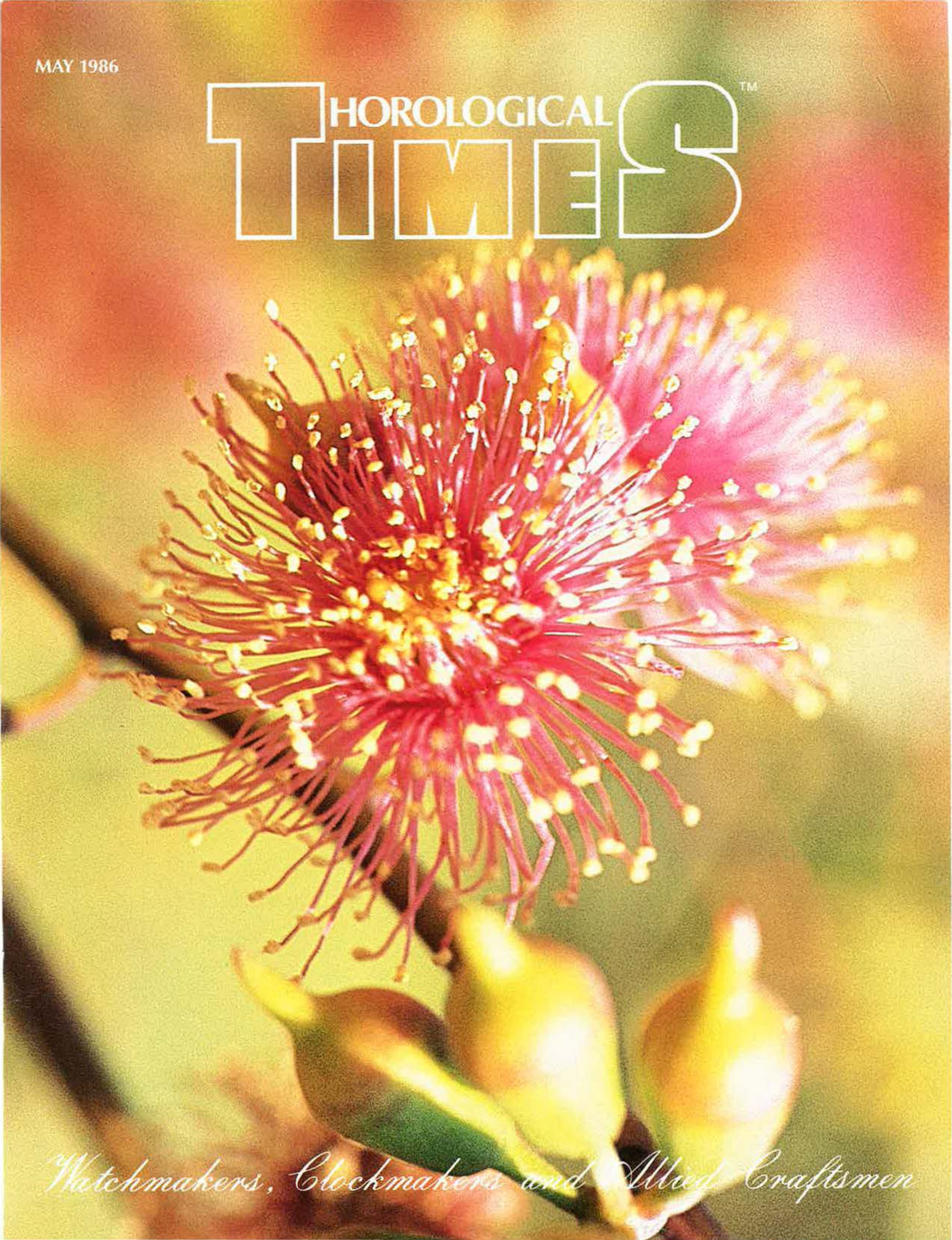
MAY 1986

HOROLOGICAL TIMES™



Watchmakers, Clockmakers and Allied Craftsmen

GUARANTEED LOWEST PRICES!

QUARTZ REPLACEMENT MOVEMENTS

FACTORY FRESH - THOUSANDS IN STOCK FOR IMMEDIATE DELIVERY

BULOVA 2500.10

5½ x 6¾

$24.95 Each

$19.95 w/repairable exchange.

In stock for immediate delivery!

Y482A

Each $10.95
(5) $9.95
(15) $8.95

6¾ x 8

Non-sweep version of Y481A. Replaces Lorus and many others.

V231

Each $14.95
(5) $14.00
(15) $13.00

5½ x 6¾

May Special $9.95

961.003 ESA

Each $8.95
(5) $8.00
(15) $7.50

6¾ x 8

Replaces FF60, ST69-21, Bulova 6AH, and most 6¾ x 8 mechanical movements. Dial feet must be shortened.

Y481A

Each $10.95
(5) $9.95
(15) $8.95

6¾ x 8

Used by Lorus, Pulsar and most major brands. Sets mechanically.

2020 MIYOTA

Each $11.95
(5) $10.95
(15) $9.95

6¾ x 8

Replaces Citizen 2020 and ADEC 2028.

FE6820A

Each $10.50
(5) $9.50
(15) $8.50

5½ x 6¾

Replaces ESA 301.001. Same dial feet as AS1012, 1677, 1977, FEF6620, Bulova 1000.11, Seiko 11A.

Y588A

Each $11.95
(5) $10.95
(15) $9.95

5½ x 6¾

Used by Armitron, Pulsar, and Seiko (5420A). Same dial feet position as Miyota 3220.

2950 MIYOTA

Each $13.95
(5) $12.95
(15) $11.95

5½ x 6¾

Replaces Citizen 2950 and ADEC 2958. Sweep second.

3572 HARLEY (RONDA)

Each $13.95
(5) $13.50
(15) $12.95

5½ x 6¾

Popular thinline movement (2.7mm thick). Fits Bulova 5AH cases - dial feet must be repositioned.

V235 HATTORI

Each $12.95
(5) $12.00
(15) $11.00

5½ x 6¾

Very popular Lorus movement (3.0mm thick).

3220 MIYOTA

Each $13.95
(5) $13.00
(15) $12.00

5½ x 6¾

Replaces Citizen 3220 and ADEC 3228. Very popular.

Y480A

Each $11.95
(5) $10.95
(15) $9.95

6¾ x 8

Accept no substitutes! Original electronic setting. Used by Pulsar and other major brands.

V230

Each $12.95
(5) $11.95
(15) $10.95

5½ x 6¾

Used by Pulsar and many other major brand names. Thinline (2.5mm) version of V235.

2030 MIYOTA

Each $10.95
(5) $9.95
(15) $8.95

6¾ x 8

Replaces Citizen 2030 and ADEC 2038. Sweep second version of 2020.

ORDER TOLL FREE 1-800-543-0408. OHIO 1-800-582-8027

Cas-Ker Co.

$15.00 MINIMUM WATS ORDER. INFORMATION & INQUIRIES 513-241-7073.
2121 SPRING GROVE AVENUE P.O.BOX 14069-A CINCINNATI, OHIO 45214

VOLUME 10, NUMBER 5 MAY 1986

HOROLOGICAL TIMES™

Official Publication of the American Watchmakers Institute

HOROLOGICAL TIMES (ISSNO145-9546) is published monthly and copyrighted by the American Watchmakers Institute, 3700 Harrison Avenue, Cincinnati, Ohio 45211, for $40.00 per year ($4.50 per copy in the United States and $50.00 per year; $5.50 per copy outside the U.S.). Second class postage paid at Cincinnati, Ohio. POSTMASTER: Send address changes to HOROLOGICAL TIMES, P.O. Box 11011, Cincinnati, Ohio 45211.

A Clue to Success 4

A New Series Begins 26

JIDA and AJDA CO-CONVENTION HIGHLIGHTS Page 40

DEPARTMENTS

HOROLOGICAL TIMES™

Executive and Editorial Offices

AWI Central
P.O. Box 11011
3700 Harrison Avenue
Cincinnati, Ohio 45211
Telephone: (513) 661-3838

Harold J. Herman: *Editor*
Regina Stenger: *Associate Editor*
Donna Baas: *Production Director*

Sue Scott: *Business Manager*
Mildred Howard: *Circulation Manager*
Margie M. Brater: *Circulation*

Technical Editors:

David G. Arnold
William Biederman
James H. Broughton
Fred S. Burckhardt
Edgar "Nick" Cleves
Steven G. Conover
Joe Crooks
Wes Door
Henry B. Fried
Orville R. Hagans
Ewell D. Hartman
Robert A. Nelson
Archie B. Perkins
Marshall F. Richmond

AWI Officers:

Fred S. Burckhardt: *President*
William Biederman, CMW: *1st V.P.*
David G. Arnold, CMC: *2nd V.P.*
Robert F. Bishop: *Secretary*
Robert A. Nelson, CMW, CEWS: *Treasurer*

AWI Directors:

James Adams, CMW
Otto Benesh, CMC
Joe Crooks
Wes Door, CMW
Henry B. Fried, CMW, CMC, FAWI, FBHI
Orville R. Hagans, CMW, CMC, FAWI, FBHI
Gerald G. Jaeger, CMW, CEWS
Robert M. Leach, CMC
Howard L. Opp, CEWS
Archie B. Perkins, CMW, FNAWCC

David H. Fryday: *Affiliate Chapter Director*
Robert L. Howell: *Research and Education Council Director (REC)*
Marshall F. Richmond: *Past President*

Milton C. Stevens: *Executive Secretary*
Michael P. Danner: *Administrative Director*

FELLOWS OF THE AMERICAN WATCHMAKERS INSTITUTE

George Daniels
Henry B. Fried
Josephine F. Hagans
Orville R. Hagans
Hamilton E. Pease
Marvin E. Whitney

Editorial

It's just so darn hard to read the instructions. What a joy it is to dump all the parts on the floor and lovingly stare at them for a few moments before attacking. Such is the nature of the human. Sadly, time seems to only make bigger and quicker dumpers out of most of us. The stage is critical when someone begins to dump something before they remove the wrappings.

That's what makes it so tough for many of the older codgers when it comes to learning something new in their trade. If they don't catch on to it pronto quick, you can expect that they may have some nasty things to say about the product itself. Never was this attitude so conspicuous as when the quartz watches were introduced. That was some 12 years ago or so. Now we can look around and see those watchmakers who held their patience and persisted in learning the ways of the quartz.

Just around the corner is another set of instructions and a new product. Hold your fire and keep your cool so that you may be considered one of the progressive watchmakers or clockmakers. It just makes an older person feel so darn good when a young upstart regards them with respect.

UP FRONT

ANNUAL MEETINGS

BOARD OF DIRECTORS—The annual Board of Directors meeting will be held June 28-29, 1986 at the Flagship Inn in Arlington, Texas. This will be the first time the meeting will be held outside of Cincinnati, Ohio in five years. Moving the meeting on occasion is done to give members in other areas an opportunity to attend. All members are invited to attend the annual Board of Directors meeting.

AFFILIATE CHAPTERS—David Fryday, affiliate chapter chairman, has arranged for the chapters' meeting to be held in conjunction with the annual board meeting. Chapter delegates will meet on Friday, June 27.

RESEARCH & EDUCATION COUNCIL—The directors of the REC have scheduled their in-service program and annual meeting for June 23-26, 1986 in Arlington, Texas. Instructors from Research & Education Council member schools are invited to attend.

1986-1987 COMMITTEES—Soon after the reelection of new officers for fiscal 1986-1987, the President will name members to the various AWI committees. Details about the committee assignments can be found on page 12.

BENCH COURSES—Two bench courses are receiving considerable attention at this time. The demand for the Retrofitting program has been greater than we had anticipated, therefore, we have assigned James Broughton to be a second course instructor. He and Buddy Carpenter will each present the course at least once a month until July 1987. A complete schedule will be in the June issue of HOROLOGICAL TIMES. Antique Watch Restoration is another frequently asked for course. Archie Perkins is the instructor. We have two programs scheduled between now and August. We will consider requests for the program from September on, at this time.

ON THE FRONT

These Bottlebrushes were photographed in Southern California by Hans Gerdes of Stanton, California.

The Jewelry Industry's Most Compact and Efficient Leather Strap Book Merchandiser will help you show and sell Men's and Women's Watch Straps!

Extra Profits

2.6 Keystone

40 Packages Straps of best selling **Remborde'** styles, in most popular prices and sizes.

The **easiest-to-use Over-the-Counter** presentation!

Closed: 6-1/2 x 12" x 2-3/4"
Open: 3-1/2" x 12" x 5/8"

Men's Book: Bk-525 — All Men's Styles.
Women's Book: BK-485 — All Women's Styles.

Your Net Cost BK525 $226.88 **BK485 $218.25** **TERMS AVAILABLE**

Waterproof Skindiver and Sportstraps™

K-35 Men's Sportstrap (Casio-type); Black. 11/16" (18mm)

K-353 Men's Sportstrap (Casio-type); Black. 13/16" (20mm)

K-351 Men's Sportstrap (Casio-type); Black. 3/4" (19mm)

K-354 Men's Sportstrap (Casio-type); Black. 13/16" 20mm)

K-352 Men's Sportstrap (Casio-type); Black. 11/16" (18mm)

K-355 Men's Sportstrap (Casio-type); Black. 3/4" (19mm)

Esslinger & Co.

P.O. BOX 64561 ST. PAUL, MN 55164
National WATS - Orders Only 800-328-0205
Minnesota WATS - Orders Only 800-392-0334
Inquiries - Information 612-452-7180

PRESIDENT'S MESSAGE...

Fred S. Burckhardt

CHANGE

...it can make a difference

In the book *Creating Excellence* by Hickman & Silva, there is one section called 'removing the blinders.' This refers to the blinders that inhibit insight. At the top of the list is this Number One blinder:

RESISTANCE TO AND AVOIDANCE OF CHANGE. Many executives resist rocking the boat with change. Executives who cling to the status quo for safety are consciously or unconsciously resisting new insights.

As I read this, I thought of the many times I have seen the resistance to change over the last few decades. I've known of watchmakers who have left the business rather than accept the change in time-keeping devices. I've seen those who have resisted a change in a certain method of operation because that's the way Uncle Delbert did it for years, even though a new method would be much more practical and efficient.

Any business or organization should have as its one constant, *change*. Without change; without new ideas; without fresh, stimulating thinking; with resistance to change because "It's always been done that way!": without any creative processes at all, these things are what will create a stagnancy, and the final decaying of the business or organization.

During the past two years, there have been some changes in AWI. New programs have been instigated. Changes in certain procedures have been made. Constant activity aimed at improvements in many areas has produced a more efficient type of operation.

We should all be thankful for the Directors of AWI. Their foresight, versatility and their ability to envision that which is yet unknown has caused them to strive for that which creates excellence, and not settle for that which creates decay.

Star Struck Inc

COMPARE AND SAVE

BATTERY PRICE LIST

maxell

#	COST	#	COST	#	COST	#	COST
RENATA 18	.70	309	.53	364	.31	395	.38
RENATA 20	1.00	313	.53	366	.42	396	.39
RENATA 22	.80	315	.57	370	.38	397	.38
RENATA 28	.95	317	.63	371	.38	399	.38
RENATA 43	.60	319	.90	373	.53	512SW	1.00
LR 43	.31	321	.40	377	.39	626W	.49
RENATA 44	7.00	323	.50	379	.77	712SW	1.89
LR 44	.31	325	.45	381	.40	803	.85
RENATA 45	1.10	329	.58	384	.30	1220	.75
RENATA 48	1.10	341	.82	386	.43	1240E	1.34
RENATA 52	4.75	343	.38	387	.53	1620	.75
A76	.48	344	.63	388	.53	2016	.67
186	.48	350	.67	389	.37	2025	.67
189	.48	354	.50	390	.44	2032	.67
191	.48	355	1.47	391	.36	2320	.75
201	4.19	357	.60	392	.24	2325	.95
301	.54	361	.37	393	.39	2430	.95
303	.64	362	.38	394	.42		

EVEREADY

MAXELL ALKALINE BATTERIES

TYPE	COST
AA	.45
AAA	.45
C	.70
D	.70
9 Volt	.60

- ALL BATTERIES SHIPPED WITHIN 24 HOURS
- CALL BY NOON E.S.T. FOR SAME DAY SERVICE
- SPECIFY EVEREADY OR MAXELL WHEN THERE IS AN OPTION
- RATED AND ESTABLISHED ACCOUNTS SHIPPED OPEN CREDIT (30 DAYS) OTHERS SHIPPED C.O.D.

800-243-6144

IN CT. (203) 847-9292

WE ALSO HAVE A COMPLETE LINE OF:

FINDINGS **DIAMONDS** **SOLDERS** **CASTINGS** **CHAIN**

TOOLS **COLORED STONES** **WIRE**

CALL AND ASK FOR OUR COMPLETE CATALOG

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

BOX 2056 • SAUGATUCK STATION • WESTPORT, CT 06880

Bench Tips

Joe Crooks

Clarifying Symbols

EDITOR'S NOTE: Last month's Bench Tip came from Tom Stanley of New Zealand. This month we are also featuring one of Tom's tips.

I have just been through a pile of service manuals looking for the answer to a problem, and observed that the Casio service manuals are more suited to the electronics industry than to the watch trade. Perhaps you, too, have a Casio service manual, but can't make head or tail of it because of the strange symbols used. I hope that the following table will assist you.

Symbol	Explanation	Symbol	Explanation
AC	All Clear Terminal input	PZ	Piezo Speaker
C_c	Temperature compensating capacitor	SF	Colon Terminals
CD	Chip capacitor	SL	Light Switch
COM	Common Terminal	S_1-S_2	Switch Terminals
CT	Trimmer capacitor	S_1-S_x	Segment Terminals
LCD	Liquid Crystal Display	TR	Transistor
LSI	Large scale Integrated circuit	VCC	Output converter into voltage level from VC
LZ	Inductor coil	VC	Output (-ve) Usually same level as voltage doubler but with square wave form 128 Hz
VCH	Stabilising terminal under "Off" time condition	VSS_1	Battery (-ve) side
VSS_2	(-ve) output of voltage doubler circuit	VDD	Battery (+ve) side GND
T_1-T_n	Terminal and number for inspection	XT	Crystal oscillator input side
$\overline{XT}$	Crystal oscillator output side		

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

Swiss Watch Batteries.

Swiss QUALITY VALUE-PAK™

New! Save Lots-of-Dollars when You Buy Factory Fresh, High Quality Swiss Watch Batteries in Convenient, Low-Cost, Bubble-Pak!

• High Quality Factory Fresh •
• Absolutely Guaranteed •

Swiss Type	Value-Pak Cost
392	**.20**
364	**.25**
301	.50
303	.62
315	.50
317	.61
319	.77
321	.39
323	.40
325	.40
329	.54
341	.72
343	.36
344	.61
354	.50
357	.59
361	.35
362	.34
364	**.25**
370	.36
371	.35
373	.52
377	.35
379	.67
381	.39

Swiss Type	Value-Pak Cost
384	.29
386	.42
389	.35
390	.43
391	.34
392	**.20**
393	.36
394	.41
395	.35
396	.36
397	**.34**
399	.34
LR43	.24
LR44	.24
1220	.71
1620	.71
2016	**.59**
2025	.61
2032	.61
2320	.73
2430	.83

Prices subject to change. Pricing on other references available on request.

6¾ x 8

ESA 961.001

$6.95 (reg. $9.45)

factory fresh

— SPECIAL PURCHASE —

Stock up now with these popular quartz movements

Lowest Prices — Anywhere!

3¾ x 8

ESA 202.001

$16.95 (reg. $24.00)

5½ x 6¾

ESA 927.002

$9.95 (reg. $15.95)

Quick-Ship®

800-292-5522

IN CALIFORNIA CALL: (800) 331-5522

OCEANSIDE™ TIME

Worldwide Importers and Distributors

2790 Harbor Blvd., P.O. Box 2404
Costa Mesa, CA 92626

Information 1 (714) 751-5522
TELEX: 5101 00 2177 OCEANSIDE

Questions & Answers

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

More on Wooden Floor Clock Movements

A READER WRITES IN:

In the March '86 issue you gave some terrific answers to problems with wooden floor clock movements. There was an absence of 'problems' in the question presented so I will offer one possibility: the drum that winds the cable may have been slightly tapered because of original lack of precise machining or that the wood shrunk and distorted with age. This could cause the cable to snag itself and bundle up. Worse yet, it could crawl over the end of the drum and bind itself.

I had one such case. As I worked the movement, I failed to notice the taper and sure enough, the cable bound up. As I was setting up the clock at the customer's home, I found that all the wood had disformed which left me with no good surface to use for proper leveling. As best I could, I used the surface of the drum for leveling and it worked out OK. However, I had to do some bending, shimming, and refastening the case to the wall to ensure proper running of the cable.

I did offer to take the movement back and remachine the drum, but the customer somehow felt that my adjustments would maintain acceptable performance. It has done so for over a year now. But . . . next time I will surely check the drums of wooden clocks more closely.

This story involves two trips to the customer. The first one was in the blind as to the tapered drum, and the second was to 'fix' it as I stated.

Vic Broski

P.S. I used brass cable.

Q I need your help with a fine Swiss chronometer. I cannot disassemble the mainspring barrel from the barrel bridge without using any excessive force. Here is some information on the chronometer:

> 17 ligne Vacheron & Constantin, 21 jewels, serial #387,431, pocket watch movement, wolf teeth crown and ratchet wheels, mainspring barrel suspended from the barrel bridge.

The mainspring barrel arbor is squared on both ends; the arbor hub has two offset holes in it.

Can you tell me how to disassemble the mainspring assembly and the size of mainspring one should install?

Oscar Cox
Great Falls, Montana

A *The Vacheron Constantin is one of the highest grade of watches made at that time (c1890). To disassemble the barrel unit, place the points of a spanner wrench in each hole of the barrel arbor and unscrew that part. It will unthread itself from the rest of the barrel arbor, releasing it from the barrel bridge. (While doing this you must secure the other end of the arbor so that it doesn't turn and resist unscrewing the flange.)*

As for mainsprings, you can obtain the gauge of the spring from that which is inside the barrel. Replacement springs aren't available. However, you can remove the endpiece from the old one and rivet it to the new spring which is available with the width, thickness, and length.

Q Which is the finer polish: burnisher or diamantine?

Steve Nicholson
Des Moines, Iowa

A *For small pivots or turned surfaces as watch or clock pivots, burnishing a PREPARED surface is better. First, it polishes well. Secondly, it provides a hardened compressed surface and thus better wearing. Polishing only provides a good-looking surface. If your surface isn't smooth, the polish will only polish whatever surface you've provided.*

Q I have long puzzled over the relationship between the weight of a balance wheel and the arc it describes. I have seen many times that a light balance wheel substituted for a heavier one seems to describe a greater arc in the same clock, and oftentimes ends up knocking the bankings. I have asked a number of clockmakers and watchmakers, and I have received a wide variety of explanations and contradictions. As with many theoretical explanations delivered "off the cuff" many of them are offered eagerly at first but tend to break down midway into uncertainty. The more respectable of these seems often to end in "Well, I used to understand it, but I haven't got it right now." The more insidious if more creative of them often end in vague scientific sounding catch words and almost magical disguises which translate to "I don't really know." And so, after setting seriously to the task, I have come up with a

(Please turn to page 10)

Quartz Movements • Over 90 Calibers in Stock!

Call or Write for Complete Listing and Free ESA Battery Guide.

Borel

BULOVA • ESA • EBAUCHE • FE

BUL2783 Kit

to Quartz retrofit Accutron 218-2, 224-2 also replaces ESA 9362, 536.121 complete with mvt. ring and mounting instructions. Order BUL 2783 Retrofit Kit.

$27.00

927.001

5½ x 6¾ L x 2.95mm

$13.95
5@ **12.95**
15@ **11.95**

978.003

5½ x 6¾ L x 2.5mm

$14.50
5@ **13.50**

FE 6820

5½ x 6¾ L x 3.6mm

Replaces 301.001, AS 1012, 1677, 1977, FEF6620, Bulova 1000, Seiko 11A

$10.50
5@ **9.50**
15@ **8.50**

HARLEY/RONDA • MIYOTA • PULSAR

HQ 3572

5½ x 6¾ x 2.7mm

Popular thinline movement. Replaces 977.001, 588.001. Fits Bulova 5 AH cases.

$13.95
5@ **13.50**
15@ **12.95**

HQ 672

6¾ x 8 L x 3.25mm

Replaces 961.001.

$12.95
5@ **12.00**
15@ **11.00**

MIYOTA 2030

6 x 8 x 3.15mm

Sweep, Replaces Citizen 2030, Adec 2038 and other 2035.

$10.95
5@ **9.95**

V230A

5½ x 6¾ x 2.5mm

Used by Pulsar & Lorus.

$12.95
5@ **11.95**
15@ **10.95**

Borel
Quartz and Japanese Style Crown Assortments

SWISS MADE

No other crown approaches Borel Crowns in quality, looks or effectiveness. Borel Crowns are made by the top Swiss producer of crowns for new-watch production. Borel stocks the complete range of sizes, styles, tap sizes, post lengths and tube openings.

Write for Sample and Literature or call:
1-800/821-5686
in Missouri 1-800/892-5818

Quartz Watch Crown Assortment

28 bottle cabinet contains 50 crowns, 1 each of yellow and white of the 25 most popular numbers, 11 dustproof styles and 14 waterproof styles. Includes the new smaller diameters of 2.75, 3.00, 3.25, 3.50, 3.75 in taps 10, 11, and 12. Refills are available.

Asst. 750/2 **$55**

Japanese Style Crown Assortment

Borel replacement crown assortment for Seiko, Pulsar and Lorus, includes 56 crowns, 1 each yellow and white of 28 numbers, most are the waterproof type with gasket. Diameters from 3.5 to 6.5mm. Some of the numbers in the assortment are:

30E02N	35M10N	40M17N	40M32N	45M30N	50D05N
35D03N	35N57N	40M24N	45D01N	45W29N	55M06N

Asst. 950/2 **$65** Refills available.

Borel

NATIONAL TOLL-FREE ORDER SERVICE • 1-800/821-5686
In Missouri 1-800/892-5818

Borel, 1110 Grand, Kansas City, MO 64106

Distribution Centers in KANSAS CITY LOS ANGELES OAKLAND

Borel

QUESTIONS & ANSWERS
(Continued from page 8)

theory which seems to me quite reasonable, and I ask for your confirmation or rejection of it.

1) At the moment that the balance wheel has completed its excursion and stops just prior to reversing direction, all of the power it has received from the clock (watch) and which has not been wasted in friction, etc. exists as potential energy, the kinetic energy having been fully converted in the work of winding the hairspring.

2) This amount of power is at this moment entirely visible as a quantity of tension in the hairspring, a measurable force.

3) The heavier balance wheel with its stronger hairspring will turn only a small arc before its hairspring has been wound to this specific tension, while the lighter balance wheel with its light hairspring (beating the same frequency as the heavier one) will have turned through a greater arc before it has wound its hairspring to the same tension.

*That is actually the question, the last item being somewhat less clear to me, but begging approval or rejection.

4) It may well be that the heavier balance wheel moving more slowly through a shorter arc possesses the same mass velocity as the lighter balance turning quickly through a wider arc in the same period, and that therefore both balance wheels have the same governing power, the lighter one being preferable for purposes of narrowing the escapement's interference relative to its full arc.

Is my reasoning correct or just convenient?

Richard Geddes
Boston, Massachusetts

Although I feel from your letter that you are quite capable of understanding the theoretical problems involved in theoretical terms, I will attempt to answer you in simpler form.

When a lighter balance is substituted in place of a heavier one, of course the motion will increase and rebanking may occur. This is due to the fact that the power unit, the mainspring, etc., engineered for the heavier balance, is now relatively too strong for the work it was originally designed to do. The lighter balance and its weaker hairspring (since it has not the same duties of returning a heavier balance to rest) will thus receive a very strong impulse from the pallet fork which in turn received its sudden leverage from the escape wheel, etc.

You will notice that in 8-day watches and traveling clocks the balance is most often much smaller than balances of 12 size, 16 size, or larger watches. This is a MUST in horological engineering if the limited area of the mainspring is to provide sufficient power to go through a train with an extra (8-day) train wheel between the barrel and center wheel and still provide isochronal amplitude to the balance unit. Making a lighter balance does this.

A heavier balance can be made to have as large an arc as is needed, providing the power to impel it via the escapement, if the mainspring were powerful enough. If the heavier balance did not have a large enough arc, same as a lighter one or smaller one, isochronism would not result and the timekeeping would be erratic at best.

Your contentions of heavier vs. lighter balances and their MATCHED hairsprings are not at all applicable. A 16 size watch with a large heavier balance has the same (540°) motion as a baguette watch with a tiny balance if both watches are designed properly. Substituting one for the other in the same watch is courting trouble. If you've ever seen stop watches that vibrate at 100 times a second, the analogy might be more easily understood. Here the hairspring is as strong as an 18 size balance but the balance is smaller in diameter than the hairspring. It must be both small and light. However, the mainspring must be super strong so that the watch will start and maintain all the escapement functions. High speed photos show this takes place. However, the arcs are a bit shorter. Isochronism suffers a bit but for the very short intervals that the timing is done, it matters rather little.

I hope this explains, at least in part, your questions.

Henry B. Fried

Good Buys For Your Bench

$45.00

Demagnetizer

Demagnetizes or magnetizes parts or tools. *To demagnetize:* Simply hold object in the center of the opening with button depressed for 3 or 4 seconds. Slowly withdraw part in a straight line. Release button. *To magnetize:* Hold the part or tool against the inside of the opening and press the button for 4 or 5 seconds and release.
Opening is even large enough to accommodate cassette tapes for quick erasure. (3" X 1-1/2")
No. 26.704-1—Shipping weight 2 lbs.

Air Eraser Kit/Portable Sand Blaster

The AEC Air Eraser can erase a fine line or work over a wide area. Works like magic to erase defects in jewelry castings, clean fine instrument parts, remove dust, tarnish and other corroded accumulations on a great variety of delicate objects.
Kit comes complete with AEC Air Eraser; 4' air hose with moisture trap; dust respirator; 6 oz. jar aluminum oxide compound; A-34 hanger.

No. 23.060-1—Complete kit. Shipping weight 2 lbs.

$70.00

Ideal for gripping and inserting small screws (for 0,5 to 1,00 mm)

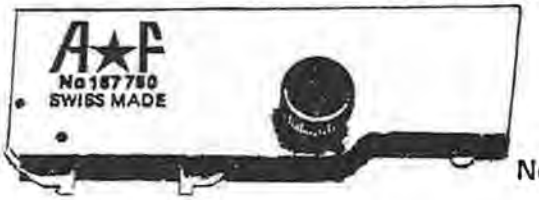
No 240.208 **$12.10**

PHILLIPS SCREWDRIVERS

$12.50 SET

This handy set of Phillips screwdrivers features the smallest Phillips size available—1.50mm. Great for quartz, computer or camera repairmen.
No 18983.4 Phillips Set—4-pc.

CASE WRENCH New item, simple type in blue coloured aluminium, can be used with both hands thanks to the knurled screw that can be fitted on either side of the wrench.



$12.50

No 167.760

SCRATCH BRUSH

With pen-shaped handle, Glass bristles
No 17294 **$4.60**

NEW!

QUARTZ OIL by Moebius

The finest oil for today's quartz timepieces

Moebius, the leader in fine lubricants, created this product specifically for quartz analog watches. It is non-toxic, non-spreading, long-lasting and has good viscosity.
2 cc Bottle.
OL-241 **$9.95**

VISA and MASTERCARD ACCEPTED

ORDER BY PHONE: 9-4 C.T. Weekdays: Illinois (800) 972-3776. Other States (except Alaska & Hawaii) (800) 621-4767. *ORDER BY MAIL: P.O. Box 726H, Chicago, IL 60690.

MARSHALL SWARTCHILD

CHICAGO, IL 60647 : 2040 MILWAUKEE AVE. : 312-278-2300 • DALLAS, TX 75201 : 109 N. AKARD : 214-741-1454
HOUSTON, TX 77001 : 1212 MAIN ST. : 713-759-9009 • SEATTLE, WA 98101 : 1425 4TH AVE. : 206-682-6158

Time and Talent to Share?...

Soon after the annual Board of Directors meeting, June 28 & 29, the President will be appointing committees. These committees are vital to the work and advancement of AWI.

Here are the various committees we presently have. If you have the time to work and talent to share, why not volunteer for a committee assignment. To volunteer, write: The President, AWI, P.O. Box 11011, Cincinnati, OH 45211, and indicate your area of interest.

FINANCE
NOMINATIONS FOR BOARD OF DIRECTORS
CONSTITUTION AND BYLAWS
AREA REPRESENTATIVES
BENCH TIPS
CERTIFICATION & EDUCATION
CONTRACTS & LEGAL
HONOR AWARDS
IDENTIFICATION MARK
MATERIAL DISTRIBUTORS LIAISON
MEMBERSHIP
NEW GUILD LIAISON
PUBLICITY & PUBLIC RELATIONS
SEMINARS & WORKSHOPS
TECHNICAL BOOK REVIEW
TECHNICAL
VISUAL AIDS
AWI PACKARD WATCH COLLECTION
BATTERY NUMBER SYSTEM
BUILDING MANAGEMENT
ECONOMIC STUDY
HOROLOGICAL TIMES ADVISORY
YOUNG MEMBERS

ZANTECHNOLOGY

Yes, We Have IN STOCK

2N50

Y432

R377

10% DISCOUNT ON FIVE OR MORE MOVEMENTS
MOVEMENTS CAN BE ASSORTED

Movement	No.	Size	Thickness	Price
Armitron	5590	11½	5.0 MM	$16.00
	32003	6¼ x 8	3.5 MM	$16.00
BFG	888	13½	5.5 MM	$16.00
EJ	30	12	6.0 MM	$16.00
ESA	551.111	7½	4.35 MM	$16.00
	555.412	10½	2.7 MM	$16.00
	561.101	6"- x 8	2.8 MM	$16.00
	579.001	6¾ x 8	2.7 MM	$16.00
	9182	13	5.5 MM	$16.00
	9222	6¾ x 8	4.6 MM	$13.95
	927.102	5½	3.6 MM	$16.00
	928.411	10½	2.8 MM	$16.00
	935.312	10½	4.5 MM	$16.00
	940.111	12½	3.7 MM	$16.00
	944.132 (day at 12:00)	13	4.0 MM	$16.00
	944.132	13	4.0 MM	$16.00
	951.111	7½	4.3 MM	$16.00
	960.111	11½	4.5 MM	$16.00
	961.001	6¾ x 8	3.8 MM	$11.95
	961.101	6¾ x 8	4.1 MM	$11.95
	963.115	8¾	3.8 MM	$16.00
	965.112	8¾	3.8 MM	$16.00
	965.312	10½	3.8 MM	$13.00

Movement	No.	Size	Thickness	Price
FE	6820	5½ x 6¾	3.6 MM	$10.50
FHF	202.001	4 x x 8¾	2.2 MM	$22.00
Handok	820	10½ x 12	3.4 MM	$30.00
Harley/ Ronda	377 (day at 3:00)	11½	4.3 MM	$16.00
	R377 (day at 12:00)	11½	4.3 MM	$16.00
	672	6¾ x 8	3.4 MM	$16.00
	872	8¾	4.0 MM	$16.00
	R1177	11½	5.1 MM	$16.00
	R1377	13½	6.1 MM	$16.00
	3572	5½ x 6¾	2.7 MM	$16.00
	3672	6¾ x 8	2.7 MM	$16.00
	3772	10½	2.6 MM	$16.00
	3972	11½	2.6 MM	$14.00
	3975	11½	2.8 MM	$12.00
ISA	1198	11½	3.8 MM	$16.00
Miyota	2N50	4 x 6	2.1 MM	$30.00
	2Y50	5½ x 6¾	2.6 MM	$16.00
	3N20	5½ x 6¾	2.8 MM	$16.00
	3T00	8¾	3.0 MM	$16.00
	3T10	8¾	3.0 MM	$16.00
	2005	8¾	4.0 MM	$16.00

Movement	No.	Size	Thickness	Price
Miyota	2015	8¾	—	$16.00
	2025	6¾ x 8	3.1 MM	$16.00
	2035	6¾ x 8	3.1 MM	$16.00
	2105	10½	4.0 MM	$16.00
	2115	10½	4.0 MM	$16.00
	3225	5½ x 6¾	2.6 MM	$16.00
Pulsar	V236	5½ x 6¾	3.0 MM	$14.00
	Y112	11½	3.1 MM	$13.00
	Y121	6¾ x 8	3.1 MM	$13.00
	Y432	5½ x 6¾	3.0 MM	$18.00
	Y480	6¾ x 8	2.6 MM	$16.00
	Y481	6¾ x 8	2.8 MM	$12.00
	Y573	11½	4.6 MM	$16.00
	Y590	5½ x 6¾	3.4 MM	$16.00
PUW	432	6¾ x 8	3.7 MM	$16.00
	532	6¾ x 8	3.5 MM	$16.00
	683A (Alarm)	11½	3.6 MM	$16.00
	801	12 x 12	3.7 MM	$30.00
	900	6¾ x 8	2.5 MM	$16.00
	910	6¾ x 8	2.5 MM	$16.00
Remex	1910	9¾ x 10½	2.5 MM	$12.00
	6641	11½	4.0 MM	$16.00
Rico	0190	11¾	4.3 MM	$16.00
	580	11 ½	4.8 MM	$16.00

Quartz Watch Repair Training Course

The Three Day Hands On Quartz Watch Repair Course is a thorough, indepth, technical review of all types of quartz watches. The course emphasizes the basic principles and similarities between all types of quartz watches and the practical application of the fundamentals to everyday quartz watch problems.

The electronic circuits of the Quartz Analog, Digi-ana and the LCD are thoroughly examined and tested. Each component is visually inspected under the microscope. Their functions and location in the watch are well illustrated with microscopic color slides. Although the emphasis is on testing, troubleshooting, and locating the problem, many repair techniques are actually performed by the students, such as, soldering - desoldering, circuit board cleaning, and conductive epoxy repairs. Each student receives individual attention and close supervision by Mr. Zanoni and his expert staff.

The next training class will be held on June 23, 24 & 25 Tuition $450

TUITION INCLUDES:
- Digital Watch Repair Manual Vol. I
- Quartz Watch Repair Manual Vol. II
- Business Plan Folder
- The use of all test equipment
- Testing of quartz movements & components
- Lunch daily
- Transportation to and from Townhouse Motel and Zantech, Inc.
- Unlimited telephone consultation

The Ultimate In: Quartz Watch Dry Dusting Systems

Dust-Off® II

This high pressure dusting system with pinpoint accuracy, assures precise dusting to blow out lint and dust from quartz analog movements and watch cases.

Dust-off II Kit
No. G-2 . . . . . $22.99
Kit includes high pressure nozzle and 12 oz. refill
Additional 12 oz. refill
No. Gr-2 . . . . . $4.75

COIL REPAIR KIT

Wire-bond conductive epoxy WB001 is a two part silver filled, electrically conductive epoxy which hardens at room temperature in a few hours after mixing. Its very high electrical conductivity and putty-like properties make it suitable for repairing fine broken wires such as **coil and motor wires** of electronic watches, and any other broken wire or solder joint, small or large.

Complete Kit No. WB001 . . . . . $24.95
A & B Epoxy Refills No. WB002 . . . . . $19.95
Video Tape Instructions . . . . . $ 9.95

"Replacing Quartz Watch Batteries" on Video Tape.

LEARN BATTERY REPLACEMENT THE *CORRECT* WAY with this step-by-step 50 minute video tape, "Replacing Quartz Watch Batteries". The tape illustrates in microscopic detail all of the necessary methods and techniques for easy and profitable battery replacement. It applies to all major types and brands of quartz watches, including **SEIKO, PULSAR, ARMITRON, CASIO, TIMEX,** etc. The tape illustrates the most common mistakes made by sales clerks when replacing watch batteries, and most importantly, shows how to avoid them. The training program was written, directed and produced by Louis and Greg Zanoni, prominent consultants and instructors in quartz watch technology. It is sponsored by **Maxell Corp. of America,** a leading manufacutrer of batteries and magnetic recording tapes.

Price $95.00

ZANTECH INC.®

77 SHADY LANE • TRENTON, NEW JERSEY 08619 • (609) 586-5088

Order Phone 1 (800) 441-7569

Technically WATCHES © 1986

Archie B. Perkins, CMW, FNAWCC

Antique Watch Restoration ©1986

Part V

MAKING WATCH SCREWS

When restoring antique watches, it is found quite often that a screw is broken or is missing from the watch entirely. Unless a screw that fits the watch is found in a collection of old screws, then the screw would have to be made. Sometimes a screw from an assortment will fit as far as the thread is concerned, but the head is too large. In this case, the head can be turned down to fit. In any case, the screw selected should match the other screws in the watch or be altered so it will match the other screws. Nothing looks worse than to find mismatched screws in a nice antique watch. In this case, the watch has not been restored to its original condition; it has just been repaired or "fixed".

If a screw cannot be found to match the original or be made to match the original, then a new screw should be made to match. Note: Some of the early antique watches had no screws at all. Others had very few screws. An English watch made about 1600 engraved "Simon Bartram" had no screws at all. The plates were pinned together with taper pins going through holes in the pillars. Chances are the dial was also pinned on with taper pins going through holes in the dial feet. More likely the click was pinned onto a post in the plate and the click spring was riveted to the plate. Possibly the threads on the screws in some of the early antique watches were crudely hand filed. Therefore, to duplicate these screws is more difficult than for the later antique watches. This method of making screws was used before the screw plate was developed. Some of the screws in early antique watches were possibly made on a screw cutting lathe of some form.

Figure 1

HAND MADE SCREWS

If a screw needs to be made for one of these early antique watches that had hand filed screws, it can be done on the lathe by hand. The rod that the screw is to be made from is chucked in the lathe. Then the rod is turned down to the proper diameter for the part to be threaded. Mark off the pitch of the thread and the number of threads that the screw is to have. Then, as the spindle of the lathe is turned back and forth by hand, use a sharp 3-cornered file to trace the thread around the rod. Each time the thread is traced, it becomes deeper. After a spiral groove is formed, then the lathe is turned slowly with the motor as the sharp corner of the file follows the spiral groove. This is repeated until the proper depth and shape of thread is cut. After this, the head is formed on the screw and a slot is filed with a screw head file. Finally, the screw is hardened, tempered, and finished to match the finish on the other screws in the watch.

THREAD CUTTING ATTACHMENT

If a watch restorer has a small thread cutting lathe or a thread cutting attachment for the watchmakers lathe, then almost any screw can be reproduced. A thread cutting attachment for the watchmakers lathe is shown in Figure 1. The thread cutting attachment is fastened to the end of the lathe bed. Different change gears are used on the lathe spindle and the slide rest screw to create a ratio in movement between the revolution of the lathe spindle and the advancement of the top slide of the slide rest that carries the threading tool. The thread cutting attachment is connected to the lead screw of the slide rest by two universal joints and a connecting rod. The thread cutting attachment allows the watchmaker to cut both right hand and left hand threads on rods of any diameter. Internal or external threads can be made as well as tapered threads. The thread cutting attachment can be used to make taps to be used for making dies or screw plates. Inch or metric threads can be cut with the thread cutting attachment.

USING THREAD CUTTING ATTACHMENT

To use the thread cutting attachment, one must first determine if the slide rest being used has an inch lead screw or a metric lead screw and how many threads per inch the lead screw has if an inch slide rest, or how many threads per centimeter the leads screw has if a metric slide rest. This

can be done in one of two ways. The threads on the lead screw can be counted for one inch, or one centimeter if it is a metric slide rest. The second method is to place two gears with the same numbers of teeth, one on the lathe spindle and the other on the lead screw. Then a thread is cut. The number of threads cut will be the same number as that of the lead screw. Usually a watchmakers slide rest has 40 threads per inch or 10 threads per centimeter if it is a metric slide rest.

Suppose one needs to make a screw with 120 threads per inch and has an inch slide rest which has a lead screw with 40 threads per inch. The problem would be stated:

$$\frac{40}{120} = \frac{\text{lead screw}}{\text{threads to be cut}}$$

Now to select the proper gears for the lead screw and for the lathe spindle, the following method can be used:

Reduce both numbers to their lowest terms. For example, dividing each number by the same number, say 40, would reduce the numbers to 1/3. Now by multiplying each number by the same number one can determine the gears needed. The following examples give three choices of gear combinations to cut 120 threads per inch.

$$\frac{1 \times 25}{3 \times 25} = \frac{25 \text{ one spindle}}{75 \text{ on lead screw}}$$

$$\frac{1 \times 30}{3 \times 30} = \frac{30 \text{ on spindle}}{90 \text{ on lead screw}}$$

$$\frac{1 \times 32}{3 \times 32} = \frac{32 \text{ on spindle}}{96 \text{ on lead screw}}$$

The gears in one of these choices should be in the gear set. The gear with the number above the line always goes on the lathe spindle. The gear with the number below the line always goes on the lead screw of the slide rest. Intermediate gears are placed between the two gears so they can be connected. If the lead screw has a right hand thread, then two intermediate gears will be needed to cut a right hand thread, and only one intermediate gear is needed to cut a left thread. The intermediate gears can have any number of teeth as long as they are connected directly in line and not compounded (stacked).

THE THREADING CUTTER

The cutter for cutting the thread is held in the tool post of the slide rest. The end of the cutter should be sharp with a 60° angle between the two sides leading to its point if cutting a 60° thread. The angle can be checked with a thread angle gauge. The cutter should be checked to make sure the point is on center with the rod being threaded and that the point is set square with the rod. When cutting a right hand thread, the cut is started at the end of the rod and finished near the shoulder. When cutting a left hand thread, the cut is started near the shoulder and finished at the end of the rod.

CUTTING THE THREAD

The thread is cut by making several passes along the groove forming the thread. Start the cutter at the end of the cut with a very light cut and advance the thread cutting attachment to the stopping point. Now withdraw the cutter from the rod and return the cutter back past the starting point. Next, bring the cutter back to the starting point, then move the cutter back into the groove with another light cut, advance

Figure 2

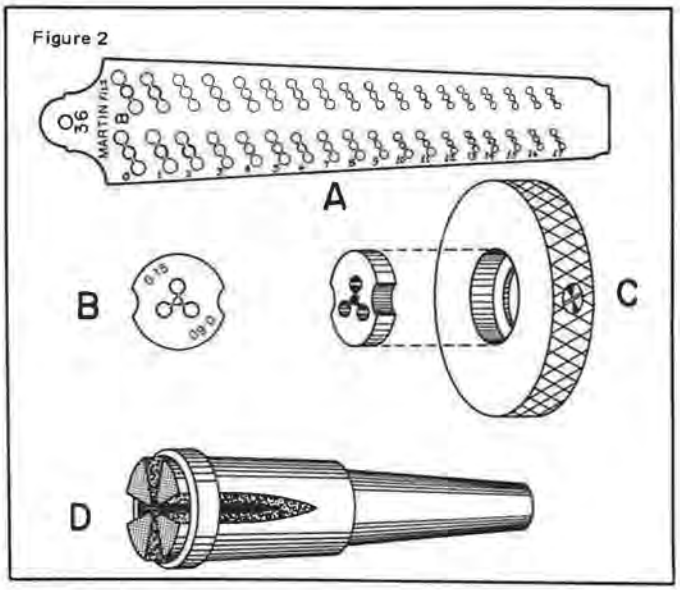


Figure 3

the attachment and cut the thread to the stopping point. Withdraw the cutter and return the cutter to beyond the starting point. These operations are repeated until the thread is cut. The reason that the cutter is returned back past the starting point is to allow the slack in the gears and attachment to be taken up by the time the starting point is reached.

When cutting threads, one of two methods can be used. The headstock of the lathe can be turned slowly with the motor; or the belt can be removed from the pulley, and the crank of the slide rest can be turned by hand to turn the gears of the attachment to cut the thread.

THE SWISS SCREW PLATE

Some other methods of cutting threads are shown in Figure 2. View A shows a Swiss screw plate. This is a 36 hole plate which cuts a right hand thread. These plates are also available to cut left hand threads. When the plate cuts left hand threads, it will be stamped with a "G". This means "gauche" which is French for left. A Swiss screw plate that is stamped with the letter "L" indicates that the plate is based on the Latard thread. If the plate is stamped with the letter "B", then the plate is based on the Bourgeaux thread. These are old thread patterns before standardization of screw threads. The Latard thread is smaller in diameter with a finer

pitch than the Bourgeaux pattern for the same number hole. A screw plate stamped with the letter "S" has a very fine thread for threading barrel arbors.

Although the Swiss screw plate does not contain a standardized thread design, neither do the old antique watches. Therefore, the Swiss screw plate is probably the best threading device available for making screws for antique watches outside of a thread cutting attachment for the lathe.

USING THE SCREW PLATE

Figure 3 shows how a Swiss screw plate is used to thread a rod for a screw. The rod used to make a screw is chucked in the headstock of the lathe. The rod is then turned down to the proper diameter for the threading and its end is pointed at about a 60° angle. Then the screw plate is used to make the thread for the screw. It is very important to get the screw plate started straight and square with the rod. The hollow end of the tailstock spindle can be used to keep the screw plate square until it gets a good start on the rod. Cutting oil should be used to lubricate the plate and rod while the thread is being cut. The screw plate is held in the fingers of the right hand as the pulley of the lathe is turned forward and backward with the left hand to cut the thread. Each time the lathe spindle is turned forward 1/4 turn to cut the thread it is then backed up 1/2 turn to clear the cuttings from the thread. This back and forth motion is continued until the thread is cut.

THREADING DIES

Other threading devices are shown in Figure 2. View B shows a more modern style threading die. These dies can be bought individually or in sets. These usually have metric threads. These dies are supplied in sizes to cut threads on diameters of from 0.30 mm to 1.20 mm in 0.05 mm increments and thread pitches from 0.075 mm to 0.25 mm.

View C, Figure 2 shows a holder for the die that is shown in View B. This holder is knurled around its edge so it can be held with the fingers without slipping when threading a rod for a screw. This holder has set screws in its edge for holding the die in place.

WATCH FACTORY DIES

View D, Figure 2 shows a special die that fits into the lathe tailstock spindle. The die has a taper spindle which fits the tapered hole in the tailstock spindle. This die was somewhat adjustable since the body of the die had a slight taper and a sliding band that could be moved on the tapered body to open or close the die. Elgin National Watch Company made this type of die for all of the screws in its watches. As far as is known, these dies were never for sale to the watchmaker, but they did supply the watchmaker with the taps for most of their screws. This type of die has an advantage over other types of dies because, since it is held in the tailstock spindle, it is easy to get it started straight. Also, it can be used as a production tool. Elgin made these dies for inch threads. Sometimes a die is not available for making a particular screw. In this case, one would have to be made up special. If a screw can be found that has the proper pitched thread with the correct diameter, then a tap can be made from this for threading the die. Otherwise, the thread cutting attachment would be needed to make a tap to thread the die.

MAKING A DIE

Figure 4, View A shows a tap made from a screw. Three flat sides have been ground on the screw and the end pointed to form the tap. Usually the die is made from high carbon steel disc as is shown in View A. However, the die can be made from a piece of sheet steel just as well. View B, Figure 4 shows the stages used in making a die.

Stage 1. The disc from which the die is to be made can be cut off of a high carbon steel rod. First, a center is spotted in the center of the disc. Then a circle is scribed which is approximately the diameter of the tapped hole. Now, scribe a circle for the relief holes. Next, divide the disc into three equal segments and scribe lines from the center of the disc through these points. Now spot centers where these lines intersect the relief hole circle. Next, the center hole is drilled and threaded with the tap.

Stage 2. Drill the three relief holes.

Stage 3. Use a jewelers saw to saw slots from the relief holes into the threaded hole.

Stage 4. File or mill the semi-circles in the edge of the die and then stamp the die with the diameter of thread the die is cut, the number of threads per inch or centimeter, and the tap drill diameter. Now the die is hardened and tempered to a pale straw color.

Figure 4

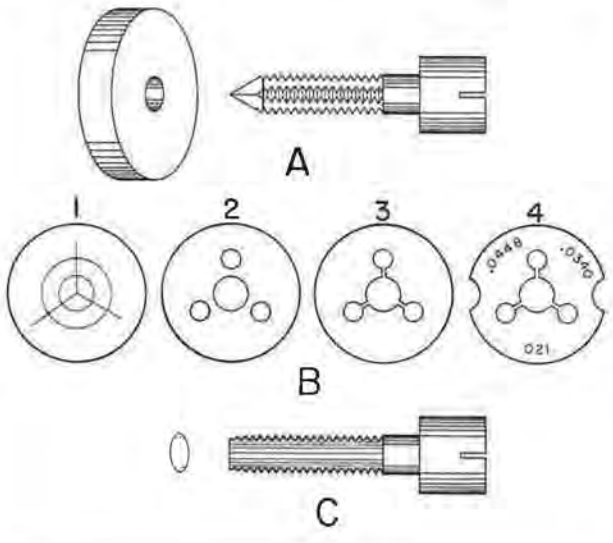
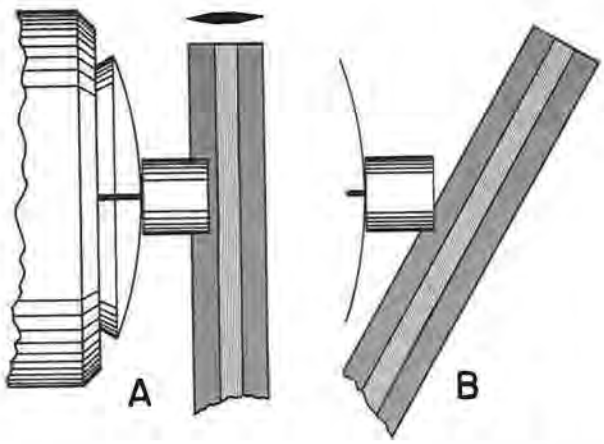


Figure 5



LEFT HANDED TAP AND DIE

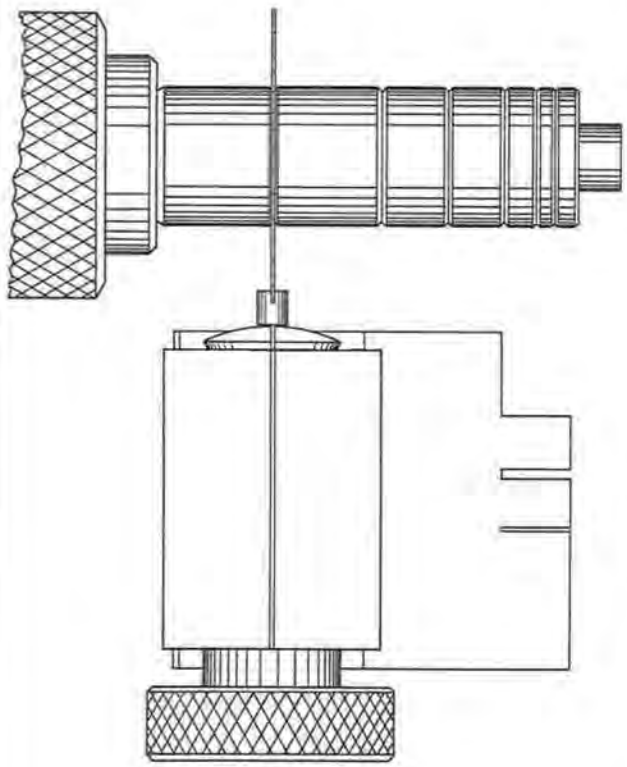
Sometimes a die is needed to make a screw with a left hand thread. If a die is not available, then it would have to be made up special. The thread cutting attachment can be used to make a left hand threaded tap to make the die, or a tap can be made from the proper sized right hand threaded screw. View C, Figure 4 shows such a tap. The threads are ground off of two sides of the screw creating an oval shape as shown. A very thin thread is left on opposite sides. After this is done, then the tap can be turned to the left to thread a hole with a left hand thread for making the needed die.

CUTTING SCREW SLOTS

A very important step in making a screw is cutting the slot in the head of the screw. One method that can be used to make the slot is with a screw head file. This is shown in Figure 5. The slot is started with the screw head file on the corner of the screw head as in View B, Figure 5 and finished as is shown in View A, Figure 5. This method of cutting the slot is recommended on old antique watches that have had the other screw slots hand filed. This is so all of the screw slots match.

Another method that can be used to cut screw slots is shown in Figure 6. A circle saw is used on an arbor chuck for cutting the slot. The screw is chucked in a square chuck holding block and the chuck holding block is rested in the "V" notch of the Levin saw table as is shown. The height of the saw table is adjusted so the screw head is on center with the saw blade, also the saw table is adjusted so the edge of the saw is centered with the screw head. This method can be used as a production method for slotting many screws.

Figure 6



Screws can also be slotted by the use of a circle saw mounted on an arbor chuck in the milling attachment. This is shown being done in Figure 7.

MAKING A BRIDGE SCREW

Figure 8 shows the steps used in making a bridge screw. The steps are numbered in the proper sequence for making the screw and are as follows:

1. Turn the diameter for the thread.
2. Thread the screw. This can be done with thread cutting attachment or the proper die.
3. Cut the screw off of the rod. This can be done with a sharp pointed graver, a cutoff graver, or a jewelers saw.
4. Chuck the screw by the thread and turn the head to length and diameter.
5. Cut the slot in the head of the screw.
6. Chamfer the corner of the screw head with a graver and chamfer the edge of the slot with a triangular Arkansas stone. After this, the screw is hardened and temepred and finished to match the other screws in the watch.

MAKING A HIP DIAL SCREW

Another screw that needs to be made occasionally is a hip dial screw. A hip dial screw is shown in Figure 9. View A shows a side and top view of the hip dial screw. The hip dial screw was used on some of the later antique watches. The principle of its operation is shown in Views B and C of Figure 9. View B shows the screw in an open position. One side of the hip on the screw is cut away to allow the dial foot to come through the watch plate beside the dial screw. View C, Figure 9 shows the dial screw in a closed position. The sharp edge of the dial screw cuts into the side of the dial foot to hold the dial tightly. When turning the screw to tighten the dial, the screw should be backed up to draw the dial tightly against the lower plate.

Figure 8

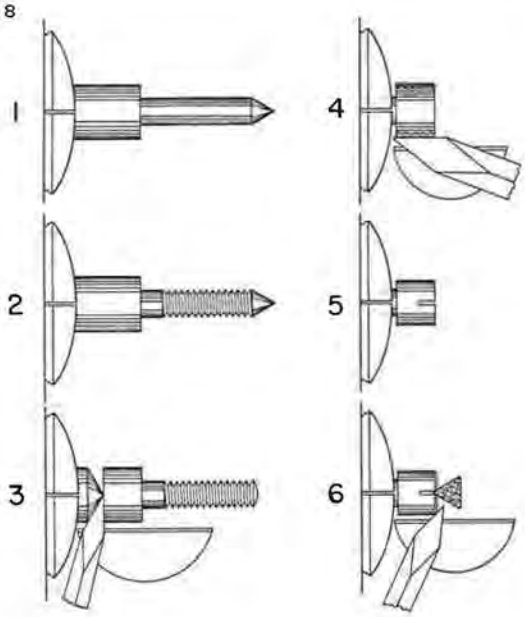
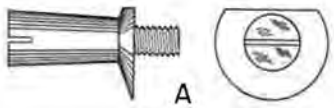


Figure 9



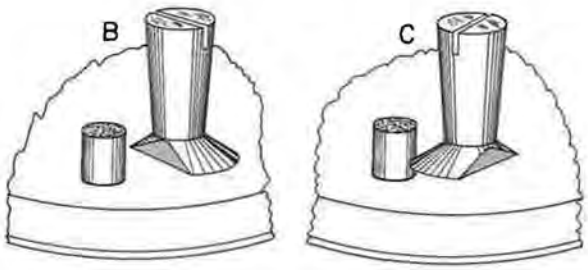


Figure 7

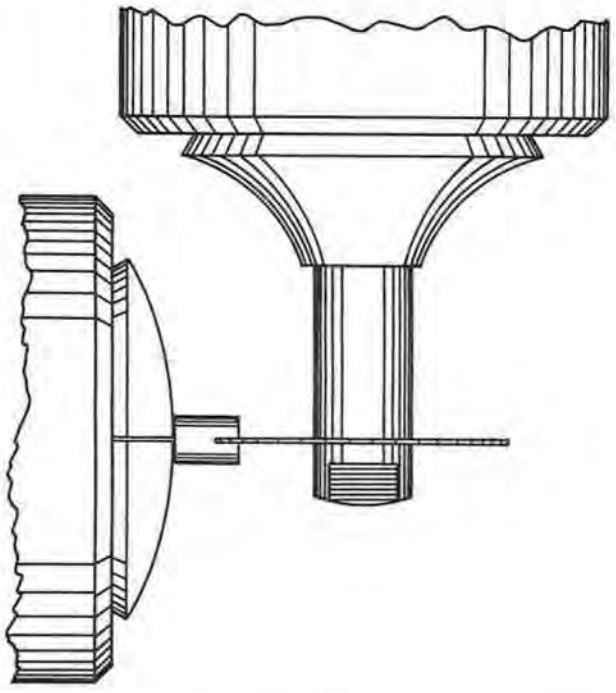


Figure 10

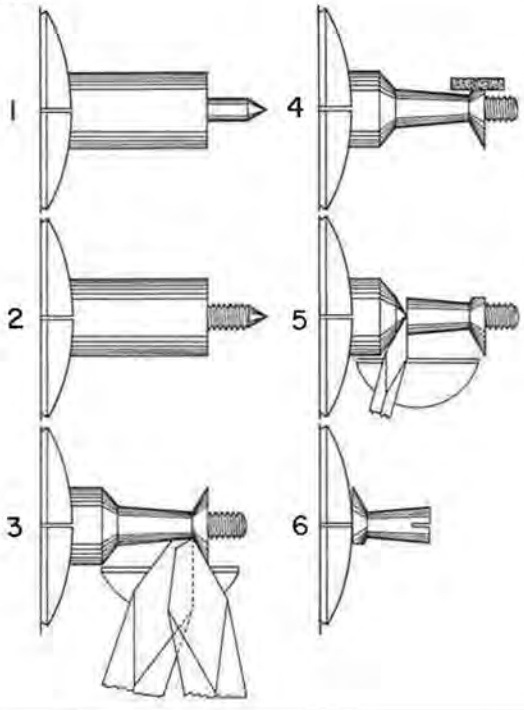


Figure 10 shows the steps used in making a hip dial screw. The steps are as follows:

1. Turn down for the thread.
2. Cut the thread.
3. Turn down and shape the head.
4. File or mill the flat on the hip.
5. Cut the screw off.
6. Cut the slot in the head of the screw. After this, the screw is hardened, tempered, and finished to match the other screws in the watch. These examples should prepare the watchmaker for making other screws for antique watches.

REFERENCES

Fried, Henry B. *Bench Practices for Watch Repairers.* Denver: Roberts Publishing Co., 1954, pp. 92-124.

Perkins, Archie B. "Technically Watches", *Horological Times.* American Watchmakers Institute. Cincinnati: May 1982, pp. 16-18, 26. July 1983, pp. 6-9.

* * * * * * * * * * * *

"ANTIQUE WATCH RESTORATION" will continue next month.

WATCHES Inside & Out!

Ralph Geiger, CMW, CMC, CEWS

THE OPTICAL COMPARATOR

An optical comparator is a device which projects an enlarged silhouette image of a three dimensional object onto a viewing screen. Tool makers and quality control inspectors, among others, use optical comparators to check parts for accuracy and uniformity. Such a device could be put to good use by a horolgist. However, most of us would probably balk at a $3500 price tag.

I was recently wishing I had an optical comparator. To my surprise, I already had one (I've had it for three years but didn't realize it). It was my fiche reader. Compared to the real thing it leaves a lot to be desired, but for my sporadic use it can be an excellent substitute.

Conversion is simple, just remove the fiche carrier. This allows enough room to place a component under the objective lens. The range of focus on a fiche reader is small, so it is necessary to position the part as close to the objective (upper) lens as possible. I found a locking tweezer (diamond tweezer) and a small vise work well to hold parts in position (the tweezer holds the part and the vise holds the tweezer). It is also handy to have a piece of clear acrylic to set parts on. The acrylic is then placed on a movement holding ring and slid under the lens.

At the Portescap factory in La Chaux-de-Fonds, optical comparators are used to test and control the quality of incabloc shock springs. A scaled up transparency drawing of the spring is placed over the screen and then a random sampling of springs is compared to this drawing. If the enlarged image of the springs deviates excessively from the shape and dimensions of the drawing, the batch will be scrapped.

A similar method can be used to advantage by the bench horologist. When parts are to be duplicated, the original can be placed under the lens and a drawing made on the screen by tracing the silhouette. This is done by attaching a thin sheet of paper to the screen or by covering the screen with clear plastic food wrap and using a nonbeading marker. The duplicate can then be checked for accuracy by comparing its silhouette to the drawing of the original. This method makes the testing of an angle or a curve especially easy. Try it next time you want to check the form of an overcoil.

You will probably find that trying to align the image with the drawing is about as hard as playing some of the video games in the arcades. Drawings on paper can be removed from the screen and reoriented to match the image. This cannot be

FIGURE 1. Elgin 713 escape wheel.

FIGURE 2. Font 59-21 escapement.

FIGURE 3. Hamilton 987 hairspring (focused on overcoil).

FIGURE 4. Clock wheel teeth.

FIGURE 5. Tracing of clock wheel teeth (to assist in achieving proper spacing and profile when replacing broken teeth).

FIGURE 6. Straight-edge clamped to base of fiche reader to assist in realigning the work with the drawing.

done with a drawing on plastic food wrap. Clamping a straight-edge to the base of the fiche reader can help in realigning the image by giving you a fix on the front-to-back positioning. Before making the drawing, position the work under the lens and clamp the straight-edge in place so that it touches an edge of the work holder. Now that the front-to-back location is secured, it is a much easier task to find the correct side-to-side and rotational orientation when replacing the work holder. It may be desirable to make a special jig to hold the part in correct position, should the job warrant it.

A true optical comparator is a luxury I will probably live without for a long time. In the meantime though, my fiche reader will allow me to make observations and comparisons I could not have made with my loupes, microscope, or micrometers.

TCB

SHOP TALK

Wes Door, CMW

Mechanical Repairs In Quartz Watches

PART I

DETENTS AND REMOVING STEMS

Probably the most time consuming part of our quartz repairs is the mechanical work. We should check all other possibilities first, since it is easier to check the cell and faster to probe test the coil, check the circuit, coil, etc. After we discover a mechanical problem, the solution may be familiar to us since we have been working with mechanical movements for many years. There are a few differences, of course, between those older movements and our new breed of quartz modules.

First we need to remove the module from the case. (Up to this point we probably did the preliminary tests with the module still in the case with just the back removed.) On the older dress watches which were not quartz, we removed the movement from the case without removing the stem and crown. On our modern quartz dress watches, it is generally necessary to remove the stem and crown. In all of the water-resistant types, it is still necessary to remove the stem and crown to separate the case from the module (movement).

REMOVING STEM AND CROWN

The stem is held in place by a detent, but most watches now do not have the typical detent screw which screws into a threaded detent. Instead, most of the quartz watches now have a riveted type of detent, wherein the detent is riveted to the old screw end area of the detent post (detent screw). Since this new detent and detent screw now works as a one-piece unit, a spring of some sort must be used to apply sufficient tension to hold the stem in place. In some watch designs the spring is under the dial; however, some detents are spring loaded from the train side.

There are other types of detents, some of which are shaped like a flat square or rectangle piece. One edge of this piece is sharpened on one side of one edge to fit into the stem slot. It is held in place by spring tension from the opposite side. To remove the stem in these watches we must first find the manufacturer's equivalent of the detent screw and either lift or push the proper area. This proper area may be a button, lever, or other means marked with a small round indented dot. Some stems release by a lever that is hidden and is not visible until the stem is pulled out to a certain position. This may be the setting position–that is, pulling the stem all the way out–or it might be the middle day and date position.

Other methods may require our watchful eye on the words printed on the movement. It may say "push" or "push here" or it may just be an arrow which points to the proper button, lever, hole, etc.

If we are really unsure as to the whereabouts of a means to release the stem, just observe the stem area. On most quartz movements, one may remove the screws (in the stem area) on the train side. This probably will not be the train bridge but may be the circuit board or other plastic covered area. This should expose the stem area, at least enough to decide how the stem is to be released.

The best thing about spring loaded releases is the fact that the removed stem may be replaced with much more assurance since the setting parts will automatically stay in place while the stem is being placed back into the movement. The new breed of stems have a sloping area just outside the slot area. This angle on the stem makes it easy for the stem to be pushed back into its proper "IN" position without fear of several parts being dislocated.

After the stem is removed, the movement may now be removed from the case. The stem should be *immediately* placed back into the movement for two reasons: (1) it keeps the setting parts in position while we check out the movement or complete our repairs; and (2) with the stem out in the setting position the electronic portion is disconnected, thus causing the watch not to run.

This may be important to us later, after the repairs are completed, and we wonder why the watch isn't running. For these reasons it is very important to leave the stem in the "IN" (neutral) position, if at all possible.

Next month we will remove rust, etc. as we continue our discussion on mechanical repairs.

We Salute These New Members!

ABBOTT, Douglas A.–Basking Ridge, NJ
ALBEAN, Matthew J.–Indianapolis, IN
ANDERSON, Steven J.–Kalamazoo, MI
AVELLINO, Charles–Brooklyn, NY
BASH, Herbert E.–Lancaster, OH
BEALL, Terry L.–Findley, OH
BERMAN, Daniel–Ft. Worth, TX
CERDA, Robert–Dallas, TX
CHANG, Shi-Dong–Seoul, Korea
CIESLER, Richard P., Sr.–Stacy, MN
CLAY, Philip G.–Battle Creek, MI
COLSON, Gordon F.–Claxton, GA
COONS, Theodore H.–Lakewood, OH
CRITELLI, Karyn M.–Georgetown, CT
DAVIS, Malcom D.–Hagerstown, MD
DESCHAINE, Robert–Jackson, MI
EASTERDAY, Mark Joseph–Mesa, AZ
EMERY, Robert J.–Springfield, OH
FLORES, Angel–El Paso, TX
GARCIA, Manuel–Santurce, PR
GRAYDEN, Royal–Roseville, MN
HARRINGTON, Blair–Boston, MA
HARRIS, John L.–Houston, TX
HOUGHTEN, Jeffrey R.–Davis, CA
JAMES, Howard L.–Cable, WI
JEWELL, William C.–Batesville, IN
KIM, Sung-Yong–Seoul, Korea
KURIMOTO, Carlos M.–Van Nuys, CA
LARSON, Milton–Lynden, WA
LEO, Dominic A.–Medford, MA
McCOTTER, William E.–Washington, NC
McGONIGAL, George–Conshohocken, PA
MIZRACHI, Benjamin–Hollywood, FL
MOORE, Timothy–Overland Park, KS
OLSON, Curtis–Cambridge, MN
NIKOS, Karl Steve–Overland Park, KS
PARK, Hyong-Rae–Seoul, Korea
PENA, Arthur–S. St. Paul, MN
PLANTZ, Jeff–Madison, WI
RAATZ, William A.–San Rafael, CA
RAJANIEMI, Frederick R.–St. Helen, MI
SANCHEZ, Martin G.–Houston, TX
SHEVELENKO, Garri–Newark, NJ
SPIELDENNER, Kurt E.–Lynnwood, WA
STEIDLE, Craig E.–Springfield, VA
STEVANATO, Robert A.–Escondido, CA
STILES, William Randall–Longview, TX
SULICH, Michael A.–Whiting, IN
TRAPP, William J.–Albrightsville, PA
VIRGILIO, Larry T.–Beaumont, TX
WALL, Earl V.–Albuquerque, NM
WAPLES, Ivan–Lincoln, NE
WARREN, William F.–Springfield, MO
WOODY, Wayne M.–Pittsboro, IN
YUN, Jae-Shik–Seoul, Korea
ZIMMERMAN, Sheldon–Duluth, MN
ZYCHOWSKI, Andrew–Rockaway, NJ

THE PICKLE BARREL

REPAIRING STONE SETTINGS

Part I

Marshall F. Richmond, CMW

Repairing stone settings seems to be one part of jewelry repair that brings out the most questions from people already doing ring sizing and light repairs. These people have already conquered the basics of using hard solder, filing, and shaping. Repairing stone settings should be within the scope of their abilities with some instruction and a lot of practice. One of the most asked questions concerns repairing broken prongs or prongs that are worn thin at the girdle of the stone or the tips hooking over the edge of the stone. In this article I will try and describe several ways to make these repairs.

BEFORE REPAIRING A SETTING

A rule of thumb when taking in work on prong rings is this: If there is metal hooking over the girdle of the stone, usually a hard solder tip is adequate. But if the prong is broken off or missing, it is necessary to hard solder on a new prong. As this is only a rule of thumb, it is not *always* applicable, but is in most cases.

There are many considerations to be taken into account before starting to repair a setting. A very important one is if the stone will stand heat or if it has to be removed. Another rule of thumb is that red, white, or blue stones will take heat—but not in all cases. It is true that rubies either genuine or synthetic will take heat; blue sapphires either genuine or synthetic will also take heat; and, of course, a diamond will take heat, so this is where the red, white, and blue rule applies. Garnet is a red stone and will not take heat; cubic zirconia is a white stone and will not take heat; but most synthetic birthstones as are found in mothers' rings will take heat (except for some doublets which are easily recognized by observing the girdle). This is always a consideration for if the stone must be removed it is much more time-consuming and a larger cost estimate should be given.

Another observation that should be made is the location of the damaged prong. If it is in a cluster and inside the outer prongs, it is quite difficult to tip or re-prong. In starting to learn the repair of stone settings start with the simple, such as prong replacement or tips on single stone rings. Then with experience work into repairing the more difficult, like multi-stone prong set rings or replacing beads on bead set rings.

ILLUSTRATING THE REPAIR

It has been said that a picture can be worth a thousand words. There is no better way to communicate than with pictures, but in drawings which illustrate jewelry, perfection is reflected. Although this may give you an understanding of what the repair should look like in different stages of the work, the real work does not look so perfect. The metal will be discolored from the flux, solder, and heat, and the added metal may not seem to be exactly in the right place. The ends and edges are ragged but by shaping, bending, and polishing, the finished repair can look perfect. An experienced craftsman who uses files and pliers well can turn even what seems to be an ugly job into an object of beauty. Using photographs for illustration gives a true picture of the different steps for any project if no altering is done after each step before being photographed. When putting metal on a prong I usually roll out a piece of gold on the rolling mill to a thickness of about .3 or .4 mm. With jewelers shears, I cut strips to the width of the prong to be replaced. Rather than saw the ends usually they are cut with end or diagonal cutting pliers. This makes the ends ragged,

Figure 1

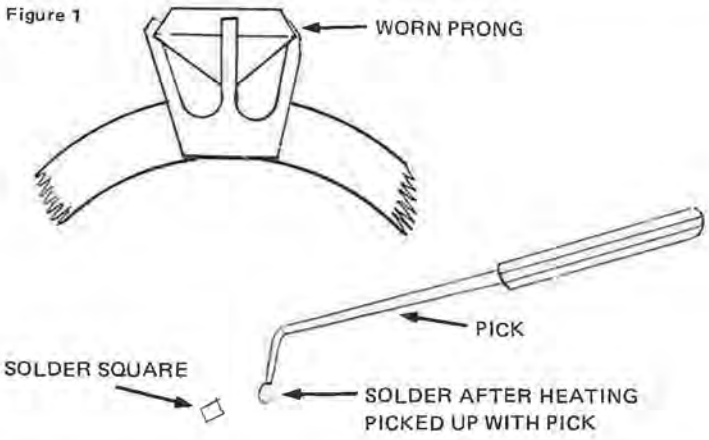
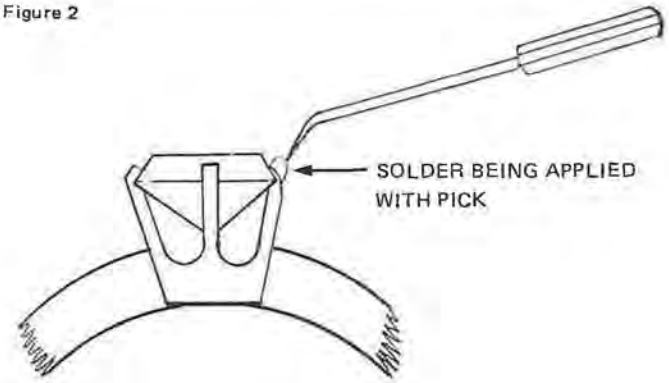


Figure 2



and when soldered to the old prong it is far from a neat job. However, if the solder joint is good it will dress out to be a fine looking prong, having good strength and durability. Even in putting a piece in a ring to enlarge it, it is generally cut from a piece of flat gold, so will be rectangular or square. When soldered in using "V" joints (especially on a half round shank) it looks very crude when the solder joints are made before any finishing is done. But by using a piece a little larger than the shank, and by making the ring ½ size smaller than desired, it can be put on the steel mandrel and tapped to the correct size with a steel chasers hammer. At this point it looks more crude than it did before peening it to size. With files this can then be shaped to the desired shape, then polished. Using this method, not only is the size made exact, but the solder joints have been tested for strength and durability.

APPLYING SOLDER TIPS

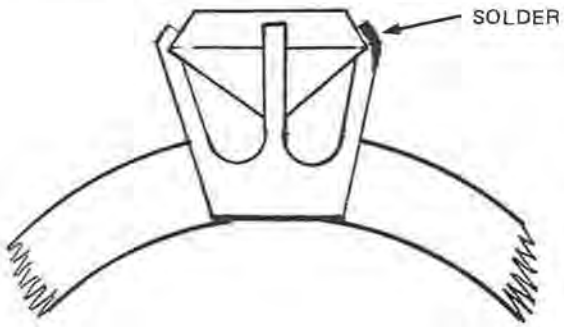
Solder tips on prongs are quick and fairly easy once the skill is developed. I will try and give a step-by-step method of applying solder tips to stones that will take heat. If the stone has to be removed, solder tips are not practical, because straightening the prongs will weaken them and it will be risky in trying to reset the stone without replacing them.

As always, the first step in tipping is to pre-clean the ring so no foreign matter is on or under the stone, or on the mounting (which could boil or burn, making any kind of coating on the stone or ring). Next, dip the ring in boric acid and alcohol, light it, and let it burn off, leaving a coating of boric acid over the mounting and stone to retard oxidizing. Using a pair of heavy soldering tweezers, place it on the asbestos pad with the stone and setting up and weigh the tweezers with a steel block to keep it from moving. Cut small squares of gold solder of the proper color and karat and lay on the asbestos pad for fluxing. Flux the tips of the prongs where they hook over the girdle of the stone. This can be done by applying some heat to the prongs and applying the flux with a piece of sharpened pegwood, controlling the flux so it just covers the tip of the prong down over the girdle. Using a solder pick heat can be applied to one of the chips of solder until it melts and forms a sphere, at which time it can be picked up with the point of the pick (see Figure 1). With the pick in one hand and torch (with small tip) in the other, heat can be applied to the prong to be tipped. As it starts to get hot the ball of solder on the point of the pick can be touched to the tip of the prong at its very end until it flows enough to let go of the pick. By the way the heat is applied, this solder can be flowed to a dome on top of the prong tip (see Figure 2), then by moving the heat pulled down over the girdle of the stone which will strengthen the weak place in the prong right at the edge of the stone. In some cases it is then necessary to apply another piece of solder as was done with the first one, but don't pull this piece over the edge of the stone which will leave a nice domed tip.

Other prongs can be retipped at this time without pre-cleaning or burning off the boric acid and alcohol, but each prong should be fluxed prior to applying the solder tip. How the heat is applied to keep from melting the first prong(s) is important. The direction that the heat is applied from is really the controlling factor. Remember that solder will follow heat and flow to the hottest spot once it is in a fluid state. The next step is to remove any excess solder by filing to try and get all the prong tips uniform in size and shape. A good file to use for this is a barrette needle file for although it is triangular in shape only one side of the triangle has cutting teeth and the other two sides are smooth so it is much easier to control the cut of the file. Sometimes some excess solder will creep between the prongs which is hard to remove unless you have experience in hand engraving. With an engravers flat graver (about a Number 38), this excess can be cut away leaving a brite cut finish on the sides of the prong. Depending on the shape of the prong tips desired they can be finished

(Please turn to page 36)

Figure 3 — Finished prong after shaping and polising. Black area on prong tip represents solder.



Elapsed Time Clocks PART I

Marvin E. Whitney, CMW, CMC, FAWI

EDITOR'S NOTE: We're pleased to begin a brand new series by Marvin E. Whitney on "Elapsed Time Clocks." Mr. Whitney authored a long running series, "The Ship's Chronometer" several years ago, which in 1985 was published in book form.

This new series will cover principles of operation, disassembly, cleaning, repair, reassembly, and testing procedures of the elapsed time clock. It will alternate with Steven Conover's "Chime and Strike" series.

All photos courtesy U.S. Air force.

In recent years a great deal of interest has been shown in military timepieces, particularly among collectors. One, in particular, is the elapsed time clock made for the U.S. Navy Bureau of Aeronautics and the U.S. Air Corps. The first elapsed time clocks for the Bureau and the Air Corps were made by LeCoultre and purchased from the Jaeger Watch Company, 304 East 45th Street, New York City.

Antoine LeCoultre came from a family of expert metal finishers. In 1833, he opened his own watch manufacturing company at Le Sentier in the Vallee de Jou, Switzerland. He started by producing watch pinions and later began manufacturing other watch parts on equipment that he himself had designed.

The economic conditions surrounding World War I led LeCoultre to develop and manufacture precision aviation and automotive instruments RPM gauges, speedometers, dashboard clocks, etc. These instruments were sold primarily to E. Jaeger of Paris. In 1930, LeCoultre designed and began manufacturing his first "Chronoflite," a double chronograph aviation clock. As an outgrowth of this business relationship between LeCoultre and Jaeger, a partnership was formed in 1936, and the firm became known as Jaeger - LeCoultre.

In 1937, the partnership expanded its research and technological expertise and resources by designing and manufacturing a series of aviation instruments, such as microspeedometers, relays, autopilots, altimeters, and artificial horizons.

The "Chronoflite" was incorporated in one case: split second timing, elapsed time, and an 8-day clock. (See Figure 1.) Split second timing was operated by pushing the right-hand button "A" to start, stop, and return the split second hand to zero. The small inner dial at the bottom recorded minutes traversed by the split second hand. For elapsed time, the red (or outer) portion of the left-hand button "B" was depressed to start, stop, and return the elapsed time hands of the upper small inner dial to zero.

The small button "C", immediately below the 6 o'clock position, permitted the stopping of the elapsed time hands. When both indicators "D" and "E" were red, the elapsed time hands were operating. By turning button "C" to the right, it changed indicator "E" to white. When the indicator "E" was white, it stopped the elapsed time hands which allowed for taking time out for refueling, repairs, etc., and by again turning small button "C" to the left, indicator "E" was again red. When indicator "E" was red, the forward operation of the elapsed time hands was resumed, thus making it possible to keep an exact record of flying time for any definite period.

When the indicator "D" (located within the upper small dial) was red, the elapsed time hands were operating; when the indicator was red and white, the elapsed time hands had been stopped of all forward motion; and when the indicator was white, the elapsed time hands were back to zero. (See Figure 2.)

Figure 1. Dial view of LeCoultre's first "Chronoflite" Elapsed Time Clock.

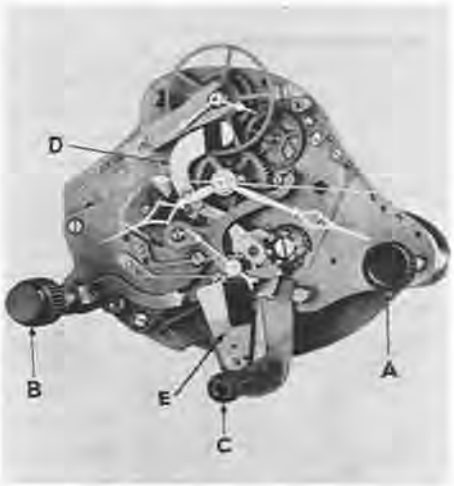


Figure 2. Under the dial view of the "Chronoflite" elapsed time mechanism.

Figure 3. The exterior back of the "Chronoflite" case, sold by the Jaegar Watch Co.

Figure 4. The dial of LeCoultre's second "Chronoflite" model.

Figure 5. An under the dial or dial side of the pillar plate view of LeCoultre's second model. The large wheel at the 12 o'clock position is the time of flight hour wheel which carries the elapsed time hand.

Figure 6. The chronograph mechanism which starts, stops, and returns the sweep second hand to zero.

FIGURE 7. A dial view of LeCoultre's 24-hour Elapsed Time Clock with the civil date subsidiary dial.

The movement housed in a black metal case was secured to the aircraft's instrument panel with four mounting screws. The movement was held in the case by three screws whose heads protruded from the back of the case. On the back of the case was a removable sealing screw which made it possible to regulate the clock without having to remove the movement from the case. (See Figure 3.)

Several different models of the "Chronoflite" elapsed time clock were produced. The basic movement was LeCoultre's 310 series of chronograph clocks. Bestfit's *#111 Encyclopedia of Watch Material, Part 1,* shows three different calibers of their 310 series: the 310-5318, 310-5320, and 310-5321, the last three digits being the actual caliber or model number.

All "Chronoflite" models had a black dial with luminous tipped hands and dots at the 5-minute graduations, except the first model which had line marks at the 15- and 45-minute mark. Some of the dials were marked "A.C. U.S. Army", Type A-10, and the serial number; or "Bur Aero.", U.S. Navy.

The first two models were fitted with 12-hour dials. However, on the first 12-hour model (which was stamped Type A-10 on the dial) only two luminous numerals, 3 and 9, appear on the dial. (See Figure 1.) The second 12-hour model had 1 through 5 and 7 through 11, indicating the hours. On both models the minute graduations were marked with small numerals at each 5-minute interval. (See Figures 4, 5, and 6.) The minute graduations also served as an index for the sweep second hand.

The later models were characterized by a 24-hour dial and a civil date subsidiary dial, whose 31-day orbit at the center of the dial was identified by the words "Civil Date" and was marked off with numerals showing each 5-day graduation. The continuously running hour and minute hands operated over the orbit of the 24-hour dial, which was graduated in minutes, employing large Arabic numerals for the even-numbered hours from 2 to 10 and from 14 to 22. Small Arabic numerals marked the odd-numbered hours 3 to 9 and from 15 to 21 and small numerals for the hours 12 and 24 at the bottom and top of the dial respectively. On the outside of the chapter ring, at the 3 o'clock position, appeared the words "Set Date" and an arrow pointed towards the plunger which sets the date and was activated from the outside of the case. (See Figure 7.)

The sweep second hand was center-pivoted in front and on top of the regular continuously running hour and minute hands and operated over the same orbit as the continuous running hour and minute hands.

The elapsed time minute and hour hands operated over a 12-hour orbit at the top (24 o'clock) position, which was graduated in minutes with numerals indicating each hour from 1 to 12. The small dial at the botton (12 o'clock) position, which was graduated in minutes, recorded the minutes traversed by the sweep second hand.

Basically, the movements in all three models were of the same design and all powered by a single barrel-mainspring unit. (See Figure 8.) The only real difference was the added civil date mechanism to the 24-hour dial model. The movement made use of 13 jewels: four balance, one roller, two pallets, two escapewheels, two pallet arbors, and two 4th wheel jewels. The balance wheel was bimetallic and fitted with a steel overcoil hairspring. The escapement was located on the train side of the pillar plate. In the earlier models, the balance cock was long and only one screw was used to attach it to the pillar plate; while on one of the later models, which had the caliber number 332 stamped on the pillar plate, a triangular shaped balance cock was used which was secured with two screws.

The movement number was stamped on the dial side of the pillar plate, near the time of flight hour wheel and cannon assembly, and on the underside of the barrel bridge.

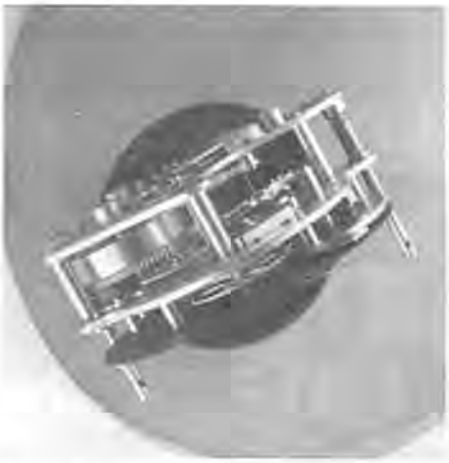


Figure 8. The single barrel-mainspring unit which was common in all of LeCoultre's Elapsed Time Clocks.

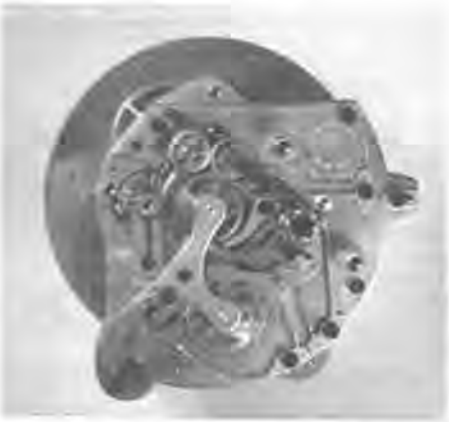


Figure 9. The chronograph mechanism and marking on the back or top plate of the LeCoultre Elapsed Time Clock.

There is no information available as to how many were purchased by either the Air Corps or Navy. The lowest movement number that I have seen was 156581 and the highest 200380. The top of the barrel bridge was stamped:

Thirteen 13 Jewels
8-Day
Jaeger Watch Co.
Inc
USA
New York
Made in Switzerland

while at the bottom of the plate is found LeCoultre & Co. On a later model which carries the caliber number 332, the words "Adjusted to Temperature" appeared near the LeCoultre & Co. name. (See Figure 9.) However, on some calibers, the barrel bridges were just stamped:

Thirteen 13 Jewels
8-Day

with the manufacturer's name appearing at the lower edge of the barrel bridge. We were told at the U.S. Naval Observatory that clocks marked in this fashion were manufactured for

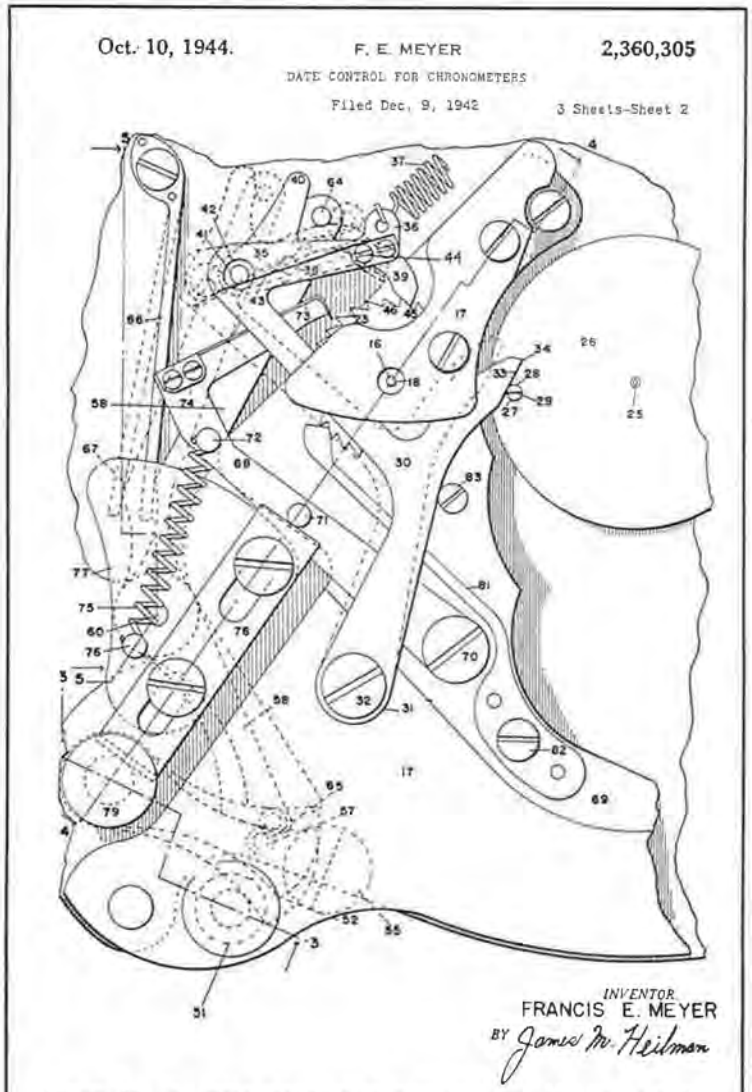


Figure 10. A patent specification drawing of Mr. Meyer's civil date indexing mechanism which was used in the Elgin-Hamilton Elapsed Time Clock.

Figure 11. The dial of the Elgin-Hamilton 24-hour Elapsed Time Clock. The unmarked subsidiary dial at the 24-hour mark records each revolution of the sweep second hand up to 60 minutes, while the one at the 6 o'clock position is the continuous running second hand orbit.

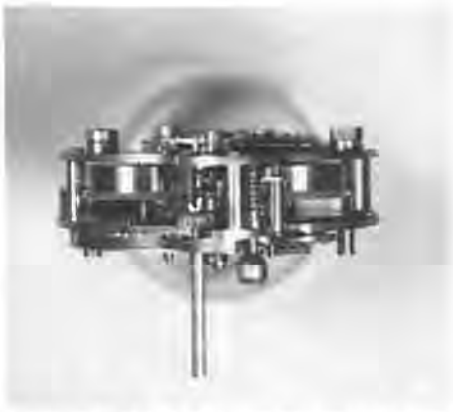


Figure 12. The dual barrel-mainspring assemblies of the Elgin-Hamilton Elapsed Time Clock.

Figure 13. A view of the Elgin-Hamilton Elapsed Time Clock chronograph mechanism. This mechanism was responsible for starting, stopping and returning the sweep second and minute register hands to zero.

civilian aircraft. However, we found such stamped clocks in any number of service marked cases. This was understandable for when we were forced into World War II, we found ourselves facing a critical shortage of timepieces and related spare parts. Thus, cannibalizing of older and basic movements of watches and clocks was a means at some of our repair depots and ships to make an inoperative timepiece operable.

Shortly after Pearl Harbor was attacked by the Japanese during the early hours of December 7, 1941, Hamilton, like many other manufacturers, turned their entire production facilities to the manufacturing of highly specialized navigational timepieces and other precision instruments. The Navy's time-oriented priorities for Hamilton were: No. 1 – Marine Chronometers; No. 2 – Chronometer Watches; No. 3 – Chronograph Watches; and No. 4 – the development of an elapsed time clock.

However, the Navy's Bureau of Aeronautics and the U.S. Air Corps wanted two sources of supply which resulted in Elgin's and Hamilton's cooperative effort in designing an elapsed time clock. Elgin had already done some preliminary work on just such a clock, but when Hamilton analyzed what had been done, they (Hamilton) recommended that it was best to begin again. Ernest W. Drescher of Hamilton and George Kirk of Elgin were selected by their respective companies to design an elapsed time clock and to coordinate the dual production effot.

Upon examining the Jaeger elapsed time clock, they found several design defects which they felt needed to be redesigned if the clock was to operate at maximum efficiency under combat conditions. These defects were: (1) had only one mainspring; (2) contained no backward wind or ratcheting system; (3) wound counterclockwise which resulted in damaged and/or broken teeth because individuals were accustomed to winding timepieces clockwise; and (4) the dating mechanism operated off of a pin on the hour wheel, and since it employed a creeping-jump type mechanism, it was not possible to set the time hands backwards through midnight because the date indexing lever remained in the path of the pin on the hour wheel. Should this be attempted, the pin would bend or break. With the above in mind, design changes were made and a newly designed 8-day elapsed time clock emerged.

Francis E. Meyer, one of Hamilton's design engineers, designed a new date mechanism which permitted setting the time backwards through midnight. The device was known as a "Date Control for Chronometers". On December 9, 1942, Mr. Meyer applied for a patent, which was granted October 10, 1944, as #2360, 305. (See Figure 10.)

The Elgin-Hamilton 8-Day Elapsed Time Clock was a 24-hour dial clock with special chronograph and civil date features, designed for use as a navigational instrument in aircraft. (See Figure 11.) The movement, rather than being that of a simple clock, was more like that of a large complicated 8-day, 16-jewel watch with the usual lever escapement. The clock contained a total of 417 parts, 248 of which are different. The primary differences between the trains of this instrument and those of an ordinary 12-hour dial watch were: (1) a somewhat more complex winding and setting mechanism was utilized; (2) two barrel-mainspring assemblies were used instead of one (Figure 12); (3) the gear ratio between the cannon pinion, minute wheel, and hour wheel rotates the hour hand once for every 24 revolutions of the minute hand, instead of the usual 12; and (4) the addition of the three especially designed chronograph, elapsed time, and civil date mechanism on the front and rear plates.

The functional features of the elapsed time clock were: (1) a 24-hour dial; (2) the usual combined winding and setting knob and the continuously running hour, minute, and second hands; (3) a chronograph system for measuring and recording short intervals of elapsed time (in 1/5 seconds).

Figure 14. An under the dial view of elapsed time and civil date mechanism of the Elgin-Hamilton Elapsed Time Clock.

Figure 15. An exterior back view of the Elgin-Hamilton Elapsed Time Clock case. This particular case carries the Elgin National Watch Company's name.

This mechanism, which measured and recorded from 1/5 of a second to 60 minutes, was controlled by a single push button for starting, stopping, and returning the sweep second and minute register hands to their original zero positions (Figure 13); (4) an elapsed time mechanism, entirely independent of the chronograph mechanism, for measuring long intervals of time (in both hours and minutes); and (5) a "civil date" mechanism with a calendar device for the consecutive indication of the civil date with the passing of each 24 hours. (See Figure 14.)

A unique feature in the design of this elasped time clock is that when it runs down, the second and sweep second hands will always stop on zero. It makes no difference the number of times it is shaken to start up. It stops with the second and sweep second hands on zero and the minute hand on a minute graduation.

Elgin made the dial, barrels, mainsprings, escapement, and plates since this was the only safe way to control alignment and registration. Hamilton was responsible for the manufacturing of the various levers, springs, and wheels. Many of the screws were factory stock items (screw threads differ between those of Elgin and Hamilton), while others were designed with a special function in mind. Thus, during disassembly it is advisable to keep all screws attached with the parts they serve to facilitate reassembling.

Specification AN-C-62 stipulated that the clock run for eight days on one full winding of the mainspring. However, because of the unusual long mainspring, this clock would run 12 to 13 days, though the torque of the mainspring drops off considerably after the eighth day. Elgin had considerable difficulty in making a mainspring which would not result in the overbanking of the balance when first wound up, and yet be of sufficient strength that when the elapsed time and chronograph mechanism were operating, its function would not bleed off the torque.

Hamilton resorted to an unusually long mainspring, which measured 60 inches in length, in designing their Model 22, 35-size chronometer watch. This proved to be an excellent choice since the performance of the chronometer watch exceeded all expectations. The use of the longer mainspring was one of the primary reasons. By utilizing the center portion as the power source, a more uniform and equal torque was provided. For many years Hamilton's Drescher was a strong advocate of a longer mainspring in watches. In view of the success of such a spring in their chronometer watch, Hamilton suggested to Elgin that the solution may be a longer mainspring. Elgin increased the length of both mainsprings, which indeed proved to be the answer to the above mentioned problem.

A panel on the back of the bakelite case carries the manufacturer's part number, contract number, manufacturer's serial number, and the manufacturer's name. Some panels also show either the Type, AN 5741-L, or the basic Navy stock number, R88-C-5733-11. (See Figure 15.) The top plate on the chronograph mechanism side is marked 16-jewels, Made in U.S.A., and Adj. to Temp & 2 Pos.

Hamilton's production records show that they produced 15,641 Model 25 Elapsed Time Clocks from 1944 to 1945. Clocks produced by Hamilton can be identified by the serial number which is preceded by the prefix, 2H, e.g. 2H2519. Elgin produced 25,000 Grande 601 Elapsed Time Clocks with serial numbers from T300,001 to T325,000. However, you will find many Hamilton marked movements in Elgin marked cases and vice versa. The case flanges, which retained the self-locking nuts that were used to secure the clock to the aircraft's instrument panel, were often broken when they were received by the repair shop. To expedite repairs, movements and cases were often switched.

Although the total number of Elgins and Hamiltons came to more than 40,000, which seems to many as an enormous quantity, one must remember when the U.S. Air Force reached its peak during World War II (in July 1944), it alone had 79,908 of all types of aircraft and (in May 1945) 43,248 combat aircraft. Also, at the time of Japan's surrender in August 1945, Admiral Chester W. Nimitz had under his command the mightiest military force ever assembled under one flag in the world, an armada of more than 6,250 ships and submarines and some 15,000 combat aircraft.

Often, when I am discussing the Elgin-Hamilton Elapsed Time Clock, I find many who are of the opinion that Waltham was also involved. Yes, Waltham, as well as several other watch companies, produced elapsed time clocks for the government, but none of them were involved in the joint Elgin-Hamilton project. The Waltham Elapsed Time Clock, as well as those of other manufacturers, will be covered later.

The elapsed time clock was a crafted piece of workmanship, a tribute to Elgin's and Hamilton's design engineers and production facilities. Those that came through the U.S. Naval Observatory, when I was there, performed very well. There is no way of knowing how many of these clocks escaped the ravages of war. Anyone fortunate enough to own one has a fine timepiece and should be proud to be the owner of such.

Watch & Clock

BOOKS from AWI PRESS

Ready Now!

1. BENCH PRACTICES for Watch/Clockmakers—Henry B. Fried. Hairspring practices, Replacing Regulator Pins, Jewelling & Dial Repairs $9.00
2. CAVALCADE OF TIME—Henry B. Fried. Highlights of the Zale Private Collection of Timepieces. $10.00
3. THE BEST OF J.E. COLEMAN CLOCKMAKER—Orville R. Hagans. An aid to solving everyday problems in clock repairing $30.00
4. ESSENCE OF CLOCK REPAIR—Sean C. (Pat) Monk. A practicing clockmaker reveals repairing secrets. $19.95
5. QUESTIONS & ANSWERS FOR THE CLOCKMAKING PROFESSION—AWI. Experts answer everyday questions about clockmaking $14.95
6. QUESTIONS & ANSWERS FOR THE WATCHMAKING PROFESSION—AWI. Helpful information on repairing watches. $5.95
7. REPAIRING QUARTZ WATCHES—Henry B. Fried. Includes a basic course in electricity & electronic horology $22.95
8. STRIKING CLOCKS—Joseph G. Baier. A hands-on survey for the clockmaker. $7.95
9. THE SHIP'S CHRONOMETER—Marvin E. Whitney. A concise treatise on the fascinating nautical timepiece . . . for the collector as well as the horologist $75.00
10. WATCH & CLOCK INFORMATION, PLEASE—W.H. Samelius. The writing of Samelius edited by O.R. Hagans $30.00
11. THE WATCH ESCAPEMENT—Henry B. Fried. How to analyze, adjust, repair the lever and cylinder, and more $8.00

ORDER YOUR COPIES TODAY!

Make check or money order payable to AWI PRESS. U.S. FUNDS ONLY, PLEASE.

Please send the following book(s): (List by title)

_____

_____

_____

AMERICAN WATCHMAKERS INSTITUTE
3700 Harrison Ave., P.O. Box 11011
Cincinnati, Ohio 45211

Name _____

Address _____

City _____

State _____ Zip Code _____

All Books Shipped Postpaid

BENCH COURSES

	PROGRAMS	INSTRUCTORS
A	Meter Microamps and Modules	Gerald G. Jaeger, CMW, CEWS
B	AWI Certified Citizen Quartz Watch Technician	Buddy Carpenter, CEWS
C	Pulsar Quartz Analog Y590 and Y112	James H. Broughton, CEWS
D	Seiko Quartz Combos	Leslie L. Smith, CMW, CEWS
E	Quartz Watch Test Equipment	Calvin E. Sustachek, CMW
F	Common Sense Quartz Watch Repair	Robert F. Bishop
G	ESA Digital/Analog 900.911 and ETA Analog 961.101	William Biederman, CMW
H	ESA Analog Quartz Repair	James Adams, CMW
I	Using the Watchmakers Lathe	Archie B. Perkins, CMW
L	Introduction to Striking Clocks	Joseph G. Baier, Ph.D., CMC, CMW
M	Striking Clocks—Advanced Seminar	Joseph G. Baier, Ph.D., CMC, CMW
N	Introduction to Clock Repair	David G. Arnold, CMC
R	Introduction to Jewelry Skills	Marshall F. Richmond, CMW Max Hoover, CMC Charles Callahan
S	Management Seminar	Fred S. Burckhardt
T	Retrofitting	Buddy Carpenter
U	Advanced Lathe Course	Archie B. Perkins, CMW
V	Antique Watch Restoration	Archie B. Perkins, CMW
W	Restoration of Fusee Watches	Ralph Geiger, CMC, CMW

MAY 1986

3-4	W	Cincinnati, OH	GEIGER
5-7	V	Cincinnati, OH	PERKINS
18	T	Hazel Park, MI	CARPENTER
31	H	Sacramento, CA	ADAMS

JUNE 1986

1	H	San Diego, CA	ADAMS
6-8	V	Austin, TX	PERKINS
14	T	Los Angeles, CA	CARPENTER
15	T	San Francisco, CA	CARPENTER

AUGUST 1986

17-18	W	Newark, NJ	GEIGER

SEPTEMBER 1986

6-8	U	San Francisco, CA	PERKINS
14	J	Austin, TX	CARPENTER
14-17	M	Seattle, WA	BAIER
21	D	St. Paul, MN	SMITH

OCTOBER 1986

18-19	W	San Francisco, CA	GEIGER
22-24	I	Cincinnati, OH	PERKINS
25-27	U	Cincinnati, OH	PERKINS

I AM INTERESTED IN YOUR BENCH COURSE TO BE PRESENTED

ON _____

AT _____

PLEASE SEND MORE INFORMATION.

NAME _____

ADDRESS _____

CITY _____ **STATE** _____ **ZIP** _____

GEMSTONES

Edgar Cleves, Jr.

Crystal Systems

The structure of crystals has been the subject of very interesting speculation for centuries. Beautiful forms called crystals are developed when minerals, possessing a regular arrangement of atoms, are permitted to grow without interference. However, it is rare when crystals are found that are geometrically perfect. Much outside interference during the crystallization causes the faces to become distorted. Abrasion and distortion can also be the result of shifting of the crystals as they move through the earth.

When crystals grow in the same form, it is called habit, and it is one of the distinguishing features of many minerals. Familiarity with crystal forms and habits is a valuable aid in the identification of rough gemstones. Sometimes minerals develop to such a very fine degree that the flats appear to have been polished by a lapidary. With a great deal of experience, a gemologist can tell one species from another by seeing the habit displayed by several faces of the crystal. Examples of habits are:

1) The cube and octahedron of diamond;
2) The rhombic dodechedron of garnet;
3) The octahedron of spinel;
4) The cube of fluorite;
5) The flat end hexagonal cylinders of emerald;
6) The pyramidal shape of sapphire;
7) The combination of a rhombohedron and basal faces of ruby.

The different geometrical designs are the result of properly arranged atoms. Minerals having a definite crystal structure are called crystalline, while those possessing no definite internal structure are called amorphous. Amorphous materials are weak and break easily. They display conchoidal fractures and they are sensitive to temperature changes. Some crystals grow without showing a trace of external form. This is known as a crystalline aggregate of which the best example is jadeite. It is the numerous minute interlocked individual crystals which lend the great strength and permit it to be sliced into thin layers or carved into delicate designs without breaking. Crystals are found throughout the world in all sizes and shapes, from minute specimens smaller than a pin head to extremely large specimens of many tons.

Crystals are grouped into six systems according to the mutual inclination of the crystallographic axes and the axial ratios. They can be further divided into 32 classes according to the degree of symmetry which characterizes them. We will only discuss the six basic crystal systems. A course in crystallography would be necessary to fully understand the 32 subclasses of crystals.

FIGURE 1 – CUBIC OR ISOMETRIC

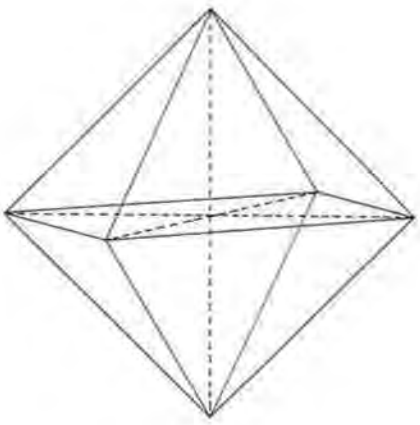


FIGURE 2 – HEXAGONAL

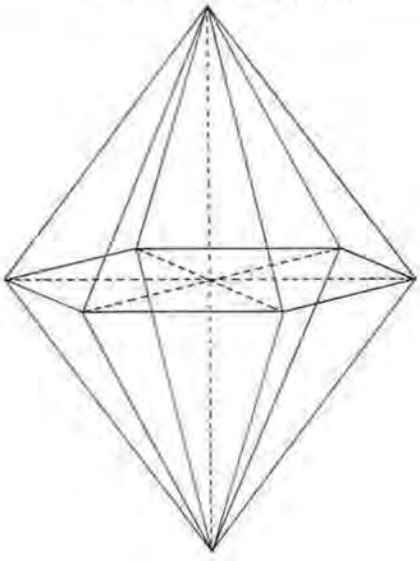
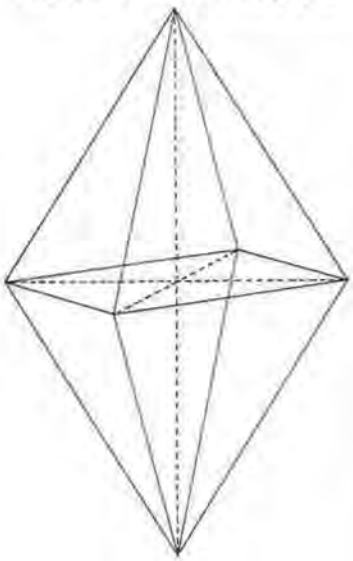


FIGURE 3 – TETRAGONAL



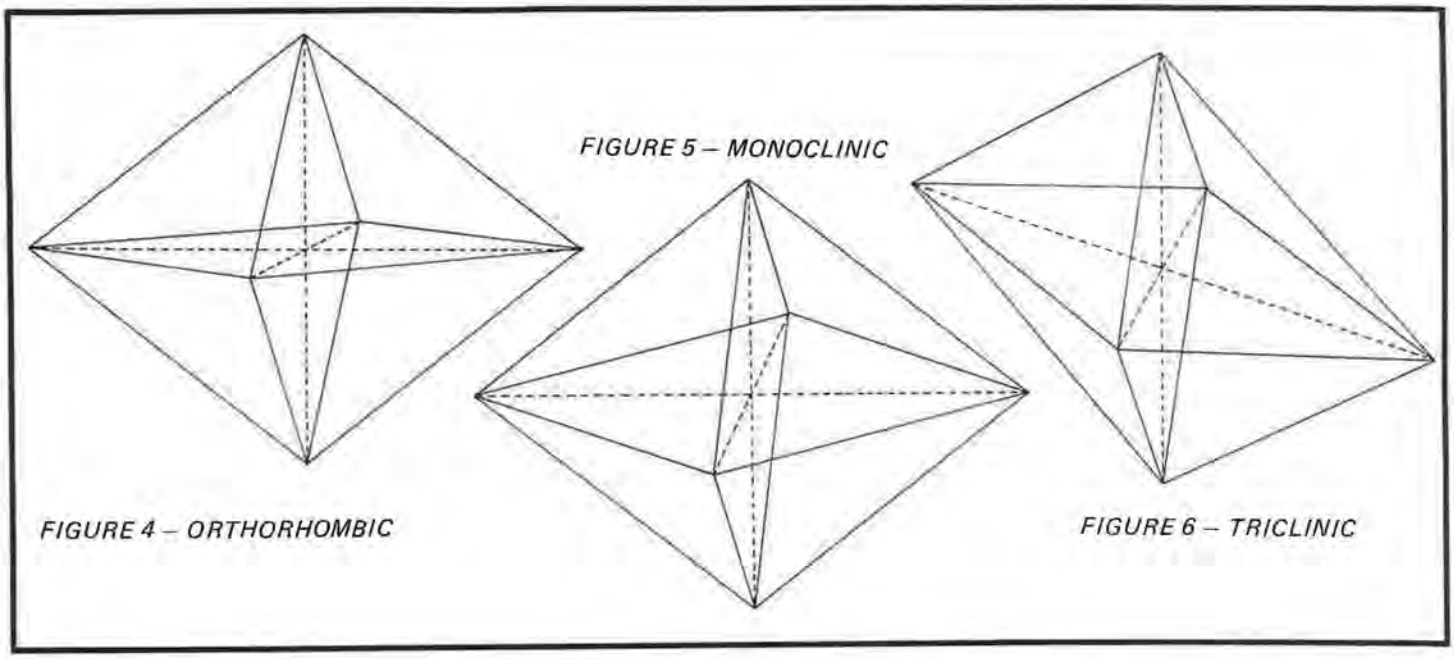


FIGURE 4 – ORTHORHOMBIC

FIGURE 5 – MONOCLINIC

FIGURE 6 – TRICLINIC

The six basic crystal systems are: 1) Cubic or Isometric, 2) Hexagonal, 3) Tetragonal, 4) Orthorhombic, 5) Monoclinic, and 6) Triclinic. Gemstones crystallizing in the Cubic system as well as amorphous materials are singly refractive. Gemstones crystallizing in the other five crystal systems are doubly refractive. Synthetic gemstones not only must have the same chemical composition, the same physical and optical properties of the gemstone they represent, but they must have the same crystal structure.

The following is a description of the six crystal systems.

CUBIC: *There are three axes at right angles to each other and equal in length. Its simplest geometric form is a cube. The internal atomic structure is also cubic (Figure 1).*

HEXAGONAL: *There are three axes of equal length plus a fourth of a different length, but at right angles to the plane made by the other three. The three equal axes cross each other at 60° or 120°. Crystals in this system have uniaxial double refraction (Figure 2).*

TETRAGONAL: *All axes are at right angles to one another, and two are equal. Crystals in this system have uniaxial double refraction (Figure 3).*

ORTHORHOMBIC: *All axes are at right angles to one another, but all are unequal. Crystals in this system have biaxial double refraction (Figure 4).*

MONOCLINIC: *One axis stands at right angles to the other two, which are not at right angles. Crystals in this system have biaxial double refraction (Figure 5).*

TRICLINIC: *The three axes are unequal and no pair includes a right angle. The angles between the faces are approximately 30°, 60°, or 90°. Crystals in this system have biaxial double refraction. The tipping of all axes results in odd-shaped crystals with sharp edges. Some are so sharp that it is possible to cut your finger while handling (Figure 6).*

The following is a list of the major gemstones in each system.

CUBIC: diamond, spinel, garnet
HEXAGONAL: beryl (emerald, aquamarine, morganite), corundum (sapphire, ruby), quartz, tourmaline
TETRAGONAL: zircon, rutile
ORTHORHOMBIC: topaz, chrysoberyl, olivine, andalusite, zoisite
MONOCLINIC: orthoclase feldspar (moonstone)
TRICLINIC: labradorite feldspar

Strange as it may seem, there are some crystals that have no organized structure. All are radioactive, containing less than one percent uranium or thorium atoms. It is believed that at one time the crystals did have organized structure, but due to prolonged periods of radioactive bombardment, were battered into disorder. This breakdown of crystal structure is called metamict and is sometimes seen in zircon. Such zircon can usually be identified by its medium to dark green color.

Crystals are grown in the laboratory from melts or solutions. One process is the flame-fusion process invented by a French chemist, Verneuil. This process produces very fine synthetic rubies, which are superior in color, clarity and size to most natural rubies. Other crystals are formed from solutions under high temperatures and great pressures.

Nature sometimes produces phantom crystals, which are ghostly, crystal-outline images appearing inside a transparent crystal. The phantoms are the crystal coatings that occurred during earlier formation when the crystal stopped growing and then resumed growing at a later date. If the coating of the crystal becomes too heavy, growth will cease completely.

Another unusual phenomena in crystals is twinning. Sometimes, twinning causes confusion; other times it is helpful in the identification of a gemstone. Twinning occurs: 1) When two individual crystals growing together appear as though they were glued together, or 2) when two related crystals penetrate each other. The best example is staurolite which penetrates each other at right angles to form a cross.

Crystals, whether small or large, perfect or flawed, are beautiful miracles of nature. The more you understand their properties, the greater will be your enjoyment of their beauty.

ANGLES

Elizabeth Brehmer

BEZEL SETTING

On occasion, a customer will stroll into your store and want a pendent made to fit their rather unusual stone. These stones could be cameos, onyx, agates, or even opals. It is not the type of stone that fits in a prong setting. It could be flat, domed (cabochon), rectangular, or even thin. Each has its own shape and characteristics. The mounting technique must reflect the shape and qualities of the stone and enhance its appearance. The simplest, cleanest solution for the jeweler is to bezel set these unusual type stones.

A bezel is basically a rim of metal which conforms to the shape of the outside circumference of the stone (whatever it may be) and clamps over the edge to secure the stone in place. Manufacturing a bezel is an involved project and will take the jeweler more labor and time than a prong setting job.

The first step, once the stone is in hand, is to determine if it is a standardized shape. Most findings catalogs will list their common standard sizes in bezel settings. If one of these bezels is available for the stone that you are setting, it will take less time and effort to use the stamped bezel. Manufacturers also supply ready-made bails which just need to be soldered on to the top of the bezels. Unfortunately, many stones which are hand cut or slightly unusual are not calibrated in size to the standard system that the manufacturers use. They require special handmade bezels. The following instruction will cover a variety of shapes in bezels. There are several techniques which accompany the particular bezel style.

One type of bezel is the bearing bezel (Figure 1). It has two elements, the outer bezel which surrounds the stone, and the bearing which acts as a seat under the stone. Bearing bezel mountings can be made for cabochon stones and also low profile faceted stones like onyx. Another variation is called the simple box bezel. It has a bezel with a full back attached. The final variation is the reverse bezel set. The stone is set from the back of the metal.

The first step in making any type of bearing bezel is to determine the circumference of the stone at its base. This measurement can be done mathematically or by cutting a strip of paper and fitting it around the stone. Measure the thickness of the metal with a B&S gauge (Brown and Sharp). The usual thickness for a bezel is between 20-24 gauge. When determining the height of the bezel for a cabochon stone, the metal strip should be one-quarter to one-third the height of the stone. For a slightly domed or low cabochon stone, measure the thickness of the stone at the heaviest or thickest point, then add approximately one-tenth extra. If the stone is a brilliant cut, the bezel height must be about 3 to 4 times the thickness of the girdle.

After the height is determined, then cut the strip according to the measured or fitted length. Always leave a little extra length for fitting and error. A second strip must now be made, this strip is the bearing. It needs to be slightly heavier gauge, approximately 18 to 20 gauge, depending on what gauge metal was used for the bezel. Its height should be one-half to one-third shorter than the bezel strip. This bearing, when soldered in place, will act as the seating device for the stone. Anneal and pickle both of the strips. The next step is to fit the bezel strip around the stone tightly and accurately with no gaps.

Figure 1 BEARING BEZEL SETTING

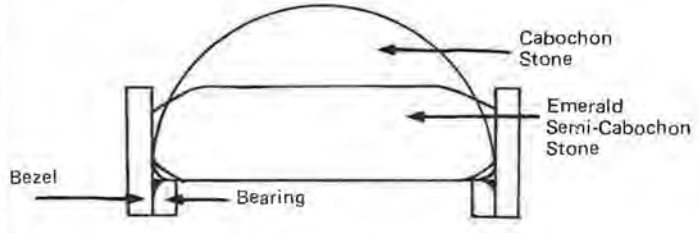
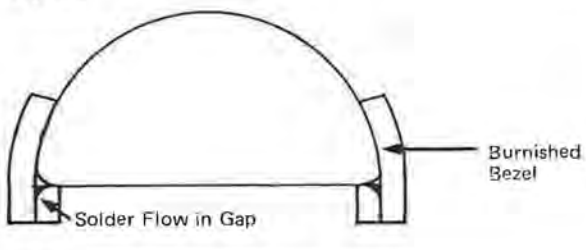


Figure 2



If you are working with a stone with angular shapes, such as an octagon, use a sharp set of dividers for measuring the stone. Start measuring about halfway down the side of one of the longer sides of the stone. From that point, measure to the first corner and add about one-tenth of a millimeter for leeway in the corner bend. Scribe the measurement on the bezel strip. Use a No. 4/0 saw blade and cut straight down on the scribe line, about 50% of the thickness of the plate. Now use a triangle needle file and lightly file in the saw groove. The idea of filing is to angle the sides of the cut slightly without cutting any deeper. Take a pair of needle nose pliers and grasp the metal, making a crisp bend in the corner. Match the bend to the angle of the corner of the stone and measure to the next corner with the dividers and repeat the same process until the bezel strip has been fitted completely around the stone.

Next, mark the overlap joint and cut off the excess metal. Solder the joint closed and remove any excess solder. The stone should fit "friction tight" in the bezel. To check, set the stone on top of the bezel and push with you finger. It should need no other force and should hold in place.

Now that the bezel is made, a bearing must be fitted underneath to form a seat for the stone. Push the stone in the bezel so that the top center of the stone is level with the top of the bezel. Make sure that the bezel top edge has been emeried flat. With the stone in this position, take your bearing strip and fit it on the inside of the bezel underneath the stone. One method is to use a set of dividers and measure the inside of the bezel (like the outside of the stone was originally measured for the bezel).

The same technique is employed for bending the corners. The bearing should fit tightly. There should be no gaps between the bearing and the bezel. Fit the bearing so that it touches the bottom side of the stone equally. Push the stone out and solder the bearing to the bezel. Once soldered, file the base of the bearing bezel down leaving about 1-1½mm of metal between the outside edge and the base of the stone. Now check the seat for any extra overflow of solder. If solder has flowed in the seat, remove it with a No. 2 or No. 4 flat graver. Set the stone in place and check for levelness.

All of the soldering should be done before the stone is set. Therefore, the bail should be made or bought and attached at this time. The stone should not be in the mounting yet. At this point, clean up any rough areas and any extra solder. Use 4/0 emery on the entire piece and do a good prepolish.

A dop stick now needs to be made. The end of a one-inch dowel rod is excellent for a dop stick. The length should be whatever is comfortable for your size hand. It should be long enough to grasp fully (approximately six inches long). Commercial dop wax should be melted onto one end. A stone facetors dop compound (greenish) works well, or a commercial compound made for jewelers called Diamond Cement® (red/brown). It is important that the dop wax have a full body strength. Beeswax, for example, is much too soft and sticky. Dop wax must dry firm and hard. Most of the dop waxes are quite brittle, this is so that they are easy to remove from the work piece. Acetone, in most cases, is a satisfactory way of removing any remaining dop wax. Place some acetone in a jar and put the piece of jewelry in the liquid. Then hold the jar in the ultrasonic for just a few minutes and the acetone will remove the residue.

To apply the object to the dop stick, warm the dop wax until it starts to melt and add the pendent. Make sure that the warm wax does not fill the seat where the stone must

Figure 3

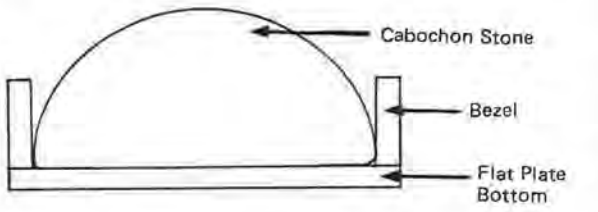
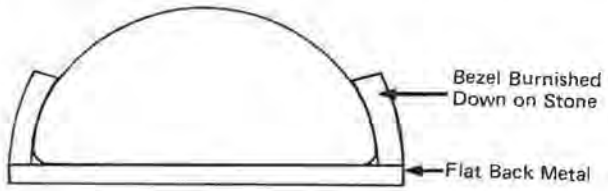


Figure 4 SIMPLE BOX BEZEL



sit. Allow the wax to cool around the bezel frame. Take a small saw blade (4/0 or smaller) and make a vertical cut down into the corner where the corner bends. The cut should be to the center of where the girdle of the stone rests. Put the stone in place to insure accuracy. All cuts should be straight down and equal in depth. After all corners are cut, place the stone in its seat and check again for levelness (Figure 1).

Next, take a burnisher (steel with curved sides) and, in the center of each side, gently push in on the bezel and make an indentation. Work each side slowly so that the stone does not move from its seat. These dents will hold the stone in place so that when the rest of the bezel is burnished in place, the stone will remain in the same position. Burnish toward the corners to close any gapping. All of the bezel should touch the stone and cover the girdle of the stone (Figure 2). To finish off the pendent, emery the new angle on the bezel. Make sure that all corners are sharp and matching, then final polish.

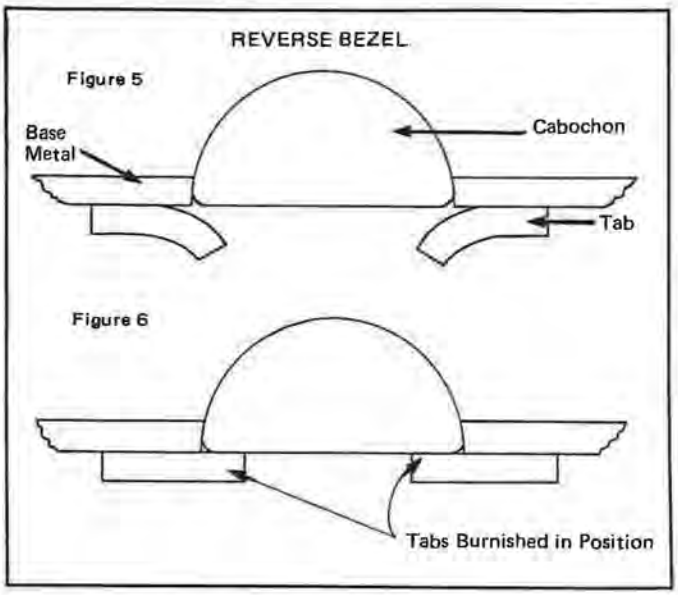
Another variation of the bearing bezel is a bearing bezel for a cabochon stone (Figures 1 and 2). The gauge of metal that is used for this bezel is exactly the same as described in the technique above. The real difference is in fitting the bezel to the stone. Make a mock bezel from a piece of paper and fit it tightly around the base of the cabochon. Remember to butt the end joint together. Use the piece of paper as a template, and cut a metal strip accordingly. To gently curve the strip to fit around the stone, use a pair of half-round pliers or bow bending pliers. DO NOT mark up the strip with dents from the pliers. It may be necessary to use some tape or cloth on the jaws of the pliers to cushion them.

Solder the bezel closed using hard solder. Ideally the seam should be on the side of the bezel. When the bearing is later added, its seam should be on the opposite side. This insures that later soldering will not pull two seams in the same spot. Special ring mandrels are made specifically for shaping bezels. A jewelers anvil is another option for shaping the bezel. Check the stone in the bezel. If it is too tight of a fit, lightly hammer it to loosen it. If it is too loose, then pull the solder seam and remove a small amount of metal and resolder the seam. Repeat all the same steps as above for finishing the piece out.

A third variation on bezel setting is the simple box bezel (Figures 3 and 4). The bezel is again calibrated with the B&S gauge (20-24 gauge) and fit tightly around the stone. In this type of setting, the bottom of the stone must be relatively flat, no facets. Once the bezel is made and properly shaped, use a piece of metal 20-24 gauge, and cut a plate approximately one-half millimeter larger than the bezel. Use the bezel as a template. Solder the bezel to the flat plate using an easy flow solder the same karat and color as the bezel. Remove the excess metal around the outside of the bezel using a No. 6 or No. 8 cut needle file. Solder on the bail and prepolish. The stone should be set in the same manner as the stone described above (Figure 4).

The last form of bezel setting is reverse bezel setting (Figures 5 and 6). This type of setting can only be used if the back of the article is accessible. It looks best when a stone is being set in a larger flat area. The thickness of the metal should be at least 16 gauge or heavier. The stone now becomes the template. Lay the stone down on the metal and lightly scribe around it. Make another mark approximately one-half millimeter inside the scribed area. Then saw the inner shape out, it should be slightly smaller than the original scribe. File the inside edge with a fine needle file to refine it, and at the same time create a bevel that leans toward the inside of the mounting and toward the center of the stone. The base of the stone should be level with the inside back surface (Figure 5). It should fit even and snug along the bevel at the top.

Once the stone seat is filed so that the stone fits snugly and the base of the stone is flush (Figure 5), tabs or prongs need to be soldered in place in back of the mounting. The prongs or tabs are to be made of 20-22 gauge metal and should be approximately 2mm wide. These tabs should be



soldered in place using hard solder the same karat and color as the mounting. The tabs should be bent in a downward position prior to soldering. This will help in proper placement and keep the solder from flowing into unwanted areas. Prepolish the mounting and pull the tabs back far enough to allow the stone to seat in place. Do not scratch the mounting. Take a flat, smooth prong pusher and push the prongs, or use a burnisher to burnish them in place against the back of the stone (Figure 6). Final polish the stone and check for its tightness.

PICKLE BARREL

(Continued from page 25)

with a beading tool or cup bur if a rounded dome-like tip is what you want or for a triangular effect is easy to finish with a fine cut needle file (see Figure 3 for finished shaped prong).

After the shaping is done and you are sure that it will not be necessary to go back and apply more heat, the boric acid and flux residues can be removed by boiling in water or pickling in a heated pickle pot using Sparex® or a 10% solution of sulphuric acid. The same result can be accomplished quicker if it is boiled in a pickle pan made of copper that will just hold a couple of finger rings. This can be held over the flame of your torch until the pickle solution comes to a boil in probably less than a minute if Sparex or sulphuric acid is used.

I cannot emphasize too greatly the importance of removing the residue of boric acid and flux. This residue becomes crystal and is harder than the abrasives you will use in polishing, so if there are spots of this crystal substance where the polishing is done the polishing compound will remove metal around these spots and when finally finished leave small raised places in the finished surface. After being pickled while the ring is still wet, a bronze bristle wheel on the polishing motor will burnish the outside surface and clean off any film from pickling. Using a bristle brush wheel on the polishing motor with Tripoli® abrasive, the prong head can be polished. Then with a cotton buff the rest of the outside of the ring can be polished. If the inside of the ring is not perfectly smooth and shiny, an inside finger on the polishing motor will finish the inside of the ring. For a final finish rouge on the bristle brush, cotton buff or inside ring finger makes for a fine finished ring.

I might add that any polishing accessories using Tripoli should be so marked and NOT used for any other abrasive. The same applies to any polishing accessories using rouge. Although it is a good idea to mark the accessories with the abrasive to be used on it, it is not really necessary because Tripoli will make the accessories black, and rouged ones will remain red so they are easy to tell apart.

Of course, the final finish is washout. This can be done best using an ultrasonic tank with either a commercial washout solution or a solution you can make up yourself with liquid soap or detergent and ammonia. If no ultrasonic equipment is available it can be washed by hand with a washout brush or an old toothbrush using the same solution that you would use in an ultrasonic tank. Rinse in hot water if available and dry in a dryer or with a heat lamp. Steaming for a final rinse is no doubt the best, but if you're in a small shop doing a limited amount of work, it would not be profitable due to the cost of equipment and the time involved in keeping up steam and maintaining it for only a few jobs each week. One thing that steam cleaning eliminates is the need for drying because the steam is hot enough to dry any article immediately.

As heat is an important factor in repairing prongs and stone settings, there are some considerations that should be pointed out. Solder flows at a lower temperature than the metal being soldered. As solder has a lower melting point it also has a lower boiling point. Whenever solder is heated hot enough to boil, it has been heated too hot. It leaves the solder joint porous which makes it weak and visible when polished. As was pointed out earlier that solder can be pulled by moving the heat, so the direction from which the flame comes can play a large part in how you apply the solder and then pull it to where you want it. Too much heat will cause it to flatten out and run to places it shouldn't go. Practice and experiment will teach you how to apply solder if you observe and practice on every repair job that you do. It is surprising how much can be learned from a repair that is making you money.

This will be the first of several articles on repairing and replacing stone settings. The next article will deal with replacing prongs on prong settings.

In the Spotlight © 1986
by Orville R. Hagans

From the Manuscript and Photo Library of Orville R. Hagans, FAWI, CMW, CMC, FBHI, FNAWCC

TIME

How many times do we say we don't have time to do something? We all have said it on different occasions in the past. But it is a poor excuse. Those who have the most to do get more done in less time than those who are not required to be so busy. Many times we think we cannot be bothered with something because of the time necessarily taken up in carrying out the task. But if we really stop to analyze the situation we can usually find time to do it and, possibly, the several other things we wanted to do before this new task arose.

Because a new job comes up unexpectedly and necessitates the changing of our original plans, we should not say we have not the time to do it because we do not want to or because we wish to take the easier way out. We should budget and rebudget our time. It is true we will not be able to include everything we want to do and everything that others require of us. We must constantly make choices and we do. However, after the choices are made we should not eliminate more by saying that we can't possibly do it, since we are "so busy."

This is an unnecessarily trite saying. Granted, it should be used occasionally, but not as frequently as it is. Many of us can do things which are asked by others by using the time at the task that is ordinarily used in making and saying the alibi.

CAS-KER COMPANY DONATES WATCH MOVEMENTS

The Cas-Ker Company of Cincinnati, Ohio recently donated a number of surplus quartz analog watch movements to the AWI education program. In accepting the gift, President Fred Burckhardt noted that on several other occasions during the year the Cas-Ker Company has made similar donations in support of AWI's projects. One was instrumental in the development of the Retrofitting course currently available. This recent donation will be passed on to the schools who teach watch repair.

...from all around the ASSOCIATION...

PENNSYLVANIA

The Watchmaker's Association of Pennsylvania will hold their annual convention in Lancaster the first weekend in June. Planned is a four-day program offering something for all.

There will be three quartz watch repair courses: a Swiss ETA course, for basic watch repair; a Hamilton course which is a mid-level course and would feature building the Hamilton KHAKI watch with an opportunity for students to purchase the ones they build. The third course is for the more advanced repairman wanting to pick up a little added knowledge; it will be dealing with Omega watches.

The '86 Convention will also include tours to the Hamilton Clock factory and the National Watch and Clock Museum. The Saturday night Banquet Speakers will be John Gelson, President of the Hamilton Watch Co., and Mr. Fred Burckhardt, President of AWI. A course on stone faceting and a class on jewelry repair are also planned for the event.

Registration is June 5, and the convention will end at noon on June 10. For more information, contact: Watchmakers Association of Pennsylvania, 1126 Centre Lane, State College, PA 16801.

MARYLAND

Fred White and Dick Ward spoke at the February meeting of the Horological Association of Maryland. They demonstrated ways of removing and inserting clock mainsprings. Discussed were broken springs caused by barometric changes, thunderstorms, and other unexplainable reasons. Also covered were white alloy springs, types of clock oil, spring life, and repairing spring holes, and the program was videotaped for later use. Stan Craig showed the efficiency of a quartz analyzer.

NEW JERSEY

The Watchmakers Association of New Jersey met on March 11 at Memorial Hall, Cranford, NJ. The program, "Pricing Clock Repairs," was presented by Michael Lizza, director of a clock repair school in Toms River, NJ. Mr. Lizza is a full time consultant to the clock industry and a specialist in both clock production and repair. Information from a nationwide survey and current prices of clock repairs and their relationship to those in other parts of the country was discussed.

NEW YORK

Lou Zanoni, President of Zantech, Inc., addressed the Horological Society of New York at their March meeting. He presented a videotape entitled "Replacing Quartz Watch Batteries."

This tape, which is intended as a training film for retail jewelry store personnel, was received with great interest by the seasoned watch repair membership of the HSNY. The reasons for this were: 1) The technique of the presentation. This was the first time that the HSNY audience was exposed to a technical program using a VCR and a television set. 2) The clarity of the images. The close-ups, magnification, and clarity of the objects created a stirring impact. Tiny threads in a screw-back case appeared as large cable wires on the TV screen. 3) The tips contained in the tape. The 50 minute tape covers a large range of subject matter. Material of special interest to the watch repairer were: the handling of special gaskets, when to separate the bracelet from the case, opening and closing techniques of uncommon types, how to determine (in an unmarked movement) when a battery should be inserted with its positive side down, etc.

Mr. Zanoni introduced the program and its conclusion, distributed Zantech literature, and answered questions. During this period the audience expressed its appreciation for receiving a unique audio-visual experience.

Horological Society of New York elects new slate of officers for 1986. They are: SEATED FRONT ROW (l to r): Morty Silver, Trustee; Dan Gaenger, President; Howard Levy, Vice President; Al Rudnick, Executive Secretary. SECOND ROW: Dennis Tricarico; Irv Albert; Paul Homburger, Executive Committee; Harry Fisher, Editor; Ben Matz, Executive Committee. THIRD ROW: Ted Fishkow, Recording Secretary; Henry Loeser, Executive Committee; Dan Richter, Executive Committee. NOT SHOWN: Jack Schecter, Trustee; Frank Carpathia, Financial Secretary/Treasurer; George Gibson, Executive Committee.

NORTH CAROLINA

The North Carolina Watchmakers Association will hold its 1986 Convention June 6, 7, and 8 at the Radisson Hotel in High Point, NC. The program will feature Marty

Berzon of Cyma Watch Company. "Buddy" Carpenter will present his new bench course on retrofitting, and Cliff Wilson of Swest will present a program on jewelry making.

The Wayne Community College Watchmakers Guild is one of North Carolina's most active guilds. Under the direction of instructor Alice Carpenter and President Michael Boggs, the Guild promotes the program at WCC with working displays at a local shopping mall by cleaning jewelry and buffing watch crystals for shoppers. Field trips to trade shops, material houses, manufacturers, and local merchants add a real world dimension to the training. They participate in campus programs and have special fund raising projects for their own activities. In cooperation with local guilds they send representatives to Career Day activities across the state. All this is in addition to a very ambitious program in watch and clockmaking and jewelry repair. The program covers not only the latest developments in these fields, but requires the student to learn the basics of metallurgy, toolmaking, and the use of the lathe. The NCWA, local guilds and watchmakers help the students with Convention expenses, tools, and good advice. The NCWA is proud to have this program in their state.

Wayne Community College Guild. Left to right: John Faison, Vice President; Brian Craig; David Godwin; Steve Traxel, Treasurer; Michael Boggs, President; Joe Hayes; Bill Henderson, Reporter; Dallis Wright; Angela Roberson, Secretary; and Alice Carpenter, Instructor.

Book Review

NOTE: This review by Henry B. Fried is on a video tape program.

REPLACING QUARTZ WATCH BATTERIES, by Louis A. and Gregory L. Zanoni. a 50-minute program available in VHS and Beta formats produced by Zantech, Inc., Trenton, NJ 08619, 1986 at $95 each. Three-quarter inch U-Matic at $115 each.

"This is the watch industry's first comprehensive training program on the subject of watch battery replacement." This is the statement by the producers of this instructional video cassette. Louis Zanoni, the producer and instructor in this feature has a most impressive list of credentials in this subject and one of the best teachers of this subject. Mr. Zanoni is the author of texts on quartz watch repair, was one of the first to conduct seminars in quartz watch servicing and repair, as well as being a pioneer with RCA in the very earliest days of solid-state horology.

The instruction is aimed at training the retail store personnel, demonstrating the proper handling procedures and battery replacement techniques. Louis Zanoni is also the instructor in this excellently photographed manipulations aided by his electronics engineer son, Gregory. Detailed close-ups of watch cases and intricate parts of various movements are shown in sharp focus at more than one hundred times their original size, all in full color.

The instruction includes all the fundamentals for all sizes and types of quartz watches. It shows the many errors committed by sales clerks when selecting and replacing batteries and how to avoid them.

The 50-minute video tape demonstrates the proper methods, tools, and equipment used to open watch cases, how to recognize types of cases, and proper tool selection. It also demonstrates the various safety precautions in opening cases to avoid self-inflicted injury as well as to avoid damaging the case, its movement or module.

Battery differences are discussed and illustrated. Silver oxide, lithium, alkaline, mercury, and high and low drain cells are shown, their differences explained, and reasons for selection taught.

Care and replacement of case gaskets, digital displays, and alarm contacts come into consideration in battery replacement and are included in the instructions. Further points mentioned include the testing of batteries and indications of aging battery performances. The removal of a watch band in preparation for certain case opening operations and how to prevent coil damage in doing so are featured in close-up views and with vocal directions.

Demonstrations of watch case closing procedures after battery selections are included. Further subjects are battery straps, contact screws and screwdrivers, precautions against loss or damage, and how to remove and replace batteries are shown. These moving views in which the center of attention always fills the entire viewing scene focuses the viewer's attention and concentration on the subject matter.

In this presentation, Mr. Zanoni cautions that it is better to use a thinner battery than a thicker one if a substitute cell is a MUST in certain instances. Thicker ones may cause breakage and possibly short circuiting.

Various tools and templates of battery gauges are shown and used throughout the presentation. He also shows how to reset watches and in digital timepieces, advises to reset the logic circuit and functions after battery replacement, demonstrating the process by which this can be accomplished.

The film, made under the sponsorship of the battery division of the Maxell Corporation of America, is available from Zantech, Inc., 77 Shady Lane, Trenton, NJ 08619. The cassette quality is superior and professional and should be of benefit for store personnel and assist the professional watchmaker in doing quicker, surer work.

Henry B. Fried

JIDA and AJDA Co-Convention Palm Springs, CA

The Co-Convention of the Jewelry Industry Distributors Association (JIDA) and the American Jewelry Distributors Association (AJDA) was held March 18-23, 1986 at the Palm Springs Marquis Hotel in Palm Springs, CA. Shown on these two pages are some of the highlights of that convention.

Denis Gaber (Ray Gaber Company), president of JIDA.

Glenn Bostrom (Bostrom Corporation), executive director of JIDA.

Julian Jadow accepted the "Man of the Year" award for Milton Berman (B. Jadow & Sons, Inc.).

Bruce D. Merrifield, Jr. (Merrifield Consulting Group—Greenwich, CT) gave a talk at the Wednesday Business Session on "Understanding, Developing and Marketing Value Added Services."

Chuck Berris (M. Beresh, Inc.) and Herman Kirkpatrick (Albert Froidevaux & Sons USA) at the Co-Merchandise Exhibit Day on Thursday.

Harold Perlman (American Perfit Crystal Corporation) and Earl Grenson (Jewelmont Corporation).

William Esslinger and Karl Esslinger (Esslinger and Company) with Pascal Bourquard (Pibor Iso S.A.–Switzerland).

Dominic D. Priore (Niagara Jewelry Supply Corporation) with Tony Thompson and Keith Sessler, both of Maxell Corporation of America.

Mary Zanoni, Gregory Zanoni (Zantech, Inc.), Robert Moengen (Jewelmont Corporation), and Louis Zanoni (Zantech, Inc.).

Dan Marmo (Conserv-Seiko), Pat Cassedy (Cas-Ker Company), Jonathan Frankfort (Conserv-Seiko), Jack Schecter (Conserv-Seiko), Henry Livesay (Livesay, Inc.), and Angelo Zappala (Conserv-Seiko).

Gary Borel, Mark Borel, and Roger Borel, of Jules Borel & Company.

AWB Industries awarded the two largest distributors of Panasonic batteries trips to Japan. The winners were Henry Livesay (Livesays, Inc.) at left, and Bob Mahar (Mahar & Engstrom Company) at far right. Also shown are Thomas Corbett (Panasonic Industries) and Ira H. Silver (Conover & Quayle, Inc.).

LEFT: Kenneth Weil (The Gould Company) and Don Squires (Kerr Manufacturing Company).
RIGHT: Marvin Schwartz (Hammel-Riglander & Co.), Denis R. Gaber (Ray Gaber Co.), and Robert Alukonis (Hammel-Riglander & Co.).

Well known trade association attorney Jed Mandel (Jenner & Block) gave a talk on "Operating Effectively Under the Law."

New Products and Literature

WORLD'S SMALLEST BATTERY OFFERS RESILIENCY, LONGEVITY

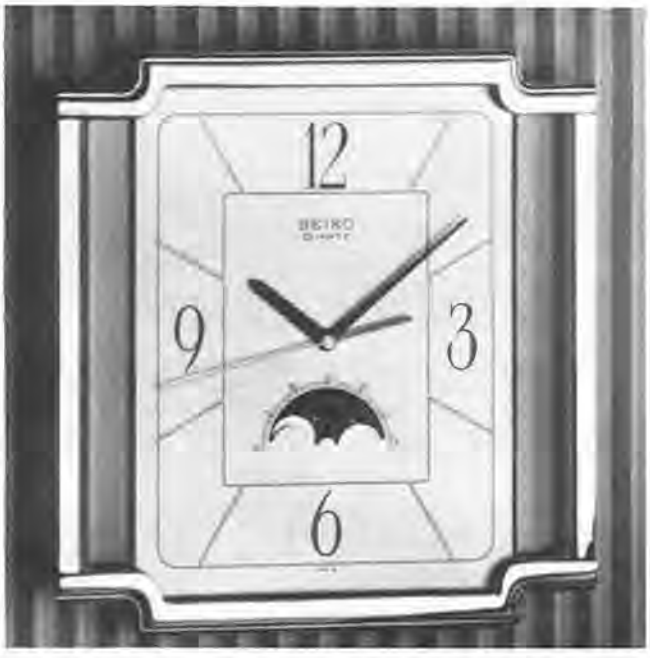
Maxell Corporation of America has introduced the world's smallest silver oxide battery. The new SR512SW micro silver oxide weighs a mere 0.13 grams and measures 0.228 inches in diameter by 0.05 inches thick. Designed for use in watches, calculators, and electronic devices, the battery's small size lessens the risk of leakage, thus prolonging its lifespan, says Ian Irving, Maxell's Battery Products Division national sales manager.

In addition to being marketed under the company brand name at a suggested retail price of $6.99, Maxell will supply the new silver oxide battery on an OEM basis as well.

For addditional information on the micro silver oxide battery or other Maxell battery products, write to **Maxell Corporation of America, 60 Oxford Drive, Moonachie, NJ, or call 201-641-8600.**

Maxell Corporation's World's Smallest Battery

SEIKO ADDS MOON PHASE TO CONTEMPORARY WALL CLOCK



Seiko frames this rectangular wall clock with modernity featuring gold tone sculpted corners and its moon phase indicator. Modern Arabic numbers grace the four quadrants. The new Seiko moon phase wall clock has a suggested retail price of $69.50 and is available from authorized Seiko clock distributors nationwide.

STARSTRUCK OFFERS FREE VHS VIDEOTAPE PLUS CHANCE TO WIN VCR

Starstuck, Inc. of Westport, CT, in conjunction with Maxell, is sponsoring the following promotion. For every 100 Maxell batteries ordered, their customers will receive a free VHS tape, as well as receiving a free raffle ticket to win a video tape recorder to be raffled off June 2, 1986. For more information contact: **Starstruck, Inc., Box 2056, Saugatuck Station, Westport, CT 06880; or call toll free 1 (800) 243-6144.**

THE ESSENCE OF FINE ART

Bulova's Clock Division, in conjunction with Hoya Corporation, has created a "Sculptures in Time" series–a collection of full lead crystal clocks. Capturing the essence of fine art, these timepieces are elegantly handcrafted with diamond-cut designs, sand-blast frosting and bevelled details. Individually packaged in a satin-lined gift box, they are designed to beautify the most elegant of homes.

Each Bulova Crystal Clock is unique, identical to no other. All the cuts, curves, and delicate shadings have been formed by a craftsman's hands, combining ancient skills, diamond cutting techniques, artistic design, and modern quartz technology. The slight design deviation from one clock to another is the craftsman's hallmark–his individual touch.

These clocks have been created to give aesthetic pleasure as well as timekeeping accuracy. They are to be enjoyed for a lifetime and for generations to come.

Models illustrated in the photo above are: B9803, B9802, B9805, B9801, B8904, with prices ranging from $225.00 to $400.00. Available from: **Clock Division, Bulova Watch Company, Inc., Bulova Park, Flushing, NY 11370; (718) 565-4200.**

Bulova's "Sculptures in Time"

CAS-KER INTRODUCES NEW ROLLING MILL

The Cas-Ker Company is now offering a combination square wire/flat sheet rolling mill with a 4:1 reduction gear. The hardened roller mill measures 75mm in diameter and 2¾" in width. The 4:1 reduction gear makes a snap of reducing sheet or wire in size, and converts cast ingots into readily usable sheet or wire. Cost is $300. Contact **Mamie Wallace at Cas-Ker Co., 2121 Spring Grove Ave., Cincinnati, OH 45214.**

New Rolling Mill From Cas-Ker Company

PULSAR ANALOG QUARTZ WATCHES

Pulsar adds fun fashion styling in its Spring 1986 collection. A pair of striking analog quartz sweep second hand watches

with dashing graphic dials and color coordinated cases and straps are bold, fashion updates in the line. Those pictured below are water resistant to 50 meters priced at $79.50 suggested retail, and have an approximate three-year battery life. Model PHD019s has an attractive gray and black graphic dial and a distinctive red second hand. A black bezel on a round stainless steel case is matched with a black neoprene strap. Luminous hands and stick markers stand out on this sporty timepiece. Model PHD013s has a rounded rectangular stainless steel case distinctively paired with a black neoprene strap. Luminous hands and dot markers are highlighted on a graphic black dial. A turquoise sweep second hand adds a snappy touch to this stylish watch.

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

Pulsar Analog Quartz Watches Models: PHD019s and PHD013s

CASTING PRODUCTS CATALOG

Gesswein has a new 48-page Casting Products Catalog. This catalog contains a complete line of equipment, tools, and supplies for the large and small jewelry manufacturer. Model making, mold making, investing, burnout, melting, casting, and finishing products are all illustrated and thoroughly described in this publication. Included in this catalog is Gesswein's Casting Kit. It is a complete kit of everything you'll need to start your own a casting operation for $170.00. A $100.00 rebate coupon, which can be used towards the purchase of any Gesswein product, is issued when you purchase $1000.00 or more from the catalog.

For your copy of Gesswein's Casting Catalog, send $3.00 (free to current customers) to **Gesswein, 255 Hancock Ave., Bridgeport, CT 06605, (203) 366-5400.**

Gesswein
Casting Products Catalog

Howard Miller's quartz anniversary clock called the "Sculptura" (No. 612-791) has an unusual dual pendulum, a brass finished base, and a glass dome. The cream-color dial with brass bezel, black Roman numerals and black hands balances on inverted "U" support columns of polished brass. Dimensions are: height 8½", diameter 6". The suggested retail price is $75. **Howard Miller Clock Company, 860 East Main St., Zeeland, Michigan 49464; (616) 772-9131.**

DIAMONDS AND CARBIDES FROM FOREDOM

The Foredom Electric Company announces the further expansion of its tool line with the addition of diamond points, diamond lapping compound, and carbide burs for use in rotary tools. These new products add to the company's large selection of points, burs, buffs, brushes, cutters, saws, and wheels available. All are usable with Foredom's flexible shaft power tools. These quality products are available from Foredom dealers throughout the United States and Canada.

Diamond points are ideal for use on the toughest materials—carbide steel, reinforced plastics, fiberglass, ceramics, glass, metal alloys, and gemstones. Diamond lapping compounds are available in four grades for fine finishing, polishing, and lapping. Foredom carbide burs can be used on most metals including stainless steel, steel alloys, and cast iron. They are long lasting and provide smooth finishes. Burs come in 23 shapes and sizes on 1/8" shanks.

For information contact: **The Foredom Electric Company, Rt. 6, Bethel, CT 06801-0262, or call (203) 792-8622.**

Foredom Electric Company
New Catalog

News in the Trade

FRENCH WATCH/CLOCK INDUSTRY TRADE MISSION IN NEW YORK

The French Watch and Clock Information Centre (CIH) is organizing with the Commercial Services by the French Embassy in New York, a Trade Mission. Taking part will be 21 manufacturers of watches, watch straps and bands, alarm-clocks, and clocks of all sizes and shapes. The event is planned for June.

A presentation of participants' collections will take place on June 17, 1986 at the Parker Meridien Hotel, 118 W. 57th Street, New York City 10019, from 10 A.M. to 7 P.M.

The American watch and clock importers, wholesalers and material dealers are invited to attend this event through which they will be able to discover the latest trends of the French manufacturers' collections and to appreciate the variety, quality, style and elegance of their models.

WATCH AND CLOCK MUSEUM APPOINTS DEPARTMENT HEAD

John D. Metcalfe, CMBHI, has been appointed Head of the Conservation Department of the Watch and Clock Museum of the National Association of Watch and Clock Collectors, Inc.

Metcalfe is a graduate of the three-year horology course at the Hackney Technical College in London, the only institution continuing to offer formal training in museum conservation methods for both watches and clocks.

Following his graduation, he performed voluntary conservation for the British Museum in London. He then worked for a clock and musical box restorer, formed his own business, and more recently was partner in Eliot & Metcalfe, antique clock and musical box restorers of Covent Garden, London.

Metcalfe received his Craft Member, British Horological Institute (BHI) certificate after completion of five years at the bench. He is also a member of the Antiquarian Horological Society. He joined the NAWCC in 1979.

Metcalfe's responsibilities, in addition to preserving the Museum's collection and restoring selected items, include the training of interns in preparation for their employment by other museums having substantial horological collections, and the conducting of workshops in conservation and restoration at the Museum.

MORRIS PENNINGTON NAMED TISSOT VICE PRESIDENT SALES

C. Michael Jacobi, President of International Time Corporation (ITC), announced the appointment of Morris Pennington to the position of Vice President–Sales.

Pennington has held senior management positions as Marketing Vice President of the Time Products Division of McGraw Edison Company in Laurinburg, NC, Director of Marketing and Sales for Timex Clock Company, and most recently held the position of Corporate Vice President and General Manager of the Clock Division of the Citizen Watch Company in Lyndhurst, NJ.

The Tissot line was introduced into the Chicago, Boston and Washington, D.C. markets last fall. Headquartered in Middlebury, CT, ITC was formed in a joint venture between Tissot Switzerland and Timex Corporation for the sales and distribution of Tissot watches in the U.S.

Morris Pennington

JA AND MJSA ISSUE JOINT STATEMENT ON POLYGRAPH

Upon passage in the U.S. House of Representatives of H.R. 1524, a bill which would ban the use of the polygraph by the vast majority of businesses in the private sector including the jewelry industry, Jewelers of America's Chairman, Michael Roman, and George R. Frankovich, Vice President/Executive Director of the Manufacturing Jewelers & Silversmiths of America, Inc., expressed on behalf of their membership "bitter disappointment" with the House action. Their statement goes on:

"Industry members made an exceptional effort to secure support for a substitute bill H.R. 3916 introduced by Representatives Bill Young (R-FL) and Buddy Darden (D-GA), which would have allowed the use of the polygraph. Our grassroots campaign produced 173 votes for that bill, but in the end, the all-out effort of organized labor and the unfavorable publicity surrounding the use of lie detectors were too much to overcome. We are appalled, however, that a majority of the House turned its back on business and service owners' multi-billion dollar problems with internal theft."

The House of Representatives allowed four industry exceptions to the all-inclusive ban of polygraphs. They are: businesses selling controlled substances (drugs), security guard services, child care centers and nursing homes, and power transmission companies.

"We expect that opponents of the legislation will challenge this hypocritical double standard in H.R. 1524. We know our industry witness will," concluded the two jewelry industry trade associations in their statement.

GOVERNOR BLANCHARD HONORS ZEELAND'S HOWARD MILLER

Governor James J. Blanchard sent birthday greetings and paid special tribute to Howard Miller, founder of Howard Miller Clock Company of Zeeland, MI, for his commitment to Michigan and his dedication to "quality, craftsmanship, and innovative design."

Miller, who turned 81 in April, is Chairman of the Board of the West Michigan company. He settled in Zeeland as a boy and founded the Howard Miller Clock Company in 1926. The company has received wide recognition as an innovator in the clock industry, and *Fortune* mag-

azine has selected its products as being among the best designed consumer products in the past half century.

"Throughout its 60-year history, the Howard Miller Clock Company has been associated with quality craftsmanship and is looked upon today as a design leader in the clock market," the Governor said.

Miller urns the business with the assistance of sons Jack, who serves as president, and Phil, executive vice-president.

OPTIMISM IN WATCH AND JEWELRY SECTORS AT INHORGENTA '86

The international trade fair INHORGENTA '86 in Munich was characterized by a highly positive atmosphere. The fair, which ended on February 11 after five days duration, added considerable impetus to the watch and jewelry industry's confidence in this year's business developments. Many exhibitors who took part in this fair noted a considerable increase in order-placing as compared to last year. This corresponds to the approximately 6% increase in the number of visitors; about 19,000 visitors from 60 countries were registered. The percentage of foreigners among the visitors was just under 20%. A large number came from the trade sector, especially from the watch and jewelry trade.

The general assessment of the market situation is much more optimistic than it was in 1985. The sectors of the economy displaying products at INHORGENTA and the target groups approached by them there regard business developments in their industries, and in the general economy, in a much more favorable light. This also means favorable conditions for preparing the 14th INHORGENTA, which will be held in Munich Feb. 13-17, 1987.

PULSAR APPOINTS FOUR DISTRICT SALES MANAGERS IN NORTHEAST REGION

In a move to further strengthen its sales activities and administration in providing better service to its retail jewelry and department store customers, Pulsar Time has appointed four district sales managers in the northeast region.

Those appointed are: Bob Huelsman, based in Pittsburgh, PA; Mel Cohen, based in New York City; Samson Grieff, based in Walpole, MA; and Bob Hillebrecht, who is headquartered in Flemington, NJ.

At the recent Pulsar region sales meeting, Pulsar's National Sales Manager, Lou Moore (center) congratulates the four district sales managers (left to right) Bob Huelsman, Mel Cohen, (Moore), Samson X. Greiff, and Bob Hillebrecht.

WINNER OF WOSTEP SCHOLARSHIP 1986 DONATED BY WJA

The Women's Jewelry Association for the first time donated a scholarship to be given to a lady candidate for the Watchmakers of Switzerland Training and Educational Program (WOSTEP) in Neuchatel, Switzerland. The class period covers January to July 1986. Jean-Pierre Savary, President of WOSIC, made the presentation to Joan E. Belk, student at Bowman Technical School in Lancaster, PA.

Pictured from left to right: Robert Sener, assistant director and instructor; Mrs. Parkhurst, director and administrator, Bowman Technical School; Joan E. Belk, student; and Jean-Pierre Savary, WOSIC.

WINNER OF SWISS TRIP SPONSORED BY WOSIC AND BALAIR AIRLINES

The drawing of the Swiss trip, sponsored by the Watchmakers of Switzerland Information Center, Inc. and Balair Airlines, was held during the Jewelers of America Show, February 1986. The trip was awarded to Mrs. June Brodsky of Reininger's Jewelry Store in Easton, Pennsylvania. The ticket is round trip and good for one year.

Present at the drawing were (from left to right): Peter Laetsch, manager of WOSIC; Jean-Jacques deReynier, F.H. Bienne, Switzerland; Jacques Klaus, president of Balair Airlines; and Jean-Pierre Savary, president of WOSIC.

Classified Ads

REGULATIONS AND RATES: Ads are payable in advance $.50 per word, $.60 per word in bold type. Ads are not commissionable or discountable. The publisher reserves the right to edit all copy. Price lists of

TRADESMEN

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

CUSTOM BALANCE STAFFS cut and fitted. Since 1922. James Bourne, CMW, P.O. Box 215, Ladysmith, WI 54848. Phone (715) 532-3166. (10-6)

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

PAT'S PEARL & BEAD RESTRINGING. Reasonable Price. Quality Work. Fast Service. Patty McClory, 510 St. James St., Crestline, OH 44827. Phone (419) 683-3739. (tf)

CLOCK WHEEL AND PINION CUTTING. Fast Service - Write for free brochure and price list. Fendleys, 2535 Himes St., Irving, TX 75060. (tf)

Quality watch repair on Rolex to Pulsar, price list of services with SASE. Harry Granzow, Watchmaker, Box 272, Kankakee, IL 60901. 1 (815) 939-4870. 5-2

TRADE WATCH REPAIR: JIN'S WATCH SHOP, KOREAN-TRAINED WATCH REPAIRMAN. REPAIR ALL QUARTZ AND MECHANICAL WATCHES, SPECIALIZING IN SEIKO. 5652 BROWNSBRIDGE RD., P.O. BOX 306, AUBURN, GA 30203. 4-3

Jewelry repairs, bead and pearl stringing. Chain soldering. Fast service. Vicki Elia, 689 N. Cass, Westmont, IL 60559; (312) 654-2055.

EXPERT SWISS TRAINED WATCHMAKER. 35 years of experience in different countries. Specializes in very complicated watches, such as as repeaters, clockwatches, Rolexes, carriage clocks, singing birds, and other high grade watches. Any broken part can be made by the expert. All estimates free of charge. LFR Swiss Watchmaker, Louis Rybicki, 674 Floral Dr., Solvang, CA 93463. (805) 688-0327. (tf)

Watch Repairs. Graduate 1950 Western Pennsylvania Horological Institute, certified American, Swiss & Japanese. 36 years experience. Trade work–mechanical, electronic & quartz. Professional service, competitive prices. Contact for price list and references. Island Watch Works, 2401 Grand Island Blvd., Grand Island, NY 14072 (between Buffalo & Niagra Falls, NY); (716) 773-7000. 5-1

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. (tf)

Wheels, pinions, barrels or whatever, repaired or made new. Repivot arbors. No watch parts. Ken Leeseberg, Ken-Way Inc., 19 W. 672 Army Trail, P.O. Box 219, Addison, Illinois 60101. (tf)

VERGE BALANCE STAFFS and other repairs and restorations for Fusee watches. 18th and 19th century English WATCH HANDS made to order in authentic styles. Fine antique clocks, watches and chronometers repaired. Ralph Geiger, CMW, CMC, CEWS, 8105 Valley Farms Trail, Indianapolis, IN 46224. 5-1

ELECTRONIC EQUIPMENT SERVICE (tf)
WE ARE FACTORY AUTHORIZED SERVICE FOR:
* VIBROGRAF/PORTESCAP
* TICK-O-PRINT/L&R
WE SERVICE ALL MAKES OF ULTRASONICS AND OTHER WATCH-RATE RECORDERS AND EQUIPMENT
JACK PHILLIPS
ELECTRONIC INSTRUMENT SERVICE
2 LOWER ALCATRAZ PLACE, MILL VALLEY, CA 94941
FOR INFORMATION CALL (415) 388-9289

CLOCKS: gearcutting, retoothing, repivoting, rebushing, jeweling. REPAIRING: Chronographs/timers, fusees, aircraft clocks, antique clocks/pocket watches. Send sample for estimate, SASE. NIEGELS HOROLOGY, Roy Niegel, CMC, CMW, 101 E. St. Joe Drive, Spirit Lake, ID 83869. (208) 623-4330. (tf)

Watch wheel cutting, repivoting and staffing.
WE CAN MAKE ANY PART
WE CAN RESTORE ANY WATCH
Free estimates, references on request, expedient services are provided. SASE for brochure.
European **WATCH & CASEMAKERS, LTD.**
140 N. 7th Ave., P.O. Box 1314
Highland Park, N.J. 08904
Tel. (201) 937-5611

HAND ENGRAVING FOR THE TRADE. SASE FOR PRICES. STEVEN M. KAMINSKY, 414 S. MAIN ST., P.O. BOX 964, FINDLAY, OHIO 45839. 5-3

CLOCK WHEELS–Reasonable rates and fast service. Wheels made from sample. Kazen & Son, 215 N. Shia., Corunna, MI 48817; (517) 743-3431. 5-4

Trade Watch Repair. 35 years experience. Fast service. Modern equipment. Mechanical and electronic. Write or call for price list. "BUD'S" WATCH REPAIR SERVICE, 3748 N. New England Ave., Chicago, IL 60634; (312) MU5-9590. (tf)

GUARANTEED WATCH REPAIR. PROESSIONAL service at excellent prices. Certified Master Watchmaker and Certified ROLEX Technician. Call for price list and other information. CTS SERVICES, 1(800) 362-9241; in Iowa call (515) 852-3838. 5-2

FOR SALE

MINI QUARTZ MOVEMENTS. Guaranteed lowest prices – as low as $2.30. 2-yr. guarantee. Large selection of hands and numerals. Free delivery. SASE or call (704) 333-0221. Hall Clock Shop, 1512 Central Ave., Charlotte, NC 28205. (tf)

WATCH REPAIR SHOP FOR THE TRADE. Fully equipped. Servicing fine and loyal accounts since 1950. Has always been highly profitable. Wishing to retire. Reply to: *Horological Times*, Box FS-05-861, 3700 Harrison Avenue, Cincinnati, OH 45211. 5-1

WATCHMAKER ESTATE SALE–A large inventory of watch repair materials, tools, and related items is for sale to a serious buyer or group of buyers, by the administrator of the estate of a respected AWI Certified Master Watchmaker. Includes many rare parts for wrist and pocket watches; precision tools; bench; lathe; cleaning machine; etc. Must see. Reply to: Watchmaker Estate Sale, P.O. Box 25226, Nashville, TN 37202-5226. 5-1

GUARANTEED: Hard-to-find watch parts. Complete watch movements, too. Send stamp: Donald Kroker, 4325 N. 5th St., Fresno, CA 93726. (3-3)

CENTRAL FLORIDA CLOCK & WATCH SHOP. Sales & Repairs, established 11 years, only shop in county 150,000+, good location, reasonably priced. Serious inquiries only please. Reply Box FS4861, *Horological Times*, 3700 Harrison Ave., Cincinnati, OH 45211. 4-3

services will not be accepted. Confidential ads are $4.00 additional for postage and handling. Classified Display Ads are $25.00 per column inch. The first of the month is issue date. Copy must be received 30 days in advance (e.g. June issue closes for copy on May 1).

Horological Times, P.O. Box 11011, Cinti., OH 45211; (513) 661-3838.

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

Store For Sale

A WATCH PROFESSIONAL'S DREAM

Three year old, modern watch store in primary enclosed mall, located in Maryland, specializing in the sale of watches, bands, and on premises repairs, offers unique opportunity to watchmaker or retailer. 40% retail, 60% repairs. Taking in over 225 repair jobs monthly, selling over 200 batteries weekly. 1985 gross sales $160,000. 1986 already up 20% over last year! Well organized, turnkey operation makes it easy for you to take charge. Selling price $115,000. Offers you a secure future!

Call our TOLL FREE answering service and leave your name and address; we will send you all the details for your consideration:

1-800-334-0854, ext. 891

400 DAY DOMES: 5½" x 11" glass, $7.50 each, or 4 for $26, UPS included. For price list of 35 other glass and plastic domes, send SASE to C.A. Zimmerman, P.O. Box 8973, Ft. Collins, CO 80525. (1-Etf)

CLOCK MAINSPRING LUBRICANT. Successfully tested five years. Easily applied, nongumming, molecularly bonds to springs. Four ounce container $10, postage paid. John Nagle, Clockmaker, 13 North Goodwill, Myerstown, PA 17067. 4-2

L & R Console Ultrasonic Watch Cleaning Machine with reversible basket, excellent condition, $235.00. Jim Bissett, 413 South 113th Place, Apache Jct., AZ 85220. 5-1

TOOLS– Seitz # 30154 brass bushing holder tool, jeweling set, many others. SASE for list. Tools, Box 2218, Sandpoint, ID 83864. 5-1

For Sale–Ultrasonic Cleaner, Branson Model B-524, Watchmakers Lathe, Boley Model W-N, Inverto Deluxe Staking Set–On an accumulation of 40 years of clockmaking, other tools and parts. Too much to separate and file. Write TOOLS, V.M. Trudeau, Spanish Lakes, 4 Montoya, Ft. Pierce, FL 33451. 5-1

Lathes, Sensitive Drill Presses, Boley Cross Slides, Collet Chucks, Staking Sets, Ultrasonic Cleaners, Bulova Microscope, Hamilton 21 Chronometer, Chauncy Jerome Movement, 5000 Cylinder Crystals–cheap, tools of all kinds, too much to advertise. Will trade. Send SASE for list. H. N. Webster, 3700 Hall Ave., Sebring, FL 33870. (813) 385-8924. 5-1

Complete set watchmakers and jewelry hand tools. Some material, Bulova # WT ultrasonic watch cleaning machine & bench. Enough to start complete repair department.

CALL (308) 872-2138

PARTS AND SERVICE HEADQUARTERS FOR SCHATZ, KUNDO, KOMA, KERN, HALLER, HERMLE, NISSHINDO. MECHANICAL-QUARTZ-ELECTRONIC-CIRCUIT BOARDS-MAINSPRINGS - SUSPENSION SPRINGS - MOVEMENTS, ETC. GREENHILL CLOCK SERVICE, P.O. Box 2247, El Cajon, CA 92021.

Be All the Clockmaker You Can Be!

Wheel Cutting Engines Starting at $425.00

VISA & MasterCard

Catalogue $3.00
Ken Law, CMC, CMBHI
Highway Contract 30, Box 825
Prescott, Arizona 86301

KUNDO AND SCHATZ PARTS mechanical, electronic, and quartz. Try us! Baltimore Clock Parts, 2004 Hillside Drive, Baltimore, MD 21207. (tf)

CLOCK TIMER. Regulate your clocks electronically with the new CTI Clock Timer. Can be used on almost any clock with mechanical escapement. Pendulum clocks large and small, lever or cylinder escapements, anniversary clocks, etc. For information write: Can Tho Instruments, P.O. Box 80113, San Diego, CA 92138. (tf)

SUPERCELL Batteries

AS LOW AS .14 CENTS EACH!

#392, 364, 396, 362, and many more. New Supercells, premium maxi-silver oxide guarantees long life up to 3 years. Fresh from the factory direct to you. Ten individually sealed to a card. First time offered. Now you can buy direct from the source. For 24 hour express service call:

TOLL FREE 800-334-0854, ext. 891
or write
TIME SOURCE INTERNATIONAL
P.O. BOX 613
Baltimore, MD 21133

SCHOOLS

CLOCK REPAIR TRAINING for the serious resident student. Contact Gerry Hough, Parkland College, 2400 W. Bradley Ave., Champaign, IL 61821. Phone (217) 351-2225. 4-4

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

HELP WANTED

WATCHMAKER–who is experienced in the service and repair of quartz-analog and Rolex watches. Join our team of four long-term watchmakers in one of our fine stores in Richmond, Virginia. We believe in quality work, the highest ethics, and the importance of our watchmakers. We provide good working conditions, fine equipment and an outstanding package of benefits, including a retirement plan. Please call me collect at (804) 740-1422. Ewell Hartman, CMW, Schwarzschild Jewelers, Regency Square, Richmond, Virginia 23229. (Enthusiasm Makes the Difference) 5-1

EXPERT WATCHMAKER. Produce highest quality jeweled, digital, analog, repair. Technical leader and patient teacher. Benefits. Write Peoples Jewelry Co., P.O. Box 973, Toledo, OH 43696. (9-12)

WANTED TO BUY

IMMEDIATE CASH PAID for Gold, Silver, Platinum, any form! Jewelry scrap, filings, gold filled, sterling! Immediate top dollar cash offer return mail! Satisfaction guaranteed. Ship insured/registered mail to: American Metals Co., 253 King St., Charleston, SC 29401; (803) 722-2073. (tf)

WANTED

We buy all types of Jewelers Scrap–Any condition.

$27.00 lb. Gold-filled Watchbands
$12.00 lb. Plated Watchbands
$12.00 lb. Silver Watch Batteries
(Mixed acceptable–We sort free of charge & we pay for mercury)
$5.50 oz. G.F. Optical, Cases, etc.
GOLD–95% of the market price for 10K, 14K, etc.
We buy filings, bench sweeps, filters and buffing waste.

Please call or write for more information:

SPECIALTY METALS REFINING CO.
10 Bay St., Dept. 107
Westport, CT 06880

1(800) 426-2344

"We will match any offer and still give you our quick, dependable service."

Postage and UPS reimbursed.

SITUATIONS WANTED

(Please turn to next page)

Dates To Remember

MAY 1986

18—Retrofitting Bench Course (AWI), Buddy Carpenter, instructor; Detroit, MI.

30-1—Kansas Jewelers Association 80th Annual Convention; The Holidome; Hutchinson, KS.

31—ESA Analog Quartz Repair Bench Course (AWI); James Adams, instructor; Sacramento, CA.

JUNE 1986

1—ESA Analog Quartz Repair Bench Course (AWI); James Adams, instructor; San Diego, CA.

6-8—Antique Watch Restoration Bench Course (AWI); Archie B. Perkins, instructor; Austin, TX.

6-9—Watchmakers Association of Pennsylvania Annual Convention. Information: Watchmakers Association of Pennsylvania, 1126 Centre Lane, State College, PA 16801.

14—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Los Angeles, CA.

15—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; San Francisco, CA.

18-22—41st NAWCC Convention; Cleveland, OH.

28-29—American Watchmakers Institute (AWI) Annual Board of Directors meeting; Flagship Inn; Arlington, TX.

JULY 1986

13-14—Jewelers of America New Orleans Trade Show; New Orleans Marriott Hotel; New Orleans, LA.

25-27—Watchmakers Association of Ohio 40th Annual Convention; Columbus, OH.

AUGUST 1986

9-11—19th Heart-of-America Jewelry Show, Marriott Hotel, Overland Park, I-435 & Metcalf, Overland Park, KS. Information: Sharon Blair, P.O. Box 12553, Overland Park, KS 66212; (913) 381-2033.

16-17—Wisconsin Jewelers Association Trade Show, Olympic Resort, Oconomowoc, WI; (608) 257-3451.

17-18—Restoration of Fusee Watches Bench Course (AWI); Ralph Geiger, instructor; Newark, NJ.

22-24—Nebraska & South Dakota Jewelers Association 81st Annual Convention; Ramada Inn; Kearney, NE.

23-24—Minnesota Jewelers Association Fall Trade Show; Radisson South; Bloomington, MN.

SEPTEMBER 1986

6-8—Advanced Lathe Bench Course (AWI); Archie B. Perkins, instructor; San Francisco, CA.

13-14—Iowa Jewelers and Watchmakers Association Convention and Trade Show; Des Moines Marriott Hotel; Des Moines, IA; (515) 274-1596.

13-14—North Dakota Jewelers and Watchmakers Association Convention and Trade Show; Seven Seas Motor Inn; Mandan, ND; (701) 667-2836.

14—Retrofitting Bench Course (AWI); Buddy Carpenter, instructor; Austin, TX.

14-17—Striking Clocks — Advanced Seminar (AWI); Joseph G. Baier, instructor; Seattle, WA.

21—Seiko Quartz Combos Bench Course (AWI); Leslie L. Smith, instructor; St. Paul, MN.

27—Arizona Horological Association Convention; Prescott, AZ.

OCTOBER 1986

18-19—Restoration of Fusee Watches Bench Course (AWI); Ralph Geiger, instructor; San Francisco, CA.

22-24—Using the Watchmakers Lathe Bench Course (AWI); Archie Perkins, instructor; Cincinnati, OH.

24-26—Florida State Watchmakers Association Convention; Palm Beach, FL.

25-27—Advanced Lathe Bench Course (AWI); Archie B. Perkins, instructor; Cincinnati, OH.

NOVEMBER 1986

1-2—Illinois Watchmakers Convention; Rockford, IL.

Ad Index

Seiko believes the world's most advanced timepieces deserve the world's most advanced after-sale support system.

At Seiko today, it normally takes about 6 to 9 working days for in-warranty job completion! What's more, the simplicity of control saves time and headaches, and fosters the kind of special relationship between Seiko dealers and their customers that you want and deserve.

How is this industry breakthrough accomplished? With the help of our Seiko service professionals, thoroughly trained experts, every one. With a service and materials system destined to be the most efficient in the industry—the most sophisticated and advanced computer-backed system imaginable.

From the moment a watch arrives at a Seiko Service Center, all pertinent facts about it go into our computer system. We can monitor it through the repair cycle. Pinpoint its status at any time. Maintain an incomparably detailed record of every watch we handle, retrievable from the system for years to come.

We've streamlined our supplemental services as well. Our unique microfiche system puts all the technical information you'll ever need to know about any Seiko watch at your fingertips easily and inexpensively. And we offer full-scale instruction bench course programs. Now Seiko service is upgraded to parallel the fine reputation of Seiko and its dealers everywhere.

In servicing our superb timepieces Seiko has gone all out to achieve the same single-minded standard of leadership that prevails in producing them. Our way of best serving you, our valued Seiko Authorized Dealers.

SEIKO

Setting the standard for the world, for the future.

We're giving away the store!

Free Maxell tape or floppy disk products!

Free, from the leader in quality, technology and consumer recognition: your choice of a Maxell T-120 videotape...two Maxell XLIIS-90 audio cassettes...or a Maxell MD2 floppy disk 2-pack!

The catch? Just order 100 Maxell watch batteries before May 31, 1986. We're giving away the goods to remind you that at Maxell, quality runs in the family. So hurry! For the name of your nearest participating Maxell Battery Distributor, call **201-641-8600** today!

Maxell Corporation of America
60 Oxford Drive
Moonachie, NJ 07074

maxell