

JULY 1980

TIMES

HOROLOGICAL



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TIMES[®]

HOROLOGICAL

Official Publication of the American Watchmakers Institute

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Editorial

FORD MOTOR COMPANY SELLS WATCHES

"Ford World," a tabloid published by the Public Affairs Staff, Ford Motor Company, recently ran an article entitled "Why the cutbacks are necessary," and ran statements by Ford Chairman, Philip Caldwell. He said that in the first three months of this year, foreign cars held 28% of the U.S. market, and in some areas of the country, foreign car sales accounted for double the national average!

On page 4 of this same newspaper, Ford Parts and Service Division ran a coupon ad offering two Citizen watches with retail values of \$100.00, and one with a retail value of \$125.00, for \$44.95 each. Two were described as "gold" and the other as "silver finish." Circulation of the newspaper is 302,525. The offer evidently is not restricted to employees of the Ford Motor Company.

Miyoshi Nishibuchi, Citizen Watch Co., explained that almost all large watch companies distribute premium watches in this manner, and that the case quality of the Citizen premiums does not meet the high standards of those Citizen watches sold to jewelers. He also said that these premium watches do not carry any guarantee.

It would be far better for Ford to offer in-house incentives to their employees, involving Ford products, than to take over the role of jeweler. It would also be better for large watch companies offering these premiums to discontinue them. This comes at a time when some jewelers are discontinuing the sale of watches completely, and these merchandising methods could be a factor in such decisions.

17-13

On the front

*How long I slumber'd 'tis a chance
to guess.*

*When sense of life return'd,
I started up as if with wings . . .*

from The Fall of Hyperion
Keats



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300 Transistor

Housed in a dust free capsule, this reliable movement represents your best value today in a transistor clock movement. Runs for over a year on a single 'C' cell and accurate to within 10 seconds per day. The low price combined with trouble free service make this unit an exceptional value.



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450 Quartz

\$5.75 In Quantity



2 3/8" x 2 13/16" x 7/8"

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\$5.75 In Quantity

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\$9.50 In Quantity



This compact unit can be fitted into any type of enclosure, case or panel. The pendulum does not affect quartz accuracy of one minute per year, so that various lengths of 8 to 14 inches may be used. Noise from movement is negligible, only ticking sound of pendulum can be heard.

1 or 2 @ \$13.95—3 to 9 @ \$12.75—10 to 24 @ \$11.75—25 to 49 @ \$10.50—50 to 99 @ \$9.50. Write for quantities over 100.

575

Quartz Striking Pendulum

8 1/4" x 5 1/8"

24.00 In Quantity



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- Chimes on half hour—Counts on hour
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Appraiser, Appraise Thyself

More and more watchmakers are diversifying into allied fields of service. Jewelry repairing, diamond setting, appraising, etc. are becoming as much a part of the watchmaker's duties as watch repair itself. This flexibility makes the watchmaker much more valuable to his employer or to his own business. There are, however, certain risks and liability factors which must be considered when performing these services.

I'm sure you've noticed that *Horological Times* has featured several articles dealing with these allied services. The idea is to help familiarize newcomers with these trades and with the pitfalls involved. We hope that these and future articles will help you in avoiding risks of legal action due to claims of damages or loss.



Leslie L. Smith

One of the services that everyone seems to be performing these days is appraisal work. While a good percentage of those doing appraisals are trained to some extent and have a working knowledge of how to appraise and how to protect themselves, there are many who do not have any idea of what appraising is all about. This opens the door to possible liability claims by the customer.

Future articles in *Horological Times* will be written by experienced appraisers and addressed to appraisal work, which should be of interest to many of our members doing appraising. Also, those who haven't taken the GIA courses should consider the importance of this training. Appraisal work can be very profitable with few headaches, providing the person is well qualified and aware of the risks involved.

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TALE OF TWO CELLS

By Fred S. Burckhardt

This tale of woe began one day last winter. As I was walking along a downtown street, I was approached by—shall we say—someone more unfortunate than myself. He walked up and asked if I could spare some change for a cup of coffee. Having no smaller change, I handed him a nickel. When he muttered, “Thanks, sport,” I looked at him a second time and realized that it was an old watchmaker friend of mine standing there in his tattered overcoat and torn knitted ski cap. He lowered his head and started to turn away. I said, “Is that you, Harvey?” For a fleeting second I thought maybe I was mistaken, as the Harvey I used to know was a giant of a man, not the mere wasted shell that stood before me. “Harvey,” I repeated, “Is that you?” “Yes,” he answered. “I was hoping you wouldn’t recognize me.”

Stunned by this revelation, I said, “I haven’t seen you at the guild meetings lately and thought you were ill or moved out of town.”

“I wish that were the case,” he said. “Maybe I’d be in better shape both physically and mentally.”

From the way he talked I could tell some terrifying event had taken place. Not wanting to pressure him into telling me, I asked, “Want to talk about it?”

“I don’t want to waste your time telling you my troubles,” he said. He then added, “This is something I brought upon myself and I just have to live with it.”

I said, “Listen Harvey. We’ve been friends for many years and even though I’m always around when the chips are up, I still have time for a friend in need. But first let’s get out of this bitter cold.” We walked to the next block and entered the library, sitting at a table near the back so nobody could see me talking with this wretch. We sat in silence for several minutes. Finally I said, “Harvey, you were one of the best screw turners in town. You had a terrific repair business, a fine family, a second home by the lake, everything looking up, and now this. Tell me, wretched person, what happened?”

Harvey said, “I’ve never uttered a word of this to anyone, but I just can’t keep it to myself any longer. You must promise that after I tell you my

"...being the compassionate person that I am, I threw a quarter on the table and said, 'Get yourself a good meal Harvey, and then get out of town as soon as you can.' "

story, you'll take pity and not be too harsh with me."

I said, "Harvey, from the looks of you, you've punished yourself enough already. There is nothing you could have done to justify the anguish you've inflicted upon yourself."

Harvey answered, "I hope you feel the same way after I tell you what I did." He then went on to relate his tale. "About six months ago, a customer came into my shop with his LED and asked me to change the cells. I took the old ones out but then discovered I only had one new cell in stock. I checked the old ones and found one was still okay, so I put it back in with the new cell.

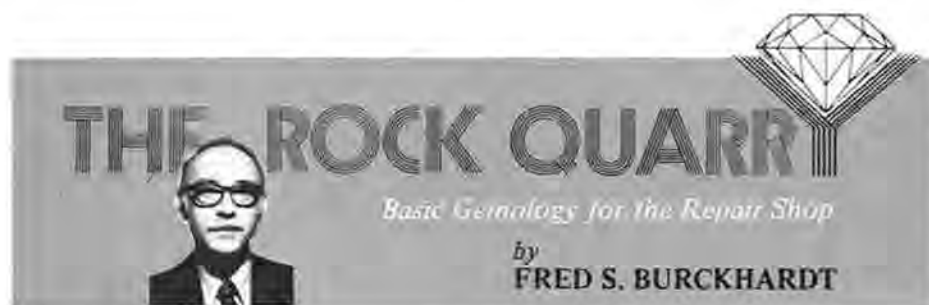
"Now wait a minute, Harvey," I said. "Do you mean to tell me you only replaced one cell when you knew both should have been replaced? You've been told time and time again to always replace both cells. How could you have done such a dastardly deed? I don't believe what you are telling me!"

"I know," Harvey replied. "I haven't had a decent night's sleep in months. I think about it all the time. It started to affect my work and drove me to drink. Finally I lost everything; my business, my family, and most important of all, my lakeside home."

He then started to sob. I put my hand on his shoulder and said, "Harvey, you are one rotten person and you deserve all the agony you've been through. You've put a blot on the name of good watchmaking. I don't want to hurt your feelings, but I hope I never see you again. I plan to start proceedings to have you excommunicated from the guild. May all your screwdrivers and tweezers rust!"

I got up to leave, but being the compassionate person that I am, I threw a quarter on the table and said, "Get yourself a good meal Harvey, and then get out of town as soon as you can." It made me feel good knowing I had helped this poor soul to make a new start.

That was the last time I saw Harvey. I heard he made his way to Mandan and joined the blonde-haired Indian tribe. They say time heals all wounds, and those that are pure in heart forgive their fellow men. So Harvey, I want you to know I'm sorry I didn't break all your fingers when I had the chance. Nothing is forgiven, so don't ever come back!



THE ROCK QUARRY
Basic Gemology for the Repair Shop
by
FRED S. BURCKHARDT

Our Readers Write

A PAT ON THE BACK

All your technical articles are great . . . I also really enjoy the Association news that you include each month. It's nice to read about what other watchmakers are up to.

I think AWI and the *Horological Times* deserve a pat on the back for the job they do.

Joe Martin
Boston, MA

It's my opinion that the articles you print on restoration of antiques—clock or watches—are more widely appreciated than you may think. I know I am doing more restoration work than ever. It can't be denied that inflation makes people aware of their valuables and more people are eager to have their nice old possessions restored.

I find your articles very helpful in doing restoration. This is the bulk of my business. Please don't stop.

Carl Wright
New York, NY

As a young watchmaker just starting in my career, I find trade magazines such as the *Horological Times* extremely helpful. I feel it is of the utmost importance to keep abreast of current developments in all aspects of the watch and clock industry. After all—the world changes so fast, that no one (no matter what their field is) can keep their head buried in the sands of time.

Congratulations on a fine publication.

Karl Josephson
St. Louis, MO

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.

Edward L. Endman 1912-1980

Death last month (June 8) ended Edward L. Endman's 51-year love affair with the watch and jewelry business. He died in Chicago after a brief illness. Memorial services were held June 12 at Hillside Memorial Park Chapel in Culver City, California.

Born in 1912 and raised in Montreal, Canada, Mr. Endman studied for a time at McGill University. In 1929 he found the door open to his life's work, with employment at Swartchild & Company in Chicago, a leader in distribution of watch materials. It was there that he fell in love with and learned the business.

In 1945, he left Swartchild and Chicago, following the Horace Greeley admonition to "Go West, young man," and with his brother, Morris, established Pacific Jewelers Supply Company in Los Angeles (at 424 South Broadway). Satisfied customers built the business and Endman's reputation.

In 1953, the respected 75-year-old San Francisco firm of Nordman & Aurich was on shaky ground. Eddie—as everyone knew him by then—acquired the business, pumped new life into it, and made it again a healthy supplier to the industry.

Endman was subsequently active in ownership of numerous material companies. In 1959 he was chosen as



president of what is now the Watch Material and Jewelry Distributors Association, and he served a second term in 1961. One of his significant accomplishments was obtaining the first consolidated Swiss movement catalog of interchangeable parts. He was a founding member and in 1961, third president of the Golden Nuggets of Southern California. In 1963 he was 17th president of The Jewelers 24 Karat Club of Southern California. In 1966 he was the fourth individual to be honored as WMJDA's "Man of the Year."

In 1973, Eddie Endman bought the then 103-year-old Swartchild & Company, where he'd made his start. He eventually consolidated it with the Marshall Co., thus Marshall-Swartchild.

Industry activities apart, Eddie Endman was a family man. In 1933 he married Gladys Pitler, who sustained him in all he did, and who will continue the Marshall-Swartchild business. A son, James David, is an attorney in Los Angeles. A daughter, Judith Simon, lives in California's Antelope Valley. Seven loving grandchildren remember Eddie, who also leaves his father, Samuel; two sisters, Nancy and Tilly; his brother, Morris; and countless friends throughout the industry.

May he rest in peace.



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DIAMOND AND STONE SETTING

By

Marshall F. Richmond

Stone setting can be a trade within itself, and in many cases, it is. Manufacturing jewelers employing a full contingent of craftsmen will have specialized diamond setters, colored and irregular stone setters, metal working jewelers, engravers, casters, platers, and polishers, and each of these is an individual trade. Many manufacturing jewelers accept jewelry repair from their clientele and, with a complete complement of craftsmen, turn out quality repair on any article sent them. However, we as individuals are in a position where we have to be able to make any repairs that come into our shops. Although we need not be masters of any or all of these special trades, we can learn enough to do jobs comparable to the repairs that are made in the trade shops. It will no doubt take us longer, as we have to study each job with which we are not familiar and exert maximum effort, but with practice and experience, those repairs that come into our shops will be accomplished with excellent dollar compensation for the time involved.

In previous articles, mention has been made of stone setting after the settings themselves have been repaired or replaced. We will try to be more specific in this article devoted entirely to stone setting. There are three basic settings for stones: bead settings, prong settings, and bezel settings. The original "Tiffany" is a classic example of a prong setting using a head with six prongs arranged in a circle with the tips bent over the edge of the stone. Many round, brilliant-cut diamonds are set this way, and now the prong setting is more popular than ever, being used for everything from melee to large diamonds and colored stones. Many of the modern settings are four-prong, and even some three-prong settings are being used for small stones. Prong settings are also used for emerald cuts, marquise, and pear-shaped stones.

The flat setting is a bead setting used to secure



round stones in square, triangular, hexagonal, and octagonal-shaped settings. There is usually one bead in each corner, but on triangular and square settings, sometimes two smaller beads are formed in each corner.

The bezel setting covers many variations: A full bezel, which goes completely around the edge of the stone regardless of shape; a bezel which covers only the ends and corners of square and rectangular stones; and a bezel which covers only the ends of oval stones and includes tube settings.

To set Tiffany or prong settings, only a few tools are needed: Flex shaft tool, full set of setting burrs, prong pusher, needle files, jeweler's saw with 6/0 blades, vernier caliper, ring clamp, and polishing equipment. Setting pliers can be used instead of a prong pusher with less danger of bending a prong. See Figure 1.

To set the stone in a prong setting, first measure the stone and check the setting to see that in cutting the seat, the head is adequate. Select a setting burr the exact size of the stone or very slightly smaller, put it in the flex shaft tool, and cut a seat for the stone. See Figure 2, A, point a. With the ring held firmly in the ring clamp, place the stone in the seat. A good way to handle stones is with a small amount of beeswax on a short piece of pegwood or a wooden match stick. Check the stone to see that the seat is cut deeply enough to allow sufficient metal to bend over the prongs. Also make sure that the stone is level with the ring mounting. With the stone in the seat, use the prong pusher or setting pliers and start bending the prongs slightly over the edge of the stone. After the first prong is bent over, always go to the prong directly opposite. Then go to the next pair which, in the case of a four-prong setting, will be all. In six-prong settings, after the first pair is bent, go to any prong, but after it, go to the one directly opposite. After all prongs have been bent

THE PICKLE BARREL



Marshall F.
Richmond, CMW

slightly over the edge and you are certain the stone is level, tighten all the prongs as much as possible, again working in pairs which are directly opposite the stone from one another. If when you start to bend the prongs over they are still too heavy to bend, use a 6/0 blade in the jeweler's saw and saw between the edge of the stone and the prong, reducing the thickness of the prong in the seat, thus allowing it to bend over the stone. When all prongs are down tightly, with the prong pusher or the setting pliers, apply pressure to the portion over the stone, moving the metal of the tool back and forth to produce a burnishing effect. This will make the prongs even tighter.

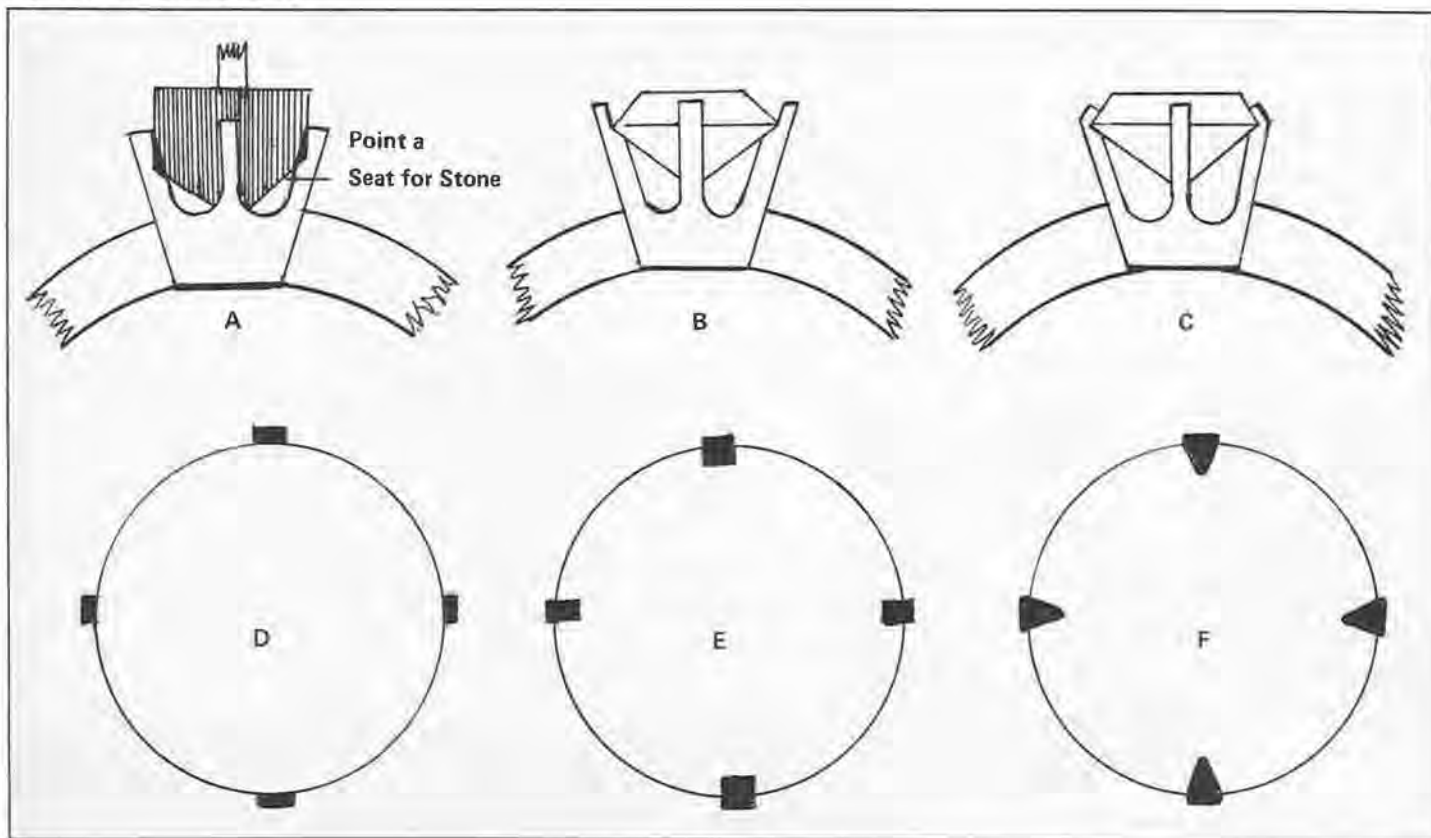
In using the setting pliers to bend and burnish prongs, the long jaw can be placed on the prong across from the one to be bent. Then considerable pressure can be brought on the tip, with little or no danger of bending the prong below the stone. With the leverage of pliers, excellent control can be had without much physical exertion. Check again to see that the stone is level, and then

with a small needle file with one side smooth to rub against the stone, shape the tips that protrude over the stone. See Figure 2, F. First polish the ring with tripoli and rouge using bristle brushes on the polishing motor to make the tips smooth and bright. Then finish polishing the ring with cotton or muslin buffs. Wash in a solution of soap and ammonia with a washout brush, or in an ultrasonic tank, and the job is complete.

Bead-type settings, sometimes called flat settings, are used in numerous types of rings but are usually restricted to setting diamonds. The tools used are the same basic tools as are used in prong settings plus engravers gravers, milgrain tool, beading block, beading tools, and abrasive stones to sharpen the gravers. See Figure 1. Gravers must be sharpened frequently and beading tools must be kept in fine condition with the beading block to produce bright cuts and perfect beads. Often gravers will have to be sharpened and beading tools shaped several times while setting one stone. An engravers block can be an added plus

in setting stones in flat settings, because much pressure is needed in making graver cuts and forming beads, and the engravers block will help you gain better control of the ring and the tools. We will start with a plain, square, flat plate so the first step is to find the center by scribing lines diagonally from corner to corner making an X. Center punch the spot where the lines intersect. See Figure 3, A, point a. With the flex shaft tool and a twist drill of about two-thirds to three-fourths the size of the stone to be set, drill a hole through the plate. See Figure 3, B. With a setting burr exactly the size of the stone to be set, cut a seat in the plate deep enough so metal can be pushed over the stone to form beads. See Figure 3, C. The depth to which this seat should be cut depends on the size and thickness of the stone, but with an ideally proportioned diamond, it should be cut deep enough so the top table of the diamond is either flush with the top of the plate or protrudes just slightly above. The scribe marks still remain in the corners,

Figure 2. Setting Prong Settings



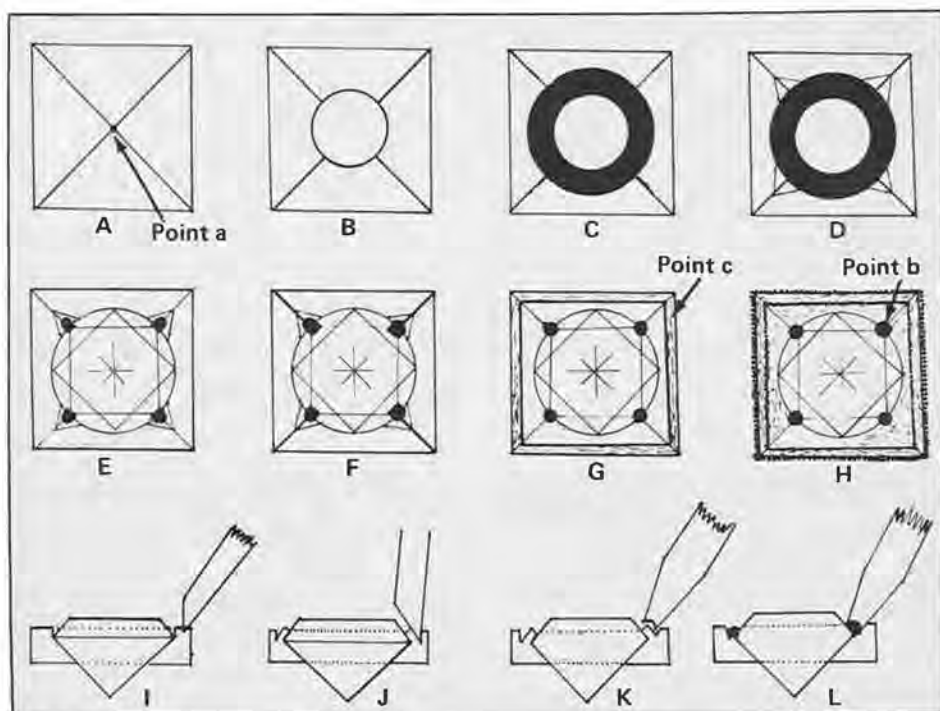


Figure 3

reaching from corner to seat, and can give you the exact location of the beads. Take a knife-edge graver and make cuts from about half way from the corner to the seat, making a "V" on each corner. See Figure 3, D. Place the stone in the seat, and with a round belly graver, push the metal up and slightly over the stone; go to the opposite corner, repeat, and then do the same on the remaining two corners. See Figure 3, E, F, I, and J. Choose a beading tool of the proper size to form a bead from the metal pushed over the stone with the round belly graver, and place the concave end over the metal at the edge of the stone. With great pressure, push toward the stone, raising the handle at the same time until the graver is almost perpendicular to the top of the stone. Go to the opposite corner, repeat, and then do the others, checking the level of the stone after forming each bead. If the stone is still

level, continue in this manner on each bead until they are all burnished and shaped. See Figure 3, Points G, K, and L. In using the beading tool, check after each bead, and if it is losing its shape or showing signs of roughness, burnish it on the beading block until the correct shape is obtained. After the beads are complete, the rest is engraving by cutting away the metal around the beads and bright cutting with a flat bottom graver. This graver must be sharp and the belly polished to a mirror finish by first rubbing the end on an india oil stone, keeping a 45° angle, and then polishing the belly on 4/0 emery buff paper mounted on a small glass plate. Engraving the top should start by cutting along the edge, leaving a downward slope between the edge and the girdle of the stone (See Figure 3, G, point c), and forming an edge completely around the setting suitable for making a milgrain edge with a milgrain tool.

Next cut away the metal around the beads, tapering the cuts from the second ridge (formed by the first cutting) to the top edge of the girdle of the stone. Again sharpen and polish the belly of the flat graver and go back over all the cuts from the corner, making a bright cut. This last cut should be a very light cut, only removing enough metal to even out high or low places and leave a mirror finish in each cut. (See Figure 3, H, point b.) The final engraving step is to run a milgrain tool around the two ridges, leaving these edges with a chain of small beads. The milgrain tool is a small wheel on the end of a small rod turning on an axle. The wheel has small, concave depressions around it and when it is rolled over the edge with pressure, it forms this small line of beads called a milgrain edge. (See Figure 4, H) These tools are quite inexpensive and come in sets with a handle and six depression sizes to choose from for making milgrain edges to enhance the appearance of settings. Flat settings can create an illusion, making a diamond look much larger than it is. When a small stone is set in a large plate with two, three, or even four rows of milgrain around it, the diamond can appear to be twice its actual size. Gravers are available for stone setting in three different types: flat belly, round belly, and knife edge. The flat belly gravers are made in sizes 36 to 49 inclusive; the round belly from 50 to 63; the knife edge comes in sizes 1, 2, and 3. The larger the number, the larger the graver. Handles are available in different lengths. The end of the graver opposite the cutting end is tapered to a dull point—similar to files—and can be driven into the handle. After installing a brand new graver into the handle, about half of the thick part of the graver can be ground away on a coarse emery wheel, leaving only about one-third the surface to be cut away when sharpening by hand on an india oil stone. (See Figure 4, G, point a.) This can cut the sharpening time in half.

A bezel setting is perhaps the



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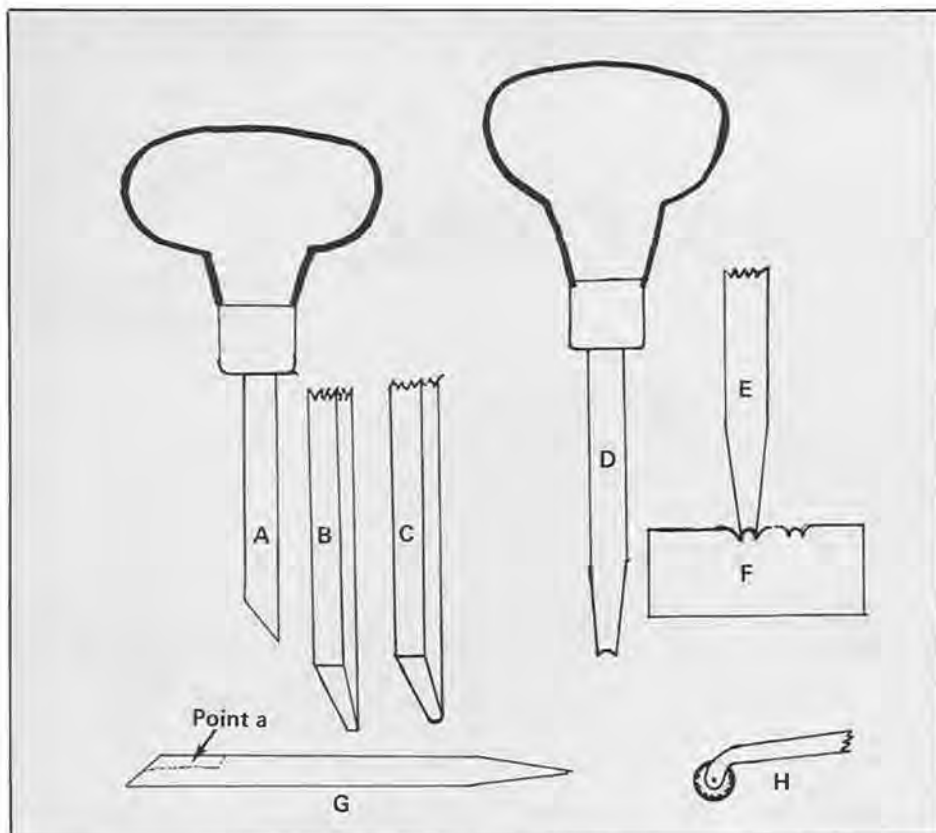


Figure 4

easiest to accomplish, but it requires a little more time than a prong setting. In a previous article (*Horological Times* of April 1980) making bezels and installing them was explained, but unless you are setting new mountings, bezel settings will most often be required when replacing cracked, scratched, or broken stones. These stones come in many standard sizes. They can be ordered by millimeter size, and if the bezel is in good condition, can easily be set. However, often the replacement stone is slightly larger than the old stone, and when this is the case, some cutting from the inside of the bezel with a flat belly graver will usually make the bezel large enough for the stone to seat properly. As a bezel is a thin band of metal surrounding the stone and protruding slightly above the girdle fastened to the ring mounting, all that needs to be done is to place the stone in the seat and burnish the bezel tightly around the stone. This can usually be accomplished with a burnishing tool. (See Figure 5, E, point e.) However, if the bezel is too thick, you may have to resort to the flat, rectangular-bottom punch (See Figure 5, F) and a brass hammer in order to tap it down. This can be done by placing the ring on a grooved ring mandrel, providing that the stone is faceted and thick enough to extend

(Continued on page 55)



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Louis A. Zanoni

GLOSSARY OF ELECTRONIC TERMS

Part V

This is the final article in a five-part series dedicated to the understanding of electronic terms. The dotted line at the inside of the page can serve as a handy cutting line so that these articles can be collected and kept in a convenient spot near a watchmaker's bench.

S

Segment Driver Usually a transistor which controls the current flow through one segment of an LED display.

Set Switch The contact point on a module that connects to the IC. When a voltage is applied to the contact, usually through the set button of the case, the module reacts to a prearranged setting program within the IC. The setting program allows the watch user to correct the time or date or any other functions which are available on the watch.

Signal An electro-magnetic radio wave that conveys information. The quartz oscillator of a watch generates a signal that can be picked up by a timing machine. The timing machine compares the signal from the watch to an internal standard frequency and displays the difference in seconds per month or day.

Silicon Chip A thin slice of single crystal silicon that has been polished and processed into a transistor, diode or integrated circuit. The terms IC, chip, die, computer, the brains, and the logic are terms used to describe an Integrated Circuit.

Solder A bond of fusible alloys, usually tin and lead, used to join metal parts. The common electronic circuit alloy is 60% tin and 40% lead with rosin flux.

Substrate A thin wafer of either ceramic, fiber glass filled epoxy, or molded plastic with a pattern of conducting lines (traces) on one or both surfaces. The conductive lines are used to interconnect an assortment of components which are bonded to the surface of the substrate. In most LED and LCD modules, the substrate is the main support frame.

Switch In a watch module, it refers to the contacts on the side or front which initiate commands to the IC. The response to a switch command is predetermined by the program of the IC.

T

Trace Conductive lines printed on a circuit board or substrate.

Transflector An optical transflector is a material that allows some light to pass through and some to be reflected. It is placed behind the back polarizer of an LC display to diffuse the uneven light of the tritium tubes for night viewing and an ordinary reflector in day light.

Trim Cap An adjustable capacitor that increases or decreases the capacitance in the oscillator circuit. The tuning range of a trim cap is limited to 180° rotation, although it does rotate a full 360°.

Twisted Nematic The shape of a nematic molecule in a liquid crystal display. The orientation of the molecules in an LC display is not perpendicular; it is twisted 90°. The 90° twist is what causes the light to be polarized when passing through it. When a voltage is applied to the liquid, it unwinds.

U

Ua Abbreviation for micro ampere. 1 ua equals one-millionth of an ampere or 0.000 001 amperes.

UP converter The circuit in an LC watch which boosts the voltage of the battery from 1.5 volts to a higher voltage to drive the display. The voltage requirement of a module is dictated by the type of display used.

V

+VDD The electronic term used to identify the positive power supply voltage which connects to the drain of a transistor.

-VSS The electronic term used to identify the negative power supply voltage which connects to the source of a transistor.

Z

Zebra An alternating series of conducting and insulating strips of silicone rubber which is used to connect the display to the substrate.

TIMES

You could be selling Maxell batteries right now.



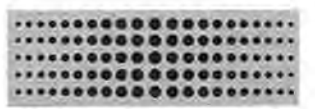
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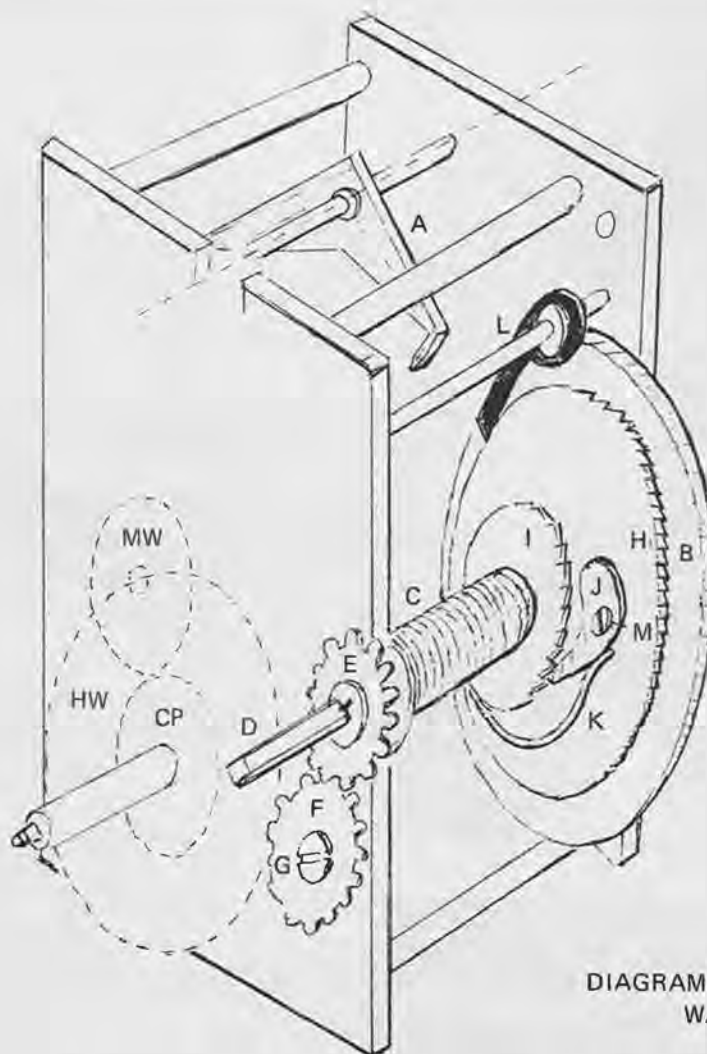
By Sean C. (Pat) Monk

Although our clock is old (ca. 1925), it is not antique. One might say it is a "semi-reproduction" of an old banjo clock. We had hoped to get a genuine Willard for this discussion, but it has been a long time since we have had one in our shop for repair. Suffice it to say that Simon Willard was the originator of the banjo clock. He was the middle of three brothers, Aaron and Benjamin, who pursued the clock-making trade in Massachusetts, mainly in the towns of Grafton and Roxbury. Simon himself had an unusually long life (1753-1848) and an exceptionally long career. He produced clockwork before he was in his teens and relinquished his tools not long before his death.

The term "banjo" as applied to clockwork originated with Simon Willard's first patent of 1802, referred to as a "patent improved timepiece." The Willard banjos, produced by all three brothers, were noted for their special case features: circular tops, narrow waists, and wide rectangular bases. Simon himself was known for the building of long-case clocks, as well as shelf and mantel clocks. He is also known to have built a turret clock for the University of Virginia at Charlottesville. In 1801, however, he built his first banjo.

The clock we will be discussing was manufactured by the Waltham Company, also of Massachusetts, and dates from about 1925 as far as we can tell. It is extremely well made, thick-

Figure 1



- A. STEEL ANCHOR
- B. MAINWHEEL
- C. FERRULED DRUM
- D. MAINWHEEL ARBOR
- E. WINDING GEAR (UPPER)
- F. WINDING GEAR (LOWER)
- G. RETAINING SCREW
- H. POWER-MAINTAINING (P-M) WHEEL
- I. RATCHET WHEEL
- J. CLICK (PAWL)
- K. CLICK SPRING
- L. GRAVITY-CONTROLLED PAWL
- M. CLICK SCREW
- N. SLOT (MAINWHEEL)
- O. CIRC. BRASS SPG.
- P. NOTCH IN M/WHEEL

DIAGRAMMATIC SKETCH of POWER MAINTAINING, etc.
WALTHAM BANJO, 8-DAY, WT. DRIVEN
(Reference also to Figures 3 & 4)



Figure 2

plated, with well-crafted wheels and pinions. The casework (which we had to restore after the weight had fallen through the bottom) is also excellently crafted, the tablets finely painted, and the ornaments of solid brass. The escapement is of the square recoil, dead-beat, steel Graham anchor type. The span of the wide anchor (A of Figure 1) is nearly the diameter of the escape wheel and, spanning $7\frac{1}{2}$ teeth, allows the impulse faces to interact very favorably with the tooth tips.

No strike is incorporated. The train is powered by a $7\frac{1}{2}$ -pound lead weight via a large mainwheel (B). The weight resides in a hardwood channel running vertically through the clock case. Figure 2 shows the clock complete in the case. The weight is attached to its ferruled drum by means of a fine brass cable. Though fine, this cable is very strong and well able to support the weight, provided that it is securely attached to the drum by a knot passed through the drum wall. The free end of the cable is secured to the left-hand front lower pillar plate.

When the clock is wound, the mainwheel arbor (D) is turned and the cable winds onto the ferruled drum. Overwinding is prevented by an arrangement between the two winding gears (E and F). The winding gear (E) is secured to the mainwheel arbor and rotates with it upon winding. The lower gear (F) also rotates when the clock is wound. Upon close examination, however, it can be observed that this gear is cut with one tooth longer than the rest. Also, one can observe that the upper gear (F) has one pair of teeth notched

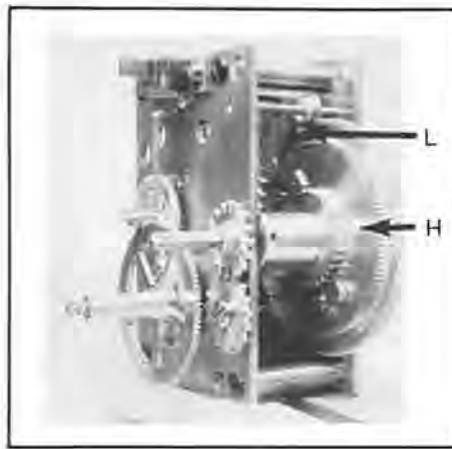


Figure 3

slightly less than the rest. When the mesh between the two gears is set correctly, this arrangement acts as a safeguard against overwinding. The retaining screw (G) can be loosened and the gear (F) repositioned so that its long tooth coincides with the shallow notch on the gear (E). This adjustment should be made upon winding before the weight has reached a critical height in its hardwood channel. After the gears have been correctly meshed, the retaining screw should be resecured.

However, there is another very important factor to be observed during winding. In all such weight-driven clocks it is desirable to have "maintaining power." In Figures 1 & 3 a power-maintaining wheel of large diameter can be observed (H). Henceforth, we shall refer to this as the p-m wheel.

The object of the p-m wheel is to insure that, on winding the clock, an immediate and thereafter constant torque will be applied to drive the train. In addition, this wheel guards against slipping, or backlash, and prevents the clock from stopping during the winding process.

However, on winding, once the weight torque is initially relieved, the ratchet wheel (I) together with its click or pawl (J) assumes the main task of relieving the train against the weight torque.

Let us concentrate on Figures 1 & 4. During the winding process, the ratchet wheel, supported by its click, holds against the weight torque. The click is tensioned against slippage by a bronze click spring (K). Immediately behind the ratchet wheel is the much

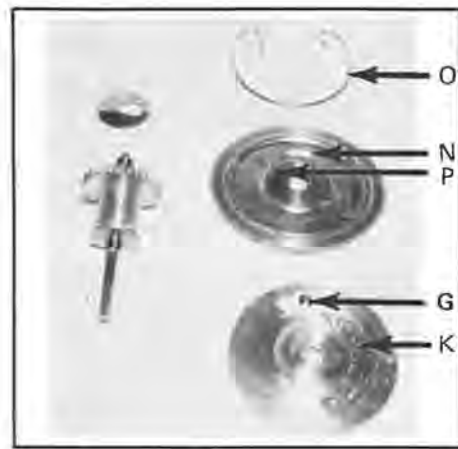


Figure 4

larger p-m wheel (H) already referred to. This power maintainer is itself prevented from slipping by the action of a steel, gravity-controlled pawl (L). The latter we have shaded in Figure 1.

Let us look at Figure 4. The mainwheel arbor, together with its ferruled drum for containing the cable and the ratchet wheel, can be seen lower left. The p-m wheel and the mainwheel are tensioned against the ratchet wheel by means of a brass tension washer, shown top left. In effect, all these components are separate entities, performing separate functions. However, when the clock is wound, the ratchet wheel rotates and so does the p-m wheel—for a limited arc only. This limited rotation of the p-m wheel is achieved via an extension of the winding click screw (M) which protrudes through a slot (N) cut into the mainwheel. The ratchet screw extension is hooked to the free end of the circular brass spring (O), top right. The other end of this spring is hooked into a notch (P) behind the mainwheel. When the clock is wound, the ratchet screw extension is withdrawn in the slot to its stopping point. This limits the movement, or arc, of the p-m wheel.

The mainwheel, of course, does not turn on winding as it is frictioned against the other components and only turns as the escapement releases the train and the weight falls.

We should not forget the pendulum. If one observes Figure 3 (we have not drawn the details in Figure 1), it will be seen that the pendulum leader is over the front plate. The wooden pendulum rod therefore hangs over the front plate, instead of over the back plate in the more common fashion. The rod is made of hardwood with a lead bob attached which is brass covered in front. The upper part of the pendulum rod is made of brass, with a hole executed in it to pass over the hour wheel behind the hands. It has a front-end suspension.

My thanks to "Scotty" Jack Dawson and our excellent cabinet refinishers, Josef and Christine Zepp, for successful restoration.

TIMES

Essence of Clock Repair ©1980

by Sean C. "Pat" Monk

CMW



More WMJDA Convention News...



Quartz Panel Moderator Kenneth Weil and wife Marcy



President John Cassedy with wife Marilyn



WMJDA Man of the Year, Harold Perlman, with wife Sue.



Something's cooking at the Man of the Year Luncheon



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Quartz Panel Discussion



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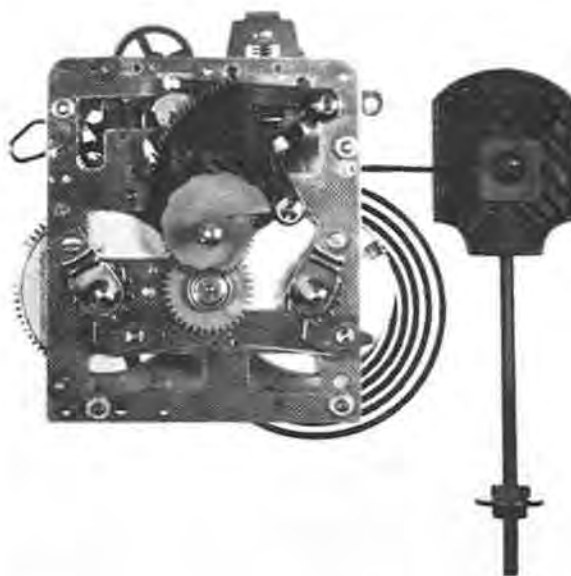


Moderator
Kenneth Weil

REPRESENTATIVES OF the major watch producers, a solid state parts supplier/training company, and AWI were brought together by Kenneth Weil for a valuable discussion regarding quartz watch technology. Emphasis of the question and answer session was on the training of the watchmaker and his ability to successfully repair solid state timepieces. Watch material distributors questioned the watch companies' unwillingness to make electronic replacement parts

available at a reasonable cost. Answers ranged from this not being a simple task, to just plain "no." There was general skepticism among the watch producers as to the watchmaker's ability to replace individual components. This was refuted by other members of the panel. It was agreed that closer cooperation between the watch companies, distributors, and AWI was needed.

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Affiliate Chapter Column / Robert F. Bishop

Profile:

Watchmakers Association Of Pennsylvania

The Watchmakers Association of Pennsylvania is the subject of this month's Affiliate Chapter profile. The WAOP has had a long and eventful history. The following article appeared in their 1979 Convention Book, and was written by Shirley McDonald, Director and Editor of the WAOP Newsletter.

This history begins in 1934, when a double-decker ice cream cone cost five cents and gasoline was eleven cents a gallon!

In May of that year, 65 watchmakers in the Pittsburgh area who had been attending meetings of the International Jewelry Workers Union decided to form an organization of their own.

A month later another meeting was held. Mr. George Niesslein was elected President, and the members voted to call their organization the Tri-State Horological Association. One of the Executive Officers named at that meeting was the late Marco Maglietta of Washington, PA. (This is of particular interest since his wife, Helen, is presently an active member of the Allegheny Guild.)

A year later, it was resolved that the Association join a National Group, so that greater benefits for members could be obtained. It was at this time that we affiliated with the United Horological Association of America, Inc., with headquarters in Denver, Colorado. Our Association being the first in the State to affiliate with this National Organization, we were recognized by them as a State Association. Our name was then changed to the Horological Association of Pennsylvania.

In May, 1938, the first State Convention was held in Pittsburgh. At that time, the State Association was officially formed to establish County Guilds, and by May, 1939, five County Guilds had been formed, namely: Allegheny, Clarion, Jefferson, Lawrence, and Venango. In that year, the State AND National Conventions were held "back to back" at the Roosevelt Hotel in Pittsburgh from May 14th through 17th.

During the war years of the forties, the County Guilds gradually disappeared, and the State Association was again composed primarily of watchmakers in the Pittsburgh area.

Then, on a cold winter night of December 22, 1950, nine persevering men made their way to the office of a Pittsburgh Notary to sign papers of Incorporation for their beloved Organization. The Incorporation was granted in January 1951, and the Watchmakers Association of Pennsylvania, Inc. drew up its first Constitution and By-laws.



Robert Bishop

Meanwhile, "down on the farm," a new national Organization called the American Watchmakers Institute had come into being. It was inevitable that the two should meet, and after a lengthy courtship, our Watchmakers Association affiliated with AWI on October 14, 1974. It has been a solid "marriage," producing two healthy offspring; namely the Delaware Valley Watchmakers Guild and the Allegheny Watchmakers Guild. The Delaware Valley Guild was organized in 1978, and the Allegheny Guild dates back to the old beginnings in 1934.

As you can see, WAOP, like many other watchmakers' organizations, has had its slack as well as its productive years. The last several years represent a period of renewed interest, and the organization has embarked on many new and varied programs. Their Registered Watchmaker program received about 75 initial applications. The Allegheny Watchmakers Guild is currently sponsoring a watch and jewelry identification program to aid law enforcement in the return of recovered stolen property to the rightful owners. The Delaware Valley Guild offers the talents and services of its members to other interested community groups. The talents of the members of both Guilds have been used extensively in providing interesting and educational programs for their regular meetings.

Their Constitution and By-laws provide for the election of State Directors who, in turn, elect the executive officers. The State is parent to the Guilds which operate under the State By-laws. However, each Guild may elect its own officers, set its own dues structure, and choose its own programs.

As I have stressed before, organizations are the result of the efforts of people. WAOP is no exception. In addition to those individuals mentioned by Shirley in the historical article quoted, there are many others who have given of their time and talent over the years: Virgil Petrocelli, George Meyers, William Busch, Mario Bocchicchio, W.O. Smith, Sr., Tom McDonald, Bill Cornfield, Eugene Eckstein, Ralph Henning, Paul Fehrenbach, Tom Murray, Jack Tillman, and many others that space does not permit mentioning. It has been my good fortune to know many of them personally. Any organization, however, needs new blood periodically. I am sure that there are many of you who have not as yet participated in the operation of your Association. Now is the time to get involved; help make the future of your Chapter bright!

TUES

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IOWA

The Spring Technical Seminar was a huge success; approximately two hundred were in attendance. The program by Dave Morrow, the Bench Course on meter reading by Gerald Jaeger, and the timely "Gold Testing and Outlets for Selling Old Gold" by Tim Dickens were all well received. Those present were pleased with the programs and returned to their homes with new technology and ideas.

Thanks go to the following suppliers who furnished coffee, rolls, doughnuts, and cookies throughout the day: Esslinger & Company, Iowa Jewelers Supply, Jewelmont, The Bergman Company, The Nest Company, and Twin City Watch Supply.

The 1980 Convention and Trade Show is scheduled for September 6 and 7, 1980, at the Best Western Airport Inn, Des Moines, Iowa.

NEW JERSEY

Last month Henry Frystak, of the Bulova Watch Company and a Life-Time Member of the Watchmakers' Association of New Jersey, was the guest speaker. Henry was called upon at the last minute because the scheduled speaker was unable to attend the meeting. Henry put on a fine

show for members. Part two will come in the Fall.

Jim Boughton, Past President of AWI and now serving as a Director, gave a Quartz Bench Course on the Swiss Flatline 940.111 and the 9362. The attendance was 28. Every student disassembled one or the other and viewed a complete slide presentation with lecture. There was a brief coffee break, followed by a slide presentation on the Citizen Multi Alarm. Each student completing the course received a certificate.

PENNSYLVANIA

The Allegheny Watchmakers Guild held its regular monthly meeting on Tuesday, May 13, 1980. The Directors met briefly at 6:30 the same evening.

The program featured Mr. Donald Palmieri, President of Palmieri & Company, who spoke about antique watches, jewelry, gold and diamonds as investments, appraising, second market jewelry, the new GemPrint technology, which are all interesting and important facets of the watchmaking profession.

OHIO

The 34th Annual WAO Convention will be held on Friday, Saturday, and Sunday

on July 25, 26, and 27, 1980, in Columbus at the Marriott Inn.

Don Basch, convention chairman, will be sending letters to members with all the specific times and activities. Howard Opp, secretary of WAO and AWI instructor, will conduct the Saturday morning seminar on the Bulova Quartz Analog (SMQ). Members are urged to get their registrations and motel reservations in as soon as possible.

The OWA Credit Union Annual Meeting will be on Sunday morning of the Convention weekend and will be followed by a continental breakfast. The WAO Annual Meeting will follow the breakfast. All OWA members are asked to attend the Annual Meeting as a completely revised code of regulations will be presented and voted on.

NEW YORK

On Monday May 5th, The Horological Society of New York heard an interesting talk on "Clock Repairing and Restoration" by Nathan Litman, instructor at Nassau Community College.

Mr. Litman combined the skills of an experienced educator with that of a practical bench man. With the aid of a large number of hand-made sketches, he covered an extremely wide range of clock types and their common service problems. He constantly emphasized the practical. For example, in discussing clocks, he eliminated the very cheaply made varieties and also the very rare. He focused his attention on the better, average type of clock. In discussing repairs, he concentrated on the most common problems ranging from the mainspring to the striking mechanism.

Many of Mr. Litman's methods were unorthodox and created lively controversy. However, the presentation

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Memo to rated jewelers

around the ASSOCIATION...

was so rich with valuable bench tips that the membership felt highly rewarded. It was a stimulating, educational evening.

CONNECTICUT

The first meeting of the Connecticut Watchmakers Association (the name accepted by voice vote) got off to an auspicious start with 25 prospective members present. With the honored guests, Mr. Milton Stevens of Cincinnati, Executive Secretary of the American Watchmakers Institute, and Mr. Creighton Shoor, Secretary of the Retail Jewelers Association of Connecticut, the meeting was called to order. Mr. Shoor expressed his personal willingness to assist the CWA in any way, and to aid the members in employment or trade related situations wherever needed. He noted that the CWA was long overdue, and he felt that it would be beneficial not only to the members, but to the trade as a whole. His remarks were well received and a motion was carried to express thanks for his welcoming remarks.

Mr. Milton Stevens was then introduced to the members. He gave a short talk on the benefits of AWI affiliation for the State Association. Mr. Stevens then proceeded to read and discuss, paragraph by paragraph, the AWI-supplied State Constitution. Each member present was furnished a copy so that questions could be raised and answered. There were numerous changes made; on some points there were very intense discussions. Finally a compromise was reached on some points and the amendments were accepted. As noted by Mr. Stevens, this healthy interest by the members was gratifying.

As the constitution requires, the members present elected 9 Directors; 3 each for terms of 1, 2, and 3 years respectively. The Board then elected

from their ranks a President, 2 Vice-Presidents, and a Secretary-Treasurer. The Directors elected for a 3-year term are William G. Kavanagh, Frances Chop, and David Meunier; for a 2-year term — Ronald Sweetland, Benoit Levesque, and Stan Chop; for a 1-year term — Vincent Galasso, Peter Matsikas, and J.C. Van Dyke.

The officers elected who will serve until December 31, 1980 are President — David Meunier of Putnam, Connecticut; First Vice-President — Vince Galasso of New Haven, Connecticut; Second Vice-President — Stan Chop of Fairfield, Conn.; Secretary-Treasurer — William G. Kavanagh of Farmington, Connecticut.

FLORIDA

James Broughton, Past President of the American Watchmakers Institute, was in Ft. Lauderdale on March 9th. Florida Watchmakers from Deerfield Beach, Miami, Hialeah, Delray Beach, Okeechobee, Satellite Beach, Perrine, Ft. Lauderdale, Lakeland, Melbourne, Bradenton, Hollywood, Vero Beach, Lehigh Acres, Lake Worth, and Miami Beach attended this very important Quartz Analog Bench course. The Florida State Watchmakers Association wishes to thank Jim for spending his weekend with the Florida members.

AWI's Jerry Jaeger was also in Florida recently with his "Meter" course. Watchmakers in Daytona Beach and Tampa areas took advantage of the occasion. Educational programs continued with a full day Seminar at the Country Squire in Lake Worth on May 18th. AWI's Fred Burckhardt gave a great talk on Gems for the Watchmaker, along with Mel Kavin of the Rubins Stone House in

Miami. Norris Switzer, noted for his lectures on solid state time computers, brought those in attendance up-to-date on LCDs. The Father and Son team, Joe and Mel Liebman, had a new film on "Repair of Antique Watches" and Mel explained the repair of the "Atmos" clock. President Paul Finne lectured on batteries and bench tips.

FSWA members are looking forward to a terrific convention at the Colonnades on Singer Island, near Palm Beach. The dates are October 31 through November 3, 1980. AWI's Ewel Hartman will be the Banquet Speaker, which will certainly be a treat. Watchmakers of Switzerland and Citizens Watch Company will be represented.

AWI held its quarterly meeting at the Holiday Inn located in Fort Myers Beach, Florida.

On Sunday, the watchmakers of Florida were able to hear four speakers who are experts in their respective areas: Orville Hagans, Marvin Whitney, Henry Fried, and Otto Benesh.

Despite a bad case of the flu, Orville Hagans presented slides of a collection of clocks, which were formerly owned by Mr. Hagans. The slides were narrated by Mrs. Josephine Hagans.

Marvin Whitney presented slides of chronometers, which traced the history of these precision instruments.

Henry Fried conducted a question and answer session on "What's New and Where Are We Going?" Many thought-provoking questions were raised by watchmakers in attendance. Their questions and comments concerned many everyday problems encountered by watchmakers at the bench.

Mr. Otto Benesh, internationally known clock restorer, spoke on the "Hows and Whys of Clock Restoration."

Everyone who attended went away with many fresh, new ideas on the watch and clockmaking professions.

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IDAHO

The Gem State Watchmakers Guild, in order to better serve their members, is sending out questionnaires concerning dates and topics of upcoming bench courses.

There will be a Watch Show-Trade-Sale on August 16, 1980. Anyone interested in participating should advise President F. Martell Grover, so that the necessary room and arrangements can be made.

ONTARIO

The Ontario Watchmakers Association held its 1980 Annual Members Meeting on April 27, 1980. The business meeting was handled smoothly by Chairman David Barthau, who is now Immediate Past President.

The afternoon technical program began with Daniel Benson (currently an instructor at George Brown College), who presented the film "The Clockmaker," by Richard Gayer of England. This film depicts the life of Martin Burgess, a Fellow of the British Horological Institute, who was born in 1931 and has dedicated many years to clockmaking.

Mr. Benson's presentation was followed by Mr. Herb Mortimer, Presi-

dent of the new company, Swisstime Canada Limited, who told Ontario members of the new MICROMA Swiss quartz watches. This new company is presenting MICROMA to the Canadian Market. These watches of top Swiss quality, are to be distributed to Canadian Jewelers only.

Mr. Joseph Goncalves of the General Watch Services, Ltd., the distributor for "Time-Cron II," brought this quartz timer for display. Mr. Rudy Hahn of Valangin Ltd., demonstrated the "Elma" line of cleaning and timing equipment, including the Vacmatic II, which is a floor model cleaning machine that can clean up to 20 watches at a time. Mr. Jim Griffin of Toronto Jewelers Supply Co. Ltd., was on hand with their new line of Portescap timing and testing equipment.

The President's Reception was held courtesy of Ebauches, SA. Mr. and Mrs. James Fraser were the host and hostess.

The President's Banquet was a successful climax to the day's activities. The wine at dinner was furnished courtesy of H. & W. Perrin and Toronto Jewelers Supply. Mr. James Fraser, the dinner speaker, gave members current facts and figures on imports from Switzerland.

NORTH CAROLINA

The C.E. Kneeburg Memorial Award for outstanding contributions toward the advancement of watchmaking in North Carolina was presented to Milton R. "Buddy" Carpenter at the North Carolina Watchmakers Convention held in Goldsboro, North Carolina. This award is presented annually by the Piedmont Crescent Guild to the person who best fulfills the high standards set by the man in whose name it is presented.



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MICHIGAN

The Michigan Watchmakers' Guild held a convention in Flint, Michigan on April 19th and 20th. Mr. Darrell Archer did a fine job explaining "The Basics of Electronic Watches."

New officers elected were President Darrell Archer; 1st Vice-President, Marx Cooper; 2nd Vice-President, Gene Hada; 3rd Vice-President, Chet Malinowski; Secretary-Treasurer, Pat Monk; Recording Secretary, Charles Barnes; Sergeant at arms, Art Greenwald; Dean, Chet Card; Directors-at-large, Dick Wieber, John McMartin, and Robert Gaines.

There was a Bench Course on Sunday, June 1, 1980 for the repair of the Citizen LCD Quartz Alarm, Cal. 9021. This Bench Course was arranged and prepared by the Michigan Watchmakers' Guild and the American Watchmakers Institute.

MASSACHUSETTS

Guest at the MWA May 20 meeting was Mr. Michael Harrold, an engineer from Lynn, Massachusetts. The gentleman gave a 45-minute talk on pocket watches that was definitive in every sense of the word. He plotted on the blackboard an interesting feature called the Watch Industry Cycle; from development through expansion, competition and decline, beginning in 1850 through 1930. He also

OBITUARY

Arthur Anklam passed away on April 18, 1980. The Watchmakers Association of Florida will miss the "Mean-ohlman," as he called himself. With his wide smile and pleasant personality, no one could deny him the fun. He was also dubbed the "largest watchmaker in the south" due to his ample girth.

A native of Wisconsin, Art's World War II assignment brought him to the Miami area, where he guarded German prisoners of war. The warm, sunny climate of Florida was just what Art liked, so he stayed.

At one time, Arthur prided himself in "not being a member of anything." It is true that he did not have membership in any watchmakers' organization, but he always donated his knowledge in helping watchmakers

on their way. However, in later years he came to realize the greatness of the American Watchmakers Institute and the Florida State Watchmakers Association. He cheerfully joined both organizations, and continually boasted of his membership.

An outstanding watchmaker and engraver, Art held an Associate of Science degree from Wilbur Wright College. He and his wife operated a store in Coconut Grove before Art went into the service of Sears, Roebuck, and Company. He was the manager of the watch repair department at the Cutler Ridge Center in Perrine, Florida, working side by side with Gus Glecer for many years.

Arthur served as Vice-President and was the immediate Past President of the Greater Miami Watchmakers Guild.

expanded on the movement styles and sizes; the production of jeweled watches; the popularity of 7 jewel movements and the reasons for it; how the railroad watches came into being and the growth thereof; the yearly production of all classes of men's watches and the dollar volume they generated. He ended with the \$3.50 pocket watch that eventually retailed for a dollar and he told why it was able to be sold at that price. He

also spoke of Timex and their burgeoning sales record which is quite similar to that of the dollar watch. The session was even more interesting because there was an old timer present who worked for some of the watch companies mentioned in Mr. Harrold's talk. The give and take between them made the history really stand out, because there was first-hand substantiation of many of the facts given.

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TRAINING CENTER, EBAUCHES SA

By Orville R. Hagans



Figure 1

During my visit to Switzerland in 1978, I had the pleasure of meeting Remy Walchli, Chief of the Training Center at the Ebauches SA factory in Marin. I spent considerable time in the laboratory and classrooms. I found that going over the training curriculum in detail was extremely interesting.

The training rooms can be separated by folding panels so various groups concentrating on different subjects can be isolated and work undisturbed. Benches are grouped with closed-circuit T.V. and sound; Figure 1 shows recording equipment for both visual and audio purposes.

Should motion pictures, slides or tapes be needed for general work, panels in the wall swing into place and reveal all such equipment in an instant. See Figure 2. Part of the classroom, when not in use, is shown in Figures 3 and 4. Figures 5, 6, and 7 show sections of the classrooms and students at work.

The following is the Annual Report of 1978, received last year. It is truly enlightening.

Figure 2



"The Training Center of Ebauches SA is steadily growing in importance, proof of this being the high number of participants following the different courses.

"In 1978, 971 watchmakers from 48 different countries attended the courses given by our instructors, either in Marin or abroad. 72 courses or seminars attended by 13 to 14 persons each, have been organized, for an average duration of 3 to 6 days. Taking into account a daily 8-hour program, this represents 28,300 instruction hours. The main subject of the curriculum is the electronic quartz calibers of the fabrication program of Ebauches SA and its affiliated firms. Out of 971 participants in





Figure 3



Figure 4

the seminars, 72 were teaching in horological institutes or schools; 127 participants were coming from the retail trade in Switzerland; and the foreign retail trade, with 539 participants, represented the majority. Moreover, 223 watchmakers, customers of Ebauches SA, attended the courses.

Seminars abroad

"Besides their activity in Marin, the instructors of the Training Center are required, from time to time, to act as lecturers abroad. These seminars are mainly organized with the collaboration of various firms and brands. In a total of 15 courses given in 9 different countries during 1978, 290 persons have been introduced to our new products. Italy, France, England, Belgium, Luxembourg, Spain, West Germany, Singapore and Hong Kong were chosen, last year, for refresher courses of Ebauches SA.

"This international activity requires a great deal of adaptation and

flexibility as well as extensive knowledge of foreign languages for our three instructors stationed in Marin. Different courses in Marin are given in several languages, French not being the only language understood. Courses are held in German, Italian, English, and Spanish. In Belgium a course was taught in Flemish last year. In this instance, our instructor had to call upon a genuine translator.

Appreciation by the manufacturers

"As mentioned before, a high percentage of the participants are to be found among our customers. Switzerland alone was represented by 169 participants registered through 57 manufacturers.

From 48 countries

"Besides the European countries, a fair number of participants came from the other continents. The fact that the participants in the courses came from 48 nations proves that the products of

Ebauches SA are known on a large scale and that—thanks to this Training Center—we are in a position to guarantee a worldwide after-sale-service.

Exchange of information

"Through these courses a very interesting exchange of information between the participants, who are also specialists, is made possible through discussions. This allows a rich flow of information to reach our instructors, who transmit it to the sources concerned.

"Finally, it is right to say that the courses on electronic calibers begin to bear fruit. After having attended these courses, many manufacturers are able to take care of the new products.

"Remy Walchli, responsible for the Training Center, wrote in his annual report: 'The retailer is now convinced that it is a question of survival to sell the quartz watch and to assure its after-sale-service.' No other comments are needed."

Figure 5



Figure 6



Figure 7



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Accurate self-starting movement operates on a single "C" battery. 4,194,300 vibrations per second. Has metal sweep hand, backhand setting, removable metal hanger. **Furnished with all fittings**, including rubber washer, metal washer, brass centerfix

nut or hex nut and brass minute hand nut. **Has standard American shaft** available in $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ " and $\frac{7}{8}$ " lengths. Available also as **24 hour movement**; as **day/date movement** with $\frac{5}{16}$ " day/date disk; also **with bell on top**, one strike on the hour, no sweep, $\frac{3}{4}$ " shaft. Size of movements: $2\frac{3}{8}$ " x $2\frac{3}{8}$ " x $1\frac{1}{8}$ ".

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TAX

Questions

By Comprehensive

This is the first installment in a series of articles dealing with specific tax questions which may be of interest to our readers. Comprehensive Accounting Corporation, 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 business use of your car gives several tax benefits?

ANSWER: The business use of your car allows you to deduct the ordinary costs of operating your vehicle and depreciation against your income.

You are entitled to deduct the business portion of your actual expenses for insurance, gas, repairs, maintenance, and depreciation. When making deductions for gasoline, in lieu of using the actual cost method, you can elect to use the optional flat deduction which has been increased to 18-1/2 cents a mile for the first 15,000 business miles per year, and 10 cents for business miles in excess of 15,000.

Generally, an automobile is depreciated over a period of not less than three years. You are entitled to depreciate the automobile over the straight-line method by taking equal depreciation over the life of the vehicle, or you can elect to use the accelerated depreciation method. Although the total depreciation over the life of the

TALK

and Answers

Accounting Corp.

automobile will be roughly the same under any method selected, the accelerated method will allow you to take more depreciation in the early years, thus reducing your taxes earlier.

Under either method, you are entitled to take an investment credit on the cost of your automobile used in your business. The credit is allowed in the year of purchase no matter when the car is purchased during the year. The investment credit is a direct reduction of your taxes and is available providing that the automobile has a useful life of at least three years. The investment credit for an automobile having a useful life of three years is 3-1/3%; if its expected useful life is at least five years but less than seven years, the credit is 6-2/3% of the price, and if it is seven years or more the credit is 10% of the cost. The credit does not reduce the price of the car for purposes of depreciation even though the credit has the effect of being a rebate against your purchase price.

With the rising costs of gasoline and automobile repair, it is important that you maintain actual records to compare the cost of operating your vehicle (including depreciation) with the optional flat depreciation method allowed in order to select the method which provides the greatest tax benefits for you.

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WATERBURY HAIRSPRING

Q I have been restoring a Waterbury ship's bell clock which has been in the hands of a soft-solder artist. Believe it or not, the hairspring has been soldered together where broken, about 90° from the end!

The old hairspring has a collet 2.15 mm in diameter with a .09 mm hole. The thickness of the spring is .06 mm; width, .23 mm; diameter at rest, 10.25 mm. It has 11½ coils.

Perhaps you can advise where or how a proper spring can be found. I shall appreciate any help offered.

Edwin T. Morphy
Clifton Springs, NY

A A replacement hairspring for your Waterbury ship's bell might be had by cannibalizing some old American heavy-balance, 18 size, and fitting it to your clock's balance. You might have to reshape the spring after timing it and making it fit the studding and old collet. These clocks did use balance jewels and large balances. However, if you cannot solve your problem this way, try contacting either of the following: Manfred Trauring, 92 Nassau St., New York, NY 10038, or S. Greenglass in care of Poltock, 93 Nassau St., New York, NY. You might also try the hairspring from an old Baby Ben clock.

I still prefer that you try a hairspring from an 18-size watch. Most likely the spring will be weak in relation to your balance, and thus you can shorten it to go faster.

Q We would be very interested in knowing the date of manufacture of the following pocket watch: Admiral No. 10466659, Tacy Watch Co., Swiss movement.

Mark Wagner
Arlington Heights, IL

A The Admiral pocket watch of the Tacy Watch Company was a product of the Tavannes Watch Company of Tavannes, Switzerland. The

name Tacy is a contraction of the names Tavannes and Cyma. Without seeing a photo of the watch, I can't tell you the dates of manufacture, but the 12-size and the 16-size models were made around the 1930's.

Q I have a few dozen unmarked round glass watch crystals. I want to put them in my American crystal system which includes whole numbers from 4 to 20 with 16th divisions in between—such as 14-7/16. Please let me know how I should measure the crystals in order to put them in the system. Should I use inches, millimeters, or some other form of measurement?

Mark L. Davenport
Northridge, CA

A It would be best to measure your round crystals in millimeters. With small, round adhesive discs, mark them as to diameter and height and place them in progressive order.

The old crystal cabinets of many, many years ago were marked off in lignes and douziemes. Roughly speaking, 12 lignes equal 1-1/16 inches. Therefore, you can figure 11½ lignes per English inch. The French inch was divided into lignes and the ligne in turn was divided into douziemes (twelfths). The douzieme was used primarily to determine thickness or height. You can see, therefore, that the millimeter is by far the best and easiest measurement to use in classifying your glasses.

Your modern round plastic "glasses" are measured in millimeters, and thus your glass crystals can be put alongside these for quick reference.

Q Enclosed you will find a picture of a pocketwatch. Could you please tell me who manufactured the watch and the date of manufacture?

A. Torontali
Cleveland, OH



A Jules Jurgensen made your movement and was in production of this type of calibre around the 1880's. It was considered top quality. Jules Jurgensen came from a famous family of Danish watchmakers who later worked in Switzerland where this was produced.

Q I have in my possession a 16-size Hamilton 974, serial no. 1327984, with a balance stop mechanism (Hack) that activates in the setting position.

I would appreciate any information you can furnish as to quantity produced, scarcity, desirability, etc.

Precision Watch Repair Co.
Philadelphia, PA

A Your Hamilton 974(P), serial no. 1 327 984 was made in 1918. From my records, there were 329,700 of these 974's made by Hamilton through the years. Since yours has the Hack mechanism, it was probably made to order for military use in 1918. In the same run as yours were produced 2,700 others—or, I should say, 2,699 others. Since so many 974's were made, I doubt whether they are rare, although they were one of the most successful models produced by Hamilton.

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Now you can send BOREL your Swiss Electronic or Quartz Movements in need of service for exchange.

Your order must be accompanied by the movement to be exchanged. Be sure to remove the dial, hour wheel and cannon pinion and save for the exchange-movement you will be receiving. Pack movement carefully. Give caliber on outside of envelope, with instructions to EXCHANGE FOR RE-BUILT MOVEMENT.

Following is a list of calibers currently in the program:

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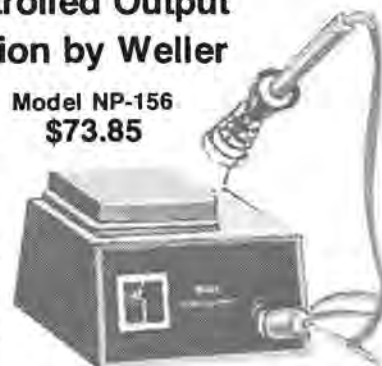
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Special .015 inch diameter. Resin flux core that is non-corrosive. Recommended for electronics. 10 ft. coil.

QR-10 **\$1.25**



QR Desoldering Braid

For desoldering components. Specially treated copper braid 'wicks' up solder when heated on top of a joint. 5 ft. in dispenser.

QR-20 **\$1.50**



Quartz Soldering Flux

The solder contains flux but it is sometimes necessary to use additional flux. 30 ml. bottle.

QR-30 **\$2.00**



Contact Cleaner

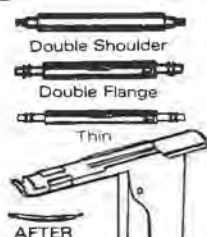
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Committee Reports

As I write this column, we have not yet held the annual AWI Board of Director's meeting, the Affiliate Chapter meeting, or the Research and Education Council meeting and workshop; however, a number of committee reports are in, and I would like to share some of them with you.

One of the most exciting reports this year comes from the Building Fund Committee; Orville R. Hagans, Chairman, Karl Buttner and Marvin E. Whitney, members. As I have already reported, Chairman Orville R. Hagans made available the rights to the book, *The Best of J.E. Coleman: Clockmaker*. The proceeds from the sale of this book have made it possible for us to retire the entire mortgage on the AWI Central building. Below you will find the details, quoted from the Building Fund Committee report.



Milton C. Stevens

Always of primary importance is the report of the Finance Committee. While we did spend 2% more than originally budgeted for fiscal 1979-1980, our income increased 6% over the projected income indicated in our 1979-1980 budget. Thus, the additional income more than offset the additional expenses. We believe the Budget and Finance Committee did an outstanding job with AWI finances in light of the double-digit inflation which plagued us during this entire fiscal year. Members who are interested in a copy of the Finance Committee report can receive one by sending a self-addressed letter-size envelope stamped with a \$.15 stamp to Finance Report, AWI Central. Probably the best news contained in the Finance Committee report is that no increase in dues is anticipated for this coming fiscal year.

BUILDING FUND COMMITTEE REPORT

The Building Fund Committee hopes our efforts will please you and we herewith present our track record from purchase date up to present date.

Building purchased Jan. 1976	\$70,000.	Balance covered by a 20 year mortgage at 9%.
Down payment	15,000.	Payable monthly, including principal and interest,
Balance	\$55,000.	at \$494.85.

We have been able to conclude our obligation in 4½ years as follows:

Principal paid in 4½ years	\$ 9,090.	
Interest paid in 4½ years		\$17,632.
Donations, including appraisal fees by Fried & Hagans	5,910.	
Funds received from sales of Coleman book, approx.	<u>40,000.</u>	
Total cash received and paid on mortgage	\$55,000.	
20 years interest at 9%	\$63,754.	
Interest paid in 4½ years	<u>17,632.</u>	
Interest saved	\$46,122.	

To have continued payments on the mortgage for the next 15½ years, the interest alone would be an annual payment of \$2,975 or \$248 per month.

In truth the Coleman book issue has made it possible to pay off the mortgage.

Cash	\$ 55,000.
Interest saved	<u>46,122.</u>
or	\$101,122.

This has made it possible to broaden our educational and promotional activities. The Coleman book sales will continue for several years and the profits will now go to ELM Trust for educational grants, museum and library.

ECONOMICS STUDY COMMITTEE SURVEY

The Certification and Education Committee and the Economics Study Committee reports include two very interesting survey results. The Certification and Education Committee's report is entitled "The Process and Product" which involves a broad vocational survey of watch and jewelry repair schools. More than 80% of the schools surveyed responded to the questionnaire which was sent to all schools in North America. This has resulted in a 24-page tally of data which should be of interest to those involved in the education and training of craftsmen for our trade. Interested parties can obtain a copy of these survey results by sending a mailing label (self-addressed) and \$.41 in useable U.S. postage stamps to Vocational Survey, Watch & Jewelry Repair Schools, c/o AWI Central.

The Economics Study Committee surveyed the attitude of practicing watch and clock repairers toward their trade. The survey was concluded in May, 1980, and I believe you will be interested in the results shown to the right and on the following page.

Do you feel that solid state watch repair will be a stable and rewarding area of employment in the future? YES 54% NO 41%

Do you feel that mechanical watch repair work will continue to be a major area in which many will be gainfully employed? YES 80% NO 17%

Do you feel that restoration work on old mechanical watches will be an important part of future watch repair work? YES 81% NO 16%

Do you feel that quartz analog watches will continue to grow in popularity and thus represent a sizeable part of future service work? YES 80% NO 16%

Do you feel that clock repair and clock restoration work will continue to grow in the future? YES 81% NO 16%

Greatest opportunities will be in (please rate first, second, third, fourth choice):

	1st	2nd	3rd	4th
Watch repair and restoration	24%	37%	23%	1%
Clock repair and restoration	14%	20%	30%	27%
Jewelry repair and making	26%	23%	19%	17%
Combination of the above	26%	13%	11%	40%

With a little experience a well-trained young horologist would expect to make annually: under \$10,000? 7% over \$10,000? 41% over \$14,000? 34% over \$16,000? 16%

The well-trained young horologist should expect to work: 40 36%, 48 53%

54 9%, more 3% hours per week.

(Continued next page)

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ECONOMICS STUDY COMMITTEE SURVEY (cont.)

Would you advise a close young friend or relative to enter the horological field? YES 74% NO 26%

WE WOULD LIKE TO KNOW A LITTLE ABOUT YOU

- A Do you repair watches 93%, clocks 70%, jewelry 46%?
- B Are you under 40 21%, over 40 79% years of age?
- C Are you self-employed 77%, or do you work for others 23%?
- D Would you enter the field of horology if you had it to do again?
YES 69% NO 14%

The Publicity and Public Relations Committee reports that the consumer brochure "Care of the Modern Watch" is at the printers and will soon be ready for distribution to AWI members. The brochure is small and attractive; it has a place on the front for individual store imprints if desired. In the next issue

of *Horological Times* we will have more details on these brochures including cost and ordering information.

The Visual Aids Committee will have at least a half-dozen new slide and tape programs available for distribution to affiliate chapter and watchmaker

groups beginning in September. This should be good news to all program chairmen.

In next month's column, I will report on the various annual meetings which will take place June 24 through June 29.

THES

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 CHINN, Carl T.—Missouri
 CLARK, Gene—Colorado
 COBB, William C.—California
 DELACROIX, Pierre C.—California
 DeMAIO, Tony—California
 DEVER, P.E.—Texas
 DOHACK, Pat—Missouri
 FARISH, Ed—Texas
 FERRIS, James S.—Texas
 FLING, Sam Jr.—Texas
 FRONEBERGER, Doug—Texas
 GEORGE, Charles—Pennsylvania
 GRIFFIS, Toby L.—Florida
 HEFEL, James E.—Iowa
 HAMMER, Harry—New York
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_____	8K work Soft Yellow	1213°	1413°		12.50
_____	6K work Soft Yellow	1202°	1229°		14.70
_____	Low work Med. Yellow	1265°	1283°		5.50
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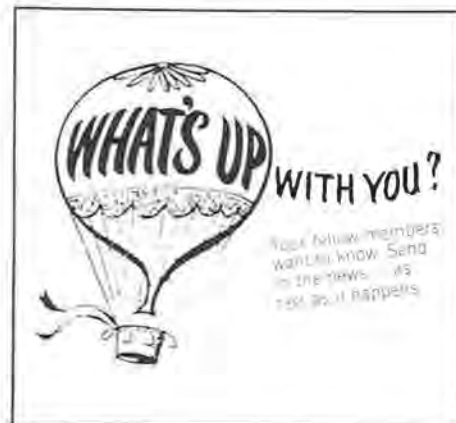
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TIME



PJC GEMOLOGY GRADUATION

The importance of time in our lives was discussed by Lary Keuhn, Dallas gemologist, when he spoke Friday, April 11, for the graduation of 18 students in the Paris Texas College gemology program. The three-month intensive program is funded with a grant from the Texas Education Agency and is one of two such professional gemology programs in the United States.

Keuhn, owner of a Dallas-based wholesale colored gemstone supplier, talked about four kinds of time—pilfered or wasted time, preparatory time, productive time, and personal time. He noted the importance of turning pilfered time into preparatory and/or productive time so that, in later life, one will have more personal time.

The gemologist began a successful gemstone business two years ago and maintains one of the largest inventories of gemstones in the South. Orlando S. Paddock, director of PJC's gemology program, introduced the speaker.

Graduating were LaShawn Bauer of Kingman, Kansas; Mark Anthony Beesley of Terrell, Texas; Hubert Callender of Pascagoula, Mississippi; Anthony J. Cashiola Jr. of Park

Allen, Louisiana; James E. Dupont of Rayville, Louisiana; Benjamin Kelly Enis of New Tazewell, Tennessee; Melvin Capley Enis of Middlesboro, Kentucky.

Also graduating were Marsha Stewart Fennessy of Paris, Texas; Carolyn Sunday Hendrix and David Michael Hendrix of Ardmore, Oklahoma; Daniel L. Hilferty of Arvada, Colorado; William Brett Howard of Ft. Worth, Texas; Linda C. Johnstone of Plano, Texas; Latricia LeighAnn McCulloch of Levelland, Texas; Mark Alan Myers of Hasting, Nebraska; Robert N. Pittell of Kansas City, Missouri; Celeste M. Santilli of Stockton, Kansas; and Lori Jo Surbaugh of Jonesboro, Arkansas.

The program at PJC was established to teach identification, grading, and appraisal of gemstones, laboratory equipment use, merchandising, and craftsmanship, because of these needs in the jewelry industry. Paul Clayton, chairman of PJC's Division of Horology, Jewelry Technology and Gemology, presided at the graduation, and Bobby R. Walters, vice-president for instructional affairs, greeted guests. 

McCARTHY RETIRES FROM BULOVA SCHOOL

Justin J. McCarthy, placement coordinator and director of professional salesmanship and communication at the Joseph Bulova School in Woodside, New York, has retired, the School's director James M. Devaney has announced.

Known in the watch industry as the "salesman's salesman," Mr. McCarthy has been the director of the Bulova Educational Center and Sales Training at the Bulova Watch Company, Inc. since 1964, and joined the Bulova School in 1977.

An independent educational institution, the Bulova School was founded in 1945 and has pioneered the physical rehabilitation and training of disabled men and women. "The emphasis here at the School," Mr. Devaney observed, "has always been on returning the disabled individual to society, adjusted and fully qualified to compete actively, competitively, and successfully."

As the placement coordinator at the non-profit school, offering training in watchmaking, jewelry, and clock repair, Mr. McCarthy placed over 90% of the graduates in gainful employment. As the director of professional salesmanship and communication, he lectured on selling techniques, product knowledge, and consumer relations.

While working for the Bulova Watch Company, Mr. McCarthy operated the largest retail sales personnel training program in the industry.

The School is one of two watchmaking facilities in the U.S. that are accredited by the National Association of

Trade and Technical Schools (NATTS). It is also approved by the American Watchmakers Institute, Retail Jewelers of America, and Watchmakers of Switzerland. 



Justin J. McCarthy (center) being presented with a Bulova Accutron watch by Bulova School Director James M. Devaney (right). Assistant Director Joseph L. Hogan looks on.

AWI Bench Courses / 1980

Programs	Instructors
A Basic Electricity & Use of Meters	Jaeger
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

JULY, 1980

2	A	Sacramento, CA	Jaeger
6	A	Fresno, CA	Jaeger
7	A	Los Angeles, CA	Jaeger
13	D	Fort Wayne, IN	Smith

AUGUST, 1980

3	C (a & b)	Dallas, TX	Broughton
24	D	Waterloo, IA	Smith

SEPTEMBER, 1980

7	G	Columbia, MO	Biederman
14	A	Birmingham, AL	Jaeger
27	C	Binghamton, NY	Broughton

OCTOBER, 1980

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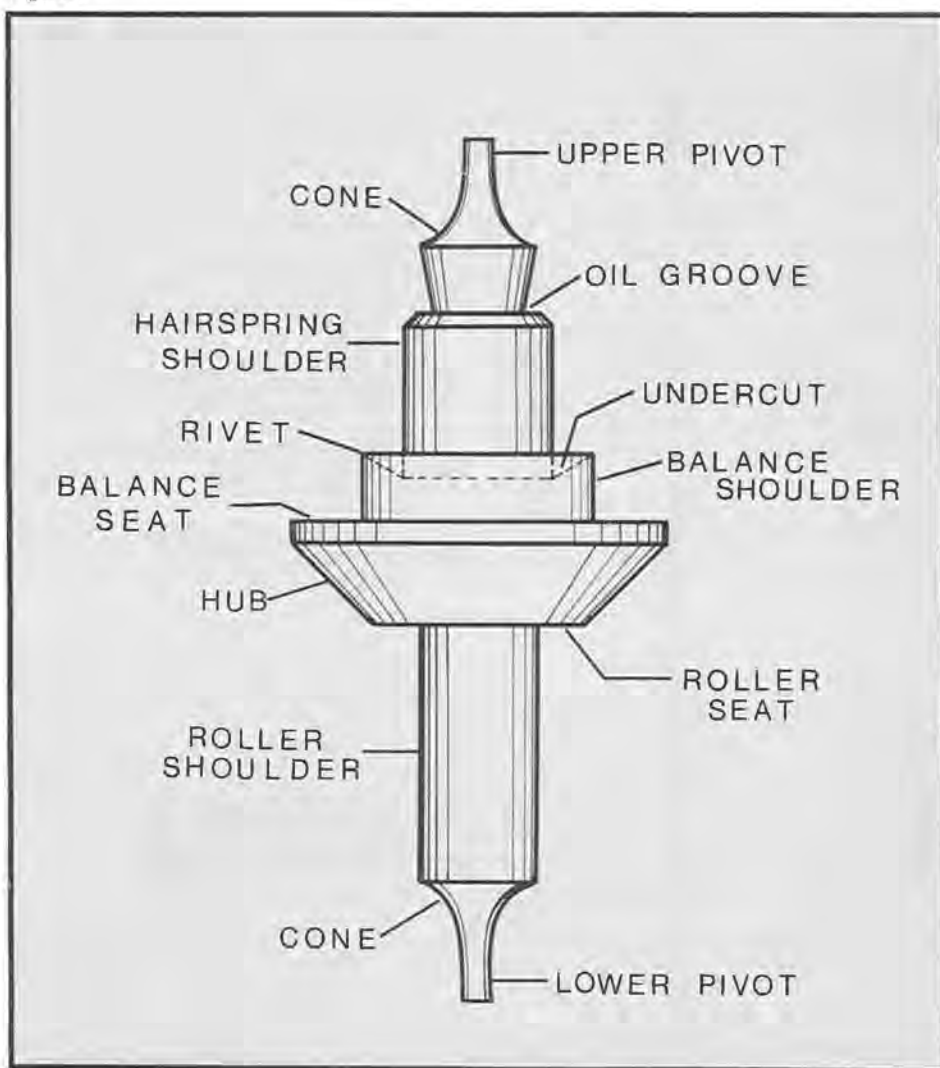
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REPLACING BALANCE STAFFS

By
Archie B. Perkins © 1980

Figure 1



One of the most important procedures for the watchmaker is the replacement of balance staffs. The balance wheel unit is considered both the heart of the watch and its most delicate part. This unit must be in excellent condition if the best in timekeeping is to be expected. Many balance wheel units are mutilated each day through improper repair methods.

When replacing balance staffs, the following procedure is necessary:

1. Identification of the old balance staff to determine the proper method of removal.
2. Removal of the old balance staff by the proper method.
3. Selection of the new balance staff.
4. Staking the new balance staff into the balance wheel.
5. Truing the balance wheel both in the round and flat.
6. Poising the balance wheel.

These important steps will be discussed in the same order as their listing.

It is important for the watchmaker to be able to identify the different balance staffs both before they are mounted into the wheel and when they are already in the wheel.

Figure 1 shows a balance staff with its different parts identified. The following is an explanation of these different parts:

UPPER PIVOT. The pivot that works with the jewels in the balance cock.

CONE. The curved part of the pivot which doesn't work against anything. It is very important that this part of the pivot be smooth and highly polished in order to help prevent the oil from traveling down the staff and leaving the jewels dry.

OIL GROOVE. This groove is an oil stop. In case the oil travels down the pivot, it will be stopped by this groove and not reach the hairspring. Oil on the hairspring could cause the coils to stick together and result in the watch gaining time. On high-grade balance staffs, there is also an oil groove just above the lower pivot.

HAIRSPRING SHOULDER. The part of the balance staff around which the hairspring collet fits. This shoulder should have its corner slightly beveled so the collet will start on easily. This shoulder should have a slight taper to it; that is, it should be about .02 mm smaller at its end than at its base.

RIVET. The part of the balance staff that is flattened down on the balance

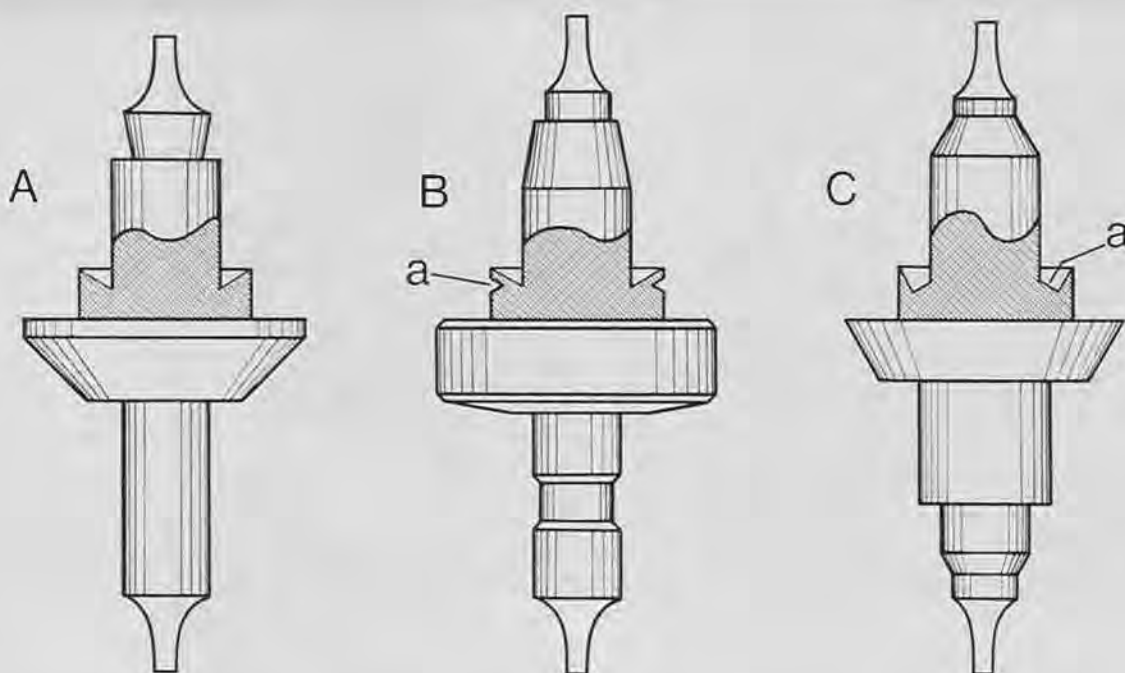


Figure 2

wheel arm with the staking punch when the staff is staked into the wheel. This rivet is undercut to make its top sharp for staking purposes. This rivet must not be so short that it does not reach completely through the balance arm, as this would make it impossible to stake in and could cause the balance arm to become damaged during the staking operation. On the other hand, this rivet should not extend through the arm of the wheel too far, as this could cause difficulty when staking the staff and could interfere with the seating of the hairspring collet. The rivet should extend through the balance arm about .1 mm. This could vary depending on how close the staff fits the hole in the balance arm. The looser the fit, the more the rivet should extend through the balance arm in order to adequately tighten the staff in the balance arm.

BALANCE SHOULDER. The part of the balance staff around which the hole in the balance arm fits. This shoulder should have .01 mm to .02 mm taper and should fit the hole in the balance arm very closely.

BALANCE SEAT. The balance arm rests against this seat. It is very important for this seat to be smooth and flat and not have any material left in the corner where this seat joins the balance shoulder; otherwise, when the balance is staked on it may be in a bind and be very difficult, if not impossible, to true.

HUB. The largest part of the staff. It separates the balance wheel from the roller table.

ROLLER SEAT. The part of the staff against which the roller table sits. It should be flat or slightly undercut and there should not be any material left in the corner; otherwise, the roller table might not sit correctly.

ROLLER SHOULDER. The shoulder around which the roller table fits. This shoulder should have a taper of about .02 mm to .04 mm.

LOWER PIVOT. This pivot works with the jewels in the lower plate.

Balance staffs can be divided

into two classifications: **RIVETED** and **FRICTIONED**. The riveted staffs can be divided into three styles. Figure 2 shows these three styles. View A shows the standard or regular riveted style. When removing this style of staff, the hub or rivet should be undercut to avoid damage to the wheel arm or hole. View B shows the Elgin side-groove staff. The groove "a" just below the top of the rivet is designed to weaken the rivet to the extent that the staff can be staked out of the wheel and the rivet will break off, letting the staff come out of the wheel without damage to the hole or arm. This makes the removal easier and quicker without the use of the lathe to cut it out. This staff design was announced by Elgin in 1938 and was used in their new 15/0s watch. Later, this design was used in most of their other models. When this staff is in the wheel, it can be identified by the shape of the hub and roller shoulder. View C of Figure 2 shows the Hamilton top-grooved staff. This staff was developed by Hamilton about 1940. Point "a" shows a deep, wide groove cut inside the rivet. This design weakens the rivet so it will break off as the staff is staked out of the wheel. When this staff is in the wheel, it can be identified by the deep, wide groove between the rivet and the hairspring shoulder. **NOTE:** Sometimes the side groove and top groove staffs are incorrectly staked into the wheel and the rivet may not break off as intended. If the rivet does not break off with reasonable taps on the punch, then the staff should be removed by cutting the hub or rivet off in the lathe. To

Technically
WATCHES

by **ARCHIE B. PERKINS, CMW**
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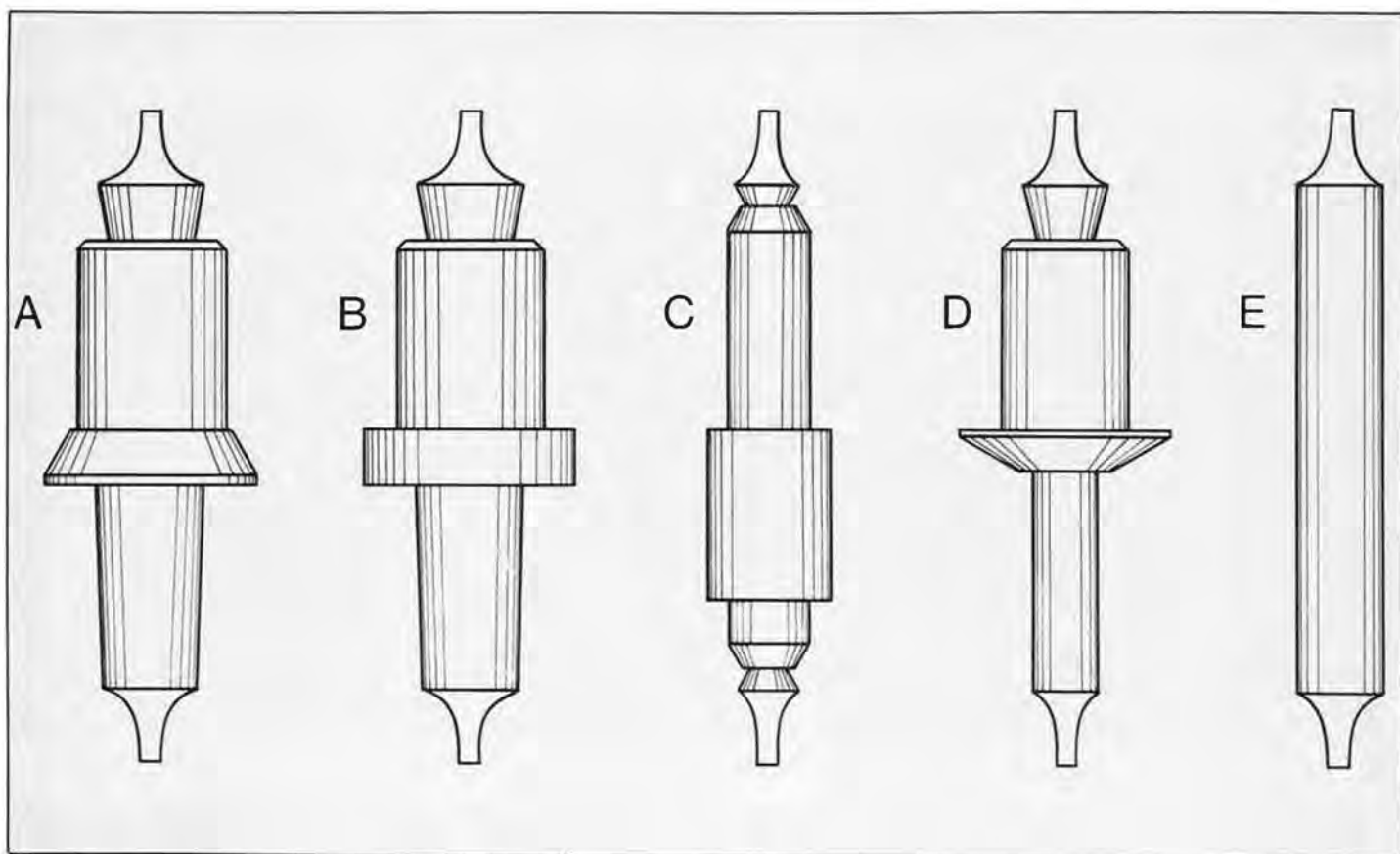
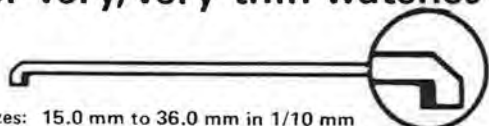


Figure 3

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correctly stake these staffs into the wheel, only a flat-faced punch should be used. These punches make the removal from the balance wheel easier and faster. If these staffs are staked into the wheel correctly, they can be staked out, as the rivet is designed to break away and become separated from the body of the staff, minimizing the chance of damage to the hole in the balance arm.

Figure 3 shows the most common styles of friction balance staffs. All of these staffs are removed by staking; no lathe work is needed. View A shows the Waltham taper-shoulder friction staff. This staff frictions into a blue steel hub that is riveted into the balance wheel. The taper shoulder fits inside the hub. See Figure 4, View A. The blue hub is never removed from the wheel during staff removal. The only time this hub is removed is when it is damaged and a new one needs to be riveted into the wheel. Figure 3, View B shows the Waltham straight-shoulder friction staff. This straight shoulder sits against the bottom of the blue hub as in Figure 4, View B.

Figure 3, View C shows the Hamilton friction balance staff. This staff also frictions into a blue steel hub similar to the Waltham straight-shoulder staff. Figure 3, View D shows a Swiss-style friction staff. This staff is staked

directly into the arm of the wheel and is shown in the wheel in Figure 4, View C. Another style of friction staff is shown in Figure 3, View E. This is the straight friction staff. This style of staff was used in the Benrus central watch and some other makes of Swiss watches. This balance staff is shown in position in the wheel in Figure 4, View D. In order for this staff to have a hole long enough to give the staff adequate support, the roller table and wheel hub are made in one piece; this is then staked into the wheel. The staff is frictioned into the hole extending through this combination hub and roller table.

Before the balance staff can be removed from the balance wheel, the hairspring and roller table must be removed. The hairspring is usually removed first. This is done with a tool made from a small sewing needle that has been ground similar to a small watch screwdriver but has a longer taper to the flat sides than the screwdriver. The grinding should be done on a fine india grinding wheel or a similar device. The needle should be ground so the lines formed on it will be across the needle. This helps to hold it in the collet slot when in use. The thickness of the tip of the tool is such that it will just start into the slot in the collet. Now the tool is placed in a small pin vise, or a handle

can be made for it from a piece of pegwood or small plastic rod. When removing a hairspring from the balance staff with this tool, the balance wheel can be held in the fingers, or it can be supported on a bench anvil over a hole that will clear the roller table. Then the tool made from the needle is wedged into the collet slot. This spreads the collet slot enough for the collet and hairspring to be lifted from the balance staff. Sometimes a combination lifting and twisting action is needed on the tool in order to lift the collet from the balance staff. Figure 5 shows a hairspring collet being removed while the balance wheel is held in the fingers. The tool being used has been made from an old broken watch oiler. This makes an excellent tool for the purpose. NOTE: Sometimes the collet slot is too wide for this tool to be used to remove it from the staff. In this case, another method must be used.

In this method, two small curved tip hairspring collet removing levers are used. These tools can be purchased from your local watch material distributor. One set comes in three sizes. The catalog number of this set is HS 304. The Bergeon Company distributes two sizes of these removers. They come in pairs: number 30013 for small collets, and number 3001 for large collets. To

(Continued on page 60)

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RESTORING THE KNIFE-EDGE SUSPENSION

By Otto Benesh

Too often we are faced with a knife edge that has been ground down until it resembles the one shown in Figure 1. Close examination shows that the edge has been reduced by over half its original size and, in addition, has worn even thinner at the end.

In order to accommodate the reshaping of the knife edge, adjustments had to be made to the back cock so as to provide proper lock and drop to the pallet faces. As you can see in Figure 2, this was done by enlarging the screw holes so that the cock could be raised. Doing this caused a related problem, as the back piece or apron could no longer perform its function. The apron is designed to keep the knife edge from raising out of its slot in the back cock, which would cause the crown wheel to run wildly and ruin the clock's timekeeping ability. This is accomplished by bending the top edge to a right angle. In addition to this, the apron limits the endshake. As the knife edge was made thinner, the apron was

lowered, and you can see what was done to the screw hole in Figure 2.

Evidently, grinding/filing of the knife edge was performed more than once on this clock over the years. Therefore, as the holes were repeatedly enlarged, additional fixing had to be done. The outer edge of the back cock was cut away to allow the apron to be lowered. Eventually—that not being enough—a hole was drilled between the top of the screw hole and the upper edge of the apron. A brass pin was riveted in to keep the knife edge from raising up and letting the crown wheel free-wheel, as it were.

With all this going on at the back end of the pallet arbor, other problems developed. The front pivot was now too high, so with an object similar to a cold chisel, a dent was made in the top edge of the front plate just above the pivot hole. It is just visible in Figure 3. With all this adjustment, the arbor began to hit the upper potence, and therefore, was bent in the center in order to clear the potence. For the one reader who is not familiar with the term potence, it is the U-shaped piece that supports the upper pivot of the crown wheel as shown in Figure 3. The piece that supports the lower pivot is surprisingly called the lower potence.

Bending the pallet arbor put it out of line, and adjustments were made to the upper potence. You can see in Figure 3 that the work was crudely done with rough tools. Perhaps we should coin a term for this type of work, or butchery, something such as clodmanship. The English were a little kinder in calling it botchery, but it is far worse than botching the job. Certainly butchers do better work than this. Notice that the screw holding the potence to the plate is far too long and is either a bad replacement or belongs elsewhere on the clock. This is a good example of why it is wise to put the screws in the screw holes while cleaning or working on the clock.

Is it difficult to fix a knife edge properly? Not really. Here are the steps I take to restore a knife edge. Remember this is not the only way that the restoration may be



Figure 1



Figure 2



Figure 3



"CLOCK CHATTER" ©1980

by Otto Benesh, CMC
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Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9

done, but it does preserve the maximum amount of original work which is one of the principles of conservation.

The first step is to remove the rivet which holds the pendulum arm to the pallet arbor. See Figure 4. If the rivet is a tapered piece of steel, you can usually tell as the smaller end is spread a bit more than the larger end. After filing the riveted-over part level with the brass block, you proceed to knock out the rivet with a punch as shown in Figure 5. Having done this, the pieces may be separated and your example will look like Figure 6.

The next step is to remove the remnant of the knife edge. However, prior to this, it is a good idea to measure the length of the edge and take any measurements that might be visible on the rear of the block. Seldom is the evidence of former filing or grinding so completely eliminated that you cannot make out the original depth of the edge, especially with work of such quality as this.

When this has been done, take a jeweler's saw and cut the projecting piece off as shown in Figure 7. If the piece is

hard, obviously you will have to anneal it, but you will find that in most cases the steel is fairly soft.

Having cut away the projecting part and filing smooth any left-over roughness, proceed to make a slot in the back piece to accommodate a new piece of steel. This is done by making two saw cuts as shown in Figure 8. Make sure the cuts are both wide and deep enough to provide a secure foundation without weakening the block. Finishing to depth is done by using a file known as a joint file. These files come in various widths and have cutting edges only on the top and bottom. They also come with both round and square cutting edges. You want the square-edged type. If you cannot obtain these files, the job can be done with a needle file of the pattern known as an equalling file. You must exercise caution with this file so you do not cut too much from the sides. A piece of paper placed on the side opposite that being cut will act as a safe edge. When you have finished cutting and filing, you should have a slot in the back block that looks like that in Figure 9.

Fit a piece of steel capable of being hardened into the slot. It should be as long as the entire slot and extend out

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Figure 10



Figure 11



Figure 12

far enough to provide material for trimming in order to achieve proper endshake. This piece is silver soldered in the slot. Figure 10 shows the piece soldered in place and, of course, in the rough. The bottom has been sawed off, and it is now ready for filing to final shape.

Figure 11 shows the new knife edge filed, fitted, polished, and hardened. Holding the block in a pair of pliers while heating enough to harden will keep the joint from becoming unsoldered. A quick quench in water will harden it and it is not necessary to draw the temper to any degree. 2/0 and 4/0 papers will put the final luster on the edge, and if you desire, you may burnish for a super finish.

Figure 12 shows the pieces reassembled and ready for the final riveting.

Put it back on the clock and the pendulum will swing the way a pendulum should.

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Split Cannon Pinions

This tip is from our good editor, Hal Herman.

The thin-walled double split cannon pinions used in old model Elgin watches are dangerous to tighten without breaking when using a broach and any type of nipper.

This job can easily be accomplished by setting the cannon pinions on a solid part of the staking tool and centering a flat punch on top of the



Figure 1

pinion. Then gently tap with a hammer. Check tightness on the center wheel and, if not tight enough, tap again.

REMEMBER: Split cannon pinions have great gripping power and are designed to slip with less resistance than solid wall cannon pinions. See Figure 1.

Sometimes, worn sleeves in pocket watches can be tightened using the same method, but alternate between flat and funnel-end punches until the four tips are bent in to tighten the ends.

Bracelet Links

In the May issue, we ran a tip by Mr. Richard Labuskie of Swissville, PA, on removing non-adjustable links from adjustable watch bands by sawing out the links needed with a jewelers' saw.

After that tip was published, I thought it was a shame that these links couldn't be used to lengthen a similar watch band that was too short.

Upon close examination with an eye loupe, it was observed that the link connecting pins were driven in friction tight and the ends were finished and polished to the shape of the band before plating.

By making a punch slightly smaller in diameter than the link connecting pins from a needle snugly fitted in a flat hole punch, the link pins can be

driven out and the band separated on the staking tool, over a hole larger than the connecting pins, without damaging the band. See Figure 1. Then the links can be used again when needed.

After squaring one end of the needle in the lathe and fitting it to a hole punch that does not bind the needle (so it can be removed from the punch later), lay the punch with needle in across the band. Mark the needle the length the pin is to be driven out—only far enough to take the band apart. See Figure 2. Then cut off the needle and square the end in the lathe to your mark with a grinding stone or platinum-point file. Smooth off burrs on the edge.

By not knocking the pin all the way out, the taper on the ends will go back and match the taper on the

sides of the band when used again. See Figure 3.

If one hole punch is too tight for inserting the needle, and yet the needle falls out of the next size larger when in the down position in the staking tool, apply a little silicon in the hole of the staking punch and this will keep the needle in place.

Drive the pins back in with a flat punch, supporting the band on a smooth part of the staking tool.

Watchmakers are begging for electronic tips. Do you have one? If so, why not take the time to share it with your fellow watchmakers? The address is: JINGLE JOE, 265 NORTH MAIN ST., MOORESVILLE, NC 28115. 

Figure 1



Figure 2



Figure 3



The History of Clocks and Watches

The History of Clocks and Watches by Eric Bruton. 288 pages, profusely illustrated with color photographs, drawings. 12 x 9 in., colored dust jacket and sleeve. Printed in Italy and published by Rizzoli, New York. \$40.00.

Eric Bruton is one of horology's best professional writers. Aside from being the publisher of trade journals, he was a former editor of the *Journal of the British Horological Institute* and the author of many books for the horological and jewelry industries. This present effort is a luxurious production. Its publisher is also known for producing only quality print and bound volumes. This volume—despite its title—seems geared for the type of collector who has some appreciation of or prior introduction to horology. The experienced and well-seasoned collector has seen photographs of many of the clocks and watches shown here. Despite this, the book is an easy-to-read account of the history of time measurement. The illustrations give it a picture-book appearance with italicized but unnumbered subtitles to the almost five hundred photographs, drawings, and illustrations, many in color.

The contents here are divided into twelve sections: The Earliest Clocks; The Advent of Clockwork; Domestic Clocks; European Mechanical Clocks; The Time at Sea; The Development of the Watch; Mass Production; The Technological Age; Watches for the People; The Science of Time; and The Great Clocks of the World. There is also a

glossary, a very fine index, a bibliography, and a page of acknowledgements.

For the inexpert horologist, this book's text and illustrations serve as a well-edited account of early time measurement, and provide a good pictorial record with descriptions of the devices used. While many of the illustrations have appeared in older books, the author must have felt that they belonged in this volume as well.

Many illuminated older illustrations, alluding to early clocks and time measurement, are included. Photographs with accompanying text are likewise included with tower clock works, famous outdoor automata, and equally famous public clock automata.

There are some nice isometric pull-page line drawings of weight-driven systems, escapements, fusee and stack-freed devices, watch escapements and other devices used in timepieces of all types. As mentioned earlier, frequently illustrated classical items are included, such as the Garde pomander watch (repeated later in this book), an Orpheus clock, and skull and cruciform watches. Holbein's often-published paintings of Cratzer and "The Ambassadors" are not absent from this book either.

A chapter on the longitude story, development pictures, the better astrolabes, ring dials, shepherd's dial, nocturnals, quadrants, and the like, illustrate the quest for exact navigation. In this chapter, of course, is included Harrison's work together with its oft-told tale. Earnshaw's differences with

Arnold, Bain's problems with Wheatstone, and Harrison's problems with the English officials always make interesting reading, and are highly recommended for those who haven't read these accounts before.

In the development of the watch, the photographic example of a Lepine calibre is a poor example of a thick watch rather than a more typical individual bar-for-each-wheel movement. The photos of watches, however, are large, in good color and sharp, deep focus.

In the section entitled "The Karrussel," a Mobilis of 1912, Swiss, usually called "a poor man's tourbillon," whose escapement unit turns once a minute, is termed a Bonniksen karrussel. Bonniksen's karrussels usually revolved once in 52½ minutes and were in the very high quality range. Unfortunately, no true Bonniksen or quality tourbillon is illustrated in a manner that would reveal its amazing principle.

The chapter on mass production is a nice history of both the division of labor and duplicating machinery. However, the photograph on page 115 of "a small shelf clock by an unknown Connecticut maker between 1840 and 1845" is actually a clock by Silas B. Terry of Terryville which was made close to 1845.

There is a good chapter on the advent of electrically-driven clocks, that Bain vs. Wheatstone conflict, and a short reference to Bain's legal victory.

(Continued on page 55)

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NAVIGATION AND THE QUARTZ CHRONOMETER

Part I

By Marvin E. Whitney

Ever since mariners first began to ply the seas, it has been clear that safe navigation depends upon a means of accurately determining position. During the era of extensive geographical exploration, the determining of longitude took on a greater significance as the safety of the ship and her crew depended on knowing her position. Latitudinal measurements had been possible for centuries, but no method of fixing a ship's position utilizing both latitude and longitude was known.

The early navigators knew that time and longitude were closely related. They knew that the difference in local time between two places, e.g., Greenwich and the mid-Atlantic, was equal to the difference in their longitude, but this calculation required an accurate timekeeper. Therefore, after the passing of several centuries and the inventiveness of many men, an accurate and portable timekeeper for the determination of longitude became a reality. For more than two hundred years, navigation and the chronometer have been closely linked together.

Although many advancements have been made in both timekeeping and navigation, today the two fields are still very compatible. Modern navigation ranges from determining the position of stationary objects on the earth's surface to finding the position of ships, aircraft, and spacecraft. Navigation is still characterized largely by the need for long-

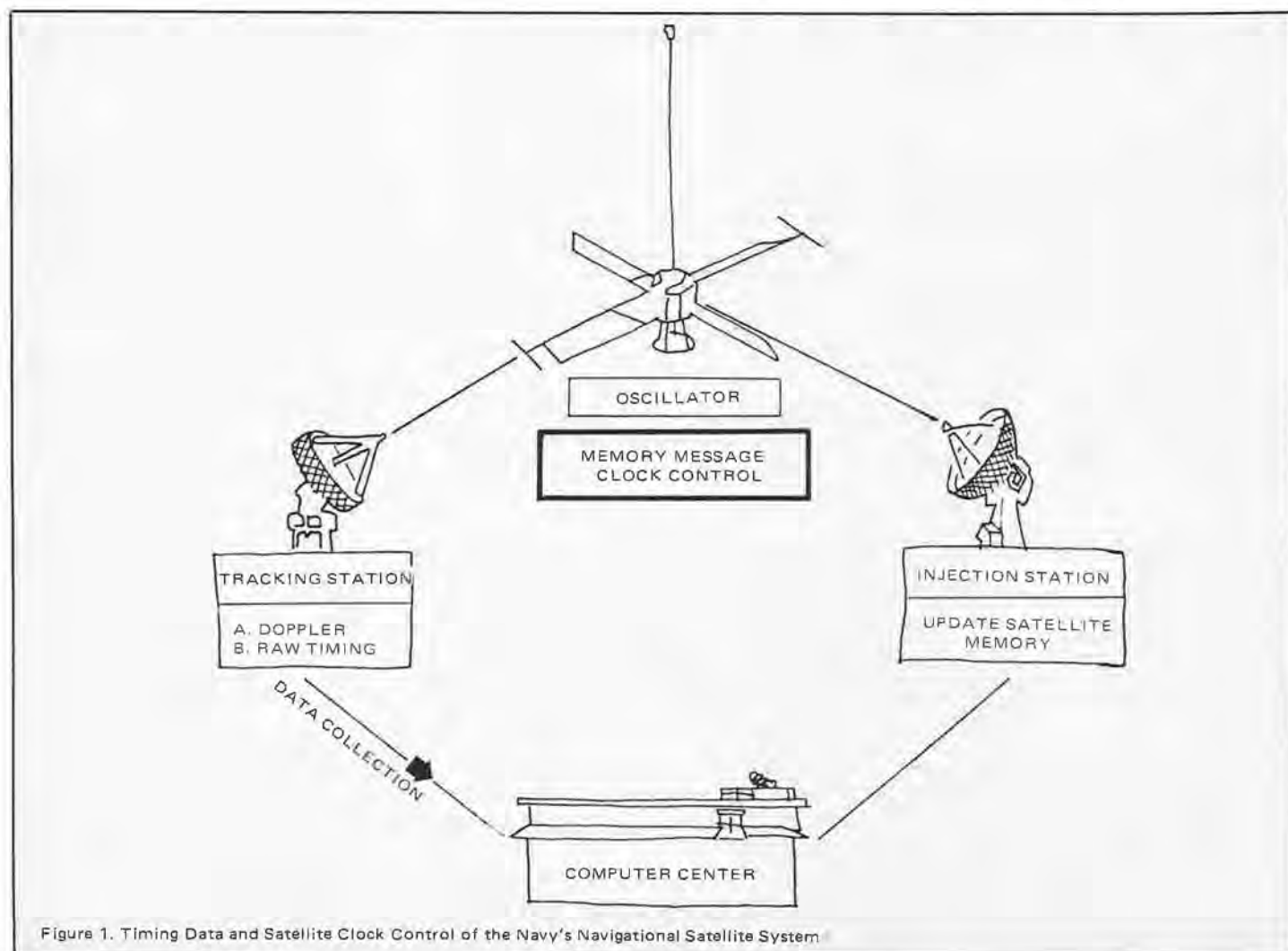


Figure 1. Timing Data and Satellite Clock Control of the Navy's Navigational Satellite System

term stability, i.e., the accurate timekeeping ability of a chronometer, clock, or watch, due to the fact that in celestial navigation, it is not the timepiece's error which is of ultimate importance to the navigator, but the constancy and predictability of the error.

Nathaniel Bowditch, the mathematical genius, navigator and author of the *American Practical Navigator*, the epitome of navigation, made the following statement some years ago: "Navigation has come a long way, but there is no evidence that it is nearing the end of its development. Progress will continue as long as man remains unsatisfied with the means at his disposal . . . Pythias and his contemporaries undoubtedly dreamed of devices to indicate direction and distance. The sixteenth-century navigator had these and wanted a method of determining longitude at sea. Then the eighteenth-century navigator could determine longitude, but found the task a tedious one, and perhaps longed to be freed from the drudgery of navigation. The modern navigator is still seeking further release from the work of navigation."

Bowditch's statement is just as true today as it was those many years ago. In recent years, in response to the ever-increasing demand for greater safety at faster speeds particularly during our space exploration, tremendous advancements have been made not only in navigational equipment but in the methods available to the navigator. However, as one Navy Captain recently told me, "The principle remains the same, but practice varies considerably."

Although the U.S. Navy has many sophisticated electronic navigational systems to draw upon and many of our capitol ships and submarines have as many as three atomic clocks on board, the Navy is still issuing the Hamilton marine chronometer to the fleet. As one Navy Commander, who just returned from Pacific duty, told me, "No matter how much sophisticated equipment you have on board, there are times when you have to return to the basics and use your chronometer and sextant to determine your position."

So with all of these sophisticated navigation systems, visual observation is not obsolete. Celestial navigation (though used as a back-up system) was employed during several of our manned space flights, although the method used varied slightly from that used on the earth's surface. After trials during the Gemini flights, the celestial navigational method was used for the Apollo lunar flights and landing. The fix obtained from the use of a sextant on the Apollo lunar 8 mission was nearly identical to that calculated by our ground tracking equipment.

Dr. Gernot M. R. Winkler, Director of the U.S. Naval Observatory's Time Service, told me that although positions at sea can now be easily determined by electronic methods through use of transmitters on land or in satellites, several thousand copies of the Nautical Almanac are sold each year.

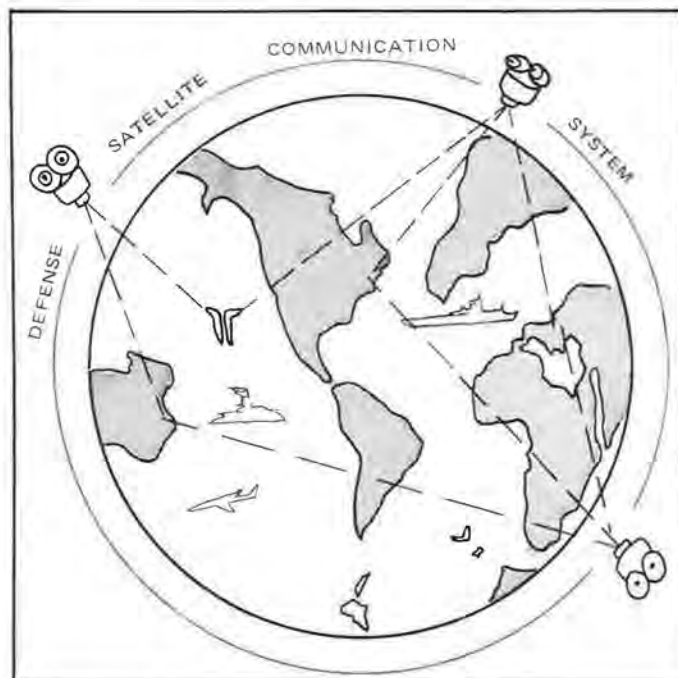


Figure 2. PTTI Worldwide Dissemination

Thus it is evident, even in this electronic age, that many navigators still rely on chronometers and sextants in determining position.

Probably the first application of electronics to navigation was initiated in 1904 when the U.S. Naval Observatory began to send out radio time signals (time ticks) which were first broadcast from the Boston Navy Yard and later from several naval radio stations. These time signals were broadcast several times each day, thus permitting the navigator at sea to check his chronometer.

Before 1904, the only time the navigator could check his chronometer was when his ship returned to port. Telegraphic time signals were inaugurated in 1865, which enabled the navigator to compare his chronometer by watching "time balls" as they were dropped at noon while in port.

The first time ball was invented by England's Astronomer Royal, John Pond, and was installed on the roof of the Flamstead House in 1833. The ball was approximately five feet in diameter. It was raised to the top of a pole where it was locked and later released by a hand-triggering device so it dropped down the pole at exactly one o'clock every day. This then provided a visual time signal so the ships in the Thames could check their chronometers.



**THE
SHIP'S CHRONOMETER** ©1980

Marvin E. Whitney, CMC, CMW



In twenty-four U.S. harbors, time balls were dropped at noon. These hollow metal spheres were about six feet in diameter with a free fall of about twenty feet. Each was located on a high building where it could be seen from port. Five minutes before noon, a signal was sent out from the Observatory and the ball was raised to the top of the pole and locked in position. Ten seconds before noon, a switch was thrown connecting the time balls with the Observatory's standard clock which exactly at noon sent out an electrical impulse, releasing the locking devices and dropping all twentieth-four time balls nationwide.

It is safe to say that modern navigation and communication would be impossible if it were not for men like Volta, Oersted, Faraday and others who spent years experimenting with magnetism and electricity. One who added to our knowledge as to how these two forms of energy work was James C. Maxwell. Maxwell was born in 1831 into an old and distinguished Scottish family and was educated in England. At an early age he became professor of physics and astronomy at Cambridge University. Maxwell, a mathematical genius in the use of equations, was able to show the relationship between electricity and magnetism based largely on Faraday's experiment with magnetic lines of force. As the result of his calculations,

it was predicted that electric charges moving with changing velocity should generate electromagnetic waves capable of traveling long distances through space.

However, it was not until 1887 that a German physicist, Heinrich Hertz, succeeded in showing experimentally that such waves did indeed exist and that they could be reflected. However, Hertz failed to realize the commercial possibilities of his discovery; it remained for others to discover that electromagnetic waves had an enormous range of frequencies and lengths—prerequisites for radio transmission.

In 1904, Christain Hulsmeier, a German engineer, was granted patents by several countries on the use of reflected radio waves. He found that when these waves struck an obstacle, a portion of the wave was reflected back. He saw this as a great aid to navigation, but as in Hertz's case, it was not until sometime later that his idea was put to use.

In 1922, Marconi said, "It seems to me that it should be possible to design apparatus by means of which a ship could radiate or project a divergent beam of these rays (electromagnetic waves) in any desired direction, which rays, if coming across a metallic object, such as another ship, would be reflected back to a receiver screened from the

local transmitter on the sending ship, and thereby immediately reveal the presence and bearing of the other ship in fog or thick weather."

During the same year, two scientists, Dr. A. Hoyt Taylor and Leo C. Young, while experimenting and testing a communication system at the Naval Research Laboratory, Washington, D.C., noted signal fluctuations when ships passed between their transmitter and a station on the opposite side of the Potomac River. However, it was not until 1934 that the full potential of their discovery was realized. In December 1934, Dr. Robert M. Page, an assistant to Dr. Taylor, constructed a pulse-signalling device that determined the position of aircraft—hence the first radar. By using the pulse technique upon which radar was based, similar pulsating navigational systems were developed.

In 1941, the Radiation Laboratory at the Massachusetts Institute of Technology began to work on a navigational system called LORAN. LORAN is a hyperbolic system of navigation by which difference in distance from two fixed points on shore is determined by measuring the time interval between the reception of a pulse-modulated synchronized signal from transmitters at the two points.

The U.S. Navy's use of radio

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navigation began first with LORAN-A; then in the early '50's, TACAN; the early '60's, LORAN-C; and then the development of OMEGA. Presently, satellites are in use. The Navy's Navigational Satellite System, known as TRANSIT, which utilizes the Doppler Effect, enables the Navy's fleet and commercial vessels to accurately find their positions anywhere on earth, day or night, and in any kind of weather.

TRANSIT consists of five satellites traveling in different fixed circular polar orbits at an approximate altitude of 680 miles or 1100 kilometers. All points on the earth's surface periodically pass under each orbital path which is completed in passes of approximately 100 minutes. In order to accomplish its navigational mission, the satellites transmit a precise time mark every two minutes.

The support system for the five TRANSIT satellites consists of four tracking stations and a central computer center. The stations located at Laguna Peak, Point Mugu, California; Rosemount, Minnesota; and Prospect Harbor, Maine, function as both tracking and message injection facilities, while the station in Wahiawa, Hawaii operates only as a tracking station. All ground stations are linked to the Headquarter Computer Center, located at Point Mugu, California.

Each satellite continuously trans-

mits its present ephemeris encoded by phase modulation on two frequencies of approximately 150 and 400 MHz. This navigational information is broadcast in two-minute intervals which begin and end at the instant of each even minute. All broadcast frequencies, as well as the satellite clock, are based on a highly precise master oscillator.

Tracking data for each satellite is communicated to the Computer Center from the various tracking stations. See Figure 1. After the computer digests the data, the orbit for each satellite is determined for the next sixteen hours, and if necessary, corrections to the satellite clock are made to compensate for any oscillator drift. This information is then transmitted back to the injection stations, but only one of these stations will actually insert or update the satellite memory.

Ships navigating by the TRANSIT system must have a special tracking receiver/computer on board in order to calculate position.

Upon the completion of John Harrison's marine timekeeper, and later the chronometers of Arnold, Earnshaw, and Le Roy, the navigator had an accurate and reliable instrument which aided him in determining longitude. However, the chronometer had its limitations because there were no means available to check its

rate and/or error during long periods at sea. Fortunately, the advent of the radio not only provided the navigator with time signals so he could accurately and frequently check his chronometer, but later it also provided a means of determining direction and distance.

Many systems have been devised to determine direction and distance by electronics, but all of these systems have a basic requirement and that is precise time. Thus, a common characteristic of any communication and navigational system is that it is time oriented and requires accurate time. Time was first determined by the Navy Department in 1830 to meet the needs of navigation. Therefore, the U.S. Navy, from necessity, continues to be the prime mover in the advancement of the study and development of time measurement and instrumentation.

A step forward in that direction is the U.S. Navy's Precise Time and Time Interval Program (PTTI). The objective of this program is to provide a worldwide distribution system whereby the dissemination of the PTTI (frequency) is synchronized to the Naval Observatory. See Figure 2.

Time signals from the Naval Observatory are transferred via a microwave link to the Defense Satellite Com-

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munication System. The time signals are then transferred from the satellites to the twenty-eight time reference stations throughout the world. From these stations, the various navigational and communication systems such as LORAN-C, VLF, and HF time ticks can be synchronized within 1/10 microsecond accuracy.

These time signals can also be used for position determination, for when any two stations are PTTI coordinated, it is possible to employ them to form a baseline for position location. The base line length and the distance of the unknown position or ship can then be determined by propagation measurements. By the application of the principle of triangulation, the navigator can then calculate his position. See Figure 3.

Although much technological progress has occurred in the advancement of navigation, new problems will continue to crop up. Thus, it is highly unlikely that the time will ever arrive when there will be no problems to be solved. No matter how reliable our equipment becomes, it will be necessary for the wise navigator to check his equipment from time to time since he cannot put his sole dependence in the so-called "little black box." Instrumentation may reflect to a high degree the science of navigation, but only a skilled navigator can practice the art of navigation. So with all of our sophisticated equipment, there will be times, whether traveling by land, sea, or in space, when the navigator must look to the "Lighthouses in the Sky" and determine his position by taking sighting of either the sun, moon, planets or stars.

It is sometimes difficult to realize the demands and complexities that technology has placed on our engineers and scientists. Advances in our supersonic space age have increased the need for precise time and sophisticated instrumentation almost beyond one's imagination. The supersonic age for commercial aviation, where we have planes flying in excess of 1,500 miles per hour, has put what seem to be unheard-of demands on instrumentation.

The Air France and British Airways "Concorde" is equipped with

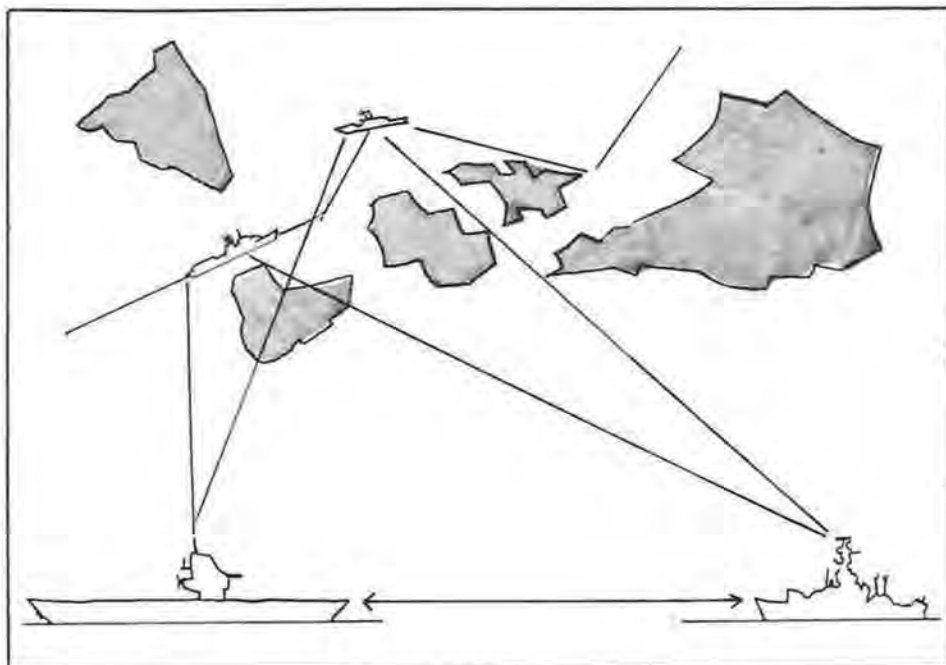


Figure 3, Positional Determination

an on-board mini-computer which, after processing the data from the various navigational instruments, projects on the pilot's instrument panel a map of the area over which the plane is flying, with his exact position being marked by a luminous circle. This instrument is capable of determining the plane's position within an accuracy of 90 yards while flying at a speed of 770 yards per second.

Once the device was produced, the question arose as to how its accuracy could be tested and verified. The answer was found in the Omegascope which is produced by the Omega Watch Company. The Omegascope is a quartz-oscillator-controlled electronic chronograph which was specially designed for timing sporting events. The individual times of several competitors are indicated at the exact moments they appear on the television screen. The image of the optic indicator system of the Omegascope is superimposed on the televised image proper. The numerals are shown at the bottom of the screen, so the television audience

can see the competitors and their times simultaneously both during and at the finish of the event.

The development of these marvelous navigational devices reads like a fairy tale. Today's mechanical marvels had very meager beginnings and as the years passed, the competitive spirit of Harrison, Arnold, and Earnshaw began to pay off in the production of an accurate timekeeper; in following Hertz and Marconi as they pioneered the use of electromagnetic waves for communication and navigation, one cannot help but be amazed and fascinated by the outcome. Now, the quartz crystal control chronometer is the latest achievement of the world's producers of fine time measuring devices. The sprung balance has been replaced by the quartz crystal oscillator, while the train has been replaced by tiny integrated circuits. The ship's chronometer which for years had no equal as a precision timepiece and contributed so much toward making navigation of the high seas safe, has, as the mechanical watch, given way to space-age electronic circuitry.

17-12

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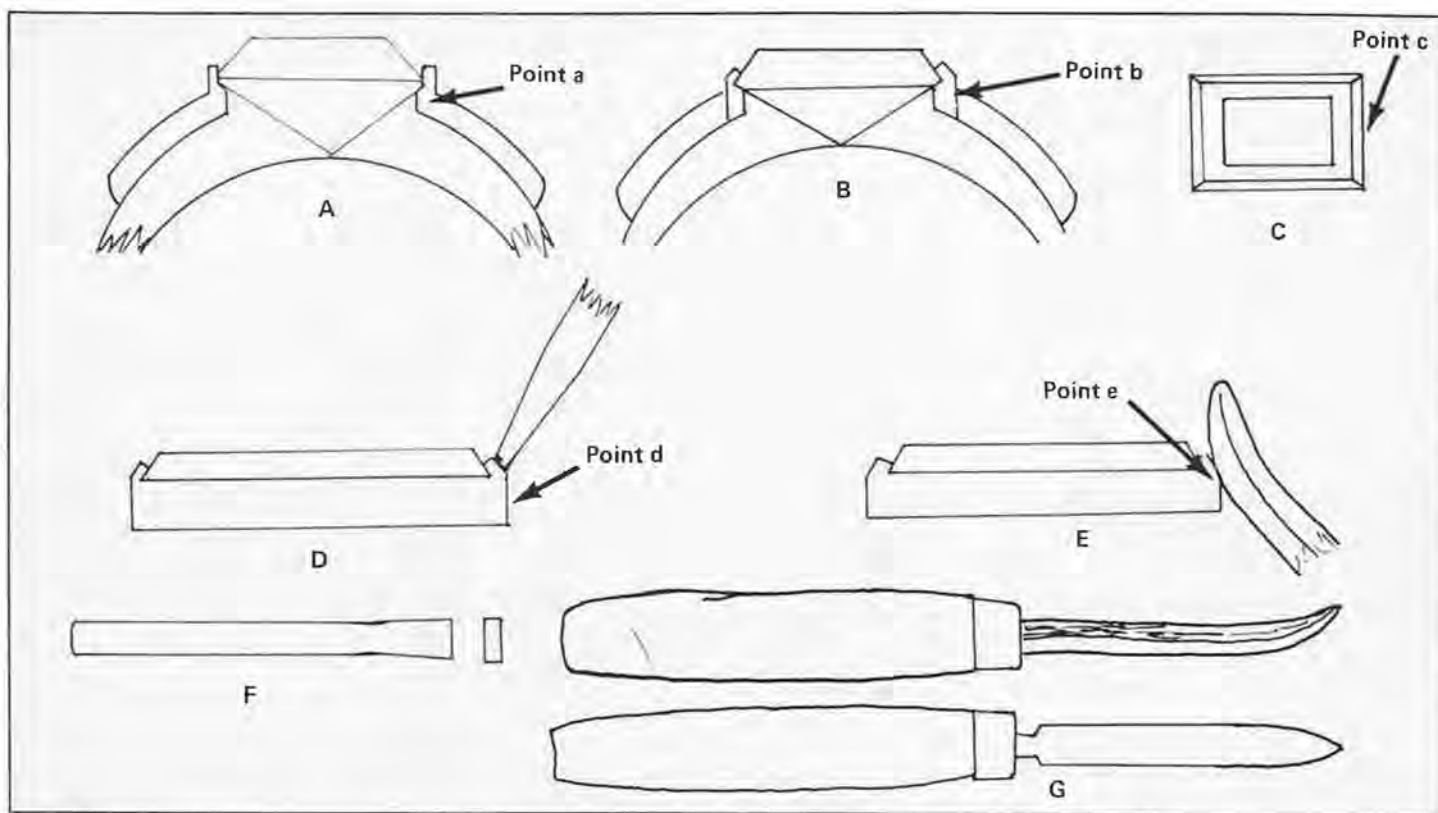


Figure 5

PICKLE BARREL

(Continued from page 13)

down into the finger part of the ring. If the stone is a flat-bottom type, a smooth mandrel can be used. Most jewelers' benches have a hole in which to stick the end of the mandrel, leaving both hands free to hold the punch and the brass hammer. Very carefully, tap the edge of the bezel, holding the punch perpendicular to the bevel of the stone. (See Figure 5, D, point d.) Extra caution must be used on very soft stones such as cameo, mother of pearl, or tiger eye, as tapping on the edge of the stone could seriously damage it. In using the curved burnishing tool, there is less danger of damaging the stone as can be seen in the illustrations. (See Figure 5, E, point c.) After the stone is well burnished or tapped in with the bezel metal tight against the stone, any rough places can be trimmed with a needle

file and polished with tripoli and rouge on a hard, felt buff wheel on the polishing motor. As in any other job, the ring must then be completely polished and cleaned in soap or detergent and ammonia with a washout brush, or in an ultrasonic tank.

Tube settings are just what the name infers: a stone set in a metal tube. Tube settings are usually used in signet or emblem rings, and all sizes of these settings are available at your findings supplier. The tube is usually gold-soldered to the top of the ring, but can also be riveted. However, all tube settings are the same when it comes to the actual setting. The wall of the tube is usually thick enough to allow for a secure seat for the stone, but if the setting is to be installed, you can pick the proper size. If you are setting a mounting with the tube already installed, you must either pick a stone to fit, or change the tube setting. To set, first choose a setting burr and, with the flex shaft tool, cut a seat

just deep enough so the surrounding metal protrudes a little above the girdle of the stone. As this is a very tight setting, very little metal is needed over the edge of the stone to hold it securely in place, and metal burnished too far over the stone reduces the visible diameter of the stone, making it look smaller. As the metal surrounds the stone, it forms a bezel and therefore can be burnished down in the same manner as a bezel, or tapped down with the flat bottom punch. Finishing is the same as in any bezel setting.

There are so many variations of the three basic settings that it would be impossible to cover all of them. However, if you have an understanding of the settings explained in this article, with experience and practice you should become proficient at setting all stones.

In our next article, we will discuss the polishing and cleaning of rings.

BOOK REVIEW

(Continued from page 49)

This eighteen-page chapter is an interesting one and includes such developments as the atomic clock.

A chapter on "Watches for the People" shows pocket watches of the late nineteenth century of all types and price ranges and representative countries of origin. This also includes the latest in LCD-Analog combination wrist watches.

A later chapter, "The Science of Time" discusses and illustrates the

ancient uses of astrolabes, armillary spheres, quadrants, and other similar instruments together with the clocks of Burgi, Tycho Brahe and Galileo, Huygens. Astronomical clocks and their development up to the present is included in photographs, drawings, and text. In this book's closing pages are good reproductions of the paintings by Dali and Pieter Breugel's allusions to time.

The final chapters show aerial photographs of Stonehenge, photos of the famous Strausburg clock, and other frequently published clock photos. There

is a good closeup photo of the tower and clock at Westminster, and a fine picture of its huge movement. Also there are engravings illustrating the early history before the erection of this famous clock. Jan Olsen's "world's most complicated mechanical clock" also comes in for textual and photographic explanation.

In all, this book would make a nice gift for anyone who would like to add to a library and desires one volume which neither specializes nor delves too deeply into technical matters, but does provide a fair coverage of the various facets of horology.

TIME

TECHNICALLY WATCHES

(Continued from page 43)

use these tools, the balance wheel is supported on the bench anvil. One of these tools is placed on a balance arm between the arm and the hairspring collet; then another tool is placed on the opposite arm between the arm and the collet. Now the handles of the two tools are lowered, causing the collet to be lifted off of the staff by the curved tips of the tools.

In the absence of these tools, two small watch screwdrivers can be used. The screwdriver blades should be sharpened so they are thin enough to go between the collet and the balance arm. When the two screwdrivers are in position, they are twisted, one in a clockwise direction and the other in a counter-clockwise direction, causing the collet to be lifted up off of the staff. Great care must be exercised when using this method so as not to slip and damage the hairspring.

Removing the roller table is the next operation in the removal of the balance staff. There have been several styles of roller removers made in the past and most of these do the job very well. One of the early styles is shown in

Figure 6. This is a K & D roller remover stump that fits the staking tool or the bench anvil. As can be seen, there is a "V" groove milled in the tool, leaving a thin ledge for the roller table to rest on as it is removed from the staff with a special roller-removing punch. This roller remover is designed mainly for pocket watches; however, it can be used for some of the larger wrist watches. A roller remover similar to this one is still available. It is made by Bergeon and is number 30070. This can be purchased from your local watch material distributor. Another style of roller remover that was very popular years ago was made by K & D and is shown in Figure 7. One good feature of this tool is that it is self-contained; that is, it has its own punch and does not require the use of a staking tool or bench anvil. To use this tool, the jaws are opened to receive the roller table by turning the knurled nut "A"; then by continuing the turning of the nut, the jaws will close up under the table until they are closed against the hub of the staff. Now the lever "B" that is partly visible is pressed, bringing the punch down on the cone of the lower pivot. By continuing the pressing of the lever, the roller table is lifted off of the balance staff. View C shows an adjustable stop for the lever

and View D shows the punch. This roller remover and the roller removing stump shown in Figure 6 are both excellent for removing roller tables from three arm balances as well as two arm balances.

Another style of roller remover is shown in Figure 8. This one is called the Rex roller remover and it is used in the bench anvil or staking tool. This tool is a set containing the base with three sizes of adjustable jaws or stumps and three cross-hole punches. It also has two wrenches for tightening the jaws of the tool. Figure 8, View A shows the base, View B shows the jaws, View C shows the wrench, and View D shows the punch. The hole in the base is beveled similar to the front of the hole in a lathe spindle. The vise jaws that screw into the hole in the base have a beveled corner seat that matches the beveled hole in the base. As the jaws are screwed into the base with the wrench, they close up.

Another style of roller table remover is shown in Figure 9. This is a K & D duplex roller remover. This tool has two different sizes of jaws for pocket and wrist watches. The jaws go between the arms and the rim of the balance wheel and under the roller table to support it for removal. The jaws are

Figure 4

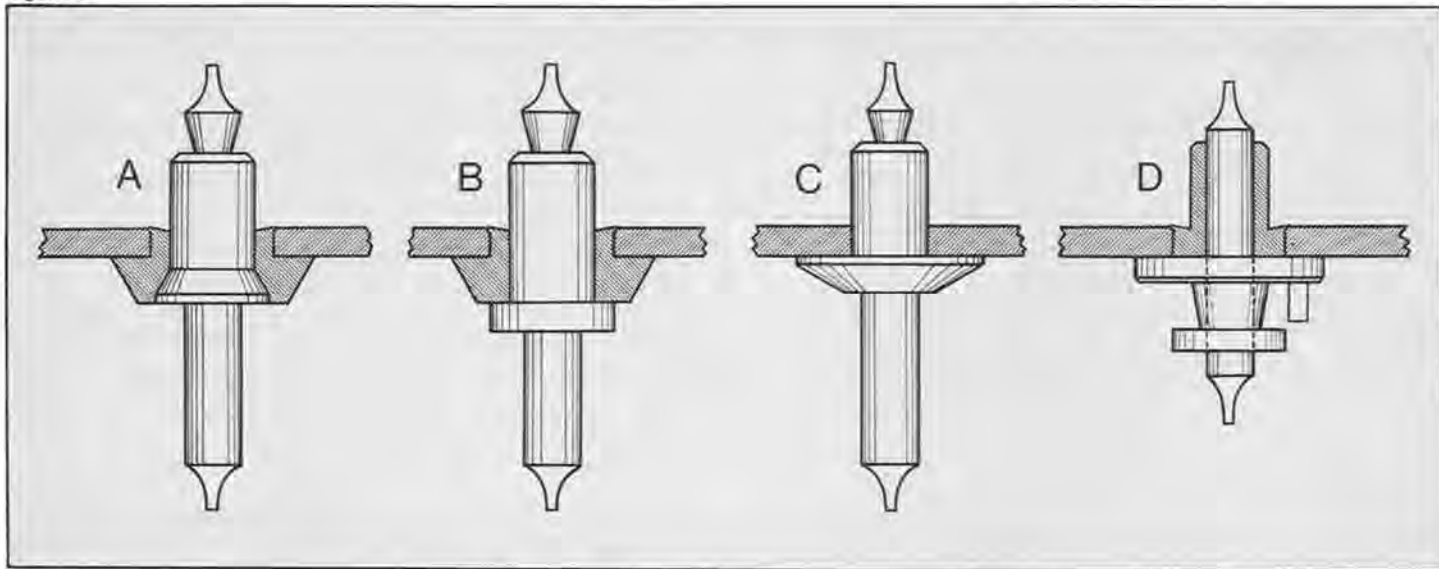


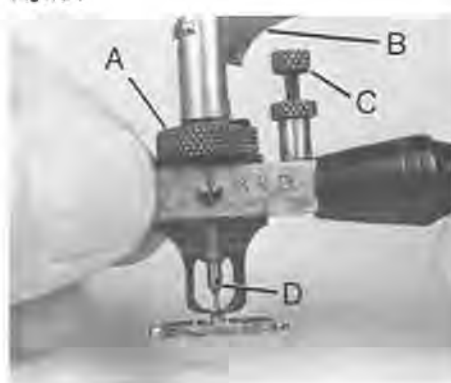
Figure 5



Figure 6



Figure 7



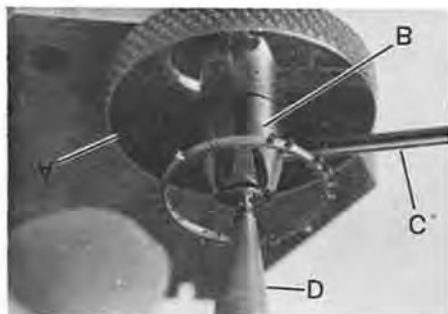


Figure 8

opened by pressing on lever "A." There are three different-sized punches with this roller remover.

Another style of roller remover that is excellent for small watches is the Borel roller remover. This tool is shown



Figure 9

in Figure 10. To use this tool, the balance wheel is placed in the tool with the graduated thickness arms of the tool going between the roller table and the balance arm. Then the two arms of the tool are squeezed between the fingers, which lifts the roller table from the



Figure 10

balance staff. It is a good idea to hold a finger over the table when it is removed to keep the table from flying away.

Next month, the removal and replacing of balance staffs will be discussed.

TIMES

Scenes from the WMJDA Associates Day



SWISS WATCH TECHNICAL CENTER, INC. CELEBRATES ITS 10th ANNIVERSARY

SWISS WATCH TECHNICAL CENTER, INC. LITITZ, PA CELEBRATES ITS 10TH ANNIVERSARY

The Swiss Watch Technical Center, Inc. has been in existence in Lititz, Pennsylvania, since 1970. A special gathering was held on April 16th, 1980 to celebrate the Tenth Anniversary of the Center. It was established in 1970 by Ebauches S.A., Neuchatel Switzerland, the largest watch movements and parts manufacturer in the world and by the Federation of Watch Manufacturers, a trade organization in the Swiss Watch Industry. Today, the Center owned by Ebauches S.A., employs over 50 people and is a vital link between the Swiss Watch Industry and the U.S. Watchmaking Trade.



The Board of Directors of the Swiss Watch Technical Center from left to right: Jean P. Savary, President; Eugene Gordon, Chairman of the Board; Willy Giroud, Vice-President and Manager; Francois Giradet, Manager of the Long Beach Branch of SWTC; Jean L. Miserez, representative of Ebauches SA, Neuchatel, Switzerland.

LANGERT APPOINTS HARVEY KAPLAN SALES MANAGER OF CITIZEN WATCH DIVISION

Harvey Kaplan has been appointed Sales Manager for the Citizen Watch division of Langert Bros. Co., a Phoenix-based jewelry distributor.

Kaplan has been a sales representative with Langert Bros. Co. since 1974, and has over 13 years experience in sales and sales management.

Under Kaplan's direction, the Citizen Watch division of Langert Bros. Co. has expanded to include Southern California and Colorado, along with Arizona and New Mexico.

Langert Bros. Co. has served the Arizona, New Mexico, and Southern California area for 30 years. They have been the dis-

tributor for Citizen Watch Co. in this area for 3 years, and were the top distributor for them in 1979.



The Citizen Watch Co. is a world-wide company which produces a precision watch in an affordable price range. Styles range from ladies' quartz analogs to a full line of LCD quartz watches with special features, such as timers and stop watches.

They also produce a line of mechanical watches.

For additional information, contact Harvey Kaplan, Sales Manager, Citizen Watch Division, Langert Bros. Co., 1620 W. Camelback, Phoenix, Arizona 85015 (602) 264-1620 or in Colorado (303) 892-9316.

STEWART APPOINTED V.P. AND CHIEF OPERATING OFFICER OF TIMEX CLOCK COMPANY

Allan N. Stewart, a Vice President of Timex Corporation, was named a Vice President and Chief Operating Officer of the Timex Clock Company, it was announced recently by Nicholas M. Mihalas, President of Timex Corporation, Waterbury, Connecticut.

Stewart was Vice President, Marketing and Sales for Timex Corporation since 1977. In his new post, his worldwide clock

responsibilities will include Manufacturing, Engineering, Sales and Marketing and Financial Control. He replaces C. Michael Jacobi, who was named Vice President, Marketing and Sales for Timex Corporation.



Prior to joining Timex, Stewart was Vice President, Marketing and Sales for Proctor-Silex. Before that he worked for General Electric Company for more than 15 years in various sales management positions.

He holds a B.S. Degree in Economics from Villanova University and is a military veteran, having served in the U.S. Navy.

Stewart is married, has two children and lives in Easton, Connecticut.

INGRID HAMMOND RECEIVES APPOINTMENT

Thomas G. Broderick, President of Power One Batteries, has announced the appointment of Ingrid Hammond to Comptroller.

Mrs. Hammond is highly experienced in watch, photo and



hearing aid battery accounting and is also in charge of all Varta Battery accounting.

To enable Power One Batteries to service its customers even more efficiently, she is spear-heading a new computerized accounting program that will process orders and invoices immediately.

Power One, in Elmsford, New York, is the North American distributor of hearing aid batteries by Varta, a world leader in the manufacturing and sales of all types of batteries.

JACOBI NAMED V.P. MARKETING AND SALES FOR TIMEX CORP.

C. Michael Jacobi has been appointed Vice President, Marketing and Sales for Timex, it was announced by Nicholas M. Mihalas, President of Timex Corp. of Waterbury, Connecticut.



Jacobi has been Vice President and Chief Operating Officer of the Timex Clock Company since September 1979. Prior to that he was corporate Controller

of Timex in 1978 and General Manager of Timex Manufacturing Facilities in Little Rock, Arkansas since 1977.

In his newly assigned position, Jacobi will be responsible for worldwide Marketing and Sales of watch products. He replaces Allan N. Stewart who was named Vice President and Chief Operating Officer of the Timex Clock Company, Waterbury, Connecticut.

Jacobi was formerly associated with the Peat, Marwick, Mitchel & Company. He is a graduate of the University of Connecticut with a Bachelor of Science Degree in Accounting and is a licensed C.P.A. in Connecticut.

Jacobi is married and lives with his wife and three children in Bethlehem, Connecticut.

MARSHALL-SWARTCHILD MOVES IN DALLAS

The Dallas branch of Marshall-Swartchild Company has moved several blocks from its former location to 109 North Akard. Zip code (75201) and telephone number (214/741-1454) remain unchanged. The new quarters, well-stocked and airconditioned and carpeted for the convenience of visitors and staff, are in Suite 300.

DIAMOND HIGH COUNCIL ANNOUNCES CHANGE IN ADMINISTRATION

On behalf of the Board of Directors of the Diamond High Council, Mr. Robert DeBelder, President, has accepted the resignation of Mr. Raoul Delvreaux, Director. The mutual decision was made as a result of varying management philosophies of Council activities.

Mr. DeBelder expressed his gratitude to Mr. Delvreaux for his contributions that have led to the significant expansion of the Council and its functions in the last fourteen months. He stated that both parties look for the continued and increasing

growth of the Diamond High Council.

He added that Mr. Delvreaux will continue to take an active part in the diamond industry and will be called upon by the Council in the future to share his vast experience and expertise.

Mr. Delvreaux's duties will be temporarily assumed by Mr. Lismonde, Secretary General of the Council, until a new Director has been chosen.

RAPP APPOINTED TO COMMUNICATIONS POST AT BULOVA

Andrew H. Tisch, President of Bulova Watch Co., Inc., has announced the appointment of Harold L. Rapp as Director of Communications. A jewelry industry veteran, Rapp has held



a variety of management positions at Bulova, one of which was president of its subsidiary overseas, Bulova International, Ltd. in Switzerland. Rapp will be responsible for trade relations and publicity. He is a member of the American Watchmakers Institute and the International Advertising Association.

KEEPING TIME WITH THE WHITE HOUSE

Ronald Reagan, the Republican Presidential contender, smiles upon receiving the Atmos Clock at a recent dinner given by the Nassau County Republican Committee on Long Island, New York. Joseph M. Margiotta, Chair-



man of the Committee (right), presented to Mr. Reagan the unique timepiece which is powered by variations in air temperature and requires no winding, batteries, connector, or electric current. Over 4,000 people attended the dinner at which Mr. Reagan commented, "I'll never be able to forget the time I had here." Already owned by numerous heads of state and V.I.P.'s around the world, the Atmos Clock is distributed in the U.S. by a division of the Longines-Wittnauer Watch Company, The Atmos Clock Company.

NEW INTRADE OFFICE IN OTTAWA

Intrade, Inc., an international marketer of electronic components and hand tools, announces the opening of an office in Ottawa, Canada. This office, located at 287 MacLaren Street, Suite 600, Ottawa, Ontario K1S 5H8 has been established to serve Canadian manufacturers in assisting them to penetrate the export market and make available to them the world-wide marketing organization, Intrade, Inc. (USA) that has been in operation since 1963. This office also markets products of American and European manufacturers throughout Canada. Special tools for the Canadian electronics industry are stocked in Ottawa. These include precision tweezers, pliers, cutters, desolderers, contact burnishers, and many others. The office is managed by Lynne Wright and Ross Ingalls, both being bi-lingual to serve the English and French speaking people of Canada.

CITIZEN ANNOUNCES BREAKTHROUGH IN DUAL-MODE WATCHES: THE ANA-DIGI

A unique, new watch, featuring a classic analog face and a subtle, multi-function digital read-out—both on the same timepiece—has just been introduced by Citizen Watch Company.

Called the Ana-Digi, this handsome slim quartz watch is highlighted by dual timekeeping and exceptional ease in setting. All corrections for both analog and digital displays are controlled simply by turning the crown at different click-stop positions. The Ana-Digi also distinguishes itself as the world's first dual-mode watch to provide three hands in the analog display.

In the digital mode, the watch features a wide range of multi-functions, including:

- a digital timekeeping function in both 12 and 24-hour displays
- an alarm
- a chime
- a count-down timer
- a stopwatch accurate up to 1/100th of a second.
- a calendar

"The watch industry has recently experienced a growing demand for a product which combines the traditional styling that shows the attractiveness of the analog mode with the multi-functions of digital," commented Setsuo Kasahara, president of the Citizen Watch Company of America. "The Ana-Digi, we feel, is the perfect solution."

Additional features of the watch include a stopwatch which automatically converts to 24-hour clocking after passing the traditional 60-minute mark, and a count-down timer with memory function, that re-cycles to the original setting. The Ana-Digi operates on a single battery cell



which lasts up to two full years, has a power cell life indicator, a night light and a water-resistant case.

It is available in yellow (\$275) and stainless steel (\$215) models.

JEWELRY MAKING FOR FUN AND PROFIT: NEW BOOK FROM JADOW

B. Jadow and Sons Inc. is pleased to announce the availability of a new book which is designed to encourage and stimulate an interest in making jewelry. Twelve projects—one for each month—have been designed with the intention to start one off towards that purpose as surely and as simply as possible.

Each project focuses on a different technique, so that in the course of gaining experience in shaping and finishing metal, one will be making beautiful pieces of jewelry.

The projects are fully illustrated, have step-by-step directions, and contain listings of the necessary tools and materials. The pieces range from a forged ring and a woven wire bracelet to a riveted stick pin and a pair

of earrings with semi-precious stones, simply set.

Jewelry making is a lot easier than one may think, and with this book as a guide, it will soon be possible for you to have the pleasure and satisfaction of being able to say, "I made it myself."

BK-1275 "Jewelry Making for Fun and Profit" is beautifully designed for easy starts to a lovely, professional-looking finished product. 8½ x 11 in., 36 pages, with 160 clear photos and illustrations. Available at your wholesale jewelers/lapidary supply houses, at \$2.50 each.



NEW LINE OF GERMAN-MADE PLIERS FROM SWEST

Swest, Inc. announces availability of a new line of jewelers' pliers which offer the best features and highest quality yet are economy-priced. The pliers have box joints which retain precise alignment even after considerable use. The handles have PVC plastic covering for non-slip grip and comfort. And, of course, the pliers have the inherent quality typical of German-made



tools. The pliers vary in length from 5 in. to 6 in. and are available in the most popular styles.

For a free brochure with prices contact Swest, Inc., 10803 Composite Drive, Dallas, Texas, 75220; 1725 Victory Boulevard, Glendale, California, 91201.

NEW ACCUTRON QUARTZ FROM BULOVA

Faceted surfaces give way to an elegant oval dial opening in this new Accutron Quartz watch from Bulova. Steel and yellow gold tone combination case and bracelet combine with Accuset® time synchronization feature. DuraCrystal® protects its good looks.



Model 91525 is available at a suggested retail price of \$195.00. Additional information is available from: National Sales Manager, Bulova Watch Company, Inc., Bulova Park, Flushing, NY 11370.

PORTESCAP'S NEW 1980 VERSION VC-101



Portescap U.S. introduces its new 1980 version VC-101 automatic cleaning machine.

At the press of a button, the VC-101 cleans, lubricates and dries up to 20 watch movements.

The new VC-101 features:

- a second holder in addition to the original 20 watch movement holder and stand to accommodate four travel alarm clocks or pocket watches.
- an override control to turn-it-off at each stage of operation.
- two drying stages—featuring a new hot air dryer, in its own chamber, on its own timing control, enabling you to both clean and dry up to 20 watch movements in each chamber at the same time—This new auxiliary dryer is especially important for proper curing of all new watch lubricants and for proper drying of travel alarm and pocket watch movements.
- new controls on its redesigned top panel, plus internal lighting for easy changing of liquids, and a main power control switch.

For information and free demonstration, please call collect Portescap U.S. Vibrograf machine division, 6 Ohio Drive, Lake Success, NY 11042. Tel. 516-437-8700.

MIDO INTRODUCES NEW OCEAN STAR 8539

Mido, the King of Water Resistant Watches has added a new Ocean Star to its 1980 collection.

Model 8539 has a self-winding movement, and is available either with a yellow top with steel back or an all-steel case with matching metal band. It is water resistant with day-date.



Suggested retail price is \$415.00 K. Also available in ladies' size under No. 7539.

Ask for our new 1980 color catalog. Mido Distribution Center, Borel Watch Co., 1008 Walnut, Kansas City, MO 64106.

ELECTRONIC INGENUITY MAKING NEW LCD A MAJOR SALES SUCCESS

Combining the functions most demanded by the public with simplicity of operation has resulted in a runaway sales success for the multi-function LCD module introduced by Ebauches Electroniques at the last Basle Fair.

Technically called the calibre 946.921, the 14-function LCD module was designed by the Ebauches Electroniques facility at Marin. The EEM team was under the direction of Jean-Claude Fatton, Module Development Division, Dr. Hans Dill, Manager Microelectronic Division and Dr. Peter Daly, Production Division Manager.

"When we decided to produce this module, we set a number of functions we believed any



LCD should have in addition to standard hours-minutes-seconds and date. It had to have a second time zone, alarm, count-down timer, chronograph function and the home time itself.

"Frankly we saw the need for an alarm timer that set off the device in the location where the wearer was sleeping—not at the home time which might be hours and hours different," Dr. Daly explained.

Another major criterion was that the module had to be operable by the average person. "When we looked at the market two years ago we found that 80% of the LCDs had functions that were unusable by the average person," he said.

"We felt that the owner of a modern LCD shouldn't have to get the instruction booklet out every time he or she wanted to operate one of the watch's functions. In addition, we are dealing with a multi-lingual market in Europe and wanted to produce a single module that would be adaptable, in the case of the days, to the three major European languages, English, German and French," Dr. Daly explained.

The 946.921 module components are manufactured in Switzerland with the integrated circuit produced in MEM plant, at Marin, outside Neuchâtel. The assembly is executed in Hong

Kong through Modutex Limited, a joint venture between Ebauches SA—an ASUAG affiliated company—and Stelux Manufacturing Limited.

"We can say, perhaps immodestly, that we have hit the jackpot with this watch module. No less than 14 different customers are buying the module either for casing up themselves or for re-sale to case manufacturers.

"One of its major advantages is that everything this watch can do, it can do separately from every other function contained within it. We were determined that all the functions of this watch must work at the same time, not in successive order.

"I believe the watch is being sold as a chrono-alarm watch with the other functions as a bonus," he said.

Dr. Daly believes that the end of the LCD is not yet in sight. "Not by a long way. Just look at the 18 to 30-year olds. What are they wearing? LCDs because they're fashionable, with up-to-the-minute technology. In addition, much of the surge of LCDs in the past two or three years is because of the alarm function, something not available in quartz analogue."

"We're working on a quartz analogue alarm but the first thing we have to engineer is letting the microprocessor know where the hands are on the dial of an analogue. After that, it's easy," Dr. Daly said.

At the present time, it's much easier to put an alarm in an LCD since it can be programmed to go off. With a quartz analogue, the electronic impulse ends with the motor that moves the hands. The tips of the hands and their relationship to the hours and minutes is, in today's analogues, not known to the "chip."

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

Tradesman

WHEELS, Pinions, Barrels or whatever, repaired or made new. Repivot arbors. Parts made to order. Send sample for free estimates. On all watch parts, inquire first. Ken Leeseberg, Ken-Way Inc., 19 W 672 Army Trail, P.O. Box 219, Addison, IL 60101.

Jewelry Repair All Types. Two (2) day service on regular work such as sizing, prong work, and stone setting. Please write for price schedule. T.A. Wiley, Jeweler, 1112 Sanford Ave., Virginia Beach, VA 23455

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Clock repair material and tools. Manufacture of clock springs, dials, escape wheels, verge kits, weights, all types of brass and steel stock and custom made parts. Catalog postpaid \$2.00. Tani Engineering, Box 338, Atwater, Ohio 44201.

Help Wanted

Work in beautiful California. West's largest jewelry & jewelry supply house has openings for management & management trainees. Send resume to: Norm Brown c/o EDS CO., 315 W. 5th, Los Angeles 90013. (800) 421-9102.

WATCHMAKER NEEDED—Excellent position open for well qualified man. Excellent salary and working conditions, full benefits. Send resume to Ken Gordon, C/O Matisoffs Jewelers, P.O. Box 8026, Chattanooga, TN 37411. 615-894-2466.

Expert Watchmaker wanted to open repair concession in extremely high volume fine jewelry store. Be your own boss in beautiful surroundings. All replies kept confidential. Contact: Bernard Utchenik, c/o The Diamond Exchange Inc., G-4021 Miller Rd., Flint, MI 48507. (313) 732-1560

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Young, ambitious, Swiss-trained and experienced watchmaker seeks further apprenticeship in repair shop of fine watches and/or clocks. W.O.S.T.E.P. graduate. Prefer rural location. Relocating no problem. Write Robert L. Mohr, 85 Highland View, Irvine, CA 92715.

Wanted To Buy

STERLING FLATWARE STOCKS — new or used needed. Call us before you sell for scrap. Also wanted: silver, diamonds, gold scrap, coins and coin collections. Call or write: Mr. Neff, HT, WFN Enterprises, 2300 Henderson Mill Rd., N.E. Suite 318, Atlanta, Georgia 30345. Phone 404/938-0744.

IMMEDIATE CASH PAID for Gold, Silver, Platinum, any form! Jewelry scrap, filings, gold filled, sterling! Immediate top dollar cash offer return mail! Satisfaction Guaranteed. Ship insured/registered mail to: American Metals Co., St. Andrews Branch, P.O. Box 30009H, Charleston, SC 29407.

For Sale

American Pocket watches, movements, cases, material and tools for sale. Write for list. Want to buy watchmakers tools, American pocket watches, related items. Dashto Horological Services, 5349 Basilica Circles, Virginia Beach, VA 23464. (804) 420-2631.

1. Bulova Accutron Meter No. 700, \$85.00.
2. Bulova Accutron Microscope 30x, \$85.00.
Jack B. Parsons CMW, Parsons Watch Repair Shop, 5533 S.W. 22nd St. Park, Topeka, Kansas 66614

EVEREADY WATCH BATTERIES. Lowest prices guaranteed. No Minimum order. No freight charge. 2% cash discount. Write for free price schedule & cross-reference guide. N.B. Sales Co., 32250 Red Clover Road, Farmington Hills, Mich. 48018. (313) 553-0947.

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Digital Watch Service Training. Zantech, Inc. offers training and instruments for servicing all types of digital watches. Course includes diagnosis of watch malfunctions and repair methods, including techniques in wire bond repairs using silver epoxy. Louis A. Zaroni, Zantech, Inc., 13 Greentree Rd., Trenton, NJ 08619. (609) 586-5088.

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Dates to Remember

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2-5—Early Bird Gift & Decorative Accessories Market; Merchandise Mart; Atlanta, GA

6-10—Atlanta National Gift Market, Merchandise Mart; Atlanta, GA

12-13—Oklahoma Jewelry Show; Camelot Inn, Tulsa, OK

14-18—Independent Jewelers Organization Fall Seminar/Buying Group; Peachtree Plaza, Atlanta, GA

18-20—Pacific Northwest Jewelers Convention; Thunderbird Hotel; Jantzen Beach; Portland, OR

20-23—SJTA Atlanta Show; Hyatt Regency Atlanta; Atlanta, GA

20-25—California Gift Show; L.A. Convention & Exhibition Center, Hyatt Regency Hotel, California Mart, L.A. Hilton, Brack Shops, Brack Shops/East, Brack Shops/South, 520 W. 7th St. Bldg., L.A. Mart; Los Angeles, CA

21-26—Early Bird Gift Market; The Merchandise Mart, Chicago, IL

25-27—Watchmakers Association of Ohio; Annual Convention; Marriott Inn; Columbus, OH

26-30—Retail Jewelers Association Fall International Jewelry Trade Show & Convention; Sheraton Center & New York Hilton Hotels; New York, NY

27-Aug. 1—Chicago Gift Market; The Merchandise Mart, The Apparel Center, the Expocenter; Chicago, IL

31-August 4—Independent Jewelers Organization Fall Group Buying Show; Atlanta, GA

AUGUST

9-11—MS RJA Annual Convention; Biloxi Hilton; Biloxi, MS

24-27—Miami Gift Show: Miami International Merchandise Mart and Expo/Center; Miami, FL

9-11—RJA Central USA; Expo Center; Chicago, IL

10-12—Tampa Gift, Jewelry & Variety Merchandise Show; Expo Hall, Tampa, FL

10-15—225 Fifth Ave. Fall Market; New York, NY

16-18—Pacific Jewelry Show, Century Plaza Hotel, Los Angeles, CA

24-26—Gift, Jewelry & Variety Merchandise Show; Miami Beach Convention Center; Miami Beach, FL

31-Sept. 4—International Watch, Jewelry & Silver Trades Fair; Earls Court, London, England.

31-Sept. 5—Dallas Fall Gift, Jewelry & Housewares Show; Dallas Market Hall & the Anatole Hotel; Dallas, TX

SEPTEMBER

6-7—Iowa Retail Jewelers and Watchmaker Association Fall Convention and Trade Show; Airport Inn; Des Moines, Iowa.

12-14—Tennessee RJA Annual Convention; Music City Rodeway Inn; Nashville, Tennessee.

OCTOBER

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

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

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