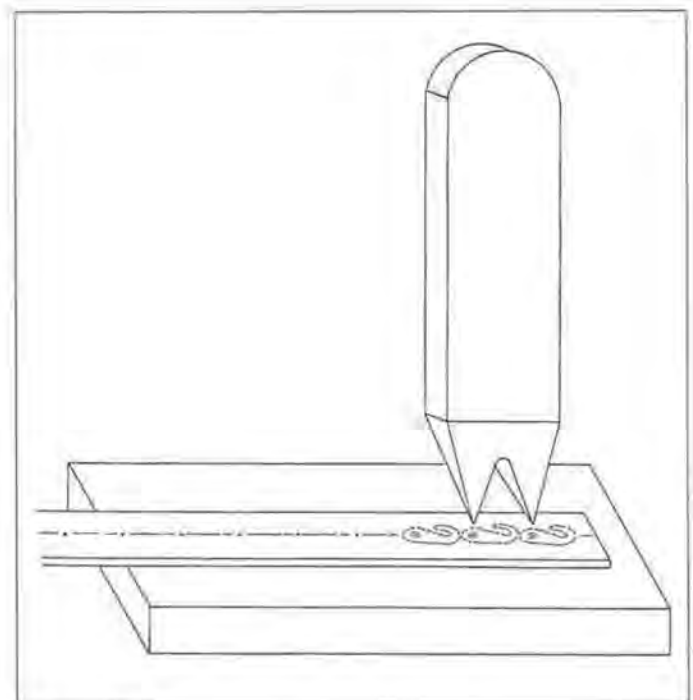


Figure 12

Figure 10 shows the link stock lined up on the die with the shape of the link shown in broken line. Also shown are the guide pins in the punch positioned to enter the holes in the link stock.

Punching Fusee Chain Hooks

Figure 11 shows a punch and die for making fusee chain hooks. This particular hook is for hooking into the fusee. A punch and die can also be made for punching

barrel hooks. Note that there is only one guide pin for the fusee chain hooks.

Figure 12 shows the hook stock on a wood block for punching the centers for chain hooks. Also shown in broken line is how the hooks are situated on the stock when they are punched out.

"Pocket Watch Maintenance" will continue.

Bibliography

Britten, F. J. *Watch and Clockmaker's Handbook*. New York: D. Van Nostrand Co. Inc., 1955, pp. 99-100.

Fried, Henry B. *The Watch Repairer's Manual*. Cincinnati, Ohio: AWI Press, 1986, pp. 351-362.

Garrard, F. J. *Watch Repairing and Making*. London: Crosby Lockwood and Son, 1928, p. 77.

Weiss, Leonard. *Watchmaking in England 1760-1820*. London: Robert Hale, 1982, pp. 95-109.

Whitney, Marvin E. *The Ship's Chronometer*. Cincinnati, Ohio: AWI Press, 1985, pp. 165-171.



ATTENTION AWI MEMBERS

DO NOT SEND YOUR
USED WATCH BATTERIES TO

CELL SAVERS

THEY ARE NO LONGER IN BUSINESS

PLEASE SEND YOUR
USED WATCH BATTERIES TO THE
AWI-ELM CHARITABLE TRUST
701 ENTERPRISE DRIVE
HARRISON, OH 45030

706 S. Hill St., #580
Los Angeles, CA 90014


SMITH SUPPLY HOUSE
LOS ANGELES

Tel: (213) 622-1687
Fax: (213) 488-0922

Watch Materials, Supplies & Tools

Watch Battery Distributor

MAINSRING WINDERS



TO FIT ON
LADY'S ROLEX CAL. 1400/2030/2035
2130/2135
MAN'S ROLEX CAL. 1530/1570
3035/3135

\$49.75 EACH



SMITH SUPPLY HOUSE IS NOT AFFILIATED WITH OR SPONSORED BY ROLEX WATCH U.S.A.
THE ROLEX WARRANTY DOES NOT APPLY TO GENERIC REPLACEMENT PARTS SUPPLIED BY SMITH SUPPLY HOUSE.



**YOUR SUPPLIER OF SPARE PARTS FOR ALL BRANDS OF
MECHANICAL AND QUARTZ WATCHES, CLOCKS AND ALARMS**



CALL TOLL FREE (800) 23-SMITH

VISIT OUR WEBSITES

www.smithsupplyhouse.com & www.watchpartonline.com





W. R. Smith
CMC, CMW, CMEW

A 22 Function Quartz Watch Analyzer

Part 1

Photos and Drawings by the Author

W.R. Smith was born in the farm community of Atoka, Tennessee, in 1921. At 14, he fixed his first pocket watch. Mr. Smith worked as a watchmaker and attended a government aircraft instrument school which prepared him for repairing aircraft instruments in the Air Corps during WWII. He flew as a radio operator and was awarded the Legion of Merit by General MacArthur for "designing and building test equipment for the instrument shop that put grounded airplanes back into the air." After discharge, he obtained a mechanical engineering degree from the University of Tennessee. Mr. Smith worked at Oak Ridge, Tennessee, as a high energy accelerator design engineer and later as a technical writer/editor. Mr. Smith holds four NAWCC gold medals, a silver, a bronze for handmade clocks, and a gold in the medal in the tool design category. He is a Fellow in the British Horological Institute, a Fellow of the NAWCC, an AWI Certified Master Clockmaker (CMC), Certified Master Watchmaker (CMW) and Certified Master Electronic Watchmaker (CMEW), and publishes his own horological material.

This article first appeared in the Horological Journal of the British Horological Institute.

INTRODUCTION

In repairing quartz watches, the experienced watchmaker knows that definitive information from a few simple tests will identify the type of repairs needed and will allow a more accurate estimate of the costs. This article describes the design and construction of a quartz watch analyzer, Figures 1 and 2, that is easy to build and use, involves very simple circuits and standard components, contains no solid state devices to be assembled and tested, cost very little, and will shorten repair times. This design is capable of performing essentially all of the functions of analyzers costing up to \$1,000, and

can be built for a materials cost of approximately \$30. A Radio Shack (Reference 1) Telephone Listening Amplifier, 43-231B at \$9.99 or equivalent is also required. Incidentally, the amplifier if provided with a contact microphone can be used separately as a beat amplifier.

The use of this analyzer is based on the assumption that the watchmaker is knowledgeable regarding quartz watch tests and their interpretation and has an analog multi-meter with a sensitivity of 25 to 30 micro-amperes. (If no meter is available, the Radio Shack (Reference 2) Model 22-215 at \$49.99 is suitable and is used later in this article in a deluxe version of the analyzer.) Thus, this discussion is limited to a description of the design and its construction, and the operating instructions are presented in



Figure 1. The 22-function quartz watch analyzer.



Figure 2. Another view of the completed analyzer.

an abbreviated format with a minimum of interpretation.

The analyzer has the following capabilities.

1. Sounds the stepping motor field coil pulses of a fully cased watch.
2. Sounds each current pulse drawn by a watch from the analyzer's power supply or from a watch cell in the cell spring clip. It also sounds the current pulses drawn by the analyzer's built in motor stepping pulse generator.
3. Supplies 0 to 1.5 volts for powering quartz, non-quartz, and Accutron watches.
4. Supplies 0 to 3 volts for powering watches using a lithium cell or the older LED watches having series silver oxide cells.
5. Provides a built-in cell spring clip for testing all watch cells under factory recommended loads.
6. Indicates the average current drawn by a watch from the analyzer's power supply or from a cell in the cell

spring clip, and sounds each current pulse forming that average.

7. Allows the un-averaged current (pulses) to "kick" the analog multi-meter needle and sound each current pulse.
8. Tests for train and stepping motor freedom and cleanliness.
9. Tests for the proper operation of out-of-watch circuit boards.
10. Supplies alternating polarity voltage pulses for stepping an analog motor.
- 11,12. Measures coil resistance—two methods.
13. Checks for coil to frame shorts.
14. Measures the no-load voltage of a cell placed in the cell spring clip.
15. Permits powering a watch from a cell in the cell spring clip, the measurement of its voltage and current under the watch's load, and sounds the current pulses drawn by the watch.

16. Measures the voltage of an in-watch cell (where the terminals are accessible).

17. Allows energizing the push button pads of an out-of-case watch, which uses the case as a part of the push button circuit.
18. Supplies the reduced voltage required for low amplitude phasing of Accutron watches.
19. Checks the output pulses of a circuit board.
20. Tests the condition of its own internal power supply cells.
21. Provides an audible signal for each current pulse drawn by the built-in motor stepping pulse generator to reassure the watchmaker that the generator is functioning.
22. Permits using all multi-meter functions directly from the analyzer's test leads, i.e., making voltage, resistance, and current measurements without repositioning the analyzer's test leads.

GUENTHER'S

404 WEST 7TH STREET #408
LOS ANGELES, CA 90014

WATCH MATERIAL SUPPLIES & TOOLS

(213) 892-8033

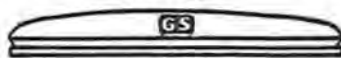
FAX: (213) 892-8035



CALL TOLL FREE (800) 462-1962



PA503



43.0 mm
WESTCLOX

\$5.00 ea.



CMX409-7

TO FIT FOLLOWING SIZES: 27.50, 28.00, 29.00 AND 29.50

AVAILABLE AGAIN!!!
DISCONTINUED GS CRYSTALS

PA503 (43mm used on Westclox fits from underneath)
CMX409-7 (26.1X21.6 used on Wittn or Longines)
CY928-38 (27.9X23.8 used on Longines)
TF1193 (used on Ingersoll Kelton fits from underneath)
(WHILE SUPPLIES LAST)

DOMED MAGNIFIER PLASTIC CRYSTALS

GUESS PLASTIC EXTRA EXTRA HIGH DOMED CRYSTAL CY928-38



25.8 x 20.1
28.3 x 22.7

TF 1193



25.8 x 20.1
INGERSOLL
KELTON



27.9 x 23.8

LONGINES
3227



AVAILABLE

31MM

\$5.00 ea.



CONSTRUCTION

Components

A list of the required components is given in Figure 3. Full scale drawings of the two nameplates are given in Figures 4 and 5. There are several ways to manage the nameplate problem. The plates shown in the photographs were made from the above drawings by a trophy firm that uses a duplicating machine having a vibrating stylus that breaks through the black coating on a brass sheet to form the images. Alternatively, it should be possible to bond a photocopy to the box and cover it with transparent plastic tape. The components are shown in Figure 6. Figure 7 shows their location in the project box and on its lid. Orient switch S_5 on the end of the box so it will be closed when the bat handle is at the COIL (up) position on the nameplate.

The 5,000 ohm linear potentiometer (pot) and its switch come as separate pieces and must be assembled after purchase. Follow the instructions very carefully when installing the switch on the pot to ensure that, when viewed from the knob side, it turns OFF in the fully CCW direction, ON in the CW direction, and the resistance between terminals A and B increases with CW rotation.

The Cell Clip

The cell clip is made of a piece of spring brass, a 10-32 brass screw (the positive terminal), which has had its head machined flat and cylindrical, and a 1/8" thick red plastic washer. Make

- 1 each, telephone listening amplifier, Radio Shack # 43-231B.
- 1 each, project box (for small unit)—6" × 3³/₁₆" × 1⁷/₈", Radio Shack #270-223.
- 1 each, project box (for deluxe unit)—3¹/₁₆" × 8¹/₄" × 6¹/₈", Radio Shack # 270-274.
- TP, speaker terminal plate (Terminal Posts)—Radio Shack # 274-627.
- J1 & J2, 2 red & 2 black banana jacks—Radio Shack # 274-725.
- 2 each, 1/8" phone jacks (for coil & amp)—Radio Shack #274-251.
- 1 each, hex knob—Radio Shack #274-415.
- R1, 5,000-OHM, linear potentiometer—Radio Shack # 271-1714.
- R2 & R3, 47 OHM, 1/2 watt resistors—Radio Shack #271-1105.
- S1, 3-pole, double throw, center off, toggle switch—GC Electronics #35-026.
- S2, 4 pole, 3 position rotary switch—GC Electronics #35-380.
- 1 each pointer knob, 1¹/₄" X 5/8"—GC Electronics #37-580.
- S3 & S5, SPST toggle switch—Radio Shack # 275-612.
- S4, SPST potentiometer switch—Radio Shack # 271-1740.
- C1 & C2, .22 MFD 50 volt capacitors—Radio Shack #272-1070.
- C3, 220 MFD 35 volt capacitor—Radio Shack #272-1017.
- 1 each, terminal strip—Radio Shack #274-688.
- 2 each, "C" cell holders with solder lugs—GC Electronics #D3-062.
- Hook up wire, black, #24 gage solid—GC electronics #14-424-1L11.
- Hook up wire, red, #24 gage solid—GC Electronics #14-424-1L16.
- Hook up wire, blue, #26 gage solid—GC Electronics #14-426-1K19.
- Hook up wire, black, #26 gage stranded—GC Electronics #14-426-1H11.
- Hook up wire, red, #26 gage stranded—GC Electronics #14-426-1H16.
- Hook up wire, green, #26 gage stranded—GC Electronics #14-426-1H17.
- Hook up wire, purple, #26 gage stranded—GC Electronics #14-426-1H15.
- Clock PC board from mini-quartz clock movement—#P-559S, Merritt's Antiques, RT. 2, Douglasville, PA 19518.

Figure 3. Parts list (American use).

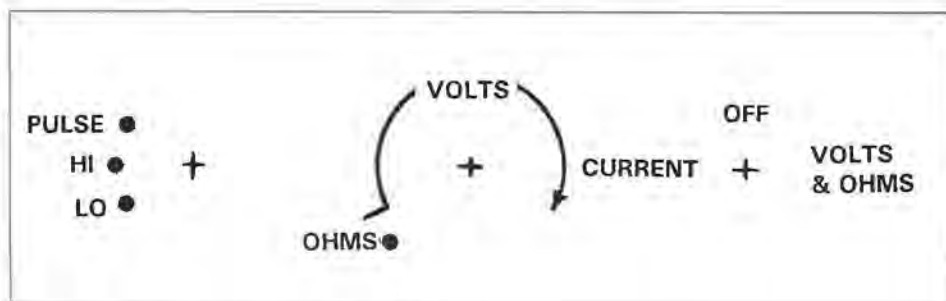


Figure 4. The main nameplate.

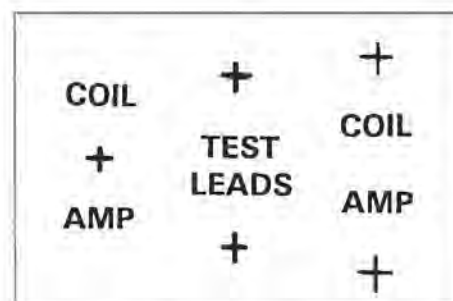


Figure 5. The minor nameplate.



Figure 6. The Radio Shack Project Box and most of the components ready for mounting.

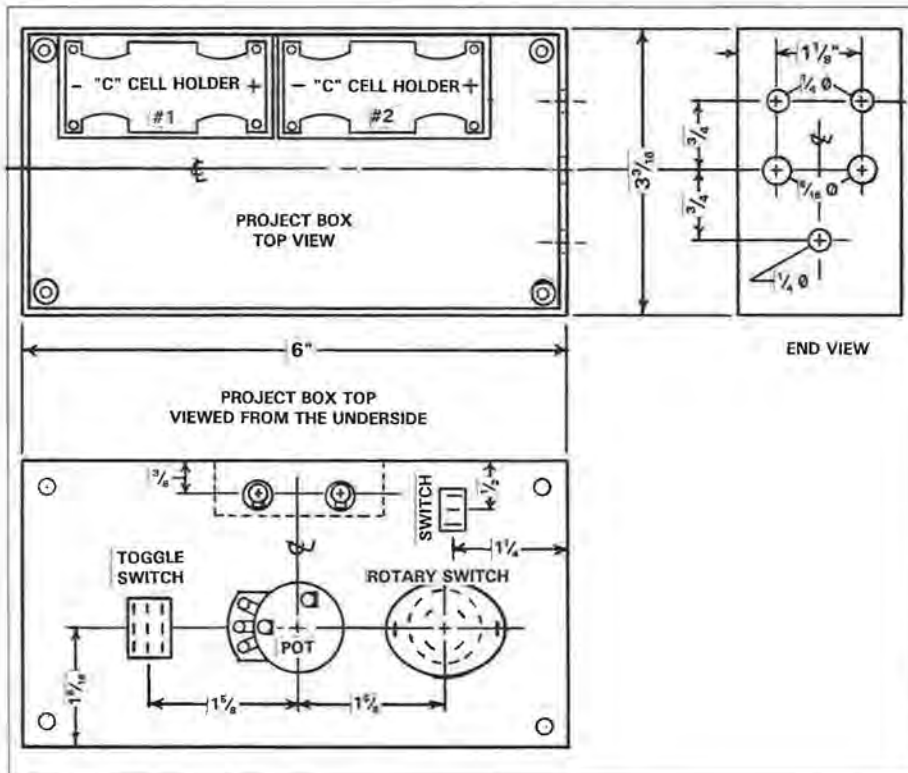


Figure 7. Components placement drawing.

the washer by mounting a piece of plastic on the screw and machining the O.D. to match that of the screw head. (A 1/8" length of a red test probe is also suitable.) Capture the end of the spring brass strip under the head of the 4-40 terminal post (TP) mounting screw. Install a solder lug beneath the nut of this

screw also. Form the strip so the cell will be held firmly between it and the 10-32 screw head but will not contact the screw head when the cell is removed. Install a third solder lug under the other 4-40 terminal post mounting screw for use as a tie point for the negative lead of C_3 .

Wiring Tips

For those with an electronic background, a schematic is given in Figure 8. For those unaccustomed to wiring from such drawings, the circuit is repeated in semi-pictorial form in Figure 9. It will be quite helpful when wiring the rotary switch, S_2 , if the numbers and letters of each terminal is marked with a small Sharpie pen as shown in Figure 9. It will also be a great help during construction to highlight each circuit on a photocopy as it is wired. This should also be done as a second check when the wiring is complete. Use only resin core solder; acid core solder will corrode the joints and cause the unit to fail.

The components are shown mounted in Figure 10. For the analyzer's functions to match the nameplate markings, it is necessary that the parts be mounted and wired with the box and the box lid oriented as shown in this figure. There will then be no need to mark the terminals of the MAIN TOGGLE switch S_1 .

Perhaps a few words about the clock PC board will be helpful. Since this is the only item needed from the seconds stepping quartz clock movement, remove it and unsolder and discard the coil and stator. Cut a 5/16" length of 1/4" diameter fiber rod, drill through it on axis with a #56 drill and thread it 0-80. Using Duro Quick Gel, bond the fiber post to the underside of the circuit board. Trace the contacts from the battery well of the clock movement and identify the (+) and (-) voltage feed points. To each of these, attach a length of stranded #26 red (+) and black (-) wire. Solder a pair of stranded #26 leads of any color in the PC contacts where the coil was attached. Mount the post with a short 0-80 screw in the location shown in Figure 10.

While looking down on the top of the lid, rotate switch S_2 fully CCW and install the knob with the pointer at LO. Rotate the shaft of R_1 (the pot) fully CCW until its switch has clicked off, and install the knob with pointer at the

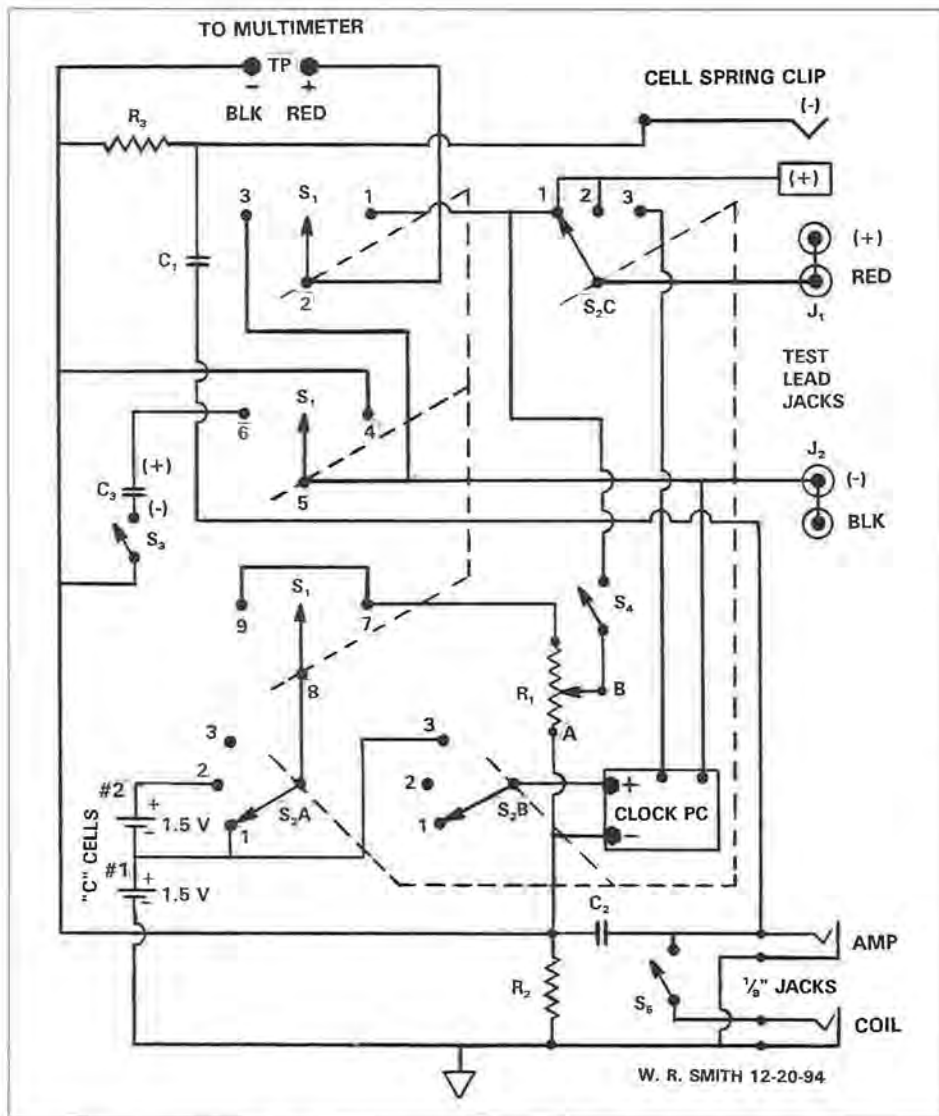


Figure 8. A schematic for the test unit for those who prefer to wire by one.

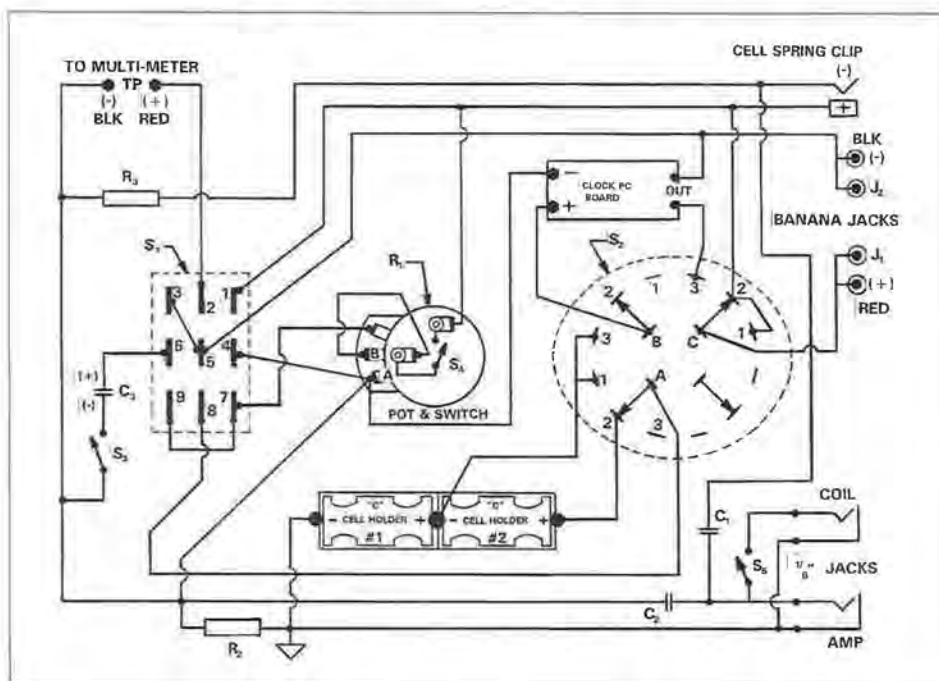


Figure 9. A semi-pictorial circuit drawing.

dot marked OHMS. It is advisable to file flats on these shafts at the location of the set screw to prevent unwanted knob rotation.

For ease of tying the components of the box lid to those in the box, two twisted cables of stranded wire must be made—a four-wire cable and a two-wire cable. Select 18" lengths of four different colored #26 stranded wires, one of which must be black. Clamp one end of the four wires in a vise and arrange them so they don't cross and are the same length. Twist about 1" of the free end together very tightly and place it in the chuck of a hand-cranked drill. Pull on the drill stock to stretch the wires tightly while twisting them into a tight cable. In the same manner, make a two-wire cable of red and black #26 stranded wire. As noted in the circuit, to reduce the number of cable wires to four, the minus terminal of cell #1 and the body of each 1/8" jack are tied together and then tied to the black wire of the four-wire cable. Since the banana jacks on each end of the box are duplicates, the red jacks must be wired to each other and the black jacks must be wired to each other. Observing polarity, red (+) and black (-), tie the two-wire cable to the red and black banana plugs.

It will be necessary to provide additional tie points by attaching a three-lug terminal strip to the box lid on the builder's side of the toggle switch, S₁. These strips can be cut to length easily using a pair of side cutters. The analyzer with all wiring completed is shown in Figure 11, and a close up of the wiring on the lid is shown in Figure 12. Note the terminal strip in the lower left corner.

The Controls

S₁, the MAIN TOGGLE switch, has three positions, CURRENT, OFF, and VOLTS & OHMS. It serves to connect the power supply cells to the analyzer, performs meter switching functions and when not in use must always be left in the OFF position to avoid discharging the cells.

S_2 is a four-pole, three-position, rotary SELECTOR switch with all poles mounted on the same shaft, i.e., each one notch of rotation moves all four poles to the next contact position. Only three of the four poles are used. In the LO position, it arranges the circuit to provide 0 to 1.5 volts and in the HI to provide 0 to 3 volts. In the PULSE position, it energizes the pulse generator, which sends alternating polarity pulses to the analyzer's test leads for stepping analog motors.

Switch S_3 has no nameplate, is referred to as the unmarked toggle switch, and is located to the left of the terminal posts. Wire this switch so that it is closed when the bat handle is in the down position, as viewed from the nameplate side of the box lid. This allows the multi-meter to indicate averaged current. With the bat handle in the up position, each current pulse will "kick" the multi-meter needle. This is accomplished by connecting or disconnecting capacitor C_3 at the multi-meter terminals. Switch S_4 is automatically operated by the variable voltage knob (pot). It connects or disconnects the analyzer's power supply from the other analyzer circuits.

The S_5 switch has two nameplate positions - COIL and AMP (amplifier) and should remain in the AMP position at all times except when using the induction coil (pick-up). The AMP position removes the pick-up from the amplifier input circuit and avoids a slight hum usually picked up by the coil. When using the pick-up for sensing stepping motor field coil pulses, the switch must be in the COIL position. This connects the pick-up to the amplifier input.

The variable VOLTAGE knob (pot) controls the output voltage of the analyzer. When the SELECTOR switch is in the LO position, CW rotation of the knob increases the voltage from 0 to 1.5 volts, and in the HI position, from 0 to 3 volts.

TESTING THE ANALYZER

Now that the circuit has been wired and the controls identified and mounted, the unit can be tested. At the start of this test and at the beginning of all other uses of the analyzer

(except when generating pulses for stepping a motor), the controls should be set as follows: the SELECTOR switch at LO or HI (as determined by the required voltage), the VOLTAGE knob fully CCW until its switch is heard to click off, and the MAIN



Figure 10. The majority of the components mounted and ready for wiring.



Figure 11. The test unit with all wiring completed and ready for use.

TOGGLE switch at OFF. Install test leads with mini-hooks in the analyzer's banana jacks. Install two new "C" cells, pushing each until its positive terminal is firmly against the positive terminal of the holder. (Some holders grip the cell so tightly the spring is unable to push the cell into contact.) Plug the pick-up lead into the socket marked coil and install a patch cable between the listening amplifier and the socket marked AMP.

Low Voltage Circuit Test

VOLTAGE knob fully CCW until its switch has clicked off, MAIN TOGGLE to OFF, SELECTOR to LO, meter to 2.5 DC V. Observing polarity, insert the test leads of the multi-meter into the analyzer's red (+) and black (-) terminal posts (TP). Set MAIN TOGGLE switch to VOLTS. While watching the meter, rotate the VOLTAGE knob fully CW. The meter needle should move from 0 to 1.55 volts. Move

the multi-meter leads from the terminal posts to the analyzer's test lead mini-hooks. The voltage response there should be the same. Return the multi-meter's leads to the analyzer's terminal posts.

High Voltage Circuit Test

Same as above but with the SELECTOR switch in the HI position and the multi-meter set to 10 DC V. Meter should read 0 to 3.1 volts. Return multi-meter leads to analyzer's terminal posts.

(Note: Most present day multi-meters use a 1.5 V battery when measuring low resistances and a 9-volt battery when measuring high resistances. To avoid the accidental application of this higher voltage to the watch, the 9-volt battery should be removed from the meter. This will leave the RX 1, RX 10, and RX 1K scales operational, which are adequate for quartz watch resistance tests.

Pulse Generator Circuit Test

VOLTAGE knob fully CCW until its switch has clicked off, MAIN TOGGLE to OFF. Move multi-meter leads from the analyzer's terminal posts to the analyzer's mini-hooks. Set the meter to 2.5 DC V, connect the amplifier and set its volume at 3 or 4. Select PULSE. The meter needle should kick forward and backward with stepping motor pulses and each pulse should sound in the amplifier. Return multi-meter leads to analyzer's terminal posts (TP).

Resistance Circuit Tests

VOLTAGE knob fully CCW until its switch has clicked, MAIN TOGGLE to OFF, SELECTOR to LO. Multimeter to RX 1 ohms, and MAIN TOGGLE to OHMS. Short the mini-hooks together and zero the multi-meter. Place a low-value resistor in the test lead minihooks and determine that the meter measures its value correctly. Using appropriate resistance values, repeat this for the RX 10 and the RX 1K scales.

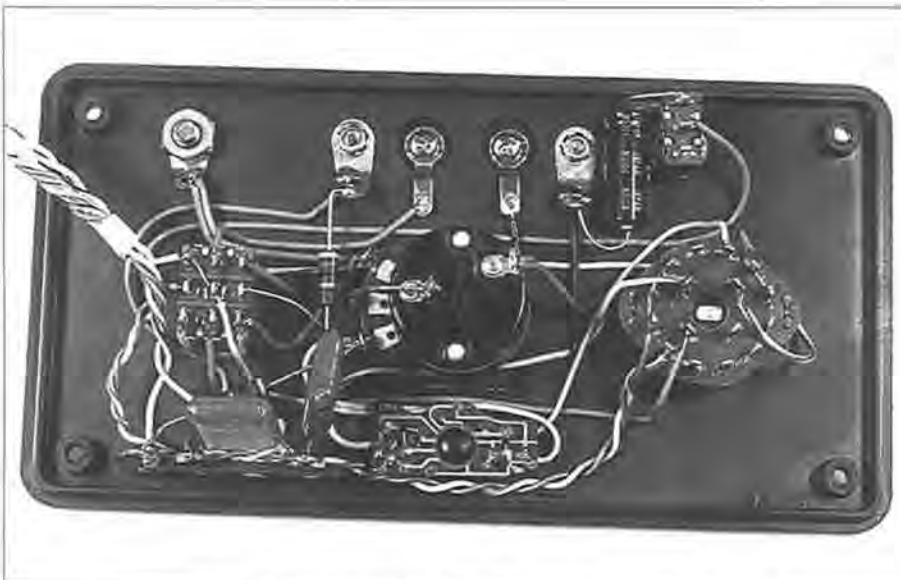


Figure 12. A close-up of the top panel. Note the 3-lug terminal strip at the lower left used as tie points for C_1 , C_2 , and R_2 . Also, note the single solder lug held by the right-hand terminal post mounting screw for use as a tie point for the negative lead of C_3 .



Figure 13. The completed analyzer shown with the Radio Shack Telephone Listening amplifier, its induction pick up coil, and an audio patch cable.

Audible Current Pulse Circuit Test

VOLTAGE knob fully CCW until its switch has clicked off, MAIN TOGGLE to OFF, SELECTOR to LO, multi-meter to 2.5 DC V. Observing polarity, attach the analyzer's mini-hooks to the cell contacts of a functional analog watch. Set the MAIN TOGGLE to VOLTS. Rotate the VOLTAGE knob CW to the proper watch cell voltage. The watch should run, indicating that it is properly powered. In addition, the amplifier will sound each current pulse drawn by the watch.

Without moving the VOLTAGE knob, set MAIN TOGGLE to OFF, the multi-meter to micro-amperes and the MAIN TOGGLE to CURRENT. The multi-meter should indicate steady current with the unmarked toggle switch down, and the meter's needle should "kick" with each current pulse when the toggle is in the up position. Each current pulse should also be

sounded by the amplifier, with the unmarked toggle in either position.

Cell Spring Clip Circuit Test

VOLTAGE knob fully CCW until its switch has clicked off, MAIN TOGGLE to OFF, SELECTOR to LO or HI, and multi-meter to 2.5 DC V scale. Place a watch cell in the cell spring clip and move MAIN TOGGLE to VOLTS. The multi-meter should now read the no-load voltage of the cell. This voltage will also appear at the analyzer's test lead mini-hooks.

Connect the analyzer's mini-hooks to a functional analog watch. The watch will run, the multi-meter will indicate the watch-loaded cell voltage, and the current pulses will be sounded by the amplifier. Set MAIN TOGGLE to OFF, multi-meter to micro-amperes and MAIN TOGGLE to CURRENT. The meter will indicate a steady current or "kicking" current pulses, depending on the position of the unmarked toggle.

The amplifier will sound each current pulse.

Pick Up Coil Circuit Test

VOLTAGE knob fully CCW until its switch has clicked off, MAIN TOGGLE to OFF, and SELECTOR to LO or HI. Place the pick-up coil's cable in jack marked COIL and set the toggle switch to COIL. Turn on the amplifier and set its volume to 3 or 4. Place the pick up coil against a functioning analog watch still in its case. The amplifier should sound each stepping motor field coil current pulse.

This completes the test of all the analyzer's circuits and it is now ready for use. The completed analyzer, with attached amplifier and pick up coil are shown in Figure 13. After all leads have been properly attached, there is never a need to reposition them. All tests are made using the analyzer's test leads.

Part 2 will continue next month.

PushLock Clasps

Buy 12 Assorted Pieces & Save 10%

SERIES 620



10mm		12mm		13mm	
10K	14K	10K	14K	10K	14K
\$6.00	\$8.50	\$7.50	\$10.50	\$10.00	\$13.80

Buy 12 Assorted Pieces & Save 10%

PushLock Clasp Is Easy to Open



A simple squeeze to open,
no need to use fingernails.

Patented

HT1200-1

Link Lock™

NEW

SECURES:
LOBSTER CLAWS
SPRING RINGS
CHARMS
SAFETY CHAINS

		1-11	12+
FJR2589	14KY LINK-LOCK™	\$3.00	\$2.70
FJR2582	Sterling LINK-LOCK™	\$1.29	—



1
Grasp with Pliers



2
Close with Pliers



3
Turn Locking Flap



4
Closed



- No Soldering
- No Cleanup
- No Damage
- No Skill

Fastest, easiest, most secure way to join jewelry without soldering.

Fargotstein's

since 1930

2505 Poplar Avenue, Memphis, TN 38112-3715

Call 1-800-238-9226

Online: www.fargotstein.com Email: info@fargotstein.com





Ken Pell, Instructor,
Winter Park Tech,
Winter Park, Florida

The Status of our Watchmaking and Clockmaking Schools

As we know, the number of schools, both private and public, that teach our trade has diminished dramatically over the past thirty years. In 1970, over sixty schools of some stature were recruiting students. Today, there are only ten who meet the AWI/REC criteria for full-time schools. The obvious answer most people give for this is that the number of job opportunities has disappeared at the same pace due to the technological advancements. The “quartz revolution” has displaced all future opportunities for the trade. The U.S. Department of Labor projections substantiate this with their dim projections for employment. Most public and private school systems have abandoned support for our programs and concentrate on the “high demand, high wage” professions which offer lucrative salaries to students, even with little or no experience.

Why do some schools such as Winter Park Tech Survive?

1. Understanding the marketplace

Since we are addressing the *after-sales-service* of a product, we must know our *product market*. Our *product market* certainly includes Swiss and Asian-made high-end timepieces but also includes less expensive products from the Swiss and Asia which the vast majority of U.S. consumers purchase. The retail industry is diverse and has created a market not only for many grades of timepieces but opportunities for employment as well. We at Winter Park Tech utilize local and statewide professionals from the watch and jewelry industry to guide us with our *Program Advisory Board*. We not only include employers but also former students who have succeeded.

2. Recruiting students

Attracting students into our programs is competitive. Winter Park Tech is a Post

Secondary public school supported by Orange County Schools K-12 District. This allows us to recruit junior and senior high students from three local high schools to attend our classes in the morning and return to their campus for the remainder of the day. Upon graduation, they can return to complete the program. Most applicants ask the same question, “How many job openings are there in this area and what do they pay?” It is often difficult to convince prospective students that there is an attractive future in our industry.

3. Curriculum

Most schools include the basic competencies required to achieve success in their programs. These are based on mechanical products that were produced prior to 1970. These are definitely essential skills required to succeed in the industry programs and generally require between 1,000 and 1,500 hours of classroom instruction. Our school not only offers a complete watch and clock repair program of 1,350 hours, but prepares students to enter the profession at four levels. The first level or *Occupational Completion Point* earns a title of *Clock, Watch, and Jewelry Technical Assistant*. The skills which are learned in this segment of the program include learning the names of the parts of mechanical and electronic watch movements, identification of movements by caliber or grade, maintenance of quartz movements, (batteries, crystals, crowns, stems, and bands), testing of precious metals, soldering gold links, metallurgy, and employability skills, (interviewing techniques, resume writing, job searches). In addition, the student learns basic computer skills such as internet searches and e-mail.

The second level or *Occupational Completion Point* earns a title of *Clock and Watch Repair Technician*. The skills learned here include the repair and maintenance of mechanical watches and clocks, concentrating on disas-

sembling, inspecting and cleaning. In addition, the student learns to modify and fabricate parts using a watchmakers lathe.

The third level or *Occupational Completion Point* earns a title of *Quartz Analog Technician*. These skills include the servicing of complicated electronic watches as well as advanced lathe skills such as repivoting and making gears and wheels.

The fourth and final *Occupational Completion Point* earns a title of *Watch and Clock Maker*. Students learn to make hairspring corrections, install jewels, bushings and balance staffs in addition to advanced lathe skills.

4. Funding

The Florida Department of Education provides funds to operate the program. Eighty-five percent of the funds are provided when a student enrolls. The remaining 15% is only given when a student completes an *Occupational Completion Point*. Prior to the introduction of OCPs, the school would not receive the entire funds for a student who did not complete the entire program. Additional funding comes when the student is placed in a job in the state of Florida.

Although we encourage all students to complete the entire program, and most do, the multiple exit points provides entry level skills for various opportunities for employment as well as assuring continued funding for the program. ☺

Microstamp Custom Steel Stamps

For Watches, Clocks and Collectables!
Personalize your work with a custom stamp by **Microstamp Corporation**
Logos & Trademarks
send us your design for a quote!



(Trace Mark@stamp shown, .25mm characters!)
Free Brochure Available!

Tel. (626) 793-9489 **(800) 243-3543** Fax. (626) 793-9491
2770 E. WALNUT ST. PASADENA, CA. 91107-3754

<http://www.microstampusa.com> e-mail: microstamp@earthlink.net

OTTO JULES FREI & BOREL

126 Second St., Oakland Ca. 94607

Phone 800-772-3456
Fax 800-900-3734
E-Mail info@ofrei.com

Address

<http://www.ofrei.com>



Go

QUALITY WATCH & JEWELRY SUPPLIES
FOR GENERATIONS
SINCE 1930

Visit our Web Site
Shop On-Line for over 5,600 items

Request a
Horological
Parts &
Supplies
Catalog
Today



DECEMBER 2000 & JANUARY 2001 CELEBRATION SALE



Bergeon 2795 \$479.00
Sale Price \$429.00
17 right direction winders,
left arbors are available.



Bergeon 5500C
\$159.00
Case & Crystal Press
Reg. \$159.00
Sale \$144.00



#5555 \$399.00
Sale \$366.00



Bergeon 30300 \$471.60
Seitz Jeweling Kit
Sale \$425.00



Bergeon 5285D \$509.00
Stalking Tool Set
Sale \$459.00

Just a sample selection of the items on Sale this month. Visit our web site or contact us for a complete list.

Phone 1-800-772-3456 Local 510-832-0355 Fax 1-800-900-3734



As a Clockmaker Turns

The American Clock Movement and Restoration Problems

Part 2

J.M. Huckabee,
CMC, FAWI, FBHI

Discussion

The aging American clocks have passed from the “clean, lubricate, and adjust” class into some more difficult problems. Service has become a “restoration project” on many of these priceless pieces of American History.

Part 1 of this series mainly involved problems with the movement framework. This second part of the series will move into problems identified by an inspection process. This is a guide to discovery of obscure and subtle problems.

Problems with the Gear Train

The spill of an 8-day mainspring can be disaster to the movement and case. Often wheels, pinions, arbors, plates, and case will be damaged when a fully wound spring breaks. Let’s begin with the power source.

A spring spill comes from two sources. The spring breaks or the ratchet and click mechanisms on the great wheel fail. The first illustration shows a click and ratchet in good condition. However, a weak area is the click rivet. A loose rivet in the wheel is a pending disaster. The best solution is a new perfectly fitted rivet. A lathe turned and installed rivet is thoroughly covered in the book, *The Top 300 Trade Secrets of a Master Clockmaker*, available at AWI.



Figure 1. Failure of the click, its rivet, spring, or the ratchet can wreck the movement.

Bearing Inspection

Pivots and pivot holes that are worn must be refurbished. Pivot polishing and pivot hole bushings are also treated in the aforementioned book. A quick assessment of wear in these pieces is shown and described in Figures 2, 3, and 4.

A pivot with wear rings will have a conjugate form in the pivot hole. It will therefore have no endshake.

Additional Inspection and Adjustment

Hand-setting friction adjustment is shown in Figure 5. Pull the pin, and form the spring tips for sufficient friction to drive the hands, yet permit easy setting.

This is a suitable time to check the escapement anchor bridge and its keeper. The anchor rivet may be too tight, or too loose. The methods I use are described in Figures 6 and 8.

Pivot holes that are off-round need to be serviced. Study Figure 7. I installed these bushings about 40 years ago. They were lathe-turned from a 1/8 inch brazing rod, and show very little wear. The clock was not new when it came into my wife’s family about 80 years ago.

Assemble the train without the mainspring. Check end and side shake of each arbor. Check wheel pinion mesh on all pieces. Spin the



Figure 2. Tip the great wheel. This indicates condition of pivot and plate hole. This one is nominally good.



Figure 3. Tip each wheel in all directions. This one is nearing the need of a plate bushing.

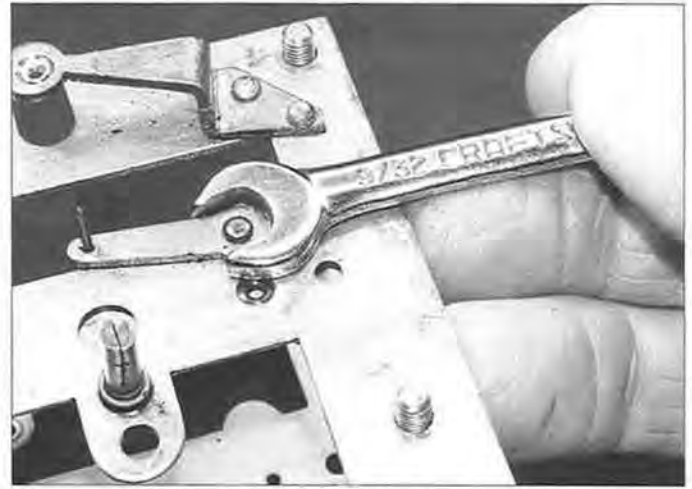


Figure 6. Escapement anchor bridge is easily adjusted with a small wrench.

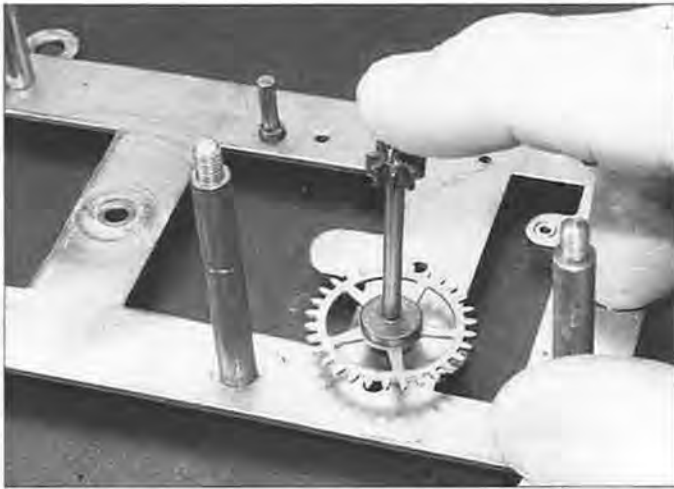


Figure 4. Part of the motion works. This one shows essentially no wear. A racked movement would probably stop the clock from this pivot.

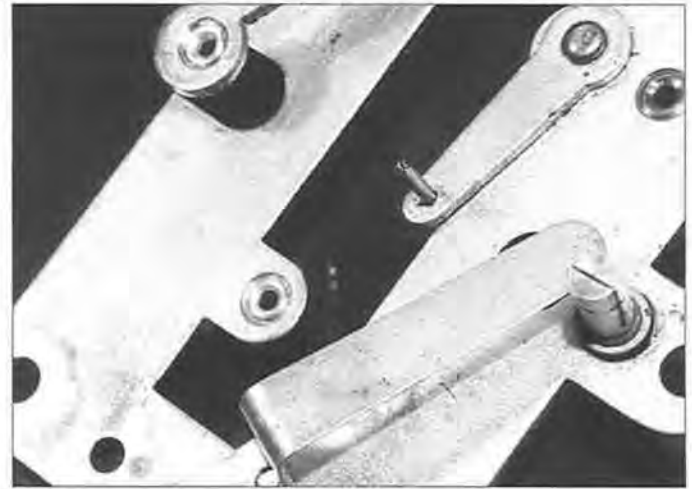


Figure 7. Inspect the pivot holes. These are lathe-turned bushings about 40 years old. The anchor-keeper may need adjustment.

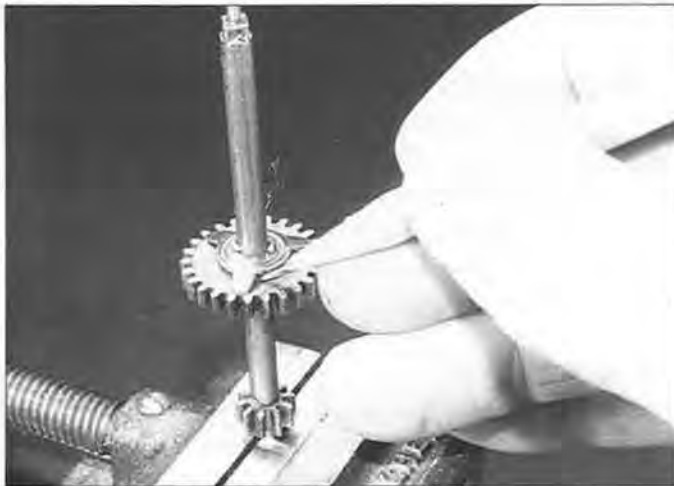


Figure 5. Hand-set friction is adjusted here. Pull the pin, and adjust the spring tips.

HERMLE - KIENINGER - URGOS
MOVEMENTS FROM

Butternorth Clocks, Inc.

- largest distributor of Hermle movements
- distributor of Kieninger movements and parts
- exclusive distributor of Urgos movements
- over 100 models in stock--largest selection in the U.S.

PHONE/VOICE ORDERS 1-800-258-5418

TOLL FREE FAX 1-888-399-8463

1715 Pearlview Ct. • Muscatine, IA 52761

E-mail: bci@muscanet.com

Same day shipping, 2-year warranty

Call for free price list

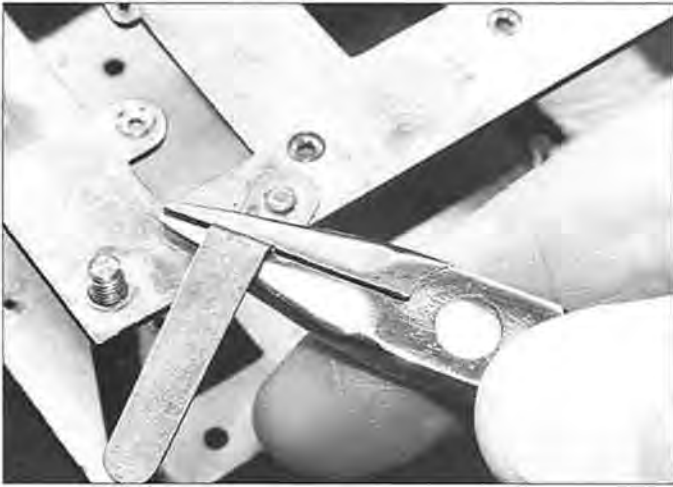


Figure 8. Turn the anchor-keeper away from the plate and adjust with smooth-jaw pliers.

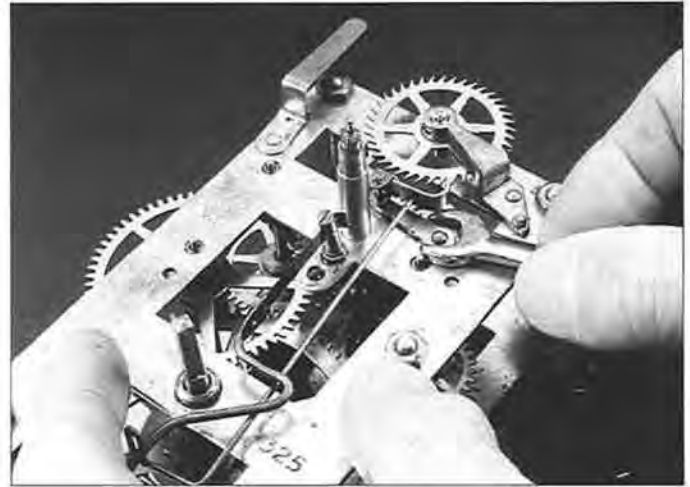


Figure 11. Make escapement adjustments here. It's easier than when mounted in the case.

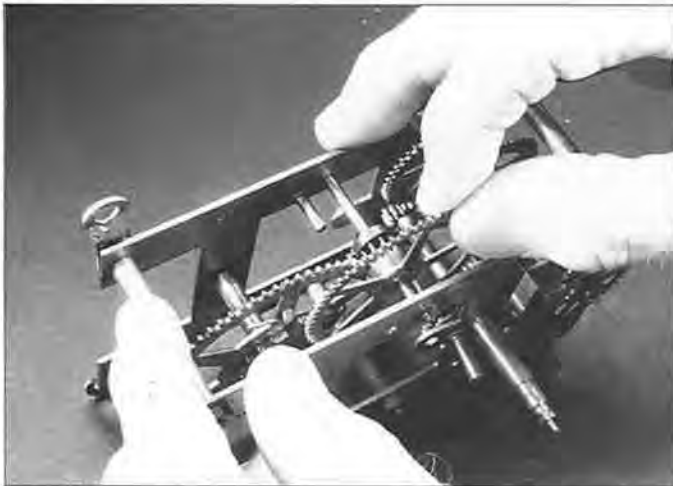


Figure 9. Assemble the movement and check wheel-pinion engagement. Also check end and side shake of every pivot.

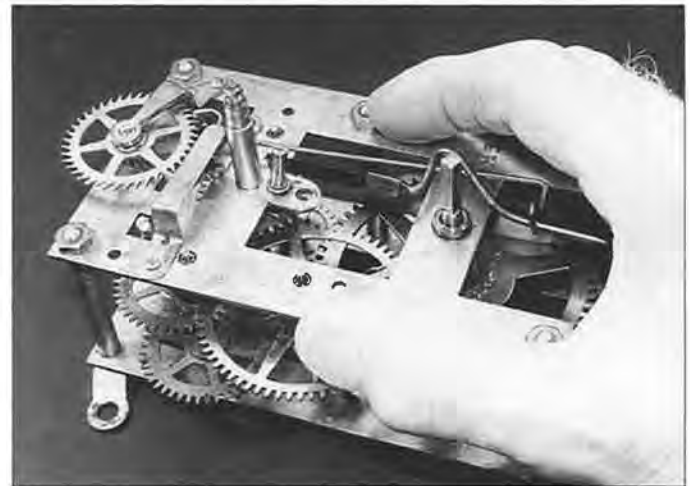


Figure 12. Ready for the case. Make final adjustments to the mounting lugs for perfect case fit.

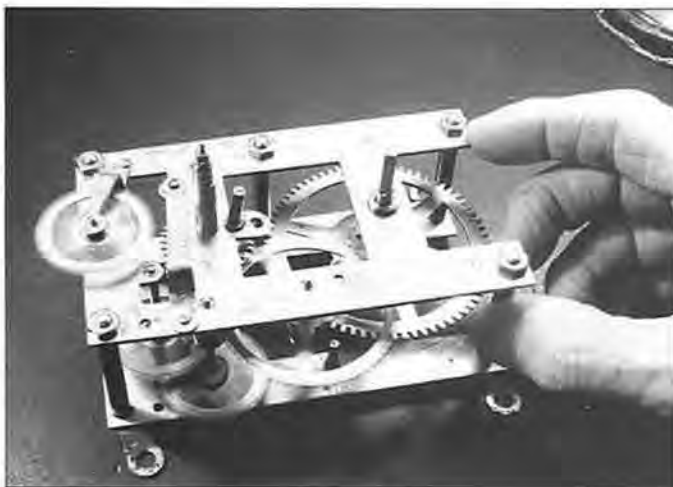


Figure 10. Spin-test the movement in several positions. With no mainspring, a fingernail on the great wheel spins the train easily.

train and search for bent arbors or pivots. My methods are shown in Figures 9 and 10. A job that is in good order passes the test (see Figure 10).

Assembly and Escapement Adjustment

It is easy to make the escapement adjustments at the stage of Figure 11. When the movement is cased, the final beat adjustment remains to be made.

And, when ready for the case (Figure 12) make a final test of the mounting lugs, and adjust so no stress is placed on the movement.

Critique

Restoration involves more than nominal repairs. Regardless of the problems, restoration can be broken down into a series of logical steps to achieve a good end result.

A third part of this series will continue with more solutions to age-old difficult problems. ☺

BULLETIN BOARD

NEW REQUESTS

Preciso

Bobby Long, Euless, TX, is seeking information on the watch brand Preciso (Standard). The Preciso watch is a 15 jewel, licence auchere brevetes. S.G.D.G. #1098471.

C & E Marshall Company

Russ Bowie, Omaha, NE, is looking for an index to the C & E Marshall Company for their watch jewel system, including the diameter and hole size of the jewels.

Atmos Bellows Ethylene Chloride

Allan Lipney, San Rafael, CA, is seeking patent information on Atmos which might give some insight on the amount of Ethylene Chloride used in the Atmos bellows.

RESPONSES

Mido Multifort Water Tester

The following have responded to Mike D. Creasey's search for information and possible source for parts for his Mido Multifort super automatic water tester: Mr. Nordbye, Bloomington MN; Frank Ferrara, Bradenton, FL; and Gene I. Hollingsworth, Emmett, ID.

Grenad Watch Balance Wheel

Mahlon Shetler, South Dayton, NY, responded to Dave Berghold's request for a balance wheel for a Grenad Watch. Mr. Shetler is working on identifying the movement and finding a balance wheel for Mr. Berghold.

Bulova Bezel

Irv Bard, G.F. Specialties, Ltd., Milwaukee, WI, responded to Jim Stanley's request for a bezel for a Bulova case #C967416.

Prentiss Calendar Clock

Jerry Keefer has obtained the instruction booklet he needed for the Prentiss Calendar Clock and was kind enough to forward a copy to AWI.

ITEMS STILL NEEDED

Waterbury Carriage Clock

Pete Warren, Keene, NH, is looking for a "parts only" 4-plate movement as described in the Tran Duy Ly series as "Sage," 8-day, half-hour strike, repeater, jeweled movement. Number 182.

Elgin Case

Kalevi Hoite, Brooklyn, NY, is looking for an Elgin 16s gold-plated hunting case.

Digital Clock with Large Numerals

Leo Jaroslaw, Acton, MA, has a customer who is looking for a source for a 24-hour digital clock, preferably showing hours, minutes and seconds. The numerals need to be at least 6-8 inches in order to be seen across a room.

Howard Pocket Watch Case

David Levine, Arlington, VA, is looking for a compatible case for a Howard Pocket Watch "Deer Series L." The case is approximately 50 mm x 15 mm.

Paul Berguette

Jim Stanley, Fort Wayne, IN, is looking for a supplier of a clasp for a Paul Berguette, Case #A2088.494. He is also looking for someone servicing warranties on this watch brand.

Hamilton-Sangamo Electric Clocks Service Bulletin

The AWI technical department is looking for a good, clean copy of the Hamilton-Sangamo Electric Clocks Service Bulletin, dated November 1929.

Do you have information regarding this month's requests? Do you need information about one of this month's responses? If so, send your information or requests to:

Horological Times Bulletin Board
701 Enterprise Drive
Harrison, OH 45030-1696
Phone: (513) 367-9800
Fax: (513) 367-1414
E-mail: dbaas@awi-net.org

Plating Precious Metals Couldn't Be Easier!
Samson Technology Corporation
The Nation's No. 1 Supplier & Manufacturer
Portable Gold Brush Plating Equipment & Solutions
Supplying the Watch Industry for Over a Decade



The Deluxe Platers Workshop \$399

Comes complete with: Power Supply-UL approved, Set of Anodes, Pen Plater, One ounce each of 24k Rose Gold, Sterling Silver, Nickel, Copper, Brass, 15mls 24k liquid Gold for Pen Plater, Stainless Steel Preplate, Alkaline Copper, 4oz of Chrome Stripper, Latex Gloves, Spray Bottle, Instruction Book & Toll Free Tech Support.

We have the **LARGEST** selection of Gold solutions: 24k, 18k, 14k, & 10k Gold, Rose Gold, 18th Century Gold, Antique Green Gold, Rhodium, Platinum, Palladium, Sterling Silver.

Member of the American Electroplaters & Surface Finishers Society, Inc., British Horological Society, NAWCC, SEMA.
The British Watch & Clock Collectors Association,
American Watchmakers-Clockmakers Institute

Samson Technology Corporation

2280 SW 70th Ave., Suite 3, Davie, FL 33317
Tel: 954-916-9322 Fax: 954-916-9338
E-mail: samson@gate.net

MC
VISA
AMEX

800-256-0692

MC
VISA
AMEX



Repeater, Petite and Grande Sonnerie Clocks

“Embee” Clock, Part 60

Leo A. Jaroslaw

©2001 (All rights reserved by the author)

Introduction

In Part 59, we completed assembly of the trains, and installed the front plate (1). In this part we will assemble the components on the front plate.

FRONT PLATE ASSEMBLY (Figures 60.1, 60.2, and 60.3)

5. Install three springs on the front plate.

Note: These springs are: Chime Stop Lever Spring (20); Strike Rack Hook Spring (22); and the Strike Rack Spring (96). These have to go on first. Other components installed subsequently would make it difficult or impossible to mount them.

5.1. Install chime lift rocker assembly (10) after adding a drop of oil to the shoulder of the pivot.

Note: The rocker is mounted with a shoulder screw, which I call the chime lift rocker pivot (11).

5.2. Install chime lift lever (18).

Note: The chime lift arbor (36) is inserted through the hole in the front plate. It extends to, and is inserted into, a pivot bearing in the rear plate.

5.2.1. Pin the chime lift arbor, with a taper pin (97), adjacent to the rear of the front plate.

Note: See schematic in Figure 60.1. This pin locks the lever/arbor assembly in place while

allowing it to rotate. Lube the chime lift arbor where it enters both the front and rear plates.

5.3. Insert the chime stop arm (39) arbor (23) assembly through the hole in the front plate.

5.3.1. Insert the rear pivot of the stop arbor into its bearing hole in the rear plate.

5.3.2. Insert the chime stop lever (19) onto the square end of the stop arbor, which protrudes through the front plate.

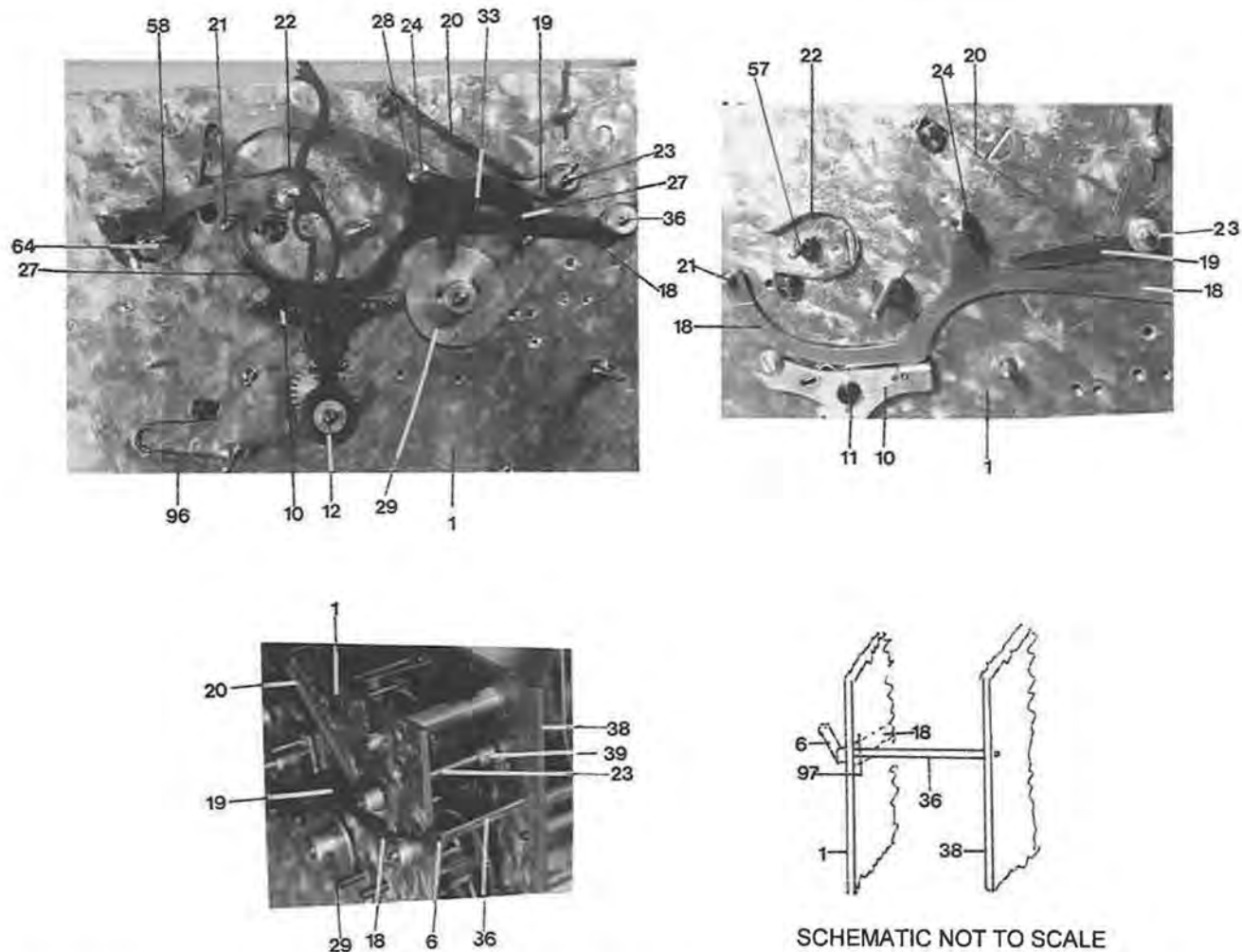
Note: This assembly is not adjustable. The correct position is as shown in the Figure 60.2 schematic. The chime stop lever (19) is resting on the stop tab (33) with the chime lift lever lying on the chime lift rocker (10).

5.3.3. Pin the chime stop arbor.

5.4. Install strike unlock lever (27) on its post (24).

Note: The post (24) is mounted on the chime lift lever (18). The chime lift lever normally rests on the chime lift rocker (10), and is controlled by it. The tab (33) is part of the strike unlock lever (27). The unlock lever, through the tab, normally rests on the chime lift lever. This prevents clockwise (CW) rotation of the unlock lever in the “at rest” position. Both the strike unlock lever and the chime stop lever are lifted when the chime lift lever rises.

5.4.1. Position the left end of the chime stop lever (19) on the chime stop tab (33).



- | | | |
|----------------------------|--------------------------------|--------------------------|
| 1 Front Plate | 21 Rack Hook Lift Pin | 36 Chime Lift Arbor |
| 6 Repeat Lever | 22 Strike Rack Hook Spring | 38 Rear Plate |
| 10 Chime Lift Rocker | 23 Chime Stop Arbor | 39 Chime Stop Arm |
| 11 Chime Lift Rocker Pivot | 24 Strike Unlock Lever Post | 57 Strike Rack Hook Post |
| 12 Center Arbor | 27 Strike Unlock Lever | 58 Strike Rack Hook |
| 18 Chime Lift Lever | 28 Strike Unlock Lever Bearing | 64 Gathering Pallet |
| 19 Chime Stop Lever | 29 Chime Count Wheel | 96 Strike Rack Spring |
| 20 Chime Stop Lever Spring | 33 Chime Stop Tab | 97 Taper Pin |

Figure 60.1. Front Plate Assembly Components

THE "KRONOGLASS" ... a semi-automatic pantograph mineral watch crystal grinding machine

- FEATURES:** Four (4) diamond grinding wheels
 Water pan with pump
 Plus all equipment necessary to reproduce at least 60 finished crystals

With this machine you can reproduce flat or concave mineral watch crystals with a bevel for watches of any shape. The American Perfit Crystal Corp. is the exclusive distributor for this machine, considered the finest of its kind available.

Replacement parts are readily available!

NOW IN STOCK -- NEWLY IMPROVED!

Contact your watch material supplier today.

SEE THE VIDEO FIRST



Kronoglass

AMERICAN PERFIT CRYSTAL CORP.

520 8TH AVENUE

NEW YORK, NY 10018

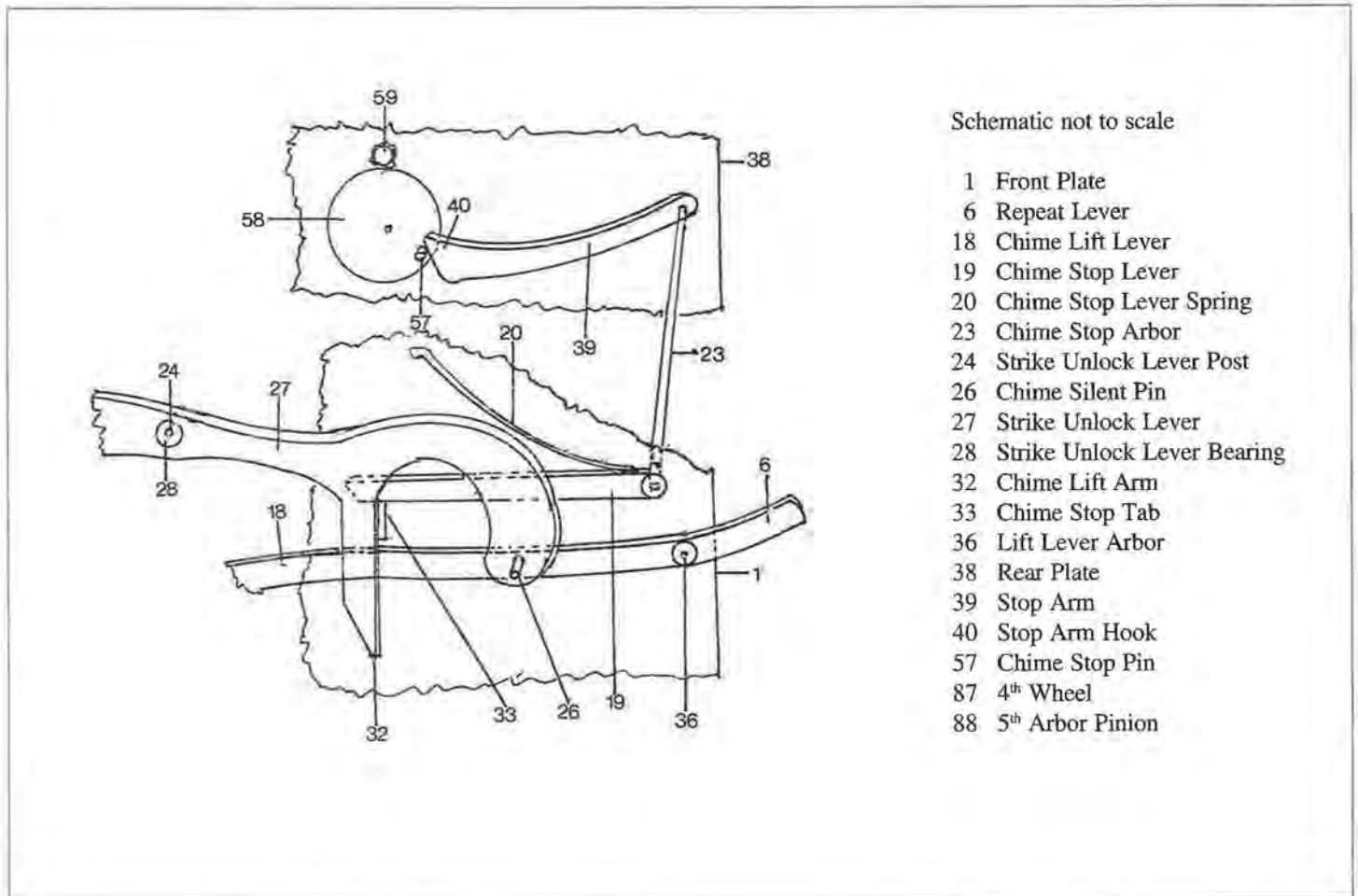


Figure 60.2. Chime Stop/Start Component Schematic

Note: The stop lever spring (20) holds the lever onto the tab when the units are in motion.

5.5. Insert the chime count wheel (29) loosely onto the end of the chime 3rd arbor extending through the front plate.

Note: Loosely tighten the set screws. They will be adjusted and tightened later.

5.6. Mount and pin the strike unlock lever (27) onto its post (24).

Note: The post is located on the chime lift lever. Place a drop of oil on the post prior to assembly.

5.7. Install gathering pallet on the extension of the strike 4th arbor.

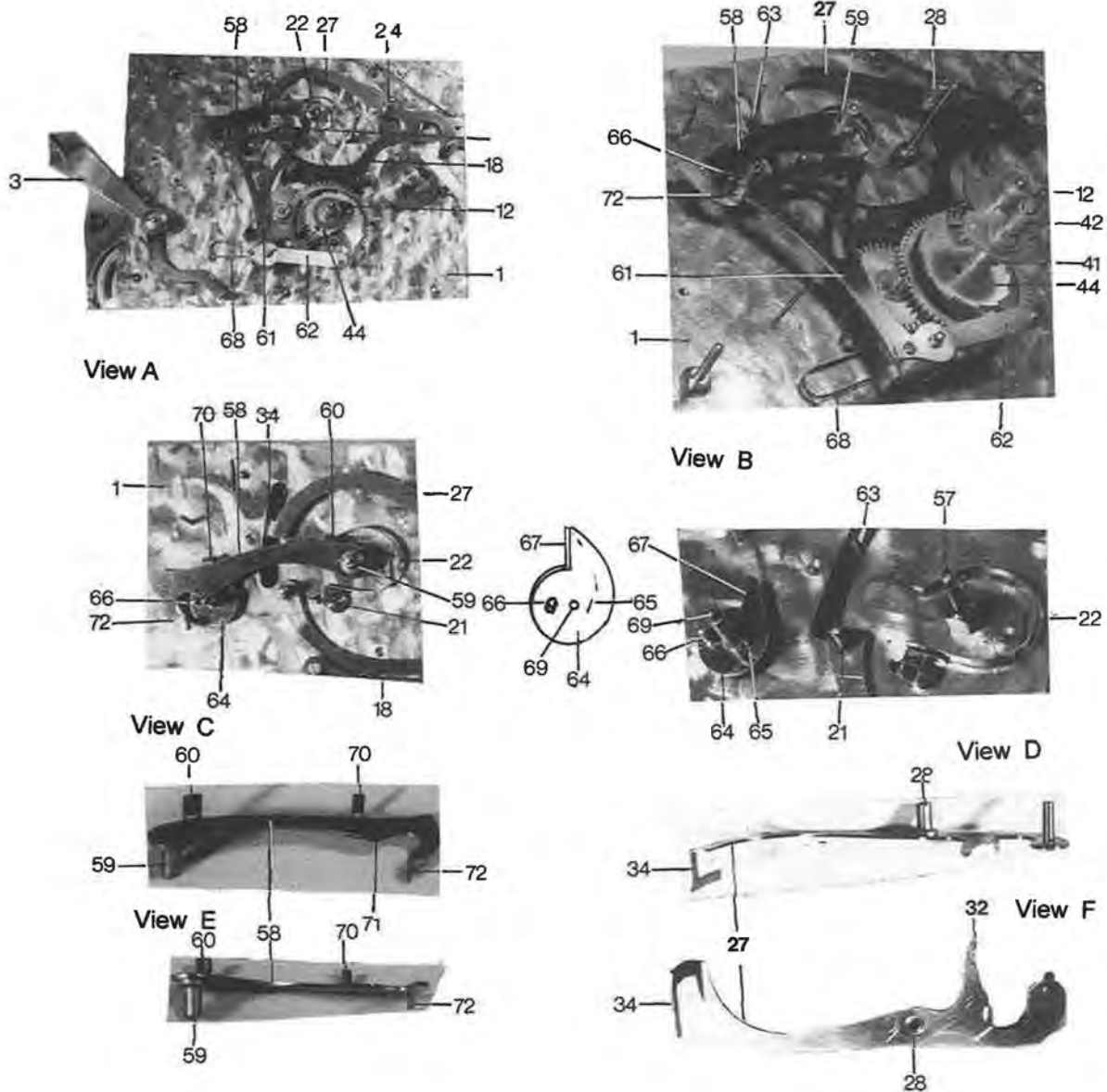
Note: The pallet is a slip fit onto the square end of the strike 4th arbor extending through the front plate. Note the position of the lift pins on the strike 3rd wheel. Since

the hammer tail and arbor are not yet installed, assume a position of where it would rest in the stopped train mode. Install the pallet in the approximate stopped position. As the end of the arbor is square, there are four positions in which the pallet can be mounted. However as noted earlier in step 2.3 (November 2000, page 37), the taper pinholes in the arbor and gathering pallet will line up in only one relative position. If the taper pin will enter through both components, the relationship and position is correct.

5.8. Install strike rack hook (58) onto the strike rack hook post (57).

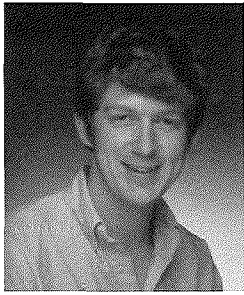
Note: The rack hook spring (22) compresses onto the rack holding tab (60) on the rack hook. This is located near the rack hook pivot bearing (59).

We will end Part 60 at this point. In Part 61 we will start with the installation of the motion work components.



- | | | |
|-----------------------------|--------------------------------|---------------------------------|
| 1 Front Plate | 34 Strike Warning Tab | 63 Strike Warning Pin |
| 3 Strike Silent Lever | 41 Strike/Moon Dial Controller | 64 Gathering Pallet |
| 12 Center Arbor | 42 Hour Pipe | 65 Gathering Pin |
| 18 Chime Lift Lever | 44 Hour Snail | 66 Rack Hook Lift Pin |
| 21 Rack Hook Lift Pin | 57 Strike Rack Hook Post | 67 Pallet Stop Surface |
| 22 Rack Hook Spring | 58 Strike Rack Hook | 68 Strike Rack Spring |
| 24 Strike Unlock Lever Post | 59 Strike Rack Hook Bearing | 69 Strike 3 rd Arbor |
| 27 Strike Unlock Lever | 60 Rack Holding Tab | 70 Stop Tab |
| 28 Unlock Lever Bearing | 61 Strike Rack | 71 Rack Hook Lift Cam |
| 32 Chime Lift Arm | 62 Strike Rack Tail | 72 Rack Hook Tab |

Figure 60.3. Strike Control Components



Education Update

Introduction to the Watchmaker's Lathe

Stewart Lesemann,
CW, CEWT

This course is designed for students with no previous lathe experience who wish to develop basic turning skills and acquire knowledge about the various types of lathes and accessories available. It will be offered as both an AWI Continuing Education course and Bench Course and can be tailored in length from 2 to 5 days. Topics covered will include:

- Discussion of lathes and accessories including: WW patterns, Geneva style, cross slides, collets, chucks, etc.
- Basic functioning and maintenance of the lathe, including disassembly and repair.
- Theory of operation
- Making and sharpening steel gravers
- Making and sharpening carbide gravers
- Turning brass
- Turning steel
- Hardening, tempering, and turning blued steel

The class will include lecture, slides, and demonstrations. There are no prerequisites.

Tools required include:

- Loupes: 3x, 5x, and 10x (or approximate magnifications)
- Metric hand micrometer
- Metric caliper-Vernier, Dial, or Digital
- Assorted files
- Coarse and fine India bench stones (Double-sided is fine.)
- Steel gravers and handles (at least 2)

Carbide will be provided at a small fee.

As a Continuing Education course (given at AWI), students will not be required to bring their own lathes. If attending "on the road" as a Bench Course, students should bring a lathe and collets in addition to the required tools.

This course is currently scheduled at AWI for April 9-13. This is the week prior to the scheduled AWI Lathe Program, making it convenient for those who would like to obtain two weeks of lathe instruction. Please note, however, that this course is not a prerequisite for the Lathe Program; it is simply intended as an entry level course for those wishing to acquire basic skills. The AWI Lathe Program is open to students at all skill levels.

If you are interested in attending either locally or at AWI, please contact us for further details.



WHEN THINGS GET TOUGH, TURN TO AWI !!

It is when times get tough that AWI membership shines through. AWI is an information broker that has the kind of information at their fingertips than can make the difference during a difficult period, or they can point the way to find it.

AWI provides information that not only helps members, but often can turn a problem into an opportunity; for example, sharing ideas on the latest information on technical advances.

The educational offerings of AWI, such as technical publications, can dramatically improve the financial position of an individual and increase productivity.

ANOTHER BENEFIT OF AWI MEMBERSHIP!

AWI EDUCATION

Bench Courses

To schedule a Bench Course in your area please contact AWI for complete information. A list of available Bench Courses is printed here for your convenience. To register for Bench Courses, please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030. Phone (513)367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org** PLEASE NOTE: Registrations are limited and will be selected by the earliest date received. Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and phone number. All registration fee checks and charges are processed immediately upon receipt. **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE COURSE.** • Indicates Bench Courses held in conjunction with a convention.

CONTACT THE AWI EDUCATION DEPARTMENT
FOR DETAILS ON HOW TO SCHEDULE A BENCH COURSE IN YOUR AREA

AWI Continuing Education

AWI's continuing education program offers classes in various phases of watch & clock repair techniques. Work alongside recognized leaders in the field of horology. See how they handle the everyday situations we all encounter. All classes are held in AWI's training rooms in Harrison, Ohio. Call or write for information and details for the classes that interest you! **DEADLINE FOR REGISTRATION IS 30 DAYS BEFORE THE SCHEDULED DATE OF THE CLASS.** To register for these courses please mail, phone, fax or e-mail your registration and payment information to: **American Watchmakers-Clockmakers Institute, 701 Enterprise Drive, Harrison, OH 45030. Phone (513) 367-9800, Fax (513) 367-1414, E-mail: educate@awi-net.org.** Please include a check or charge card number (Visa, Mastercard, Discover or American Express), card expiration date, signature and daytime phone number. All registration fee checks and charges are processed immediately upon receipt.

DATE	CLASS	INSTRUCTOR	FEE
JANUARY 2001			
8-12	Hairspring Vibrating & Timing Adjustments	Stewart Lesemann	\$250.00
FEBRUARY 2001			
5-9	Automatic Winding Mechanisms	Stewart Lesemann	\$250.00
19-23	Mechanical Chronographs	Stewart Lesemann	\$250.00
MARCH 2001			
12-14	ETA Products	Alessandro Betti	\$150.00
19-23	Watch Part Fabrication & Finishing	Stewart Lesemann	\$250.00
APRIL 2001			
9-13	Introduction to the Watchmaker's Lathe	Stewart Lesemann	\$250.00
16-20	AWI Lathe Program	TBA	\$250.00

Introduction to Clock Repair AWI Training Center Harrison, Ohio
Instructors: Laurie Penman & Gerry Penman

JANUARY 2001			
8-12	Introduction to Clock Repair, Phase I - Getting Started		\$250.00
15-19	Introduction to Clock Repair, Phase II - Striking Mechanisms		\$250.00
FEBRUARY 2001			
5-9	Introduction to Clock Repair, Phase III - Use of the Lathe		\$250.00
12-16	Introduction to Clock Repair, Phase IV - Common Escapements		\$250.00
MARCH 2001			
5-9	Introduction to Clock Repair, Phase V - Westminster Chimes		\$250.00
12-16	Introduction to Clock Repair, Phase VI - More Escapements		\$250.00
TBA	Introduction to Clock Repair, Phase VII - Platform Escapements & Carriage Clocks		\$250.00
TBA	Introduction to Clock Repair, Phase VIII - Grande Sonnerie Carriage Clocks		\$250.00
TBA	Introduction to Clock Repair, Phase IX - General Clock Part Making		\$250.00
TBA	Introduction to Clock Repair, Phase X - Grande Sonnerie Carriage Clocks		\$250.00

AWI Bench Courses

Advanced Clock Repair

Clock Case Repair

Clock Escapements

Cuckoo Clock Repair

ETA Products

Filing & Flat Polishing

400-Day Clock Repair

Hairspring Vibrating

Introduction to
American Pocket Watches

Introduction to Clock Repair

Introduction to
Quartz Watch Repair

Lathe Program

Mechanical Watch Repair

Micro Lathe Operations

Mechanical Chronograph

Organize Your Work Habits
for Success

Platform Escapements

Repair of the Atmos Clock

Repair of the Bulova Accutron

Seiko Kinetic
Quartz Watch Repair

Sequential Chime

Servicing ETA
Quartz Chronographs

Striking Clocks

Swiss Auto Quartz

For details on scheduling a
Bench Course in your area,
please contact Marilyn Bunch,
AWI Education Coordinator at
513-367-9800 ext. 303
or e-mail mbunch@awi-net.org

INDUSTRY NEWS

Watch and Jewelry Industry Launches Campaign on Watchmaker Education

The American Watch Association (AWA), American Watchmakers-Clockmakers Institute (AWI), Federation of Swiss Watch Industry (FSWI) and Jewelers of America (JA) have united to address the problem of the need for more and better qualified watchmakers and watch repairers in the United States.

"The American Watch Association is please to help coordinate the effort in order to channel the industry's resources in the most effective way to assure more and better trained watchmakers in the years ahead," stated AWA Chairman Robert Filotei of Piaget/Officine Pancrai.

The focus will be on watchmaker education. Only 30 years ago there were 44 watchmaking schools in the United States. FSWA President Peter Laetsch warned that "today there are only 11 recognized full-time watchmaking schools - a 75 percent decline.

The industry coalition established a committee to examine the need for uniform standards of curriculum and certification. Committee Chairman Laetsch will work with AWI, JA and technical experts from individual watch companies in order to evaluate existing training programs and define minimum standards of education for watchmakers and watch repairers. "The Jewelers of America's Bench Jewelers Certificate Program may provide a useful template here," said JA Chairman Ed Bridge.

In addition the committee will explore the desirability of a consistent certification process based on AWI standards. AWI Executive Director James Lubic said, "The industry needs a reliable standard of certification to assure quality service."

The coalition also created a committee on public relations and advertising, chaired by Ebel President Dennis

Phillips, to help attract qualified students. "The first step is to survey the existing watchmaking community as a prelude to designing a campaign to inform high school placement counselors and get our story out to potential students," Mr. Phillips said.

To this end, the coalition is sending a questionnaire out to watch companies, retail jewelers, independent watchmakers and others to determine the size and characteristics of the current industry and to identify future requirements for watchmakers and watch repairers. The coalition expects to compile the results of the survey in January 2001.

The coalition held its first meeting on November 14 at Piaget's office in New York City. In addition to the executives mentioned above, attending were Rolex CEO Walter Fischer and Roles Senior Vice President Jean-Claude Vollenweider, Swatch Group CEO Yann GaMard, JA Senior Vice President David Rocha and Director of Certification Mark Mann, AWI President Ronald DeCorte and AWA Executive Director Toby Collado.

Swiss International Watch Laboratory, Inc. Relocates

The U.S. office of Swiss International Watch Laboratory, Inc., recently relocated to 2681 Clipper Way, Naples, Florida 34104, Phone: (941) 659-9197, Fax: (941) 659-1597, Website: www.swissinternationalwl.com. They are now accepting all major credit cards.

Fargotstein's Seeks Investor or Sale

S. Fargotsein & Sons, Inc. (Fargotstein's) has retained Equity Partners, Inc., a national broker, to seek a joint venture, equity investor, or entirety sale for the company. Fargotstein's is a jewelry wholesaler, which was founded in Memphis in 1930.

"The company needs additional capital to grow, and my wife and I need to begin considering an exit strategy, reasoned James Delgadillo, Fargotstein's President and owner since 1985. "Sales have flattened out at about \$7 million annually over the last three years, and we would like to see this

great company progress to the next level, which requires more capital."

The firm provides watch materials, jewelers' tools and supplies, findings (gold and silver parts used to assemble finished jewelry), gemstones, diamonds and finished jewelry to about 6,000 independent retail jewelry stores and trade shops. About 55 people are employed by Fargotstein's, which operates out of a 35,000 square foot office and warehouse on Poplar Avenue in Memphis.

Mr. Delgadillo commented, "I feel we have a great company, with great people, and a loyal customer base. We have selected Equity Partners, Inc. to conduct a search for an investor or buyer to capitalize on these strengths."

According to Ken Mann, a partner at Equity Partners, "This is a unique opportunity for a wholesaler or manufacturer to acquire 6,000 customers, with revenue growth potential from that existing excellent customer base, as well as from other independent jewelry retailers."

Equity partners, Inc. is a Maryland-based investment banking firm which specializes in finding investors for companies with cash flow constraints, or excessive interest expenses, and has completed approximately 250 such transactions since 1988.

Prospective investors can reach Equity Partners at (410) 822-0216.

Diploma Courses at West Dean College

West Dean College, Chichester, West Sussex, England, will hold an Open Day on February 7, 2001. Potential students will have the opportunity to tour the workshops and meet the tutors and students.

West Dean College offers professional training in the conservation and restoration of ceramics, clocks, fine metalwork, and furniture, and in tapestry weaving and making early stringed musical instruments. The courses have a strong practical bias and are validated at postgraduate level by the University of Sussex.

Contact the Diploma Course Office at the college to make reservations: telephone +44 (0) 1243 818232/811301, facsimile +44 (0) 1243 818291 and e-mail diplomas@westdean.org.uk

Classified Advertising Regulations & Rates

Ads are payable in advance 90¢ per word, \$1.00 per word in bold type. Classified display ads are \$40.00 per column inch, 2 1/4" wide. Ads are not commissionable or discountable. The publisher may, at the publisher's sole discretion and for any reason and without notice, decline to publish or republish any ad, in which case any fees submitted or paid for such ads shall be returned or rebated to the advertiser. The publisher reserves the right to edit all copy. Price lists of services will not be accepted. Confidential ads are \$10.00 additional for postage and handling. The first of the month is issue date. Copy must be received 30 days in advance (March issue closes for copy on February 1st).

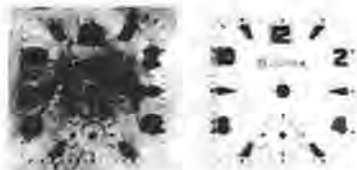
HOROLOGICAL TIMES

701 Enterprise Drive
Harrison, OH 45030
Phone (513) 367-9800, ext. 307
Fax (513) 367-1414
E-mail: dbaas@awi-net.org

TRADESMAN

DEADBEAT, RECOIL & BROCCOT PALLETS custom made. Full-service overhauls on brass clock movements. **John F. Kurdzionak Clock Repair**, 8A Central St., Stoneham, MA 02180; Phone (781) 438-1037, Fax (781) 279-2923, E-mail: jfkclock@juno.com

DIAL REFINISHING



BEFORE AFTER

Quartz Conversions
Diamond Dial Conversions
Emblem & Name Personalization

Write for Brochures
INTERNATIONAL DIAL CO., INC.
58 W. SUGARTREE
P.O. BOX 970
WILMINGTON, OH 45177
(937) 382-4535

CLOCK WHEEL AND PINION CUTTING

Fast service -- Write for free Brochure and price list. Fendleys, 2535 Himes St., Irving, TX 75060. (972) 986-7698.

CLOCK, MUSIC BOX MAINSPRINGS, GEAR PINION CUTTERS, MATERIAL & PARTS CUSTOMMADE. TANI, Box 338, Atwater, OH 44201; (330) 947-2268. Catalog \$3.00.

VINTAGE POCKET WATCH RESTORATION. Twenty years experience, guarantee, free estimates. The Escapement, Box 606, Chenango Bridge, NY 13745; (607) 648-3777.

CRYSTAL MASTER IN CHICAGO

A&B Watch Repair Inc. (Est. in 1945)
Having 55 Years Experience
In Flat Fancy & Dome Fancy
Crystal Fitting, Hunting Case,
Open Face Pocket Watch Glass Crystals
(Fast, Precision & Guaranteed Service)
29 East Madison St., Room #504
Chicago, IL 60602 Phone (312) 263-9047
Fax (312) 263-9056 (312) 263-1705

HAMILTON ELECTRIC WATCH REPAIR

Expert, experienced service on all Hamilton 500 and 505 Electric watches. Hamilton electric watches and parts always wanted. René Rondeau, P.O. Box 391, Corte Madera, CA 94976. Tel: (415) 924-6534. E-mail: rene@hamiltonwristwatch.com

PORCELAIN/ENAMEL

WATCH AND CLOCK DIAL RESTORATION
Perfect and invisible. Colors and art perfectly matched. Dennis Kaye, 888-363-9510
<http://clocks.dwk.org>, e-mail clocks@dwk.org

CRYSTAL CUTTING SERVICE

Flat Mineral Glass Crystals
Quality Work
1-Day Turnaround
R.A. Time Capsule
Montoursville, PA
You'll love our price.
For more information call
1-800-WATCH-50

ELECTRONIC INSTRUMENT SERVICE

We are Factory Authorized Service for:
• **VIBROGRAF & PORTESCAP**
• **TICK-O-PRINT & L&R**
We service all makes of ultrasonics, all makes of watch rate recorders, and related equipment. 25 years experience.

JACK PHILLIPS
757 Lincoln Ave., #26 San Rafael, CA 94901
Used Equipment Bought & Sold
For Information
Call (415) 453-9266



ALVIN KRUTOLOW FOR ROLEX SERVICE

Master Watchmaker, 47 years experience. Awarded technical certificate from Rolex in 1977. Service includes case & bracelet refinishing & waterproofing of case. All watch parts are genuine Rolex. We specialize in the repair of high-grade watches & clocks. Not affiliated with Rolex Watches, Inc. USA. Ask for Alvin or Marcus, (203) 792-4539.

DIAL REFINISHING CO. FAST SERVICE, FINEST QUALITY, quantity works welcome. Specialize on changing dial feet positions to fit the quartz movement. Send your works to: **KIRK DIAL OF SEATTLE**, 4th & Pike Bldg., Suite 625, Seattle, WA 98101; (206) 623-2452.

MURPHY'S CRYSTAL SERVICE

FAST -- QUALITY WORK

- 24-hour turnaround on most jobs.
- Complete crystal fitting service for new and old wrist and pocket watches.

CALL OR WRITE FOR PRICE LIST
FAX or PHONE (209) 531-1738
1839 N. CENTRAL AVE., SUITE B
CERES, CA 95307

ARTICLES FOR SALE

STUCK FOR A MOVEMENT?

or a watch part? Call Don Kroker's Watch Movements. (559) 229-8423 or write 4325 No. 5th St., Fresno, CA 93726.



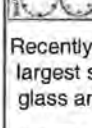
For All Your Clock Repair Needs
Send \$3.00 for our all new 128 page illustrated clock supply catalog. Over 6000 items available for fast delivery.

Home Of:

The Golden Hour Clock Co.
A complete selection of spare parts for the Golden Hour Clock.



The Phoenix Transfer Co.
Stocking the trade's best variety of clock transfers and paper labels.



The M. L. Shipley Co.
Recently acquired, we now offer the largest selection of screened clock glass and paper dials to the trade.



Timesavers

Box 12700
Scottsdale, AZ 85267 • USA
480-483-3711 / 480-483-6116
clocks@timesavers.com / www.timesavers.com

FULLY WARRANTEED
Watch Timers & Cleaners



FACTORY REBUILT WATCH TESTING EQUIPMENT

Call or Write for details:
 Tel: (516) 437-8700
 Fax: (516) 437-8708

VIBROGRAF U.S.A. CORP.
 504 Cherry Lane, Floral Park, NY 11001

Bergeon clock bushing tool, \$400.00; Bergeon clock mainspring winding tool, \$400.00; both like new. Watchmakers bench with tools, Watchmaster cleaning machine (ultrasonic) and Peerless lathe with 30 collets. Frank Fulkerson, Toledo, OH 419-472-4421 or 419-385-3248.

DASHTO INC./TOM MISTER
<http://www.dashto.com>
 Huge and everchanging selection
 Used and new horological items
 Sold by internet list only
 TOOLS/EQUIPMENT
 MATERIAL ASSTS/PARTS
 POCKET/WRISTWATCHES
 WATCH MOVEMENTS
 WATCH CASES & DIALS
 WATCH BRACELETS/BUCKLES
 MUCH MORE
WE BUY & TRADE ALSO
 tom@dashto.com
<http://dashto.org>

MINI QUARTZ MOVEMENTS. Guaranteed lowest prices--as low as \$2.30. Two-year guarantee. Large selection of hands and numerals. Free delivery. SASE or call (704) 333-0221. HALL CLOCK SHOP, 1512 Central Ave., Charlotte, NC 28205.

NOW AVAILABLE
Discontinued SEIKO & LASSALE
Bands, Cases, Dials, Straps & Case Parts

This is an inventory of complete salesmen's samples. We have over 15,000 cases/bands in stock for immediate delivery. Crystals, dials, hands and crowns are available. Renew that old SEIKO or LASSALE customer's watch for a fraction of the cost of normal parts purchase. We have many parts that the major distributor can't supply. All parts are from U.S.A. authorized models.

Call RON CANDIA
1-877-226-3259
 This is a FREE call!!!

Have caseback, dial, or band numbers ready and I will let you know cost and availability.

CALL NOW

SHERLINE PRODUCTS
10-25% OFF
 Free catalogs upon request.
ANTIQUE CLOCKWORKS, LTD.
 P.O. Box 201, Loretto, MN 55357
 Toll Free 877-643-7698
 E-mail: jgboothacw@aol.com

HAMILTON MILITARY MATERIAL. Many parts available for 992B, 4992B, M23, M22 deck watch, M21 marine chronometer, brass hardware for boxes. Robert Ravel Co., Box 32, Devon, PA 19333. Phone (610) 644-4272 or (610) 688-2909.



maxell
Batteries
 Performance, Quality & Profits
 All Prices Are In CDN. Currency

For all your watch, lithium, alkaline and photo battery needs, contact:

Simren Canada
 4549 Crosswinds Drive
 Mississauga, Ontario L5V 1G3
 Tel: 905-890-3618 • Fax: 905-507-6896
 Toll: 1-800-381-3077 • Fax: 1-888-890-8878
 E-mail: simren@idirect.com
 Website: www.simrencanada.com

BUSINESS FOR SALE

WATCH & CLOCK REPAIR SHOP
 For sale in West Central Florida
 (close to beaches)

This repair shop is owned by a European watchmaker who is looking to retire after 17 years in the same prime location. The repair shop is the most reputable in a fast-growing area. Well established client base, lots of repair work with a potential for jewelry repair as well. The shop is well equipped with tools, machinery, parts, etc. to service all kinds of clocks and watches, which can include housecalls with **Turnkey Operation**. For more details e-mail: kwuhrmacher@aol.com

SCHOOLS

Florida Jewelry & Watch Academy, Inc.



Comprehensive 3 Month
WATCH REPAIR COURSE
 Learn: Mechanicals, Quartz,
 Chrono, Hairsprings, Lathe,
 Crystals, Gaskets & Stems

Free Catalog Boca Raton, Florida www.jewelryacademy.com

Learn More Earn More 800-630-4844

HELP WANTED



EXPERIENCED WATCHMAKER

Candidate must be able to fully service ultraflat and complicated mechanical movements. Proficiency in hairspring and escapement work required. Factory service center offers fully equipped workshop and a pleasant environment along with a competitive salary and benefit package. Please send/fax resume to:

BLANCPAIN USA
 1200 Harbor Blvd., 7th Floor
 Weehawken, NJ 07087
 Fax: 201-271-4608
 EOE

HELP WANTED

Fine Watchmaker Wanted

At Time Delay Corporation we service fine mechanical watches, Rolex almost exclusively. You will find no greater opportunity to excel in the fine art of watchmaking than with us. We prefer watchmaking school students or graduates. We will take your abilities to a new level because you will learn from the best watchmakers in the United States. Advancement in this superior working environment depends upon your desire to learn new skills and techniques. Our working hours are Monday through Friday 8-5. Contrary to most retail jewelry stores, we don't work on most weekends or the six national holidays. Our benefits package includes health and dental insurance, vacation and a retirement plan. If you truly want to become a thoroughly professional fine watchmaker, this is the place to be. Send us your inquiry by fax, e-mail or mail.

Call: 800-622-5203 Fax: 214-739-5508
E-mail: gerry@timedelay.com
Time Delay Corporation
10440 N. Central Expressway #210
Dallas, TX 75231

COMPLICATIONS/GENEVA SEAL WATCHMAKERS NEEDED

Experience needed in complicated mechanical watches—bi-retrogrades, perpetual calendars, minute repeaters & movements meriting Geneva Seal. Three positions—entry level to experienced. All training provided—great opportunity for recent graduate. Salary commensurate with experience.

Please fax qualifications to:
Roger Dubuis North America
570-822-4699
or call 570-970-8888

START YOUR OWN BUSINESS

A leading operator of Watch and Jewelry Repair Service Centers in fine department stores nationwide is looking for career minded individuals to join our exciting **Independent Contractor program**. You will use your skills as a Watchmaker, or Jeweler to operate a Watch and Jewelry Repair Center in a major department store. We will provide you with a turnkey department. We will supply the lease, the showcases and fixtures, access to sources for merchandise, tools, equipment, repair material and support for the technical aspects of running a business. You will provide the initiative, the creativity and the enterprise. Small initial investment may be required. Possible locations for this opportunity are Woodbridge and Wayne, NJ, Valley Stream, NY, San Bernardino and Ventura, CA, and Reno, NV. Please e-mail to lelliothr@timeservice.com or fax information, Attention: L. Elliott to (419) 241-4594.

WANTED TO BUY

WANTED: Paying high prices for chronograph and high grade watches, movements, dials, cases, & parts. Dean Sarnelle, 25 W. Beverley St., Staunton, VA 24401, phone & fax (540) 885-6064.

We pay 97% of market for karat gold scrap (any amount)! Also, buy filings, gold fill, sweeps, silver, platinum! Immediate 24-hour payment return mail! Ship insured/registered mail to: AMERICAN METALS COMPANY, 253 King St., Dept. HT, Charleston, SC 29401. Established 1960. Phone (803) 722-2073.

CALL ME

When you are ready to sell your movements, cases, dials, parts, or complete watches. Prompt, fair settlement. Will travel or pay shipping. Mike Bailey, P.O. Box 1118, Elgin, IL 60121 or (847) 741-1289.

ATTENTION RETIRED WATCHMAKERS

Call us before you sell your parts, tools, and watches. We have helped over 125 watchmakers in the last three years to dispose of their accumulations. When you're really ready to sell, we're ready to buy! Phone (727) 327-3306. Ask for Jeff or Nancy. E-mail: jeffnancy@watchfinder.com

WATCH MATERIAL DISTRIBUTORS

Please call us if you are interested in selling your business.
All replies confidential.

Contact Pat Cassidy
Cas-Ker Co. (513) 241-7073



We also fit glass crystals to
Openface, Hunting, and English
chain drive watches.
Complete watches, dials,
movements, case springs for sale.

G F Specialties
1-800-351-6926
P.O. Box 170216
Milwaukee, WI 53217

WANTED

- Gold-Filled Scrap \$5.50 per oz.
- GF Watch Bands \$6.00 - \$18.00 lb.
- Batteries Silver .9 x SPOT
- Gold - 14k, 18k, etc. Up to 98%

Call Toll Free
1-800-426-2344
203-372-0481

**SPECIALTY METALS
REFINING COMPANY, INC.**
1915 Black Rock Turnpike
Fairfield, CT 06430



Ron Fried, President
"I look forward to giving
you honest and
reliable service."

Members:
Better Business Bureau
Jewelers Board of Trade

Our 187th Consecutive Ad



New Members

Alabama

Graham, Michael K.—Bay Minette, AL

Arizona

Kern, Jack L.—Hereford, AZ*

McGee, Robert—Yuma, AZ

California

Clemins, Kyle—Sacramento, CA

Florida

Pfefferle, Richard—Lake Worth, FL

Riedel, Bert C.—Tallahassee, FL*

Illinois

Florin, Don —Naperville, IL

O'Meara, Kelly M. —Chicago Ridge, IL

Indiana

Peckhart, William—Hamilton, IN

Kansas

Cooper, William C.—Anthony, KS

Wangerin, Timothy—Downs, KS

Minnesota

Fralich, Marvin L.—Moose Lake, MN

Mississippi

Broome, Vernon—Gulfport, MS

New Jersey

Holler, Edward—Bayonne, NJ

Sweezy, M. Dwight—Burlington, NJ

New York

Copin, Jose—New York, NY

Ohio

Pledger, Emmel—Kent, OH

Oklahoma

Box, Ellen J.—Lawton, OK

Oregon

Faulds, Del V.—Yachats, OR

Puerto Rico

De La Rosa, Hector E.—Bayamon, PR

Garcia, Raphael—San Juan, PR

Tennessee

Whitley, Guy—Nashville, TN*

Texas

Lazo, Jose A.—Houston, TX

Scharfe, John—Paris, TX

Virginia

Hoffman, William—Chesapeake, VA

Washington

Duque, Alberto—Silverdale, WA*

West Virginia

Hanson, Dave—Charleston, WV

Wisconsin

Martin, Les—New Berlin, WI

International

Calvert, Norman J.—Edmonton, Alberta,

Canada*

Kyung Rai Kim—Seoul, Korea

McCreery, Mike—Glasgow, Scotland,

United Kingdom

* AWI welcomes back these individuals who have chosen to reinstate their membership.

Advertisers' Index

American Perfit Crystal Corp.....	47
Balzer Family	15
Black Forest Imports, Inc.	21
Borel & Co., Jules	5
Butterworth Clocks, Inc.	43
Cas-Ker Co.	inside back cover
Energizer	28, 29
Esslinger & Co.	inside front cover
Fargotstein's	39
Gaber & Company	7
Grobet USA-Vigor	23
Guenther's	33
S. LaRose, Inc.	15
Livesay's, Inc.	21
Maxell Corp.	back cover
McCaw Co., William S.	3
Microstamp Corp.	41
Otto Frei-Jules Borel, Inc.	41
Samson Technology Corporation	45
Smith Supply House	31
Twin City Supply	19
Vibrograf U.S.A. Corp.	27
Witschi Electronics USA Ltd.	27

**2000 *Horological Times*
Technical Index
will be published in the
February 2001 issue**

Wind Automatics the Easy Way!

Watch Winders for Your Shop or Resale



Single head winder operates on two "D" batteries for portability. Rotates one automatic watch in either direction. Faux granite finish. Sugg. Retail \$199.99

590.903 Winder..... **\$99.00**



Our watch winders are made in Germany to exacting standards and come with a one year guarantee.

Double head winder operates on two "D" batteries for complete portability, or with the supplied AC adapter. Winds two watches at once. Rotates two watches in either direction. Faux granite finish. Suggested Retail \$299.99

590.902 Winder..... **\$129.50**



Single head electric winder on acrylic stand. Sugg. Retail \$129.99

590.906 Winder **\$72.95**

Four head electric winder. Rotates in both directions. Case is die cast zinc, matte black. Extra long electrical cord. No maintenance required after setup. Sugg. Retail \$399.99

590.908 Winder..... **\$219.95**



590.923

590.904

These watch winders will make the perfect gift for the person with automatic watches. Both have a black leather exterior and hunter green suede interior, brass fittings and lock with key, a beautiful and functional addition to anyone's home or office.

- Single Head model has one large and one small pillow that lets you keep a standard men's or ladies watch fully wound. Runs on 2 D-cell batteries or included AC adapter. Sugg. Retail \$799.99

590.904 Winder **\$399.00**

- Double Head model has four pillows (two large and two small) so you can have a standard men's watch in one winder and a ladies in the other. The top compartment provides jewelry-box storage for watches or other items. Top handle makes this the ultimate winder for travel. Runs on 4 D-cell batteries or included AC adapter. Sugg. Retail \$1599.99



590.923 Winder **\$550.00**

WE'VE MOVED!

Cas-Ker Co.

2550 CIVIC CENTER DR PO BOX 31167
CINCINNATI OH 45231-0167

CALL 1-800-487-0408
FAX 1-800-487-5848
www.casker.com

LOCAL PHONE 513/674-7700 FAX 513/674-0600
FedEx Overnight up to 2 lbs. \$7.75





THOSE WHO PUT
THEIR NAME
ON THE OUTSIDE,
PREFER OUR NAME
ON THE INSIDE.



QUALITY. INNOVATION. LONGEVITY.



THE WORLD LEADER IN MICRO BATTERY TECHNOLOGY