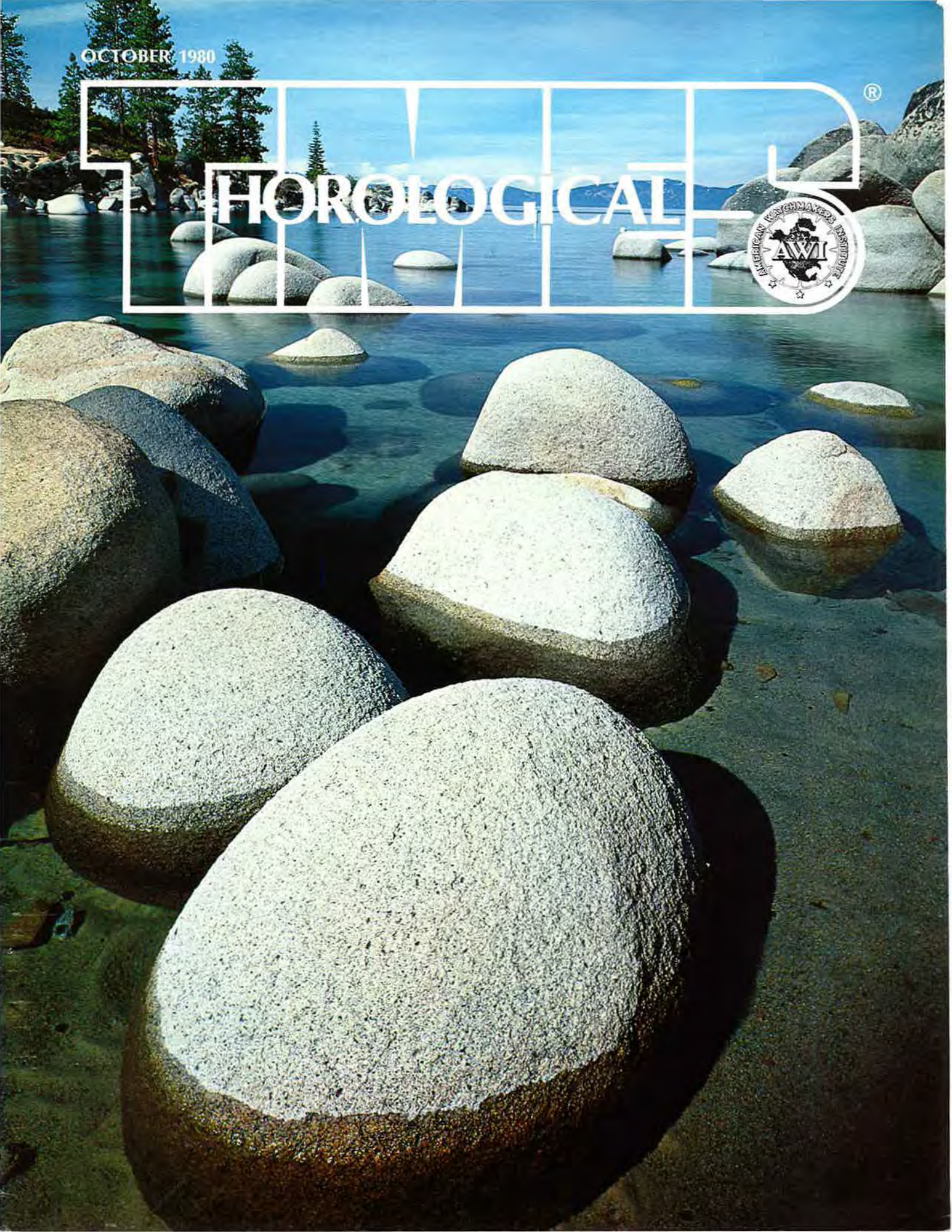
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VOLUME 4, NUMBER 10 OCTOBER 1980

HOROLOGICAL TIMES®

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JOE CROOKS **4** **THE PRESIDENT'S MESSAGE**
A 21-Gun Salute to Orville Hagans

ARCHIE B. PERKINS **8** **TECHNICALLY WATCHES**
Poising Balance Wheels

STEVEN G. CONOVER **10** **CHIME AND STRIKE**
The Mauthe W500 Movement

GEORGE SCHLEHR **18** **SCHOLASTICALLY SPEAKING**
For Students Only

WARREN E. ROGERS **20** **PROFIT THROUGH PROFESSIONALISM**
Selling Watch Repairing Professionally

MARVIN E. WHITNEY **22** **THE SHIP'S CHRONOMETER**
Navigation and the Quartz Chronometer: Part IV

ORVILLE R. HAGANS **24** **IN THE SPOTLIGHT**
Krazy Clocks: Part III

ROBERT F. BISHOP **28** **AFFILIATE CHAPTER COLUMN**
Glossaries and By-Laws

COMPREHENSIVE ACCOUNTING CORP. **36** **TAX TALK**

HENRY B. FRIED **38** **QUESTIONS AND ANSWERS**
Joseph Johnson Convertible

JOSEPH RUGOLE **42** **WATCH ADJUSTMENTS**
Forming Overcoil Hairsprings: Part II

MARSHALL F. RICHMOND **46** **PICKLE BARREL**
Profit with Quality Workmanship

FRED S. BURCKHARDT **50** **THE ROCK QUARRY**
Opals

MILTON C. STEVENS **56** **AWI NEWS**
AWI's First Clock Restoration Course

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FOLLOW THE
1980 AWI TOUR
TO THE
BRITISH ISLES
14

The "lowdown"
on ***OPALS***
56

AWI's 1st
Clock Restoration Course *is history!*
50

A ***Big***
Birthday Gift
for AWI
29

DEPARTMENTS

New Members / 12
Our Readers Write / 17
Bench Tips / 49
AWI Bench Courses / 57
News in the Trade / 62
New Products and Literature / 64
Classifed Ads / 66
Advertiser's Index / 68
Dates to Remember / 68

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

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Editorial

At first glance, the spacious single-floor building could be taken for an automobile manufacturing plant, but once inside, the immaculate surroundings and white-coated individuals indicate that you are mistaken. In one modern classroom, beginning students, some in the armed services, are learning filing techniques and heat treating. In another, clock wheels are being cut, while in still another, hairsprings are being leveled and centered. Oscilloscopes and electronic equipment occupy another area.

Rules governing the level of progress expected of each student are so stringent that more than half the students that begin this course are dismissed before completion.

In another room, seated around a long rectangular table, are the directors of the facility. They represent the Watch Manufacturers, the Retail Jewelers, the American Watchmakers Institute, and the Watch and Clock Material Distributors. Speaking to the group is an official from the Defense Department of the Federal government. He is intent upon the necessity of graduating 500 skilled craftsmen per year, since at least that number is needed to maintain our armed forces equipment in the event of conflict.

Is this just a fantasy—or an intelligent guess as to what the future might hold? It is not as farfetched as some might believe. The joining of such forces to meet the demands of our times is always a possibility.

HT

On the front

"Cabachon" Beach

Known as the "Gem of the Sierras," Lake Tahoe is a natural treasure of both Nevada and California. Here we stand on the Nevada shore, looking to California's Sierra Nevada range in the distance. This intriguing view features an area known as Sand Dollar Beach . . . but if one of our readers had first discovered it, a different name might have come to mind.

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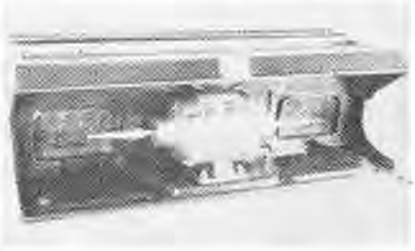
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This grand young gentleman celebrated his 84th birthday on August 10th by working out the details of yet another generous gift to the AWI.

Quoting from a letter from Orville, "The occasion was a bit unusual as three persons celebrated their birthdays–Milton Stevens, Josephine, and myself. Also, the occasion marked the birth of a new building project as the contract by and between AWI and the Hagans' was officially signed and sealed for the printing of the Samelius book."

The book, *Wm. H. Samelius–Information Please* contains the writings of W. H. Samelius, Dean of American Watchmakers, as compiled and edited by Orville Hagans. The price is $30.00.

Mr. Hagans own all copyrights to the material used in Mr. Samelius' columns which appeared in the *American Horologist* and the *American Horologist and Jeweler*, the publication having changed names in 1946. Two years before Mr. Samelius' death in November of 1961, Mr. Hagans began writing the column under the title "Information Please," and continues to do so under his own copyright.



Joe Crooks

The first 500 copies of *Wm. H. Samelius–Information Please* will be numbered and autographed by Mr. Hagans. Orders are now being received at a fast pace. If you want a numbered, autographed book, place your order now.

AWI's windfall from Mr. Hagans' Coleman book has saved us over $100,000 in mortgage and interest, as shown in Milton Stevens' AWI News column in the July issue of *Horological Times*.

When I asked Orville why he was doing this for the AWI, he modestly replied, "I hate mortgages unless I own them!"

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By Archie B. Perkins, CMW, FNAWCC

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POISING BALANCE WHEELS©1980

The accurate timekeeping of a watch is greatly determined by how well the balance wheel is poised. An out-of-poise condition does not affect the dial positions, but does affect the pendant positions. The more the wheel is out of poise, the more the pendant positions are affected. Although errors in the escapement and hairspring can also cause the watch to show out of poise on the timing machine, an out-of-poise balance can have the greatest effect on the position rate of the watch. If the wheel is out of poise, one pendant position may show slow and the opposite position fast. A balance wheel should always be trued before being poised. If a wheel is poised first and is later found to be out of true (especially in the round), after it is trued, it will again be out of poise. Before attempting to poise a balance wheel, the pivots on the balance staff must be straight, smooth, highly polished, and clean. It would be better to check the pivots and make sure they are correct before the balance wheel is trued, as there is danger of throwing the balance out of true while the pivots are being refinished should they need it. If the pivots are badly scored or shaped incorrectly, the staff would need to be changed. It would be better to find this out before wasting time trying to true and poise the balance wheel.

Figure 1

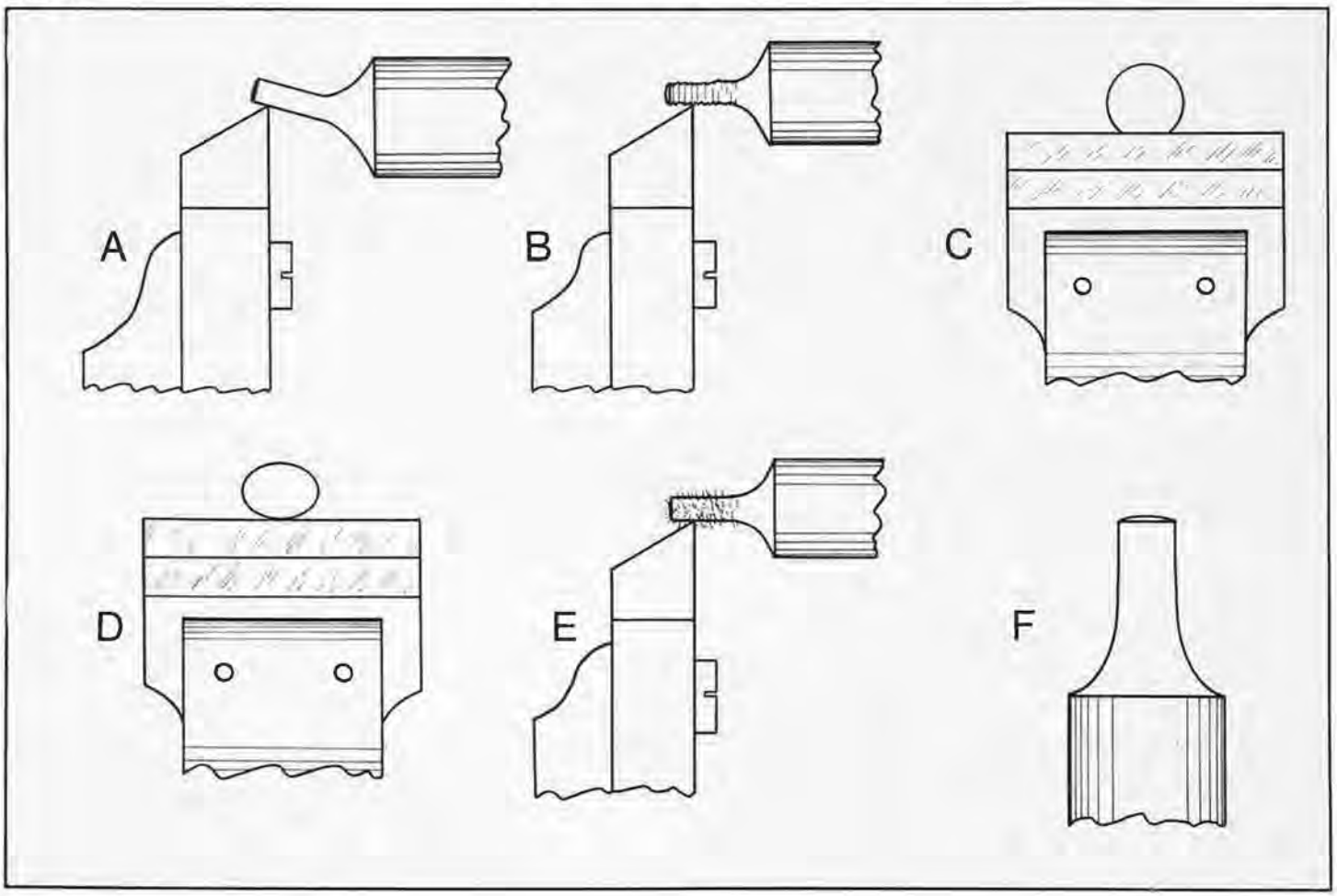


Figure 1 shows some pivot conditions which make it impossible to correctly poise a balance wheel. View A shows a bent pivot; View B shows a scored pivot; a flat-sided pivot is shown in View C. An oval-shaped pivot is shown in View D, and View E shows a pivot with steel hair clinging to it caused by a magnetized balance staff. This last condition is the hardest to detect. Cleaning the pivot with pithwood will not eliminate the steel hair. The wheel and staff must first be demagnetized and then the pivot cleaned with pithwood that has been dipped in clean alcohol in order to eliminate the steel hair. View F shows a correctly shaped pivot.

When poising a balance wheel, each of the above conditions gives a certain symptom on the poising tool. When a pivot is bent, the wheel will rock back and forth on the poising tool as if a balance screw were missing. With a scored pivot, the wheel will move in an irregular manner and will not stop at the same place each time. With a flat-sided pivot, the balance will stop at the same place each time until the weight on the heavy side of that balance is changed enough to shift the balance so the flat side of the pivot is away from the poising tool jaw. The wheel will have an irregular motion as the flat side of the pivot contacts the poising tool jaw. The oval pivot causes the wheel to have a rocking motion on the poising tool. When attempting to poise this wheel, the job will be very difficult because the wheel will rock back and forth on the poising tool; when weight is removed from the heavy side of the wheel, the wheel will shift so the opposite side is at the bottom as if too much weight were removed. This action will be repeated every time an attempt is made to poise the wheel, thus making the task impossible. The magnetized pivot that has steel hair clinging to it causes the balance not to roll freely on the poising tool. The wheel will have an erratic motion to it, making it impossible to tell where the heavy side of the balance wheel is. The action is similar to that caused by a scored pivot.

There are basically two types of tools used for poising balance wheels: the poising tool and the jeweled poising caliper. Figure 2 shows a poising tool that has ruby jaws which support the balance wheel pivots while the wheel is checked for poise. In the past, these poising tools have been made with agate jaws also; however, ruby is used almost exclusively for poising tool jaws now. Regardless of which material is used for the jaws, they should be ground and polished to sharp knife edges without any nicks in their edges. The jaws must be adjusted so the edges are square and level with each other. The tool should have two adjustable legs for leveling it. Some of these poising tools have levels built into their bases so the tool can be leveled before being used to poise a wheel. If the poising tool being used does not have a level built in, then a small circular level can be used on top of the jaws for checking their level. A small circular level number 30107 can be purchased from your local material distributor.

The poising caliper that is shown in Figure 3 is preferred by some watchmakers. This caliper has hole jewels for the pivots to rest in and cap jewels to limit the end thrust on the pivots just like in the watch. The reasoning behind the use of a poising caliper is that the pivots are resting in jewel holes just like in the watch while the balance is being checked for poise. Another concept in poising tools is illustrated in Figure 4. This is a prototype that was made up a few years ago. The principle of this tool is that it has two stretched piano wires for the pivots to rest on. Since the wires are thin, there is very little contact surface between the pivot and the wire. It is claimed that since the wires are stretched tight, there is an almost continuous vibration created on the wires which makes the tool very sensitive when a balance wheel is being poised.

To poise a balance wheel, the pivots are first checked to make sure they are straight, smooth, and highly polished. Then the poising tool is placed on the bench and leveled up. Now take a clean piece of pithwood and dip its corner into clean denatured or isopropyl alcohol. Use this pithwood to go lengthwise on the jaws of the poising tool to clean them. The pivots of the balance wheel are also cleaned with this wet pithwood. Now adjust the jaws of the poising tool so when the balance staff pivots are placed on the jaws they will be resting on the cylindrical section of the pivots near their ends. If the balance is out of poise, the wheel will turn back and forth on the tool until the heavy spot on the wheel comes to rest at the bottom of the wheel. Note: The balance wheel can be motivated on the poising tool by the use of a hair or the bristle from a soft brush. The rim of the wheel should always be parallel to the poising tool jaws when checking the wheel for poise.

When poising the wheel, weight can be removed from the screw at the bottom of the wheel or weight can be added to the screw at the top of the wheel. Several methods can be used to remove weight from balance screws. These are shown in Figure 5. View A shows how the weight is removed with the balance screw undercutter. Care must by used in selecting the proper size cutter. The hole in the cutter must clear the thread on the screw being undercut, and the outside diameter of the cutter must be slightly smaller than the diameter of the screwhead. The screw is turned on the cutter with a screwdriver or a balance screw holder as shown in Figure 6. This is the most acceptable method of

(Continued on page 54)

Figure 2



Figure 3



Figure 4



Chime and Strike

By Steven G. Conover



THE MAUTHE W500 MOVEMENT *

In this article, we will look at a German chime movement, the Model W500 by F. Mauthe. Many of these spring-driven movements were installed in floor clocks by the Daneker Clock Company of Fallston, Maryland, so it is natural to associate this particular movement with Daneker. The W500 was imported for use in their grandmother clocks until about 1970. After that time, small floor clocks were discontinued in favor of the larger, weight-driven models.

Figure 1 shows the Daneker "York County," one of the clocks featuring the Mauthe movement. The case is 71 inches tall including the finial, and only 11 inches wide at the waist section. This is too small a clock to accommodate weights or a large pendulum disc. The Mauthe movement, with its small cylindrical brass pendulum, is well suited to the case. An outstanding quality of the Daneker is its beautiful maple finish. It is an elegant little clock indeed.

The movement is spring driven, as I have said, and therein lies its weakness. Although the movement itself is long-wearing and dependable, mainspring breakage is common. Most of the Mauthe movements I have repaired were referred to me because of mainspring trouble. Usually it is the hole in the outer end of the mainspring that tears out. Some Daneker owners have continued to use a clock with one or more springs in this condition because they found that they could turn the key two or three times before the spring slipped around inside the barrel. Finally, they got tired of winding the clock every day, and they called for service. As recently as 1978, Daneker still sold replacement barrels with mainsprings for the W500. Unfortunately, they can no longer provide them.

Refer to Figures 2 and 3 to identify the major chime and strike parts of the Mauthe W500. You will find the movement similar in some respects to other German and American chime systems. A locking plate (5), which is set-screwed to the elongated front pivot of the 3rd arbor, controls the number of notes chimed at each quarter hour. The chime lock lever (22) stops the gear train at the end of each note sequence by catching the chime lock pin (21) in the 4th wheel (20). The strike is the rack and snail type, with a locking arrangement on the front of the movement rather than between the plates. On the gathering pallet (16), which is really a cam, there is a notched portion that catches a pin on the strike lock piece (17) to stop the gear train.

Assembling the Mauthe W500 is much easier if you have some notes from which to work. The front movement



Figure 1. Daneker York County with Mauthe W500 Movement (Photo by Gallard's Photo)

chime and strike parts probably present the most difficult aspect of the job. In this article, I will cover the assembly and adjustment procedure to be followed in conjunction with Figures 2 and 3.

Before you even take the movement apart, however, there are a few things you can do to save time later on in the

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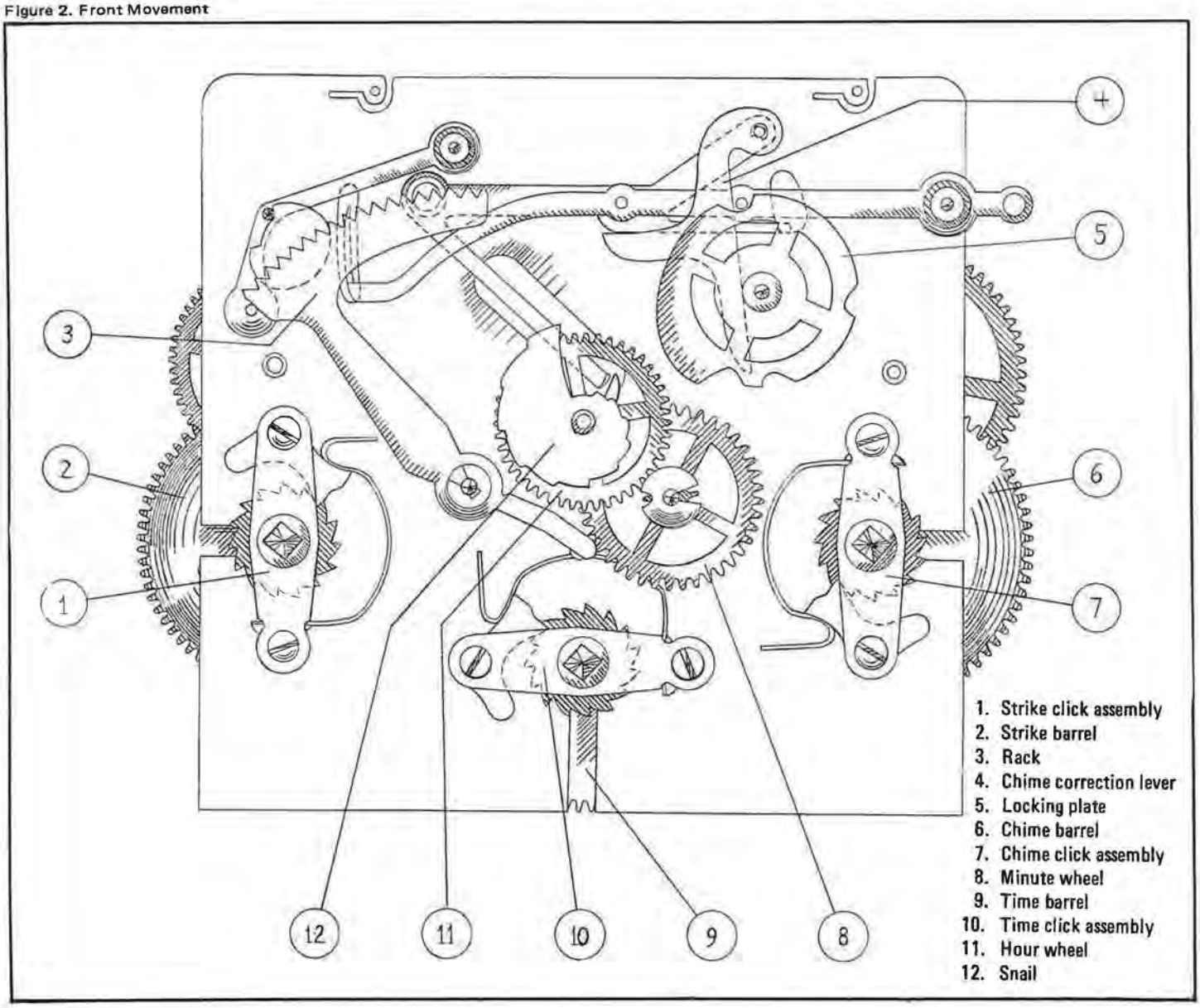
overhaul. Mark a few of the parts so you can avoid mixing them up among the three gear trains during reassembly. I suggest marking the second wheels in the time and chime trains, the warning wheels (18 & 23), the chime fly, the strike fly, and the mainspring barrels (2, 6, & 9). A "C" for chime, "T" for time, and "S" for strike is enough. Marking each and every gear in the clock is not necessary.

Disassemble the movement for cleaning. Note that the gathering pallet is pressed very tightly onto the squared end of the strike 4th arbor. If you are worried that you might break off the pivot in an attempt to remove the pallet, then by all means leave it on. However, if you discover that a bushing is required for the pivot hole, you will have no choice but to remove it.

Following installation of bushings and any other repairs, you are ready to put the movement back together. Assemble all the wheels into the front movement plate. After getting the rear plate on and the pivots in their holes, check the strike train first. To do this, add the strike hammer assembly to the rear of the movement. Next, put on the strike lock piece (17) without the taper pin fastening it in place. Rotate the gears by hand, with the fly going counterclockwise as viewed from the front. The hammers should rise and fall once before the train locks. Note whether the hammers are left in the raised position. If they are, separate the plates just enough to change the mesh of the 3rd wheel and the next pinion. After a few tries, you should be successful in correcting the hammer action. The point is that there must be no load on the hammers when the strike train warning occurs. The extra starting torque may stall the strike train. Instead of separating the plates to correct the hammers, you could try removing the gathering pallet and installing it in one of the other three possible positions on the square arbor. The

(Continued on page 60)

Figure 2. Front Movement





We Salute These New Members!

ALI, Noor Mohd M.—Texas
ALT, Albert K.—West Virginia
ANDES, Russell W.—California
APPLEBAUM, Arnold N.—California
ARNOLD, Vicky—Texas
ATHEY, Ralph—Illinois
BAILEY, Karen—Minnesota
BARRETT, Gerald—Minnesota
BARRETT, Richard P.—California
BEAMAN, Fred R.—P.Q., Canada
BELCHER, Cleaburne F.—South Carolina
BLASSER, Marvin—Texas
BREGE, Richard A.—Michigan
BRODIE, Harold M—Texas
BUELL, Janice Ball—Texas
CABALLERO, Catalino S.—Illinois
CAREY, Gerard G.—Ontario, Canada
CARPENTER, Mary—Tennessee
COFFMAN, Robert L.—Michigan
COMFORT, Mark J.—Florida
CYR, A. Joy—Minnesota
DAHLGREN, Richard—California
DERSHIN, Andrew—Texas
DITTMAR, Grant E.—Michigan
DORNES, Richard C.—Pennsylvania
DOUGHERTY, Lawtence G.—California
DOWNING, Lloyd F.—California
EDELKIND, Jamie—Georgia
EISENKRAFT, Joseph—Texas
FOSS, Lindy E.—New Hampshire
FUGATE, Marshall J.—Michigan
GARCIA, Jose Jr.—Texas
GREIPL, Heinrich—Florida
GROUNDS, David R.—Indiana
GUNALP, Asim—California
HARRIS, Lynn E.—Arizona
HERRON, Sue Ann—Ohio
HICKS, Shelby L., MD—Kentucky
HOGLUND, Donald M.—Minnesota
JUNG, Jack B.—Hawaii
KARKAZIAN, George—California
KENNEDY, Charles—Tennessee
KNOX, William—Texas
KOPPY, Warren J.—Minnesota
KUSY, Martin J.—New York
LAWRENCE, Frank—California
LEEVER, Robert—Florida
LEONI, Darlene—Illinois
LEVINE, Norman—California
LORD, George C.—Florida
LOWE, Steven M.—Tennessee
McDONALD, T. L.—California
McKIBBON, Douglas R.—Tennessee
McLAUGHLIN, Dennis—Maine
MARKUSON, Harold—Montana
MAROLDO, Vincent—New York
MERTENS, John J.—Illinois
MIKESKA, Frank—Texas
MILLER, Raymond L.—California
MORRIS, Thomas—Minnesota
MORGAN, James C.—California
MOSES, Roger—Idaho
MUZINICH, Lawrence A.—California
NORDLUND, Francis W.—Idaho
OVERCASH, Hubert C.—North Carolina
PECKHAM, A. J.—Colorado
POOSANGTONGCHAI, Nopporn—Texas
PRATT, Mark A.—Tennessee
PULPAN, Paul—Texas
REDEN, Demetrius—Texas
RESTUCHA, Roberto—North Carolina
ROACH, J.—Panama
RUGG, Lester C.—California
SAXTON, Harry E.—New York
SCHMIDT, Michael J.—Michigan
SERATT, Howard—California
SIMMONS, Linda—Tennessee
SIMONS, Neal—Minnesota
SIMPSON, Paul D.—Maryland
SOLAN, Anthony—Indiana
SPERRY, Bill—Washington
SQUIRES, W. F.—Michigan
STRAND, Barney—Minnesota
SWAFFORD, Glenn D.—Maryland
TIPPETT, R. W.—Texas
TOLMAN, Clifton L.—Idaho
WADE, Leslie R.—Virginia
WARDLOW, Donald R.—Ohio
WATSON, Jack—California

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The 1980 AWI Horological Tour

The seventh annual AWI horological tour was a huge success with twenty-four members accompanying tour director Henry Fried on a visit to England, Scotland and Ireland. The nineteen-day tour, which ended on May 20th, included a reception by dignitaries of the British Horological Institute. Among those present were: Richard Elliott of the famous clockmaking company; chronometer maker Frank Mercer, chairman of the Institute; Alex Walker, its secretary; Mr. Melchor, past president; and George Daniels, Master of the Clockmakers Company and President of the British Horological Institute. Mr. Daniels, considered the world's finest watchmaker, allowed the tour members to handle and examine one of his famous, complicated, handmade watches. Later, a visit to the "Cockney" for dinner and entertainment of the Old English music hall variety was a highlight.

The British Museum's horological section, closed for repairs, was exclusively opened for the tour members. Mr. Richard Good, its curator, was especially gracious, inviting the group to visit the scholars' room and examine other rare clocks and watches upon which he lectured.

Sixteen of the tour group took advantage of special arrangements and braved the many steps' climb to see the famous Westminster tower clock and its equally famous hour bell, "Big Ben." Seeing this strike at high noon was especially thrilling, viewing it but three feet from the huge bell and hammer. Mr. Richard Elliott, who heads the company which is responsible for the clock's maintenance, was kind enough

(Continued on page 16)



An outside look at the Big Clock. Our tour members can't be seen above the clock and gallery where Big Ben, the hour bell, was observed. The quarter chime bells are in the uppermost gallery. All is "hurricane" fenced to protect the clock and bells from the pigeons.



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AWI TOUR
(Continued from page 14)

to be the authority-guide, explaining its mechanism, history, and details. He cautioned the group to remain silent in the few seconds before the chimes and striking started, as these are nationally broadcast, and in the past few instances when visitors were permitted, some unprintable comments were also aired nationally in this short interval.

Next month, our coverage of the AWI horological tour will continue with the group's departure from London to visit other points of interest in the British Isles.



Waiting to climb the 364 steps up to "Big Ben" to see and hear it strike the noon hour and to inspect the big clock movement. Richard W. Elliott, the group's personal guide for this special event, is at right.



Tour director Henry Fried browses through one of the remarkable horological exhibits visited by the group.

Are you interested in participating in the 1981 AWI horological tour? Some interest has been expressed in visiting Egypt, Israel's diamond markets and workshops, and other spots of interest in the Mid-East with a final stop at the Basle Watch and Clock Fair in Switzerland. Another possibility is a tour through Switzerland, Belgium, France, and Holland via Western Germany. Voice your opinions by writing to tour director Henry Fried in care of AWI.





Our Readers Write

MEMBERS MAKE AWI

I've enjoyed very much the issues of *Horological Times* magazine and the AWI Bench Course at Okmulgee, Oklahoma which I attended. However, I believe that what I like most is the contact with other members of AWI—people who have been willing to help and to share their knowledge. This is a tribute to the quality of these men and their profession.

Robert G. Brendel
Buckner, Missouri

COUNT ME IN

Glad I finally joined AWI in January, 1980. A copy of your magazine did it. I've never seen such a helpful publication. Outstanding . . .

Richard T. Schardt
Aberdeen, Maryland

WORD INDEX VS. TITLE INDEX

To make your excellent *Horological Times* even more useful, why not publish an annual key word index, such as the one Mr. Hagans did for the book *The Best of J. E. Coleman*. This would be far more useful than the easier-to-produce title index which you now use.

With gratitude for your fine publication.

Robert W. Waters
Owego, New York

The *Horological Times* welcomes letters from its readers. Please write us at AWI Central, P.O. Box 11011, Cincinnati, OH 45211. We do reserve the right to edit all letters.



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For Students Only



George Schlehr

At this time of year, it is appropriate to direct a few remarks to that group of hopefuls, young and not-so-young, male and female, who have embarked on the study of one of the most fascinating and most satisfying subjects ever considered—horology. All you veteran hairspring benders are welcome to tune in, but it will only remind you of what you heard 'way back when from some kind soul who got you started in this galloping field of micro-technology. (Meanwhile, you should read that excellent article on page 497, "The Origin and Development of the French Shim.")

Students—count your blessings. Be aware of the fact that you have joined a select group of inventive and inquisitive individuals, the aggregate like of which has influenced the course of history down through the ages. You are kindred spirits with such eminent horologists as Abraham Louis Breguet, Julien le Roy, Thomas Mudge, George Graham, Christiaan Huygens, Seth Thomas, Jules Jurgenseon, and more recently, Henry Fried and Orville Hagans. (You must find some way to meet and talk with Henry and Orville. Forget the others. They're dead.) We must not forget that curious caveman, Ogh, who was the first to pound a stick into the ground and watch its shadow move with the arc of the sun. At that moment, the spark of horology was struck.

Yes, you're in high company, all right. As you work on your first SMQ, know that someone like you once stayed up until after midnight to design it and make it work.

Believe it or not, you have the same potential, if perhaps not the same patience, as John Harrison who spent his lifetime perfecting the marine chronometer for the British Navy over 200 years ago. But John did not even have the benefit of a conscientious instructor. In fact, he was a carpenter to begin with, not even a clockmaker. Thanks to him, for the first time in history, seamen knew exactly where they were on the trackless seas.

When Michel Weber was making his exquisite watch for Marie Antoinette, he worked without the benefit of a fine precision lathe with an electric motor, as you are privileged to work with today. His tools were laboriously made by hand—not ordered by phone from the local material house.

As a horologist, you will enjoy a standing and respect in your community that few can match. The intellectual giant Galileo, who postulated isochronism and the laws of the pendulum, was excommunicated from the church for his heretic beliefs and advanced ideas. No chance of that happening to you.

You are fortunate to have at your disposal the printed word in hundreds of books on horology, plus more or less complete cataloging of parts and supplies, available for a relative pittance by phone or mail. As an apprentice in the days of yore, you would have made your own wheels and pinions, planished your own plates, drilled your own jewels, spun your own cases, and been satisfied with a grunt or two of acknowledgement from the crusty old master.

You have local, state, and a national horology organization, AWI, dedicated to your professional education and welfare, standing ready and eager to help you with material help and counsel. Through them you can communicate with your peers, draw from a superb library of technical data sheets, manuals, film strips, motion pictures, colored slides, and cassette tapes. You can even have the finest horology experts alive answer your questions by simply picking up the phone and calling the AWI Hot Line. Never before in history has any student enjoyed such tremendous wealth of reference material. All you have to do is ask for it.

You have the opportunity—nay, the right—to join



your local guild and rub elbows with prospective employers while feasting on succulent chopped sirloin.

As if the availability of fine schools and instructors were not enough, AWI is spending considerable time and money to send top-flight, 48-karat specialists clear across the country to put on technical workshops for you. What an incentive! What an invitation! What a silver-plattered gift!

You have the tools, equipment, parts, supplies, and facilities at your fingertips, and expert instructors at your beck and call. You have a 23-jewel opportunity to train your hands and fingers to move with the delicate, sensitive touch equal to that of a surgeon. Don't blow it.

Well, students, now that you've counted your blessings and have been told it like it is . . .

What are you waiting for?

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Pictured are (left to right): Joseph Rugole, Immediate Past President of REC; George Schlehr, President; Thomas Imai, Vice-President; George Hoyt, Board member.



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PROFIT Through PROFESSIONALISM

By Warren E. Rogers



SELLING WATCH REPAIRING PROFESSIONALLY

There is a definite correlation between salesmanship and the image which the watchmaker presents to his customer. The manner in which a watchmaker can present a professional image was the subject of last month's article, and it follows that our personal appearance and the appearance of everything around us is part of a good sales approach. Picture in your mind the above-average salesman making his initial contact with his prospective customer. He will be adjusting his necktie, assuring himself that his shirt tail is tucked in, checking his fingernails and hands for cleanliness, giving the toes of his shoes that last little rub on the back of his trousers—all of which have to do with a good image. But now the contact is made and words become important.

It is not essential that the watchmaker make the sales presentation to the customer, but if he does not, it is essential that the salesperson involved be schooled by a watchmaker in matters concerning the estimation of repair costs. Many things must be considered, including, but not limited to, the following: age of the watch, type of watch, evidence of water or physical damage, case and crystal condition, and condition of the band. In short, a professional salesman must know his product and the limitations of the repair process.

"How much will you charge to clean and oil my watch?" is the typical question asked of the watchmaker or salesperson. A hasty response at this point, quoting a price, would be absolutely the worst sales presentation possible. Unfortunately, many retail stores as well as trade shops quote prices on this basis. Some, of course, feel they use a much more professional approach by employing the term "complete overhaul." They emphatically declare to the customer that they do not merely clean and oil watches, and then they quote a price. This would rank as the second worst sales presentation possible.

The first and most important consideration in the sales approach is to **determine the true needs and wants of the customer.** Such questions as: how old is your watch? how long has it been

"The first and most important consideration in the sales approach is to determine the true needs and wants of the customer."

since your watch was serviced? are you sentimental about this watch? are you aware of the fine quality of this watch and its current value? etc., will open a dialogue of understanding between the salesperson and the customer. This dialogue will ultimately lead to the proper pricing of the repair.

Let's examine these questions on an indivuidual basis and see how they contribute to good salesmanship, resulting in and justifying higher-than-average repair prices.

How old is your watch? Any concientious watchmaker knows that complications arise when working on older watches. Excessive wear in the mainspring and stem areas, complications due to parts availability, increased parts cost, the unexpected abuses of previous workmen, all are merely examples of very justifiable reasons for above-average repair prices. It is not difficult to explain these complications to a customer in support of the quoted estimate.

How long has it been since your watch was serviced? A response that indicates a neglect of regular service would also indicate the possibility of excessive pivot damage which would require additional attention on the part of the watchmaker. Without shaming the customer about neglect of regular service, you can explain the logic of additional charges. When the customer's response is "this watch has never been serviced in the twenty years I have owned it and it has always kept perfect time," you add still more in charges, or better yet, decline the repair completely. This customer will surely believe that a good cleaning and oiling will restore the watch to its *perfect* timekeeping ability. We all know this customer who shames the profession by saying to all who will listen that his watch kept perfect time until he had so-and-so clean it. Learning what not to take in is as important as adequately pricing what you do take in.

Are you sentimental about this watch? Many times the watchmaker becomes his own worst enemy by presupposing that a watch is not worth repair because he knows that the watch originally sold at a price equal to or less than the cost of repair. **Give the customer a chance to set his own values.** When a customer's response indicates affection for a timepiece, it is much easier to justify the charges. When sentimentality and affection are indicated, the extras of dial refinishing, crystals, and case refinishing are easily sold. Watchmakers should remember that most watches are received as gifts and represent important occasions in the life of the customer. It is beyond our capacity to set a value for the customer on such important occasions as graduations, birthdays, anniversaries, and retirement.

Are you aware of what a fine watch this is? An appreciation of quality on the part of the customer simplifies the justification of adequate repair prices. Obviously the person who owns a Rolls Royce expects to pay more for service. We could even express it another way—the person who owns a Rolls Royce would feel shortchanged if the service charges were no higher than those for a Cadillac. He wants to be set apart from the crowd. Without being facetious, the watchmaker must recognize that the servicing of fine timepieces does demand that extra attention, justifying that extra repair charge.

Professional salesmanship is actually the skillful use of questions as opposed to knowing your product and expounding all you know. Impressing your customers with your knowledge will not be as effective as impressing them with your thoughtfulness and your desire to find out exactly what they want. A good sales presentation opens a dialogue between the salesperson and the customer that will expose the desires as well as the limitations of the customer. The salesman's skill will convince the customer that his service will satisfy those desires at a competitive price.

THE SHIP'S CHRONOMETER ©1980



By Marvin E. Whitney, CMC, CMW

Navigation And The Quartz Chronometer

Part IV

Reminiscent of the famed Hamilton marine detent chronometer, the Hamilton Watch Company is now producing a quartz marine chronometer, the Chrometron-Quartz, CQ 2001. See Figure 1. The quartz movement is manufactured in Germany and fitted to the case at Hamilton's new clock factory in Lancaster, Pennsylvania.

The quartz used in the CQ 2001 mechanism has a frequency of 32,768 Hz and is rod-shaped with a cross section of approximately 1 mm^2. It is attached to a holder consisting of two thin, flexible wires and is protected by a hermetically sealed case. The energy required for its operation is supplied via the two wires.

The electronics of this instrument incorporate four circuits components: (1) quartz oscillator (2) frequency dividers (3) impulse amplifier (4) stabilizer.

The electronic quartz oscillator which excites the quartz and causes it to vibrate at its resonant frequency consists of several amplifier stages. The quartz is connected in the feedback path from the output of the second stage to the imput of the first. This causes only a certain frequency–the frequency of the quartz–to be amplified. The quartz behaves like a filter through which only a certain frequency, its own, can pass. In this way, energy is fed to the quartz crystal by a pulsating current synchronized with its own frequency. A stable vibratory condition occurs and is so maintained as long as the energy supply is present. A variable capacitor (trimmer), which acts as the regulator, is connected in series with the quartz which allows the frequency to be corrected.

The frequency divider reduces the high frequency (32,768 Hz) of the quartz oscillator circuit to one (1 Hz) to drive the stepping motor. The dividing or reduction of the frequency is done on the principle of the "binary divider." The divider circuit consists of a number of series-connected flip-flops wherein each state reduces the frequency fed to it by exactly half, or by the factor of two (2). Thus, high or low frequencies differ by power of two (2). In the CQ 2001, the divider factor is 2^{15}. When the reduced frequency is referred to 1 Hz, this produces a quartz frequency of $1 \times 2^{15} = 32{,}768$ Hz. Figure 2 illustrates the mode of operation of the frequency divider.



Figure 1. Hamilton's Quartz Chronometer mounted in gimbal, reminiscent of the standard marine detent chronometer. Photo courtesy of the Hamilton Watch Company.

From the diagram, it can be seen that after the fifteenth bi-stable tilt step of the frequency divider, the result is a square-wave oscillator signal. However, this cannot be used directly to drive the electro-mechanical converter. Therefore, a drive stage or impulse circuit is utilized to change this square wave signal into single pulses and thus provide the power to the stepping motor.

Because the CQ 2001 is operated by a 1.5 volt baby-cell-type battery with approximately a two (2 Ah) charge capacity, the voltage drop during operation does not adversely affect the accuracy and/or the other functions of the circuitry. A stabilizer circuit is

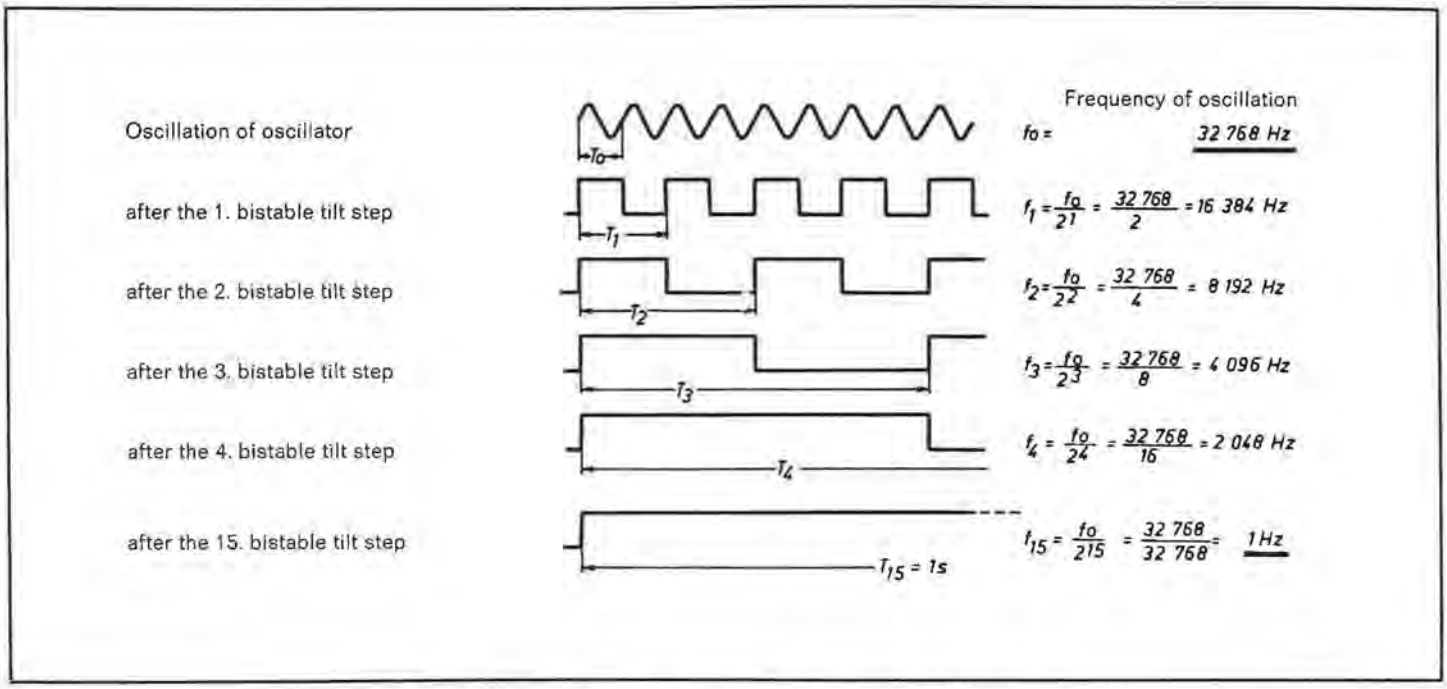


Figure 2. The above diagram illustrates the mode of operation of the frequency divider in the Hamilton CQ 2001 Quartz Chronometer. Figure courtesy of the Hamilton Watch Company.

utilized which insures a near-constant operating voltage or current during the life of the battery.

The conversion of electrical energy or impulses into a mechnical movement, allowing an analogy indicator of time in seconds, minutes, and hours to be effected, is done by an electromechanical converter. This is achieved through the use of a stepping mechanism, whereby the seconds wheel is driven directly. When supplied with incoming current pulses, a moving coil mounted in a strong magnetic field carries out oscillatory movements which are transmitted mechanically via pawls to the seconds wheel.

With normal use, Hamilton states that the deviation from standard time will not be more than 0.12 seconds per day at a room temperature of 22° C (71.6° F).

Quartz is very sensitive and reacts to excessive shocks, often resulting in a change in frequency. Should the CQ 2001 show a greater deviation in its daily rate, the following adjustment can be made: Move the cover to the right, making the screwhead of the trimmer accessible. Carefully set the screwhead with a small screwdriver without applying pressure. Turning to the right will lower the frequency, thus retarding the chronometer, while turning to the left will increase the frequency, thus advancing the chronometer.

The semi-circles on the case with + and - signs represent the rotatable segment of the trimmer, visible through the case. When this control (which is likewise semi-circular) is in the same position as the corresponding symbol on the case, the maximum position has been reached, i.e., segment underneath at the (+) sign equals maximum advancing of the chronometer, while segment on top at the (-) sign equals maximum retarding of the chronometer. For frequency adjustment, an angle of 180° is therefore available. Rotation of the trimmer through 180° signifies a maximum frequency change of approximately 0.5 seconds per day. An adjustment of one division thus produces a change of approximately 0.1 seconds per day. Care must be taken here that no dirt—and particularly no metal particles—get into the inside of the mechanism. On completion of the adjustment, move the cover to the left.

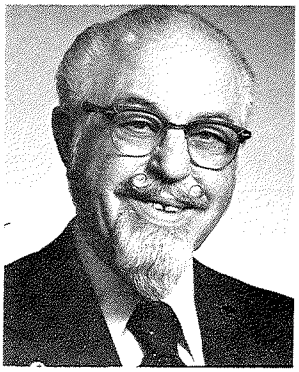
Should the CQ 2001 chronometer still show a large deviation at room temperature when at the maximum setting, it is probable that the quartz has been subjected to a severe shock. In this case, the frequency must be readjusted with special measuring equipment—a job which can only be carried out at the factory. Major repairs, particularly on the electronic circuitry, must also be done at the factory.

The electronic division of Patek Philippe, Geneva, Switzerland, not only makes an electronic chronometer, the Naviquartz, but also a marine master quartz clock, Qmsm. The Qmsm is fitted with a CMOS integrated circuit quartz time base, an impulse output with self reset protection device, and a built-in running reserve. The Qmsm marine master clock can drive either standard or fully electronic clocks in each section of the ship. It is also used to synchronize different instruments of navigation (recorders, data loggers, programmers, or time comparators). See Figure 3.

The Patek Philippe Naviquartz comes in several models and, in keeping with naval traditions, is cased in a polished mahogany case with brass hardware. The case measures 80 mm (height) x 69 mm (width) x 229 mm (length) and weighs only 2.9 kg. The movement is designed for marine use and is protected against water spray and dust. It is also immune to positional changes, atmospheric pressure, and shocks.

The accuracy of the quartz crystal chronometer under favorable running conditions (20° C or 68° F) is under 0.02 seconds per day; under marine conditions (at sea), it is under 0.1 seconds per day. The instrument will operate within a temperature range of -10° C (14° F) to 60° C (140° F).

(Continued on page 51)



Orville R. Hagans, CMC, CMW, FAWI, FBHI

KRAZY CLOCKS

Part III

This series of nonconventional Crazy Clocks accumulated over the years is presented to break the somber trend of serious and commercial motivation:

Smile a while—It's worth while

If you have a Crazy Clock, send photo and information to O.R. Hagans, 6930 E. Girard Ave., Denver, CO 80224.

The Clock That Gurgles

It has the face of a clock and the insides of a somewhat confused distillery. Instead of ticking as it marks off the minutes, this "thing" gurgles. It is the creation of Stan Reha, Denver custom fixture builder, and its design would delight Rube Goldberg.

The clock operates on a balance system, with earthenware whisky jugs on each pan of the balance. Water flows into the "up" jug until it tips the balance. The water then flows into the second jug while the first one is being drained by an automatic valve system. A full up-and-down movement of the scale moves the minute hand forward one minute. Reha says the clock keeps "pretty good" time.

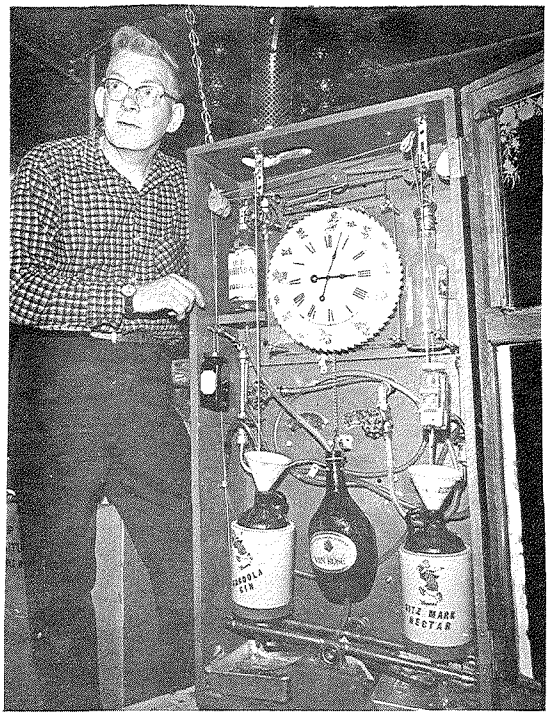
However, Reha felt he could provide some additional drama with another operation inside the clock; he made water flow from a reservoir above the clock into a vodka bottle at the upper left. As soon as the bottle fills, a siphon begins to draw water from the vodka bottle into a half-gallon wine bottle.

This wine bottle is connected by a chain and pulley system to a sealed and filled quart whisky bottle. When the wine bottle is full enough, it drops and pulls up the whisky bottle. Another siphon now empties the wine bottle. Pretty soon it is light enough so that the whisky bottle pulls it back up again.

Just what does all this have to do with the operation of the clock? Nothing. But Reha feels it's nice to watch.

Reha and Gale Young, a designer for the Denver furniture firm of Duff and Repp Inc., sat down to plan the clock for Clock Tower Inn, a steak house in Vail, Colorado, where it is now installed. Reha built it in his shop at Reha Cut Glass Co., 1905 S. Broadway.

Subsequently, Reha has turned his talents to another clock for the inn. This one will seem to work by "perpetual motion." A croquet mallet pendulum will bat balls into baskets on the rim of a wheel, and their weight will turn the wheel, apparently activating the clockwork. Actually, a concealed motor will run the clock.



Stan Reha adjusts the clock he built for an inn at Vail, Colorado. It gets attention, but it also keeps time.

Clock Made of Jade

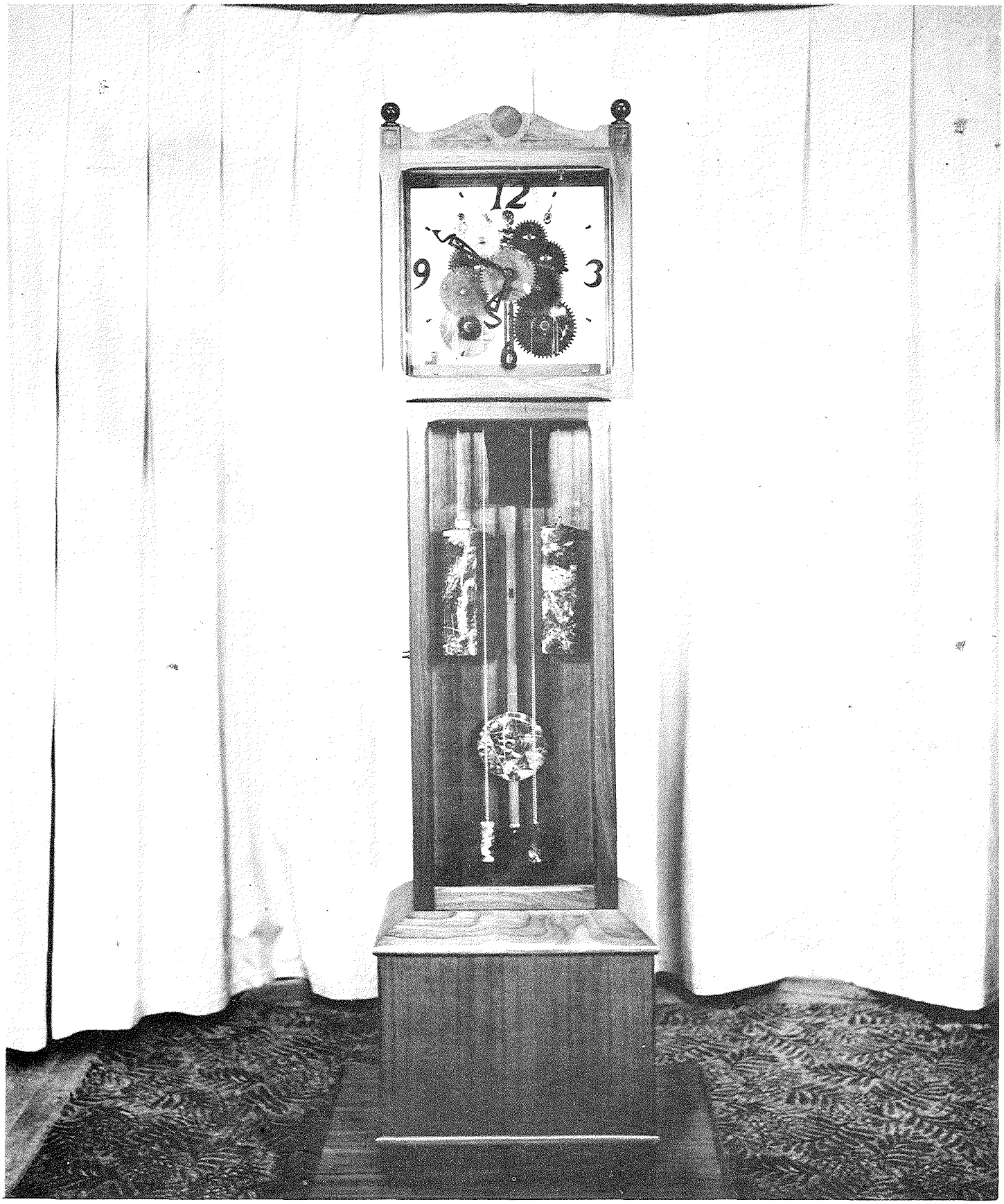
We have seen and heard of timepieces being made of all kinds of materials, but not one of jade. This, we believe, is the only one in existence, and to make it more important and interesting, the timepiece was completely made by a group of so-called "rock hounds" in San Francisco, California.

Back in 1957, Ted H. Bhend brought up the project idea to the members of the San Francisco Gem and Mineral Society. With the assistance of George Randolph and Henry H. Reinecke, they planned and carried out the construction of the jade clock aided by twenty-five other members.

To start such a project, they had Ted Bhend design and construct a wooden clock movement to make sure they could do the job in jade. Using the wooden movement as a pattern, the construction of the jade clock began.

Jade was donated and purchased to make the clock. Many hours of hard work, heartaches, and sacrifices went into the making of the clock. Catham emeralds were used for bearings.

The clock was partially finished when it was displayed in 1959. In 1962 the strike train was added. In that year the clock was displayed at the Gem and Mineral Fair in San Francisco, California.


12
9
3



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Glossaries and By-Laws

Summer is past, fall is here, and the programs of the affiliate chapters should be in full swing. AWI Bench Courses are booked into 1981, and many chapters are again providing needed service to their members.

However, based on the conversations I had with delegates at the last Affiliate Chapter Meeting and on the content of some of the Annual Affiliate Chapter Reports, many chapters are experiencing difficulty in attracting and holding members.

Louis Zanoni recently featured a glossary of electronic terms in this magazine. Perhaps the same format can be applied to this column, to help define problems encountered by all chapters, and to suggest possible solutions. We will begin with the letter A:

Apathy 1. lack of feeling or emotion
2. lack of interest or concern
3. impassiveness or indifference

One of the most common and troublesome afflictions faced by the typical chapter is the apathy demonstrated by many of its members. The apathetic member will pay his dues–perhaps with some prodding–and is generally content to let someone else take care of the nuts and bolts of the organization. He or she is apt to complain, but is always "too busy" to take an active part. This type of individual will always be a part of every organization, but his numbers can be reduced by making the simple effort to be friendly, to show him respect, and to make him feel that he is an important part of your chapter.

Apathy often infects the leaders also. Many times, the leaders have held office for so long (mainly because new leadership has not been forthcoming), that they feel they have run out of ideas, and they lack the enthusiasm typical of a new leader. Also, the sad fact is that some leaders are more interested in the title than in the responsibility. If this is the case, you–the member–must vote carefully the next time.



Robert F. Bishop

The cure for apathy is not simple. One inspiring leader can infect others with his enthusiasm, but for the most part, providing a good example and patience will accomplish the most. Your chapter should be sensitive to the needs and interests of the members and provide enough social activities to help make the apathetic member feel that he belongs.

From time to time, we will use the alphabet to underscore the problems and the benefits of the typical chapter. I will welcome your comments and your solutions to these problems.

Now to change the subject. At the 1980 Affiliate Chapter Meeting, I appointed Will Blakley, Bob Allis, Bill Givens, Charles Thayer, and Ben Matz to a By-laws Committee. They went to work quickly and carefully, and as a result, the delegates have approved our first set of by-laws. These were badly needed, and will give definition to procedures formerly governed by custom. Because I believe all members should be aware of them, they are included in this column:

Affiliate Chapters By-Laws

In accordance with section XVII of the Constitution of the American Watchmakers Institute, these by-laws shall govern all activities of the affiliate chapters.

Delegates are to be selected by each affiliate chapter; said delegate to assume office at the convening of the Affiliate Chapters Annual Meeting, and to continue in office until the ensuing annual meeting.

Officers are to be elected from the delegates present for a term of one year and shall not be eligible to serve more than two consecutive one-year terms. After an absence of one year, eligibility may be reinstated.

Officers, to be elected separately, shall consist of an affiliate chapters chairman and a vice-chairman. The chairman shall also serve in the capacity of Affiliate Chapters Representative to the American Watchmakers Institute board of directors.

The Affiliate Chapters chairman shall preside at all Chapter meetings; appoint all pertinent committees and a parliamentarian; assume responsibility for all affiliated chapters business and for the publication of the Affiliate Chapter column in the *Horological Times*.

The Affiliate Chapters vice-chairman shall act as recording secretary at all meetings and shall assume all the duties of the chairman should this become necessary.

The officers shall assume their duties immediately upon installation and shall retain said duties until the installation of their successors.

A nominating committee consisting of 3 delegates shall be appointed by the chairman. The duties of this committee shall be to present a list of qualified candidates to be voted upon separately by the delegates present. Nominations will also be accepted from the floor.

These by-laws may be changed or amended at any time by a two-thirds majority of those attending any meeting.

Orville Hagans Receives Yet Another Award

Recently, Orville R. Hagans of Denver, Colorado was presented with the first "Distinguished Mayflower Horological Achievements Award–1980" in a prestigious ceremony by James Chamberlain, President of the National Association of Watch and Clock Collectors, Chapter 75, San Fernando Valley, California.



Left to right: Orville R. Hagans being presented with the first "Distinguished Mayflower Horological Achievements Award–1980" by James Chamberlain.

The citation on the Distinguished Mayflower Horological Achievements Award is as follows:

BE IT RECOGNIZED that Orville R. Hagans is being cited as recipient of the "Distinguished Mayflower Horological Achievements Award–1980" for his long term distinguished international activities and contributions to the horological profession. The Mayflower is symbolic of the beginning of horology in America; and

WHEREAS he has been recognized by awards, commendations, and honors from international associations, industry, education, and government, and has acted as a catalyst for new ideas and concepts; recognized as an author, lecturer, curator, and dynamic leader; and

WHEREAS he has made outstanding contributions in the development and implementation in areas of horological scientific research and education which enhance the growth and prestige of the entire membership; and

(Continued on page 44)





...from all around the ASSOCIATION...

FLORIDA

The FSWA and the eight guilds wish to say "thank you" to Orville Hagans for the tremendous job he has done in the past years, and especially for making the profit of his book *The Best of J.E. Coleman* available to the American Watchmakers Institute to retire the mortgage. Some people never have time for anything, but this man keeps on working not for himself, but for AWI.

A super June picnic was held in Hollywood by the Greater Miami, the Broward, and the Palm Beach Guilds. Prizes were won and a special donation to Muscular Dystrophy was given. Everyone had a great time thanks to Sid Smith, Mel Liebman, and David Miskie.

Education is the name of the game as Florida guilds continue their seminars and work shops. Fred S. Burckhardt was present at the Lake Worth Seminar and disseminated much helpful information about gems. Mr. Paul Finne, president of FSWA, lectured on batteries and bench tips. Melvin Liebman was quite informative with his Atmos Clock repair course. Mel Koven of Rubins Stone House, Miami, gave an interesting talk on gems. Francis Hatchell of Portescap U.S. Vibrograph Machine Division explained the "Ultimate Timer for Testing Electronic and Electric Watches."

The September 7th seminar featured the famous gemologist, Joseph Tenhagen of Miami. Mel Liebman again presented his Atmos Clock repair program. Howard Opp, AWI instructor, presented a four-hour bench course on the Accutron, with all his great "tips" that only Howard can give.

A busy convention is planned for the 1st and 2nd of November at the Colonnades Hotel, Singer Island, Palm Beach, Florida. President Paul Finne has a Watchmakers of Switzerland seminar planned for Friday, October 31st, and another full-day digital bench course planned for Monday, November 3rd. The convention speakers will be Bob Moengen of Jewelmont, Louis Zanoni of Zantech, Mark Welland of Maxell, Tom LaRose of S. LaRose Company, Tom Lange of L & R Manufacturing Company, AWI's own Ewell Hartman (who will also be the banquet speaker), Bulova's Henry Frystak, Jack Schecter of Seiko, and Jacques M. Reymond of Watchmakers of Switzerland. It will be warm and lovely in Palm Beach the first of November. Everyone is invited to join the Florida members during their 15th anniversary convention. Co-chairmen Sid Smith and Charles Adams are planning a great time for all.

NORTH CAROLINA

Land of the Sky Watchmakers Guild presented a slide program from AWI at their June meeting. The slides were about the early Swiss Balance Wheel model watches. A discussion concerning shop problems and prices followed the slide program.

At the July meeting, Land of the Sky Watchmakers Guild members viewed another slide show by Henry Fried, entitled "Understanding the Chronograph."

Piedmont Crescent Watchmakers Guild held their June meeting in Mooresville, North Carolina. Mr. Joe Crooks, technical chairman and current president of AWI, presented an AWI film on production methods in watch repair.

The July meeting of the Piedmont Crescent Guild featured guest speaker Owen Dewar, who demonstrated an instrument called the "Gem Meter." Perhaps a few more watchmakers can now tell the difference between Cubic

(Continued on page 32)





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MODEL 1000

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- ***Simple to use.***
- ***Full service guarantee.***

Zantech's Model 1000 Digital Watch Monitor is a quartz watch (LED, LCD, Analog) tester and repair aid. It gives instantaneous readout of the watch's time base frequency without requiring electrical contact or disassembly of the watch. The Model 1000 is extremely accurate. Timing adjustments can be made quickly and easily with a minimum of effort. It is an indispensable tool for trouble shooting the oscillator circuit (quartz crystal, trimmer, etc.) of any quartz watch LED, LCD or Analog. Price $995.00 - inc. Analog Sensor. Probe - Model 1050A - $125.00 - inc. Analogue Sensor.

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Thank You Louis A. Zanoni, President

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(Continued from page 30)

Zirconia and diamond thanks to this informative presentation.

In June, the Coastal Plain Guild held their monthly meeting at Wayne Community College. Their program was on Seiko Slides No. 6139. The program for July featured a cassette program entitled "Your Responsibility for Customers' Merchandise."

The Cape Fear Guild held its June meeting at Faircloth's Clock Shop in Sanford, North Carolina. There was an interesting discussion on general repairs. July was the month for the Cape Fear Guild's 5th Annual Pig-Pickin'. There were approximately 115 present from North Carolina, South Carolina, and Virginia. Auctioneer Bob Shurla was able to auction off 99% of the tools and supplies that were on sale. The heat of the day (95° F) did not bother those in attendance; the guild rented the National Guard Armory which was air conditioned and very comfortable.

At the June meeting of the Triangle Watchmakers Guild, Owen Dewar presented an AWI film on "Removing Rust." The July meeting was used for planning and discussing the yearly picnic and fish fry that was held on August 3rd.

The Wayne Community College Watchmaking Guild held their July meeting at the Wayne Community College. Business discussed was a trip to Boones Antique Shop.

PENNSYLVANIA

The Allegheny Guild held its regular monthly meeting September 9th at the Ray Gaber Company in Pittsburgh. The officers met earlier at 6:30 for a dinner meeting.

The program subject was "Servicing the Antique Pocket Watch." Guild member Paul Fehrenback, who presented the program, has specialized in this field for many years. His presentation covered such facets of the subject as estimations, casings, case springs, learning how to recognize the troublemakers, and interesting repair techniques.

The Delaware Valley Guild held their first meeting of the autumn on September 15th at the Bala Cynwyd Library. The guest speaker was Bill Hilliard, whose topic concerned quartz analog movements.

The Delaware Valley Guild will soon be sending out questionnaires to their members regarding their particular areas of expertise. The purpose of this questionnaire is to advertise guild members' services among other guild members, so members can help each other.

OHIO

The quarterly meeting of the Watchmakers Association of Ohio will be held on Sunday, October 26th, 10:00 a.m., at the Marriott Inn, Columbus, Ohio. The usual hospitality room will be open on Saturday from 4:00 to 6:00 p.m. and 8:00 to 11:30 p.m. All members and spouses are welcome at the hospitality room to socialize and discuss items of mutual interest with the board of directors.

ILLINOIS

The first autumn meeting of the Central Illinois Watchmakers Association was held September 18th in Bloomington. The guest speaker was Mr. Ron Taylor, instructor in advertising at Parkland College, who discussed "Creative Advertising for the Jewelry Store."

OBITUARY
CHARLES F. MEZGER

Mr. Charles F. Mezger, 70, resident of Miami for thirty-four years, passed away August 12th, 1980.

Mr. Mezger retired in 1970 after twenty-one years of teaching watchmaking at the Lindsey Hopkins Vocational School in Miami. He enjoyed teaching immensely and was happy to see his students progress in their work. He will be remembered by his students as well as his guild and association friends.

Charles was a veteran of World War II, and a member of Harvey Seeds American Legion Post No. 29 along with numerous other organizations. He was a member of the local Greater Miami Watchmakers Guild, the Florida State Watchmakers Association, and the American Watchmakers Institute.

Mr. Mezger is survived by his wife Amelia, his son Clifford, daughter-in-law Vera, and grandchildren Charlene and Lori.

Take a bow
GEORGE
OR *when*
WASHINGTON
crossed the
DELAWARE
he laughed *all the*
way to the banks

What George wanted to do was cross the Delaware on Christmas morning, surprise the British, and secure a badly needed victory.

What he needed was boats. Specially designed boats that could hold fifteen tons of men and artillery. That could move in either direction. Boats that had a draft of not more than 20 inches.

Happily, Robert Durham, a new American, had already designed and built them.

And other new Americans invested their cash to buy them.

And Washington sailed into a victory that turned the tide of the Revolution.

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Use it with automatic or regular cleaning machines

Clean the smallest wristwatch or the largest pocketwatch assembled (Pocketwatch holder needed Z-113 P)

Our Z-113 for 6 movements

Upper disc with 6 small parts baskets, does not vibrate, no damage to delicate parts

Cap jewels do not have to be removed, as pumping action of wheels assure cleaning under cap-jewels
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Following is a list of calibers currently in the program:

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ESA 9157—13 L DATE Electronic	17.50
ESA 9158—13 L DAY/DATE Electronic	17.50
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ESA 9183—13 L DAY/DATE QUARTZ Analog	24.00
ESA 9200—6¾ x 8 L Electronic	17.50
ESA 9220—6¾ x 8 L QUARTZ Analog	20.50
ESA 9315—13 L (29mm) QUARTZ LCD	20.50

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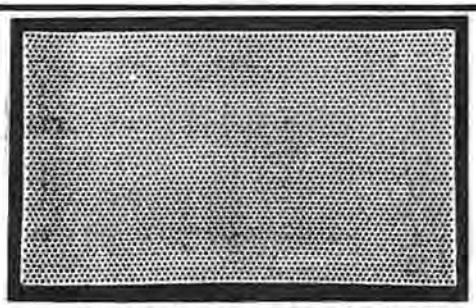
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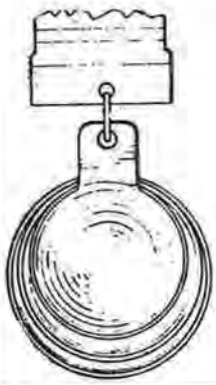
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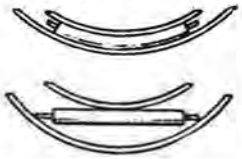
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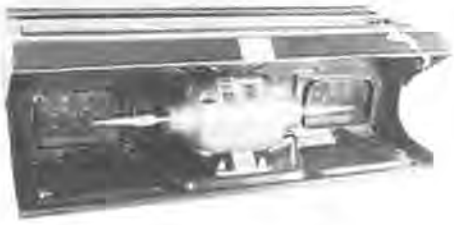


Joe S. Little, watchmaker and educator, died September 1, 1980 in Daytona Beach, Florida. After serving as a watchmaker's apprentice and as a U.S. Navy watchmaker during both World War II and the Korean Conflict, he took over the School of Watch Repair at the Mary Karl Vocational School in Daytona Beach in 1957. Two years later, the school became a branch of Daytona Beach Community College, and Mr. Little continued as Watchmaking Instructor and Program Chairman until his retirement in 1976.

Joe was a Certified Master Watchmaker, a member of the AWI and the NAWCC, and a former member of AWI's Research and Education Council. He was a past president of the Florida State Watchmakers Association, and held every office in that organization except treasurer. He was an officer in his local Guild and was active in several fraternal and professional organizations. The primary aim of his long, productive career in watchmaking was the furtherance of the education and technical skills of the bench watchmaker.

He is survived by his wife Alpha, daughter Mrs. James Jordan, and two grandsons.

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Comprehensive Accounting Corporation of Aurora, Illinois, provides a monthly bookkeeping, accounting and tax service to over 19,000 business clients through its nationwide network of franchised accountants.

QUESTION: Did you know that you may be able to deduct your spouse's expenses on a business trip?

ANSWER: Deductions for a business trip to attend a domestic or foreign convention are subject to the scrutiny of the Internal Revenue Service since the trip may be a vacation in disguise, especially when you take your spouse along. In order for you to deduct the expenses of that trip, you must first establish that the expenses are ordinary and necessary expenses in pursuit of your profession, trade, or business. In order to deduct the expenses attributable to your spouse's presence, you must establish and prove that your spouse served a bona fide business purpose and that there was a need for his or her presence.

Incidental services that your spouse may perform, such as doing minimal typing of notes or assisting in entertaining customers, generally will not be sufficient to warrant the deduction.

A case involving the deduction of travel expenses for a spouse which received much notoriety involved the late Walt Disney. Disney frequently took his wife along on business trips and deducted her expenses. The court found that Mr. Disney's business purpose in taking these trips was to perform duties as the chief executive of the company in attending sales meetings, screening films for exhibitors, participating in conferences,

TALK

dealing with marketing problems, etc. Further, he also was to promote the public image of the company as one engaged in family entertainment. In order to fulfill these duties, it was necessary for Mr. Disney to have his spouse with him at various luncheons, receptions, filmings and the like because her presence enhanced the firm's image. The court allowed the deduction for Mrs. Disney.

Another case involved the Bank of Stockholm, where the court found that the developing and renewing of personal contacts between bank officers was sufficient to allow the deductions for the officer's wife's expenses at banking conventions. The wife's presence enhanced the development of these personal contacts and was important in enhancing the image of the bank and its officers, which in turn aided the bank in developing business relationships with other banks.

In the event that you cannot justify the deduction of your spouse's expenses, all is not lost. You can deduct the expenses of the trip that you would have incurred had your spouse not accompanied you. Assume that you traveled for business by automobile overnight and you took your spouse along. Your hotel room for both of you cost $60 per day, but would have cost $45 a day for you alone. You can deduct the total cost of operating your automobile and you may deduct $45 for the hotel room in lieu of splitting the $60 in half and deducting $30. If you traveled by airplane and you received a discount on your spouse's ticket, you can deduct the full cost of your ticket even though the full cost exceeds one half of the total cost for both you and your spouse. To justify the cost of traveling alone versus traveling together with your spouse, you must maintain evidence to show what it would have cost had you traveled alone. HTIES



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Questions and Answers / Henry B. Fried



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

JOSEPH JOHNSON CONVERTIBLE

Q Please give me any information you can on the antique, chain drive watch shown in the pictures. It has an outer case which allows the watch to be carried either as a closed hunting case or as an open face watch. The case inner and outer shells and lids are 18K gold weighing approximately 2-3/4 ounces.

Thank you.

J. C. Renie
Klamath Falls, Oregon





A *I have examined your photos and am familiar with these types of watches and with the Johnson, Liverpool products.*

Joseph Johnson was a successful exporter, manufacturer, and dealer in both his own English-made and Swiss imported watches. He had a large trade exporting to the United States in the period from 1840 to 1860.

From the photos, it appears that while the movement is indeed of Lancashire (Liverpool) manufacture, the case is not, as it does not have any of the hallmarks associated with English requirements for precious metals (silver and gold). Also, the Swiss did make such convertible cases and watches. I have one such in my collection, as well as an American-made Elgin watch and matching case. However, the Elgin is not in solid gold, and the European model is silver. I would like to acquire one such as you picture, as mine are both stem wound.

Getting back to your watch, the hour hand is original, but the minute hand certainly isn't. The hour hand is very typical Liverpool post-1860 style used on both London and Liverpool watches.



Q During the restoration of antique clocks, I come across many Waterbury movements. Being particularly interested in Waterbury, I am anxious to contact the firm in an attempt to obtain information that will enable me to determine the age of the clocks I restore.

In a letter just received from the Consulate General of America in Australia, your name and address was provided as the best means of locating the correct name and address of the makers of Waterbury clocks.

Any assistance you can give to me in this matter will be greatly appreciated.

R. Elton
Mackay, Queensland, Australia

A *The Waterbury Clock Company is no longer in business. They operated from 1857 to 1944. They produced a great variety of clocks of all grades and designs. The best manner in which to determine the age of these clocks is to obtain reprints of their catalogs which are now available. I have virtually a complete set of their catalogs—mostly originals—and from comparing photographs with the illustrations in the catalogs, I can at least determine the year in which a clock was introduced.*

These catalogs may be obtained by writing to the Adams Brown Co. of Exeter, New Hampshire 03833. They are booksellers and publishers of many of these reprints, as well as reprints of numerous other American clock and watch company catalogs.

Q I have a 21 size, or 45 cm, Rockville watch. It is a keywind and set, 11 jewels, number 50248 in a silveroid case, number 1018902.

The hairspring on this watch is above the roller table and below the balance wheel on the hub. It is pinned to the back plate, and the regulator is mounted on the back plate, fitted friction tight in the recess of the balance hub.

Rockville Watch Co. is engraved on the back plate and printed on the dial. I have never heard of this company or of the hairspring being mounted on the

(Continued on page 40)

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balance in this manner. The watch is keeping very good time.

Could you give me any information you might have on this company, and also tell me how old the watch is and how rare it might be.

Thank you.

John W. Harrison
Lincoln, Nebraska

A The Rockville Watch Company was a "phony" name of a Boston calibre Swiss movement. The name was engraved to fool the American buyer into thinking that this was an American-made watch.

These watches appeared with such names a Brooklyn, Boston, Waldham, and others. These were made mainly by the Marvin Watch Company, but others in Switzerland made them as well. For the most part, they were poor quality watches, but in the general pattern of the American-made Waltham movement of the 1860 period. Many with underslung hairsprings were produced.

Congress in 1874 soon put an end to this practice and forbade any foreign-made product to appear or be permitted to enter this country without the country of origin clearly stamped or engraved upon it. Such items also could not display the name of an American state, city, county, etc.

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FORMING OVERCOIL HAIRSPRINGS

PART II

Last month's article concluded with a lengthy explanation of how to establish the final vibrating point for an overcoil hairspring. In practice, the calculations and the preparation of the hairspring should not take more than five minutes once the procedure becomes familiar. After the final vibrating point has been established, the next step is to raise the overcoil. (As last month's article concluded with step #6, we shall now proceed with step #7.)

7. Determine the starting point of the overcoil by placing the spring over the selected drawing.

The Bossart curves which I prefer show the location of three significant points. See Figure 1. Point "A" is the starting point of the overcoil; point "B" is the vibrating point before overcoiling, and point "C" is the vibrating point after the overcoil is completed. To find the starting point of the overcoil, we place the vibrating point over point "B" and center the spring on the drawing. The starting point is then directly over the point "A" on the drawing.

8. Decide on the location of the knee-bend.

The knee-bend should be completed approximately one millimeter before point "A" so that the overcoil lies in one plane. The length of the spring needed for the knee-bend is not always the same, but must be estimated according to the height of the overcoil. It is customary to limit the bending angle to 30° or as close to this as possible. The reasons for this rule are rather simple. A sharp bend stresses the spring beyond its elastic limit, and the greater the angle, the greater the stress. Angles of less than 30° would make the knee-bend much too long and create the possibility of it hitting the stud. Thus, if we adhere to the 30° angle of bending, the length of the knee-bend will depend on the height of the overcoil. The higher the overcoil, the longer the knee-bend will be and vice versa.

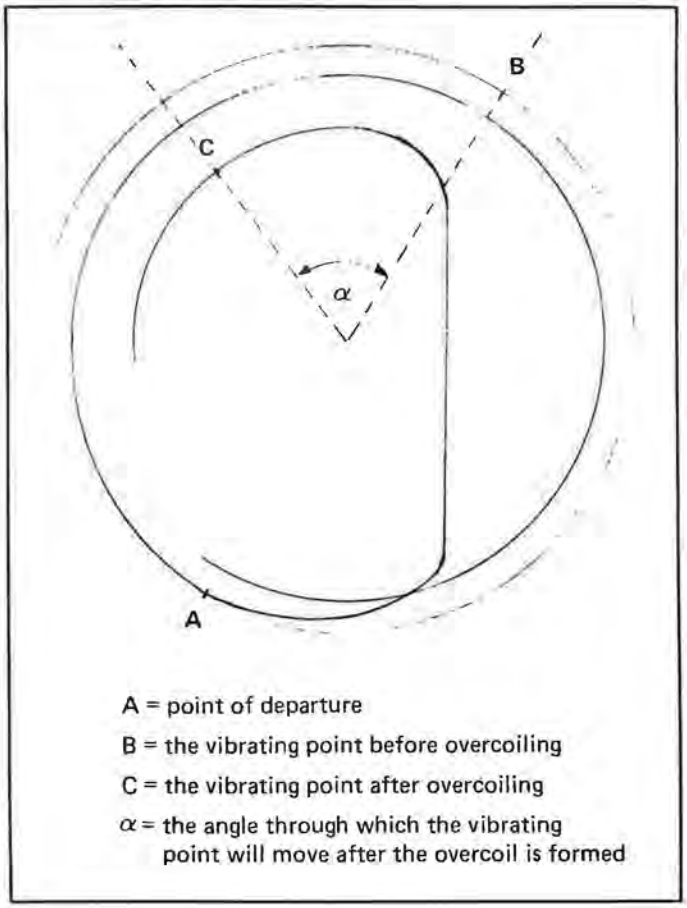
9. Raise the overcoil.

Different methods for raising the overcoil have been described in many books on hairspring work. One of the best methods is to use special overcoiling tweezers #9. These have an adjustable plunger to clamp the spring and a stop-screw to ensure equality of both bends. For those who plan to specialize in hairspring work, these tweezers are essential, but as most watchmakers will only make an occasional overcoil, they are too expensive an investment for the amount of work and time they would save.

Another kind of tweezers can be prepared from an old pair by drilling a hole through the points. Fit a pin friction-tight on one of the tines, and slightly enlarge the hole in the other so that the pin can pass through freely. See Figure 2. If we wish to make sure that both bends are made with the same angle, we could prepare a brass plate and drill holes of different diameters and depths. The tweezer points should be made to enter the holes to slightly varying depths so that hairsprings of different coil widths could be bent to the same angle. The tweezer points should be slightly rounded to prevent deformation when forced to the bottom of the hole. The holes should be drilled near the edge of the plate to provide clearance for the spring when the second bend is being made. See Figure 3.

Both methods described above require a pair of special tweezers. However, overcoils can be made quite successfully without any special tools. An ordinary pair of No. 1 or No. 3 tweezers can be used with a minimum of alterations. Perhaps the only change that is recommended is to gently stone the sharp inside edges with an arkansas slip to prevent the tweezers from cutting the spring. The overcoil can be raised by forcing the tweezers into soft wood such as a brush handle or a buff stick while holding the spring rather tightly between the points. Since there is no pin to stop the spring from sliding up the tweezers, the grip should be rather firm while the points are tapped into the wood with a brass hammer. Some

Figure 1. Four important reference points



watchmakers prefer to press the tweezers into the wood, but tapping with a hammer gives much better control of the force applied to the tweezers. Any small adjustments are much easier to perform this way.

Before the attempt is made to raise the overcoil by any method, it is advisable to use the outer coils which have been removed to make a few experimental bends. While making the bend, it is recommended that one inspect the progress several times to make certain that the first bend is not too steep. The tweezers can be placed in the same hole in the wood repeatedly until the correct angle of the overcoil is obtained. The second bend should be made after careful consideration of the proper height at which the hairspring must be grasped. The tweezers should be driven into the wood near the edge so that the apex of the angle formed by the bend lies near the edge of the wood. Care must be taken that the wood does not crack during this operation. Such misfortune could lead to disaster. The second bend is to be raised to the same angle as the first one, but by this method the only control available is visual inspection. If the bend is made too high, it is possible to reduce it by reversing the spring, grasping the apex of the bend, and gently forcing the tweezers into the wood. During this operation, the overcoil is usually slightly distorted and must be corrected before proceeding to the next step.

10. Level the raised coil and make it concentric to the rest of the spring before the overcoil is formed.

It is essential that the hairspring be observed from a distance of about three to four inches with the loupe centered perpendicular to the hairspring. This is necessary in order to see if the raised coil is concentric to the rest of the spring.

11. Place the spring on the model overcoil previously selected so that the vibrating point lies on point "B."

When the spring is centered, point "A" will indicate the location of the starting point of the overcoil. Bend the spring as the model drawing indicates with long gentle bends which produce no kinks. This is best achieved by using a pair of ordinary tweezers such as #3 or #3c and a fine point made from a broken oiler or something similar. The special tweezers #10/00, 10/0, or 10/1 should be avoided, although some books recommend them. It is virtually impossible to use them for straightening or reshaping of the spring without kinking it more or less severely, depending on the skill of the craftsman. The only place these tweezers can be used effectively is where a definite bend must be made on the overcoil such as at the beginning of the straight part and at the beginning of the regulating arc. Even there they should be used carefully. They must be held perfectly perpendicular or the overcoil will either rise or dip toward the spring, depending on the direction in which thay are tilted.

The shape of the overcoil should be reproduced as closely as possible to the drawing. If part of the overcoil is supposed to be straight, then it should be made straight. There is an optical illusion, however, that occurs when the spring is viewed from the top; the straight part will appear to us quite straight while it is still considerably curved. To avoid this illusion, we can either place a piece of paper between the spring and the overcoil, or we can tilt the spring sideways and sight along the straight part as we would along the barrel of a shotgun. Reproducing the shape closely is important so that the length and the center of gravity of the overcoil are the same as those on the drawing.

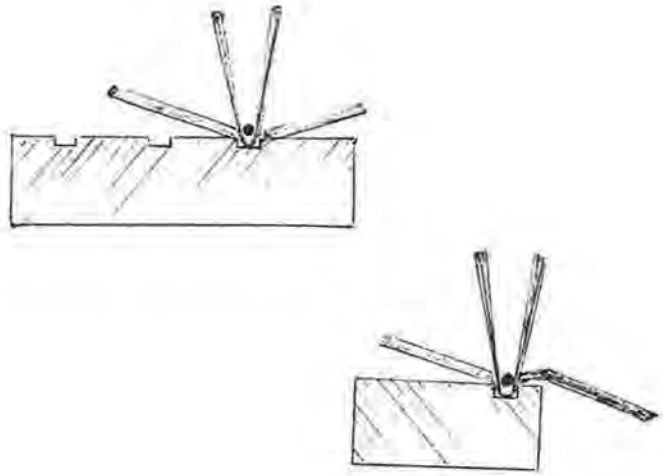
12. Form the regulating arc.

This operation can be done more accurately if the exact location of the regulating arc is determined by direct measurement. If the regulating arc is made too close to the center or too far away from it, the hairspring will not be concentric when placed in the watch. To determine the exact location of the regulating arc, place the hairspring on the balance bridge and center the collet very carefully over the balance jewel. Observe carefully which coil of the hairspring fits between the regulator pins, or how near it is to them. The regulating arc should be made exactly above the space which fits between the pins. It is essential that it be a perfect arc of the circle without any kinks on the coil. TIMES

Figure 2. Front and side views of a pair of tweezers prepared for making the knee-bend



Figure 3. Front and side views of a brass block with holes for making the two bends to the same angle.



ORVILLE HAGANS

(Continued from page 29)

BE IT RESOLVED that Orville R. Hagans be publicly recognized for his outstanding contribuitons and achievements.

On August 10, a more intimate ceremony of quite a different nature took place; on that day, Orville Hagans was on the giving rather than the receiving end. While celebrating his 84th birthday with twelve of his close friends, Mr. Hagans arranged for the American Watchmakers Institute to receive a birthday present; he chose this time to formally assign to AWI the rights of a new book which he is preparing. This book is based on the works of William H. Samelius. It will be titled *Wm. H. Samelius–Information Please*. Samelius, as most people in the trade know, was the director of the Elgin Watchmakers College when the Elgin Watch Company was operating out of Elgin, Illinois. He was one of this country's most respected experts in the field of horology.

Terms of the contract call for the profits from this book to be placed in escrow until such time as the American Watchmakers Institute can proceed with the purchase or construction of a larger headquarters office. It is planned that the new facility will include adequate space for the AWI administrative offices and the offices of the *Horological Times*. The facility shall also include much more space to accommodate the expanding AWI Museum and Library. Once expanded, the plan is to open the museum to the public on a regular daily basis. In order to do this, AWI eventually will need a competent, full time curator–one who can live on the premises and maintain the museum.

Because the new book *Wm. H. Samelius–Information Please* will contain a lifetime of teachings in the field of watches as well as clocks, it is expected to be one of the most sought-after horological books of the century. The book will retail for $30 postpaid. The first 500 copies sold will be sequentially numbered which will make them instant collectors' items. AWI is now accepting advance orders for this book which should be available for delivery early in 1981. Orders should be sent to: *Wm. H. Samelius–Information Please*, AWI Central, 3700 Harrison Avenue, Cincinnati, OH 45211. Checks should be made payable to the AWI Press.



Pictured left to right: Lawrence Jansen, Milton C. Stevens, Henry J. Koops, Orville R. Hagans, and Aaron Seiver. Mr. Hagans and Mr. Stevens are actually signing the contract, while Mr. Jansen and Mr. Seiver act as witnesses. Mr. Koops served as the notary.

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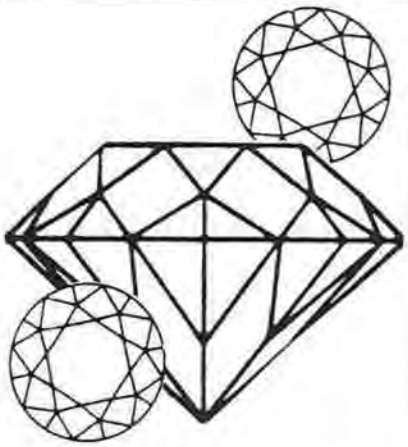
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John Farrell, AWI's First President, Passes Away

JOHN FARRELL, AUTHOR of the AWI Constitution and AWI's first president, passed away July 29, 1980 at his home in Detroit, a victim of cancer. Born in 1913 and raised in Detroit, he graduated from Southwestern High School and later attended Lawrence Institute of Technology. He began his work career following in his father's footsteps at American Brass, employed in the tool and die shops.

During World War II, he served his country as a Department of the Navy civilian and received the highest civilian award for his critical skill and the invention of a universal rotating index target.



John Farrell 1913-1980

After the war, he succeeded in securing a position as a tool and die maker with the Diesel Division of General Motors. He also began his lifelong avocation as a watchmaker. His skills in both areas earned him a transfer to the General Motors Research Laboratories in the early '50's where he settled into his work in electronics and instrumentation.

His interest and skill in watchmaking earned him the title of Certified Master Watchmaker. His skills did not go unnoticed by his peers, and a flair for organization saw him aid in the organization of the American Watchmakers Institute. He authored AWI's Constitution, a document which has stood the test of time and which remains essentially unchanged. He also became the first president of AWI. He contributed an article on horology to the *Book of Knowledge* and is listed in *Who's Who in Jewelry*.

His career at General Motors was no less distinguished, for during his nearly 31 years of service, he was responsible for 29 patents and became a recognized leader in microminiaturization. He retired from GM in November of 1978.

Those who knew John knew him to be quiet, unassuming, methodical, and always the consummate professional. He is survived by his wife Dora, to whom he was married for 43 years, his son Bruce, daughter-in-law Dorothy, and three grandchildren.

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CANADA

THE PICKLE BARREL

By Marshall F. Richmond, CMW



PROFIT WITH QUALITY WORKMANSHIP

Many workmen who can make repairs of the highest quality are still barely able to make enough money to maintain a decent standard of living. There can be many reasons for this. Some workmen do not have enough confidence in their abilities to charge a good price for their work; some are afraid that if they raise prices, they will lose business to their competitors; others are such devoted workmen that **they will not take time away from the bench to figure their cost of materials, their time involved, and their general overhead expenses in order to make charges on a time and material basis.**

The most important thing to remember is to always produce a fine quality repair—one that not only leaves the article looking as new as possible, but also makes the article at least as strong and durable as when new. If you can do this, it will be easy to earn both a reputation with the public and the self-confidence to make adequate charges, producing a professional income. For those lacking in self-confidence, there are seminars available which provide training of all types from the most basic to the most advanced. These seminars are rarely so costly that a person cannot regain his investment within a very short time by putting into practice the skills learned. As I have observed over many years of attending seminars, most craftsmen who attend these are prosperous; if you look into the parking lot, you can see many symbols of success. The less prosperous do not attend seminars and will not belong to trade organizations to keep up with the newest developments in our rapidly changing industry.

From the standpoint of making money, salesmanship is as important in service work as the work itself. Even though we love our work, we still have to make a living. When work is taken in for repair, a careful estimate should be given and a price quoted which the customer can then expect to pay when picking up the job. Rarely will a customer complain about the cost if he knows in advance what the charge will be. In some rare cases, due to unforeseen problems in making the repair, the estimate must be raised. The customer should be informed and given the choice of paying the extra amount or picking up the job not repaired. This takes us back to the procedure to be followed in taking in the repair. Always get the correct name, address, and phone number; make a note on the job ticket or envelope of the time of day they can be reached by phone. A description of the article should be listed as well as the value placed on the article by the customer in case of loss or damage. The risk of handling delicate jewelry or stones should be thoroughly explained as part of the sales talk in selling the repair job. Most important, the work to be done and the price agreed upon should be written on the job envelope or repair ticket. Repair tickets and job envelopes are available which provide space for all this information as well as a place for the customer's signature which makes this a written agreement. All of these things are as important to operating a profitable repair business as the cost of material. It follows that when making estimates, consideration must be given to the time consumed in taking in the repair as well as the actual time spent repairing the item, as this preliminary work requires as great a skill as producing a quality repair.

In watch and jewelry repair, probably the largest cost factor is material. I will refer to jewelry repair, which has been the subject of this series. Most jewelry repairs require the use of precious and semi-precious metals and stones, and the materials are available from many sources. Pre-fabricated findings are a must, as we cannot compete with mass-produced findings with our own hand-crafted work. However, like all other items stocked in the jewelry business, findings should be marked up with a profit equal to watches, rings, or other items for sale. Each piece of material should make a profit in addition to the labor charge. The markup should be keystone or better as the overall turnover is slow and many items will be in stock for months—some for years. Gold and silver sizing stock is very expensive, so to stock it in half-round and flat in all the sizes needed

can cost several thousand dollars at today's prices. Years ago I found a way of maintaining a complete stock of gold and silver that costs very little. I save all the little scraps, even the filings, for salvage. When remounting customers jewels, I always try to get the customer to let me keep the old mounting by offering them a credit against the cost of the remount job. When enough is accumulated, I melt it down and pour it into an ingot mold that makes a small sheet about 2 mm thick. To obtain the karat stock I need, I sort the scrap into 10K, 14K, and 18K. Some dental scrap will be as much as 22K. This is weighed and figured when melted to come out to the karat I need. To lower the karat, copper and nickel can be added which will also, when used properly, produce the color gold needed. To melt gold, I use a small crucible and the large jewelers' torch with the largest tip. After cooling, the 2 mm plate can be reduced to 1½ mm for general work. Pieces can then be sawed from it and further reduced with the rolling mill. I keep the 1½ mm sheets in yellow and white gold and also in silver. I also keep some of the 2 mm for sizing heavy shank rings. In addition, I keep in stock white and yellow gold and silver wire in .8 mm and 1 mm diameters. After the gold has been melted two or three times, I send it to a refiner to be refined to fine gold and then alloyed back into karat gold. I do this because every melt down deteriorates the alloy balance, and eventually the gold stock becomes porous and is no longer satisfactory for use in making repairs. When I send the gold to the refiner and request specific sizes and karats of gold in return, the refiner keeps part of the gold in refining charges. I have figured that about one-third of the gold sent is applied to the refining charge. Since I do not make my own wire, this is the way I get the gold wire used in prongs, etc. The .8 mm wire is the size used in making pierced earring posts, so with this I often make my own posts for clutch or screw-type pierced earrings. Although you may miss the fat checks for old gold, the reduction in gold material bills is far greater than the checks you would receive.

When in jewelry school, we were told of a rule of thumb governing pricing on watch and jewelry repairs: 10% of the total retail cost of the repair should be material. If the repair is ten dollars to the customer, your cost of material at wholesale should be one dollar. This cannot be figured on each individual job, but at the end of the month, one should figure the gross on repair and total the cost of material used. This should figure around 10% if you are charging enough for your labor. If the cost of material is more than 10%, then prices should be raised. Over the years, I have checked this many times when thinking my prices were out of line, and usually a price adjustment was made promptly. Many craftsmen to whom I have spoken say that this cannot be right considering the soaring cost of material. My reply is that wages are soaring along with material prices, and you have to pay as much for a pound of coffee or a new car as the worker making the big wage; it will still balance out consistently with the current economy of the country. Years ago when prices were low and I was operating a retail jewelry store, I did not have time to do all the jewelry work. Therefore, much of it was sent to a trade shop. A salesman for the trade shop apologized for having to raise the price of sizing down a ladies' thin ring from one dollar to two dollars. I immediately answered that, as I keystoned the price, it was quite agreeable with me; instead of making one dollar profit on the job, I would make two dollars for the same effort. This is considered ethical and is always a good business practice as long as a high standard of quality is maintained in the repair. It is always better to raise prices and maintain high quality work than to cheapen the quality to keep from raising the price. In working a small (one person) operation, the craftsman has to take in the work and make the estimates, meeting the customer directly. Conversation can be the most expensive cost of operation if he is too friendly with them and drags out the time with talk not related to the job. The time spent taking in a repair should be made as short as possible, while still obtaining the information outlined previously, offering any explanations involved, and answering any questions the customer may have pertaining to the repair. This requires diplomacy and salesmanship, but pays dividends in allowing more time at the bench. In addition to the time taken in meeting the customers, it will take a few minutes to regain your train of thought and find your place on the job which was interrupted.

As I have stated previously, you make your money at the time you make the estimate on the repair. Customers will pay the price if you can show in black and white the costs of time and material. Therefore, another good way to get more for your repair is to list each piece of material to be used and the labor charge involved on a scratch pad or the job envelope. Total these items and quote this total as your estimate. For example, if a job comes in for a new head and reset, list the cost of the head at retail price, the cost of gold solder used in installing it, plus the cost of installing, setting, and finishing (filing and polishing). When this is totaled in the customer's presence, the cost of the repair will be clear. Rarely will a customer refuse to have the job done that is presented in this way, and when the work is delivered, there will be no misunderstanding concerning the price. It is a good idea to mark this price on the claim check also.

Quantity buying can be profitable as many material items are available at quantity prices. If these items are fast moving and you can use a hundred lot or a gross lot in a few months, it is wise to buy in larger quantities as the cost is often less than half the cost of a single piece. When pricing these items, they should be marked up from the price of a single piece. This will increase your profit and give a return on the money invested. In buying slow-moving items such as rarely used stones or odd shaped settings, it is wise to order only what you need to complete the job at hand; ordering extras of these can cause them to lay in the material cabinet for months or years. Unwise buying in quantity is like buying something on sale that you do not really need or want just to save money. Buy only what you need and can use so dead stock will not be eating away your profit.

THE PICKLE BARREL

It has been my observation that the craftsmen who operate in a professional, business-like manner are the prosperous ones. They take time periodically to analyze their cost and price structures. These are the same people that are always present at seminars, trade shows, and demonstrations; this is where they get the know-how to keep up with all the new developments in the trade that will help them make more money and upgrade the quality of their work. They are also members of their trade orgainzations, taking an active part in local, state, and national activities.

In the eleven previous articles, I have covered most of the basics and much advanced information about jewelry repair. I would like to invite inquiries on specific problems you may be having in jewelry repair, and I will try to cover such inquiries in future articles. The next article will be a discussion of the hazards and dangers in watch and jewelry repair that I have personally encountered, as well as some that have been related to me by other watchmakers and jewelry repairmen. TMES

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Bench Tips / Joe Crooks



TWO CLOCK TIPS

Our two clock tips this month are from Mr. Sigvald T. Jenssen, 2933 Maple Drive, Fairfax, Virginia 22031.

HOW TO QUICKLY REMOVE EXCESS EPOXY FROM CLOCK GLASS

I recently had a customer call me to say she was going to pick up her clock in an hour. I had epoxied the glass in the day before and had not installed the bezel. When I picked up the bezel, the epoxy had run to the front of the glass, and there were three pea-sized balls of epoxy which I could not possibly remove in an hour. Then I had a brilliant idea and took it off in seconds with a hot soldering iron. **Do not inhale these vapors as they are toxic!**

Editor's Note–When replacing Mineral Crystals in watches, the small battery-powered electronics soldering irons do a good job of removing old epoxy from the crystal groove.

Use a large tip and file a 90-degree angle on one side of the tip to fit the bezel groove. Slowly go around the bezel. The remaining epoxy will be crystalized and can be easily removed with a screwdriver.

HEAVY NYLON CORD STOPS SILK-SUSPENSION CLOCK

I recently had an early silk-suspension French clock in for repair, and I did a complete overhaul. However, when the clock was started, it ran for a fraction of a minute and stopped. After several unsuccessful attempts to get it running, I disassembled the clock and went over it with a fine-tooth comb. I reassembled the clock, but the end results were the same; it would not run. Then I noticed the pendulum dancing on its last few swings, and I realized what the problem was; the nylon cord was too heavy. I installed a lighter suspension cord, and that took care of the problem. If you have a dancing pendulum, you have suspension problems.

Editor's Note–Skee, you are so right! These clocks were designed to run with no resistance at all (if possible) on the pendulum suspension.

I still use silk thread. It doesn't last as long as nylon, but I love that motion.

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Basic Gemology for the Repair Shop

THE ROCK QUARRY

By Fred S. Burckhardt



Opals

Opal is one of the birthstones for October, so chosen because of its array of colors which simulate the colors of Autumn. A gem opal's beauty is unsurpassed, but so is its fragility. It is one gemstone that must be worn and handled with care. If you should take one in at the repair counter, look it over carefully to see if it is chipped or cracked. Keep opals away from the ultrasonic cleaner, boil-out pot, and steamer.

The opal's rainbow effect, called "play of color," has fascinated opal lovers for centuries. Since opal is a solidified gel, it was first thought that this play of color was caused by tiny cracks in the stone, created when the gel dehydrated. Recently, with the aid of the electronic microscope, the structure has been found to consist of tiny spheres, arranged in a manner similar to lattice work, with voids between the spheres. This arrangement of spheres and voids produces a diffraction grating which breaks up white light entering the stone into the colors of the spectrum. Certain opals will only display a few colors, depending on their potential for wavelength diffraction. When light is broken up into the spectral colors—red, orange, yellow, green, blue, and violet—the red wavelength travels the greatest distance and the violet wavelength the shortest. Therefore, when the maximum wavelength that can be diffracted by a particular stone is green, you will be able to see green, blue, and voilet because blue and voilet are shorter wavelengths and will also be displayed. If the maximum wavelength diffracted were red, then you would be able to see all the colors. As one legend says, "When God finished painting the universe, he scraped his palette clean and dropped all the colors into one stone—the opal."

Opal did fall from favor for awhile, and it was considered bad luck to own or wear an opal. This was attributed to Sir Walter Scott's novel *Anne of Gerstein* in which Anne's grandmother, Lady Hermione, owned an opal which changed color, depending on her mood. She wore the stone constantly, being careful never to get it wet. At the christening of her baby daughter, some holy water was sprinkled on it, causing Lady Hermione to swoon. She was carried to her room and put to bed. The next morning there was nothing left of her but a small pile of ashes. Remember, this is just a story. If your wife wears an opal, don't go throwing a bucket of water on her and hope for the same reaction!

Basically, there are three body or background colors of opal: white, black, and red. Water opal is transparent. Low grade opal, called "potch," used to be discarded or used as a base for opal doublets or triplets. Now some of it is being plastic impregnated to bring out the play of color. Other opals are soaked in a sugar solution and burned. This simulates the appearance of a black opal.

Much of the world's opal mining is done by primitive methods in the outbacks of Australia. Claims can be filed for 150-foot-square lots. Usually it's a matter of finding a likely place, digging a hole, and hoping for the best. An old watchmaker friend of mine, Pancho Billabong, studied opal diggings and left for Australia several years ago. He knew that most opal is found in veins and was fortunate enough to find a vein. After digging for several yards, he found it ran as straight as an arrow. Playing it smart, instead of filing the normal 150-foot-square claim, he staked a claim one foot wide by 22,500 feet long. As luck would have it, the vein turned after ten feet. However, rather than lose everything, he went ahead and dug a ditch, filled it with water, built several small bridges, and charged the other miners for walking across. He made a fortune!

During his stay, he—like many others—dug his house in the side of a hill. Not satisfied with just one room, he decided to add a bedroom. It was too shallow above so he dug underneath. After that he added an attic—below the bedroom. Everything was fine until a heavy rainstorm hit. The water dripped down through the bedroom and flooded the attic. What I don't understand is, if Australia is known as the "land down-under" why the water didn't drip up? I guess I had better stick to watchmaking. I never was much good with physics.

"As one legend says, 'When God finished painting the universe, he scraped his palette clean and dropped all the colors into one stone – the opal.' "

THE SHIP'S CHRONOMETER

(Continued from page 23)

The Naviquartz II movement (Models 1202, 1207, 1208) has a stepping second hand which is doubly locked between steps. The second hand is driven electrically under the control of the electronic circuits, while the minute and hour hands are linked to the second hand through a train of gears. The frequency of the quartz time base is 16,384 Hz, and it is powered by three standard 1.5 v., UM-1 type batteries with a life expectancy of one year. See Figure 4.

The Naviquartz II series does not have a built-in battery voltage tester. However, the Naviquartz III, model 1215, which has a time base of 32,768 Hz, has a built-in voltmeter. The testing of the Naviquartz II models is accomplished by an accessory instrument, the Navitest. When plugged into the chronometer, the Navitest not only indicates the battery voltage, but also makes possible the uninterrupted operation of the chronometer during battery change. Both functions are accomplished by inserting the Navitest jack into the 1 Hz socket of the chronometer.

Under battery test conditions (with the jack inserted and the switch on the "TEST" position), the voltage of the chronometer goes to the meter through a 6.8 K Ohms resistor. An insufficient voltage will result in an inadequate deviation (4.5 V gives full scale). Two-thirds deviation corresponds to 3 v.

When the Navitest switch in on the "ALIM" position, its own internal battery feeds into the socket. This maintains the 4.5 v. in the chronometer, and now the batteries can be removed without the chronometer stopping.

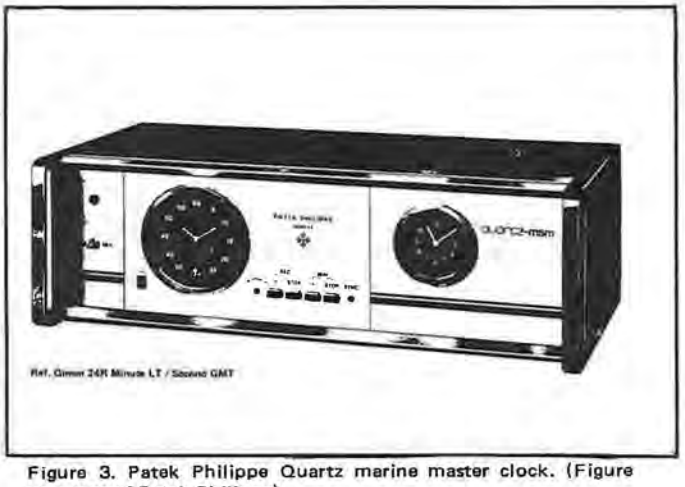


Figure 3. Patek Philippe Quartz marine master clock. (Figure courtesy of Patek Philippe)



Figure 4. Patek Philippe Naviquartz III. (Photo courtesy of Patek Philippe)

A large stepping sweep second hand indicates the seconds steps on a large peripheral dial measuring 98 mm (3-7/8 in.) in diameter. On the model 1202, the minute and hour hands of lesser dimensions are clearly indicated on a separate dial. The hands and the Arabic dial markings are white, showing clearly against the black background. Both a 12- and a 24-hour dial are available. Models 1207 and 1208

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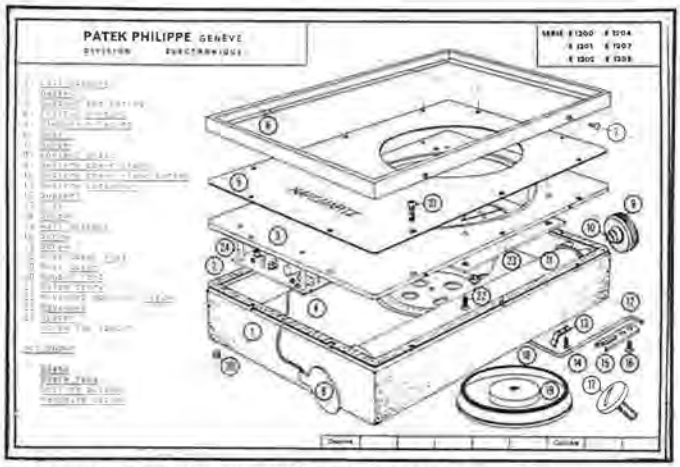


Figure 5. Exploded view of Patek Philippe Quartz Chronometer movement. (Figure courtesy of Patek Philippe)

come with black hands and have a dial with Roman numerals. The face plate and dial of the 1207 has a silver satin finish, while the 1208 has a gilt satin finish.

The solid state electronic circuits are mounted on a single printed circuit board. The basic frequency is provided by a quartz crystal oscillator at 10 Kc and is reduced by a series of dividing circuits to provide an output at a frequency of one (1) cycle per second. The frequency correction is made by a trimmer capacitor which is accessible from the outside. A three-position spring loaded and self-centering control switch either advances, slows, or stops the movement according to the direction and the duration of the operation.

The Naviquartz circuits are mounted within a cast metal box. A heavy face plate completes the enclosure. Affixed to the rear of this face plate is the stepping motor and the printed circuit board. The electronics and movement controls can be reached from the rear of the case after removing the waterproof metal cap. The battery container, assembled in the casting, is accessible only through a rear exterior screw-on cover plate. See Figure 5.

The electronic circuitry consists of three parts: (1) oscillator (2) division chain (3) output circuit.

The quartz crystal oscillator is cut for a frequency of 10 Kc. Adjustment of the crystal is achieved by tuning the series capacitor. The output of this section is a square signal wave of 1 volt, peak to peak, which is fed into the division chain.

The divider is a chain of monostable devices using integrated circuits. Within the division chain are the stop and advance circuits. These two functions are introduced by a double throw manual switch which automatically returns to its central point. The "STOP" position simply grounds the signal as it travels down the dividers. The "ADVANCE" is connected to another circuit in the last stage, which is then divided by two (2) instead of four (4), thus doubling the output frequency.

The final or output stage provides the two-pole switching required to drive the step motor. The imput at this stage arrives at a frequency of one cycle and produces the final polarized inverted 1 Hz signal.

Trouble shooting, where measuring equipment is not available, can be carried out by following these procedural steps:

1. If the Naviquartz is running either too fast or too slow, adjust by moving the trimmer. Running too slow could also be caused by a diminishing voltage; in this case, replace the batteries before adjusting the trimmer.
2. If the Naviquartz is stopped, try a replacement battery.
3. If this procedure does not cause the chronometer to operate, open the instrument. Examine all connections, wires, etc. If all are in order, disconnect the output terminals to the movement, and try a new movement. If it does not work, replace the printed circuit board with a new one. The only other possible cause then is the battery container and its connection. **Note: Always remove batteries before disconnecting or connecting the movement.**

The Naviquartz is opened by the removal of the face plate. First, remove the bezel by removing the screws along

(Continued on page 54)

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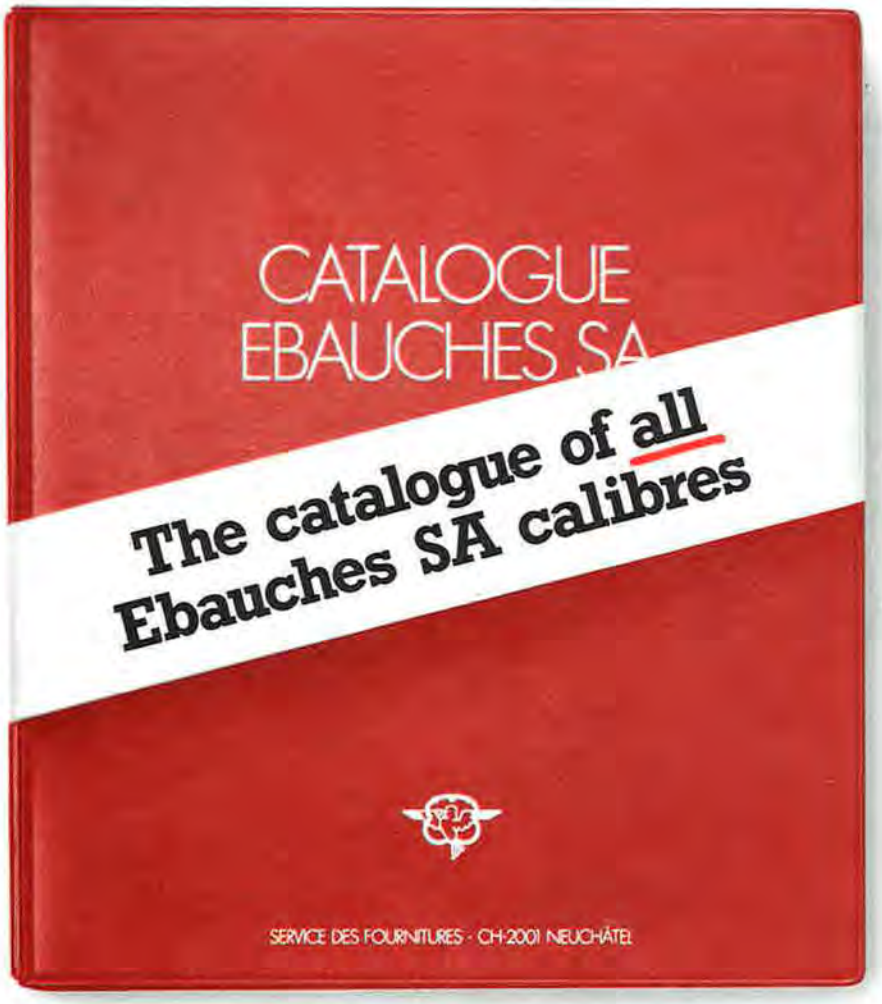
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(Continued from page 52)

its outer edge. Take care not to damage the chrome or paint work. Then remove the eight Allen screws which retain the front plate. Finally, after disconnecting the battery connections, carefully lift off the front plate.

If necessary, the printed circuit board can be removed by removing the screws holding it in position. This will facilitate access to the component card. The movement can be removed by removing the four screws which hold it on the back of the front plate.

Timex has just recently been awarded a contract to construct a quartz digital chronometer for the U.S. Navy. Permission to divulge the technical information and specifications of this timepiece has not been granted by the Navy. However, approval was received to publish the mock-up photograph included here (Figure 6).

It can be seen from examining these modern quartz instruments that the high accuracy which for many years was achieved with some difficulty in the spring detent chronometer is rather easily achieved in the quartz models. No doubt even higher accuracy will be forthcoming as quartz technology improves.



Figure 6. Mock-up of Timex's quartz digital chronometer being made for the U.S. Navy. Courtesy of the Timex Corporation and the U.S. Navy.

TECHNICALLY WATCHES

(Continued from page 9)

removing weight. Two styles of undercutters are shown in Figure 7. View A shows a marsh undercutter which has two double end cutters of different sizes. View B shows an undercutter with seven assorted-sized cutters.

Figure 5, View B shows another method of undercutting the screw head for weight removal. The screw head is chucked up in the lathe and a sharp pointed graver is used to undercut the screw head. Care should be used when this method is employed to keep from damaging the thread of the screw and to keep from shortening the length of the screw head. If the screw head is cut back any, this will prevent the head from going against the rim of the wheel when the screw is replaced in the wheel.

View C, Figure 5 shows the diameter of the screw being reduced to remove weight. The screw is chucked by its thread in the lathe and the head turned down with a sharp, polished graver. Care must be used so as not to damage the thread on the screw by over-tightening the chuck.

Figure 5, View D shows material being removed from the end of a screw by the use of the lathe and a sharp polished graver. The material can be removed leaving the end of the screw flat or rounded—whichever form matches the other screws in the wheel. View E shows how a small amount of material can be removed from the corners of the screw head. This should not be overdone to the point of spoiling the looks of the screw head. The screw can be chucked by the thread while this is being done, but it would be safer to chuck by the screw head.

View F shows how material can be removed from the bottom of the screw slot. This is done with a poising saw like the one shown in Figure 8, or a saw can be made from a single-edge safety razor blade by rubbing the edge of the blade over the corner of the file, creating notches in its edge.

View G shows how a small fine square or three-cornered file can be used to remove material from the corner of the screw slot. This is done for a small amount only.

View H shows how a drill or balance screw cutter is used to remove material from the end of the head of the screw. This method should be used only on balance screws that do not have screwdriver slots. If this method is overdone, it weakens the wall of the screw head so the head could be crushed if removed with a balance screw holder. If this method is used on screws with slots, it may prevent the screws from being removed with a screwdriver and spoil the appearance of the screw head. A set of these cutters is shown in Figure 9, and one of these cutters is shown being used in Figure 10.

Note: When removing weight from a screw to poise the wheel, it should never be removed from a meantime screw.

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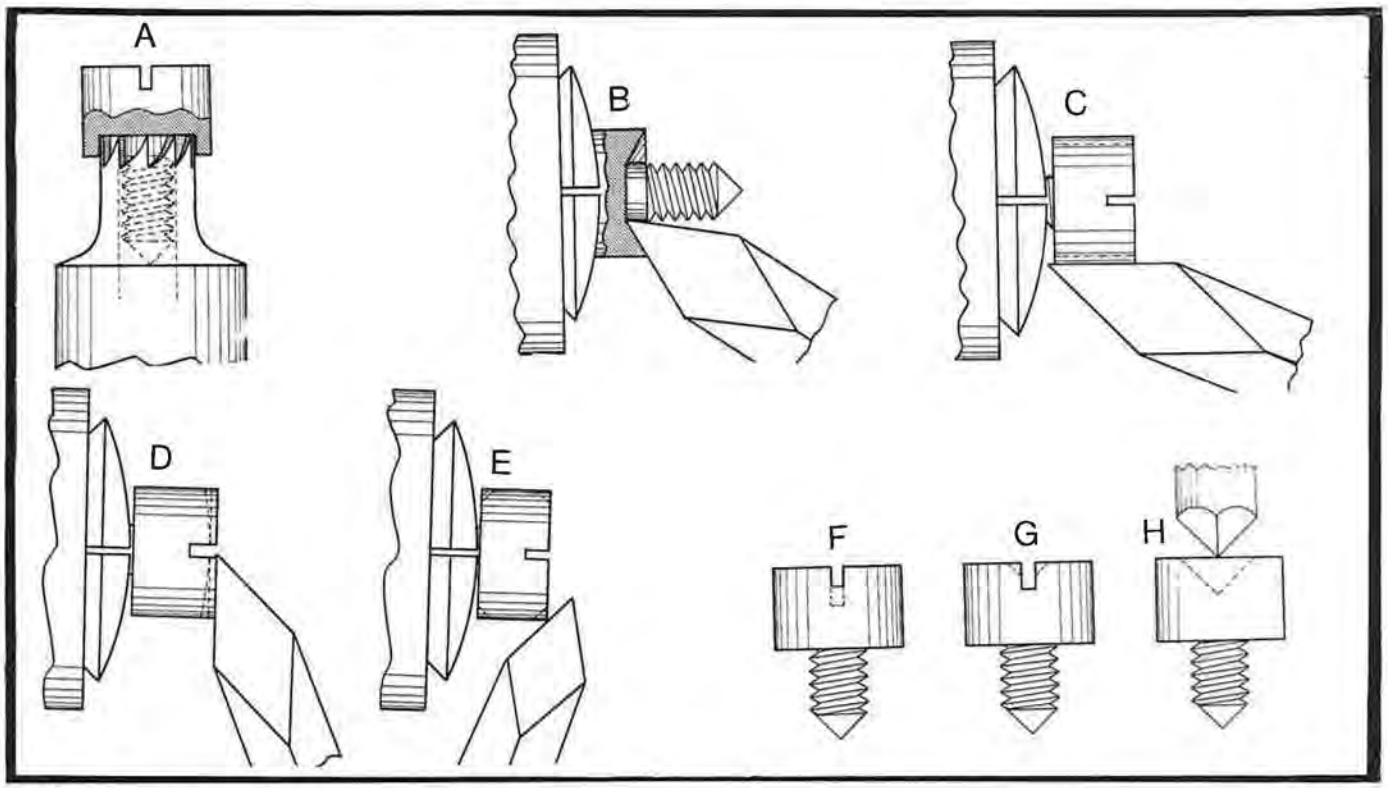


Figure 5

If a meantime screw stops at the bottom, the weight should be taken from the screws on either side of the meantime screw. Figure 11 shows a balance wheel with three styles of screws. View A shows a balance screw. This is a full-head screw. View B shows a timing screw. This screw has a head that is shorter than a full-head screw. Sometimes this screw is smaller in diameter than a full-head screw. View C shows a meantime screw. Only higher grade watches have meantime screws in their balance wheels. Usually there are two meantime screws placed opposite each other near the arm of the wheel. Some wheels have four meantime screws, two near the arm and two at right angles to these. Meantime screws are used to time the watch in seconds per day. When these screws are turned inward, the watch speeds up, and when they are turned outward, the watch slows down. These screws should always be turned an equal amount in or out in pairs. They should be about half way out of the wheel rim and tight enough in their holes to stay where they are set. Never screw these in or out unequally to poise the balance, or place timing washers on these screws. Before attempting to poise a balance wheel, all of the screws should be checked to make sure they are tight.

When the balance wheel has no screws, material is removed from the bottom side of the rim with a pivot drill.

(Continued on page 58)

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AWI's First Clock Restoration Course

The clock restoration course on which I reported in my April, 1980 article became a reality the weekend of August 30-31 in Alexandria, Virginia. Sixteen clock restoration enthusiasts joined AWI instructor Otto Benesh and AWI personnel Marvin Whitney, S. T. Jenssen, Jr., and Milt Stevens on this Labor Day weekend. Since this was the first course, we asked the participants to complete evaluation sheets so that we could learn from them. Here are some of the comments received on the evaluation of the total workshop:

"It was well put together and subjects could not have been better presented."

"Liked very much the flexibility and relaxation of the course."

"What more can be said? Course was great, and Otto is great!! Well presented."

The course is designed for individuals who already have the skill and know-how to successfully repair clocks. In the course, we try to impart certain skills and philosophies which are necessary to become a successful clock restorer. Included in the course curriculum are:

1. A slide presentation on our "Heritage."
2. A discussion of standards and ethics of conservation. These are taken from the Murray Pease Report and the Code of Ethics for Art Conservators. (There is a printed handout with this).
3. A slide presentation
4. Working exercise–Making a Count Wheel
5. Working exercise–Piercing Hands: How to make rubbings, drilling, sawing, filing, and finishing a hand or half of one, depending on time. We furnish pattern.
6. Discussion of design. This covers screws, pull bobs for strike repeat work, pendulum bobs, nuts, cock ends, etc.
7. Matting: How to make a matting tool. Exercise in matting. We supply a piece of steel ½ in. by 2½ in., must be capable of being hardened.
8. Silvering or resilvering dial. AWI brings most of the supplies for this. Attendees may bring an engraved dial if they wish.



Sixteen clock restoration enthusiasts joined AWI Instructor Otto Benesh and AWI personnel Marvin Whitney, S. T. Jensen, Jr., and Milt Stevens for the first American Watchmakers Institute Clock Restoration Course in Alexandria, Virginia, August 30-31.



Otto Benesh, AWI Instructor, teaches by doing! Mr. Benesh is demonstrating the process of resilvering the chapter ring of a large clock dial.



Marvin Whitney, AWI Treasurer, is known as a "big man" in AWI and in the educational field. Here he is putting his "big man" status to practical use by steadying the workbench while the craftsmen do some intricate filing.

9. Exercise–Making a pendulum hold down. Discussion of several types of designs and selection of one to make.
10. Slide presentation–A Horological Tour of London.
11. Questions and answers, general discussion period during the course.

The course instructor, Otto Benesh, is recognized as one of this country's leading clock restorers. He has become well known for his popular "Clock Chatter" column which appears in the *Horological Times*. Mr. Benesh is a graduate engineer who became interested in horology while in service during World War II. His interest in clock restoration took him to England where he worked in one of England's most respected shops. Mr. Benesh lists among his clients the Smithsonian Institution, the Supreme Court, and the State Department, and has been commissioned by these clients a number of times to carry out restoration projects.

By the time you read this, the next course will have already been held in Ontario, Canada at the George Brown College of Applied Arts and Technology; another will be held November 1-2 in Providence, Rhode Island. Persons who are interested in attending future sessions in their part of the country should write me at AWI Central; we will place you on the preferred list and notify you when the course will be presented near you. We would also welcome inquiries from small groups. We will be receptive to bringing the program anywhere a group of twelve interested clock repairers might be. At the present time, we are scheduling these programs for the Spring of 1981, so we would like to hear from you soon.

Because of the individual attention required in each course, the registration must necessarily be limited to twelve participants. The registration fee for the two-day program is $75.00 for AWI members, $100 for nonmembers. Preference is given to AWI members and to the earliest postmarks. Fees are refundable if cancellations are received at AWI Central five days before the program, or later if a replacement can be found. A limited number of tools are required. A complete tool list is provided with each course announcement. TIMES

AWI Bench Courses / 1980

	Programs	Instructors
A	Basic Electricity & Use of Meters	Jeager
B	Citizen LCD Alarm	Carpenter
C (a)	Citizen LCD Multi-Alarm	Broughton
C (b)	ESA/ETA Quartz Analog	Broughton
D (a)	Seiko 4300 Ladies' Quartz Analog	Smith
D (b)	Seiko LCD Chronograph/Alarm	Smith
D (c)	Seiko 0903A Men's Quartz Analog	Smith
E	Intro. to Solid State Watch Repair	Nelson
F (a)	Bulova Quartz Analog (SMQ)	Opp
F (b)	ESA LCD Chronograph	Opp
G	ESA Digital/Analog	Biederman
H	Clock Restoration	Benesh

OCTOBER, 1980

5	G	Richmond, VA	Biederman
10	C (a)	Goldsboro, NC	Broughton
12	C (a)	Hickory, NC	Broughton
18-19	A	Peoria, IL	Jaeger
19	D	Austin, TX	Smith
19	G	Richmond, VA	Biederman
19	A	Peoria, IL	Jaeger

NOVEMBER, 1980

1 & 2	H	Providence, RI	Benesh
2	C (b)	Atlanta, GA	Broughton
2	F (a & b)	Cleveland, OH	Opp

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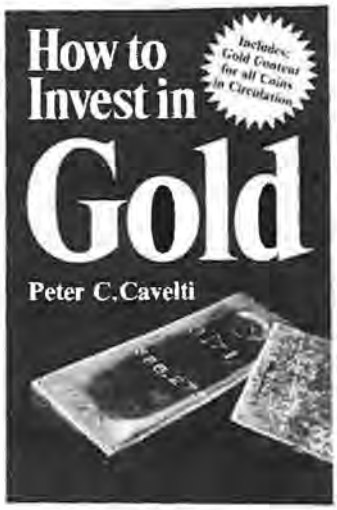
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TECHNICALLY WATCHES

(Continued from page 55)

The drill is placed in a pin vise and used like a screwdriver as shown in Figure 12. The tool shown in this illustration is a screwdriver blade shaped like a pivot drill on its end. If the balance wheel is much out of poise, material can be removed from the inside corner of the bottom of the rim with a fine file as shown at "a" in Figure 13. Care must be used when removing weight from a solid balance because if too much weight is removed, the balance will be too light for the hairspring, thus making the watch too fast. If too much weight is removed from a solid balance and there isn't enough hairspring extending through the stud to let out and bring the watch to time, then a new hairspring would have to be fitted to the balance.

If the balance wheel has screws and too much weight is removed during poising, then timing washers can be added in pairs under the screwheads to slow the balance down. When poising this type of wheel, timing washers are sometimes added to the light side of the wheel under the screw heads. If the wheel is badly out of poise, some weight is taken from the screws on the heavy side and washers are added to the screws on the light side. This helps keep the watch more nearly on time.

Timing washers come in assortments for different-sized watches and different weights or thicknesses so as to affect the timing of the watch a certain amount. An assortment of these washers is shown in Figure 14. These washers are graduated in the following manner: for a given size of watch, the washers come in 20 second, 40 second, 1 minute, 2 minute, 3 minute, and 4 minute sizes. The amounts reflect the amount of time the watch is supposed to be slowed down per day when the washers are added to the balance in pairs, one opposite the other.

To add washers, it is best to use a proper size of balance screw holder to remove and replace the balance screw. A set of these balance screw holders is shown in Figure 15.

To place a timing washer on a balance screw, grasp the screw with the balance screw holder as in Figure 16. Then unscrew the screw. Now pick the washer up from the bench on the index



Figure 6

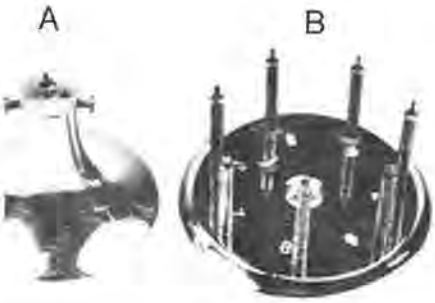


Figure 7



Figure 8

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finger. Place the washer on the screw thread as in Figure 17. Then the screw is replaced in the balance wheel. Note: It is important that the washer fit closely on the screw thread and that the washer be the same diameter as the screw head. Under no circumstances should the washer be larger in diameter than the screw head. If it is, it could rub the pallet bridge or balance cock. It is better to have only one washer on a given screw, because some watches do not have much



Figure 9

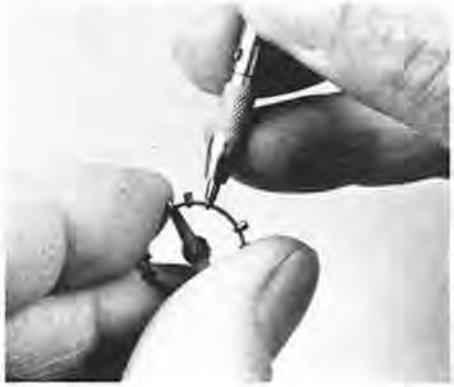


Figure 10

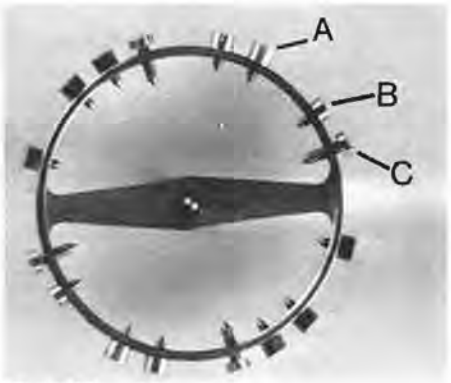


Figure 11



Figure 12



Figure 13



Figure 14

(Continued on page 65)

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CHIME AND STRIKE

(Continued from page 11)

method you use is a matter of personal choice.

Next, check the strike warning pin (19). When the strike train is at rest, the warning pin should be at a 10 to 12 o'clock position. This will allow for about a half revolution of the wheel at warning. Separate the plates and change the orientation of the strike warning wheel (18) if necessary. Of course, it would be a good idea to assemble the wheels correctly the first time to avoid having to separate the plates again. It is difficult to accomplish.

The chime train can now be checked. First, install the chime lift lever (14), but do not fasten it in place. Leave out the chime correction lever (4) for now. Add the chime-strike lever (25) and the chime lock lever (22). These two control several functions. The chime lock lever, as previously explained, locks the chime train at the end of each note sequence. The chime-strike lever has several purposes: 1. It has the strike warning lever (15) on the left end; 2. The chime lift pin (28) is in the center; 3. The strike lift pin (27) is on the right end. The strike lift pin rides on the locking plate, and near the end of the hour chime, it is lifted up high by the locking plate. This causes the strike warning. At other times, the pin falls into the slots in the locking plate, lowering the chime lock lever enough so that it catches the chime lock pin. To install the chime lock lever, hold it in position between the movement plates. Insert the arbor of the chime-strike lever first through the hole in the front plate, then through the sleeve on the chime lock lever. Rotate the gears so the fly moves counterclockwise, until the chime lock lever stops the chime lock pin. Now observe the chime warning pin (24). It should be at about a 12 o'clock position. This is necessary for chime warning. Separate the plates slightly and correct the warning wheel (23) if required.

Proceed to assemble the front movement parts. Go back to the strike lock piece and add the taper pin behind the front movement plate to hold the part in place. Check for freedom of motion. Next, fasten the chime lift lever by installing the washer on the portion of the arbor projecting through the rear movement plate. A piece of soft wire formed into an "s" shape holds the washer on. Check to be certain that this part also moves freely, without a trace of binding. Add the chime correction lever (4), which is held on with a small split washer. The locking plate is next to be installed. Leave the set screw loose.

Now carry on with more chime adjustment work. Turn the gears so the chime lock pin is held by the chime lock lever. Tighten the set screw slightly on the sleeve of the chime locking lever—more adjustment will be needed in a moment. Turn the locking plate so the strike lift pin falls into one of the four slots. Tighten the locking plate set screw.

Install the mainspring barrels at this point so you will not have to keep turning the gears by hand. There should not be any further need to separate the plates for adjustment work. See Figure 2 for the positions of the 3 click assemblies. Make sure the pillar nuts are tight before you wind the mainsprings! Put on the minute hand and turn the movement through several quarter hours. If the gear train fails to lock at the end of the chime sequence, or will not unlock to begin chiming, adjustment of the chime lock lever is needed. Loosen the set screw on the sleeve of the lever, and increase or decrease the depth of locking as required.

Check the chime correction mechanism. It is made up of a cam behind the locking plate and the chime correction lever itself. The lever pivots freely on the end of the chime lift lever. At the end of the third quarter chime, the chime correction lever comes to rest against the flat side of the cam. This lowers it away from the chime lift pin (28) on the chime-strike lever. Extra lift is required to unlock the chime train to run through



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the hour chime from this position. The long hour arm of the star cam (13) gives the higher lift. If the chimes are out of sequence, the train will not begin the hour chime until the minute hand indicates that the hour has arrived. The only adjustment required would be to go back and increase or decrease the amount of lock on the chime lock lever.

To complete the assembly of parts onto the front of the movement, install the rack (3), the minute wheel (8), and the hour wheel (11). Adjust the snail position by meshing the hour wheel in such a way that the 12 o'clock and 1 o'clock striking are correct. This is the procedure described several times in this series, and is the same for most rack and snail striking mechanisms.

Install the chime hammers onto the rear of the movement, with the chime drum and cover plate. Adjust the chime hammer sequence next. Again, this is a procedure I have described before in other articles. Allow the clock to chime through the hour and then the first quarter. Loosen the two set screws on the chime drive gear, which is the large gear on the rear of the movement. Turn the gear counterclockwise with your fingers and watch the hammer action. When the four chime hammers go in order from rear to front, tighten the set screws again. The Westminster melody will then be correct. Make sure that none of the hammers ends a sequence in a raised position.

This completes the assembly and adjustment procedure for the chime and strike mechanisms of the Mauthe W500 Movement. Other adjustments or repairs may be necessary, depending on the damage found in the clock.

13. Star cam
14. Chime lift lever
15. Strike warning lever
16. Gathering Pallet
17. Strike lock piece
18. Strike warning wheel
19. Strike warning pin
20. Chime 4th wheel
21. Chime lock pin
22. Chime lock lever (portion)
23. Chime warning wheel
24. Chime warning pin
25. Chime-strike lever
26. Chime warning lever
27. Strike lift pin
28. Chime lift pin

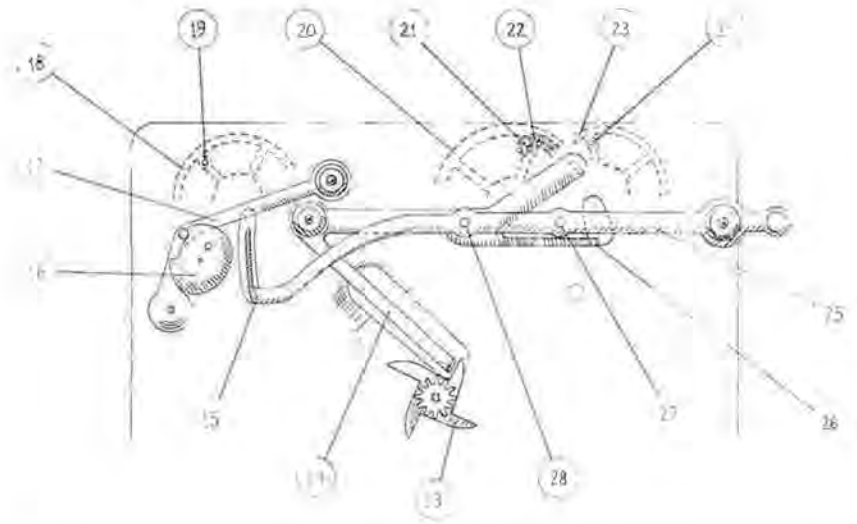


Figure 3. Front Movement (partial)

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ALBERT FROIDEVAUX/USA OPENING WAREHOUSE FACILITY IN U.S.

Albert Froidevaux & Sons of La Chaux-de-Fonds, Switzerland, has announced plans to open a warehouse facility in the Kansas City area late this fall. The move is designed to provide better service to the wholesalers in the United States and Canada.

Having been a worldwide supplier of spare parts and tools for over 50 years to wholesalers who service the jewelry and watchmaking trade, Froidevaux opened a sales office in Overland Park, Kansas, in May of 1979. The company, with offices in Mexico City and Hong Kong, sees stocking jewelers' and watchmakers' tools as a natural progression in accommodating their customers.

Herman Kirkpatrick, manager of operations in the U.S., explains, "It's simply a question of logistics and expediency. We do a large business with watch parts which can be shipped through the mail at a minimum cost from Europe. Our inventory is tremendous there, and we can provide the service of getting the wholesaler the many numbers and calibers that are needed. But tools are a different story because of weight, so the warehouse here will be stocking most tools which wholesalers sell to jewelers and watchmakers—plus with our office in Hong Kong, we have access to tools and display items from the Far East. At present, the inventory consists of several hundred items, but Froidevaux sees the numbers growing as more wholesalers become aware of the organization's capabilities in providing high quality merchandise at competitive prices."

Albert Froidevaux/USA, as the U.S. firm is called, is stocking various tools such as tweezers, pliers, screwdrivers, oilers, etc., at their present facility in Overland Park. (Albert Froidevaux & Sons/USA, 9801 Cedar Drive, Overland Park, KS 66207. 913-642-2324.)

"BLIND CITIZEN AWARD" ESTABLISHED

The American Council of the Blind (ACB) and Citizen Watch Company of America have announced the establishment of a special "Blind Citizen Award" to recognize outstanding achievements by blind individuals nationwide.

The new award was formally introduced at the ACB's national convention, held in Louisville, Kentucky, in July. There, one winner in each of the ACB's 44 state affiliates, as well as six national winners, were presented with braille watches from Citizen. In all, 50 braille wrist watches were awarded by Citizen representatives Bill Alpern and Don Baker on behalf of Setsuo Kasahara, president of Citizen Watch Company of America.

According to a spokesman for the American Council of the Blind, winners were selected because of their involvement in such areas as: public education as to the rights and abilities of the blind; integration of the blind into the sighted community; and cooperation with other organizations and groups in furthering the rights of the blind and of the handicapped in general.

Mr. Kasahara commented, "Citizen is extremely pleased to be a part of this awards program.



It's certainly gratifying to be able to acknowledge excellence with what we trust will be a very functional, reliable award."

NEW BATT-TRONICS FACILITIES

"You can still smell the paint," said a smiling Bill Hillson, President of Batt-tronics Corp., about their recently completed expansion of their totally consolidated facilities located in Orangeburg, New York.

"Sure, while it was going on, we continued to ship and do business," said Hillson, "but now, in addition to our toll-free nationwide number (800-431-2828), we have made it possible for all our customers, including those here in New York State, to also call us toll-free at 800-942-1944. It means the entire country, Puerto Rico and the Virgin Islands included, has quick access to our huge inventory of batteries from Eveready, Maxell, Accutron, Ray-O-Vac, Sanyo, Timex, Panasonic, and our expanded staff can fill orders even faster than before."

The enlarged premises enables Batt-tronics to continue R&D into various aspects of the booming battery market. As new developments occur in the areas of silver oxide, mercury, lithium, and manganese dioxide, additional sales potentials develop for the retailer.

MORE SESSIONS OF GIA'S MANAGEMENT PROGRAM

Due to popularity and demand, the GIA (Gemological Institute of America) is offering two additional 26-week sessions of its Retail Jewelry Store Management program.

The first of these resident classes began September 15, 1980 on the GIA campus in Santa Monica, California, while the second will begin May 4, 1981.

"The program will give the students an in-depth understanding of the practical daily situations that managers of jewelry stores must face," commented Richard T. Liddicoat, Jr., President of GIA.

The intensive training program provides store owners and managers with the knowledge and skills needed to run a successful retail jewelry operation in today's complex business climate.

A few of the topics included are: Motivation of Individuals; Leadership; Communication; Economics; Advertising; Store Security; Merchandising; Insurance; Financial Management; Store Layout and Design; Family

Business issues, and others. Subjects are selected because of their relevance to "real world" jewelry store operations. All subjects are presented in such a way as to be of immediate and long-term value to the student. Upon successful completion of the program, students will be awarded a Jewelry Managment Graduate Diploma.

Any interested individuals should write for applications and enrollment forms to: The Registrar's Office, GIA, P.O. Box 2110, Santa Monica, CA 90406.



Celestial globe with clockwork made by Gerhard Emmoser, Vienna, 1579, on loan from the Metropolitan Museum of Art, New York. This instrument represents an imaginary sphere with the earth at its center and the heavenly bodies located on the sphere's surface. (Photograph courtesy of the Bavarian National Museum)



Figure clock of a griffin made by Johann Ott Hallaicher, Augsburg, c. 1640, on loan from Museum der Zeitmessung Beyer, Zurich. The griffin's eyes roll with each beat of the clock. Its beak and wings move when the clock strikes the hours and quarters. (Photograph courtesy of the Bavarian National Museum)

"CLOCKWORK UNIVERSE" EXHIBITION TO OPEN AT SMITHSONIAN

"The Clockwork Universe," an international exhibition of exceptional clocks, mechanical figures, and celestial globes from the German Renaissance, opens at the Smithsonian's National Museum of History and Technology Nov. 7, 1980 and runs through Feb. 15, 1981.

The 120 priceless gold and silver treasures will be borrowed from 60 private lenders and museum collections in Europe and America. Many have never before been publicly exhibited.

"The Clockwork Universe," organized by the National Museum of History and Technology in collaboration with the Bayerisches Nationalmuseum, is supported by a grant from the NCR Corporation of Dayton, Ohio.

The objects in the exhibition represent the golden era of German clockmaking (1550-1650) when princes and sultans commissioned artisans to craft elaborate timepieces. These splendid works of art and engineering could predict the movements of the heavens, play music, and animate lifelike figures—in short, duplicate mechanically the workings of the universe.

Dr. Otto Mayr, curator at the National Museum of History and Technology and an organizer of the exhibition, calls the mechanical clock of early modern Europe "the greatest achievement in machine building before the invention of the steam engine."

The exhibition is arranged in five sections; they describe the origins and functions of clockworks, the significance of the clockmakers' guild, the role of the princely courts as sources of financial support and inspiration, the creation of artificial life in the form of figure clocks and automata, and the clockwork as a mechanical model of the universe.

Visitors to the exhibition will be able to experiment with working models and see clock movements outside their cases, as well as a short film of automata in action, and a sound-and-slide show featuring music played by pieces on display.

"The Clockwork Universe" is accompanied by German and English editions of a 330-page, fully illustrated, scholarly book, which contains 14 original essays and catalog descriptions of the exhibited objects.

BINNS ELECTED TIMEX VICE PRESIDENT

James W. Binns was elected Vice President of Finance Operations and Treasurer of Timex Corporation, according to a recent announcement by Nicholas M. Mihalas, President of the company.

Mr. Binns joined Timex in 1977 as Corporate Director of Planning and became Treasurer of the company in 1978.

Before joining Timex, he was with Rockwell International where he held various financial positions in their corporate organization and their electronics business. Prior to that time, he was a systems engineer in the advanced design laboratories of Lockheed Aircraft Corporation.

He received his Bachelors and Masters of Science Degrees in Engineering from UCLA, and his MBA from the University of Southern California. He is a member of the Southern California Chapter of Beta Gamma Sigma.

Mr. Binns lives with his wife Lynn and their son Jeff in Woodbridge, Connecticut.



WORLD'S SMALLEST BATTERY REVAMPED

The world's smallest battery, designed, developed, and produced by a Swiss company, has now come of age. Since the first series was launched at the beginning of 1979 by Renata SA, an affiliate of the ASUAG group, the Renata No. 32 battery, used in the extra-flat Delirium range of quartz watches, has been constantly modified.



The third generation of this product, which is now available, can be identified by its gold color and a green "leak-proofing" ring. According to the company's technicians, in spite of its remarkably small size, the battery's quality is excellent. In relation to the first two generations of models, the Renata No. 32 battery has undergone a number of changes.

These include the reduction of the volume of chemical content which lessens pressure on the separation system, thus eliminating the risk of self-discharge due to deterioration of the separator.

In addition, the technical design of the product has been totally changed with the separators now placed flat on the positives. As a result, they are not subject to pressure when the capsule is closed.

The leak-proof aspect of the battery has been substantially improved by using new high-resistance materials, with the power inceased from 5.5 to 6.5 mAH by using silver II.

VIGOR SUPER MINIATURE ENGRAVING MACHINE

B. Jadow and Sons Inc. is pleased to announce the availability of the big little machine for engraving in the professional way—for those who have limited engraving requirements. The Vigor Super Miniature Engraving Machine has no complicated settings, a fixed ratio "3 to 1," and a diamond cutting stylus. It uses all standard 1¼" types, and its dimensions are 8" x 10" x 6". This is the ideal unit for that small, quick job that does not require special layout or positioning—a big part of your jewelry sales. The Vigor Mini Engraving Machine will also release your larger machine for more involved jobs. The machine, which comes complete with 2 fonts of brass type, sells for $325.00.



NEW SECURITY WINDOW TO DISCOURAGE VANDALISM

A locking security window for solid doors that lets you screen callers and check outside before leaving is available from New England Stamping & Fabricating Works of North Easton, Massachusetts.

The Newstamp Security Window lets you screen callers to help keep out undesirables, and look outside before leaving to discourage would-be attackers. Providing a much larger view than typical peepholes, the 6" square window has a hinged door inside that bolts shut for security.

Easy to install yourself in hollow wood or steel doors, the Newstamp Security Window has an 11" square frame made from 1/8" thick, satin-finished anodized aluminum. Offered with a 1/4" wired glass or 1/4" unbreakable lexan window, it is ideal for retail stores, supermarkets, fast food chains, and warehouses.



The Newstamp Security Window is priced at $54.95 with lexan, and $49.95 with wired glass. Literature is available on request from Robert Zeitsiff, New England Stamping & Fabricating Works, 227 Bay Rd., North Easton, MA 02356. (617) 238-7071.

NEW JEWELER'S WORKBENCH FROM PRO-CRAFT

The Pro-Craft™ line of products for the jewelry trade now includes a single place jeweler's workbench, hand-crafted in solid rock maple. It has been specially designed for working convenience comfort, and rugged durability. The workbench is available at jewelers' supply houses which handle other Pro-Craft brand products.



BULOVA CLOCKS YOU CAN COUNT ON

Bulova's Clock Division has introduced 22 new additions to its line, which now consists of 193 clocks. Bulova claims to offer retailers the largest selection of any major brand.

A highlight among the new clocks is a clock/calculator combination in a slim 5/16", jewelry-styled case. At the flip of a switch, the digital time display is converted to the calculator display while the clock continues running. Once the alarm is set, it will automatically beep at the same time every 24 hours. The calculator adds, subtracts,



divides, and multiplies. Pouch is included. It is a great gift item for men or women. Both B6930 in silvertone with blue trim, and B6931 in goldtone with black trim, have a suggested retail price of $59.95. Additional information is available from: Vice President of Sales, Bulova Watch Co., Inc., Bulova Park, Flushing, NY 11370.

NEW TOOLS FOR ADJUSTING TRIM CAPACITORS

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TECHNICALLY WATCHES

(Continued from page 59)



Figure 15



Figure 16



Figure 17

space between the ends of the screws and the cut-out for the wheel under the balance cock. If the balance screws are moved out too far from the balance rim, the ends of the screws could touch the balance cock.

Sometimes the balance wheel has a screw missing which must be replaced from an assortment or from another balance wheel. The proper procedure is to select a screw with the proper thread and about the same head size. Now remove the screw that the new screw is to match. Then place both screws, one on each end of a balance screw scale, to compare their weights. If the one selected is lighter than the original one, then others can be tried to find one that is the same. If the one tried is too heavy, it can be reduced in weight by one of the methods mentioned previously, or another one can be selected of the same weight as the original one. A balance screw scale is shown in Figure 18.

The way to tell when a balance is approaching a proper poised condition is to watch its action on the poising tool. If a screw is missing from the balance wheel, the wheel will rock back and forth on the poising tool and it will take a long time for it to come to a stop. This means that the wheel is much out of poise. As the weight is adjusted by taking off weight from the heavy side or adding weight to the light side, the wheel will not rock so fast and will come to a stop sooner. When the balance is approaching a poised condition, the wheel will turn over and over on the poising tool with a slightly irregular motion that is a slowing down and speeding up motion. Now is when the poising saw can be used to remove a small amount of weight to finally bring the balance to poise. When the balance is in poise, it will turn slowly and uniformly on the poising tool without picking up speed or slowing down. Then it will gradually come to a stop without backing up. Another test is to set the balance wheel on the poising tool with the arm horizontal and see if the wheel will remain in that position; then place the wheel with the arm vertical and make



Figure 18

the same test. This is called four-point poise.

It must be remembered that the poising tool jaws and the balance staff pivots have to be kept clean with the clean pithwood and alcohol in order to have a free-rolling balance wheel. It is very difficult if not impossible to poise a balance wheel correctly if the poising tool jaws and pivots are dirty or damaged.

This concludes the articles on replacing balance staffs and poising balance wheels.

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7-14—United Jewelry Show; Biltmore Plaza Hotel; Providence, RI

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18-19—Illinois Watchmakers Convention; Regency Hotel; Peoria, IL

19—Massachusetts and Rhode Island RJA convention/banquet; Lantana-Braintree, MA

19-Nov. 4—Missouri Jewelers and Watchmakers Association tour of South Africa.

31-Nov. 2—Florida State Watchmakers Association; Colonnades Beach Hotel; Palm Beach Shores, Suger Island, FL

Advertisers' Index

AWI 44,48,58,67
AMERICAN PERFIT CORP. 30

B.B. CRYSTAL CO. 30
BATT-TRONIC CORP 60
J. BOREL GROUP 39
BOWMAN TECHNICAL SCHOOL 55
JOSEPH BULOVA SCHOOL
OF WATCHMAKING 51
BULOVA MATERIALS 26,27

CAS-KER CO . . . . . Inside Front Cover, 44
CITIZEN WATCH CO . . . Outside Back Cover

C. DVORKIN AND CO 51

EBAUCHES SA 6,7,53
ESSLINGER & CO 3,14,54

GEM CITY COLLEGE 52
GERMANOW-SIMON 19
THE GOULD CO 29

INTERNATIONAL WATCHMAKERS. . . . 59

B. JADOW & SONS, INC 17
JEWELMONT 37

KANSAS CITY SCHOOL
OF WATCHMAKING 52
KIENZLE 40
KILB & CO 48

LANGERT. 18,52
S. LAROSE, INC 57

MARSHALL-SWARTCHILD CO 34,35
MAXELL CORP.
OF AMERICA. 13,14,16,18
MEDIA DIGITAL CORP. 60

THE NEST CO 49

PARIS JUNIOR COLLEGE 59
PORTESCAP U.S. 5
PRECISION INSTRUMENT. 55
PRESTIGE PREMIUMS 61
PRIMEX 15

RONEL 13

SEIKO TIME CORP . . . . . Inside Back Cover
STANLEY DONAHUE CO.
OF HOUSTON, INC 58
SWEST INC 36
E. & J. SWIGART CO 4,16
SWISS WATCH PARTS DIST. INC. 45

TWIN CITY WATCH SUPPLY CO 40

ARNOLD VICKSMAN. 55
VICKSMAN JEWELERS. 61

WATCHES UNLIMITED. 41
I. WIDESS & SONS. 16

YOUNG, NEAL CO. INC 12

ZANTECH INC.. 31
ZENITH 33

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