

# Servicing a Platform: The Basics

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## I: Supplies and Tools

**Craytex**: A rubberized abrasive for deburring, smoothing, and polishing; extra fine grain, square stick. This is used to clean and polish the pivots.



Fig. 1 Craytex abrasive stick

**Eye Loupe**: Magnification will be necessary to see wear, dirt, placement of oils, etc...

**Safety Glasses**: Safety First! The glasses will protect your eyes as well as provide a place for your eye loupe.

**Pith Wood**: This soft wood is useful for holding small parts while work is done, as well as for cleaning small tools that are poked into it.



Fig. 2 Important tools

**Tweezers**: Small parts can't be handled well with fingers and it will be nearly impossible to service a platform without using tweezers. The tweezers will have to be properly shaped at the tips so as not to eject the piece being held. Small parts can be shot large distances, and probably lost with improperly shaped tweezer tips.

**Parts Bin**: A watch parts container with divisions is handy, but not necessary.

**Demagnetizer**: Sometimes tools or parts will become magnetized and a demagnetizer is essential for solving this problem.



Fig. 3 Demagnetizer

**Hand Air Blower**: A hand bulb for blowing air allows you to direct the airflow, control the amount of air, and remove small particulates that wouldn't otherwise be removable. Using your breath to blow on a piece will introduce water and could cause problems later on.



Fig. 4 Blower bulb

**Oilers:** Being able to place the oil exactly where it is needed is a necessity, and dip oilers greatly aid in that process.



Fig. 5 Dip oilers

**One Dip:** A solution used to soak the jewels to loosen any dirt or particulates. Quickly evaporates without any residue. This solution contains 1,1,1-Trichloroethane and is harmful if swallowed or breathed for prolonged periods of time. As with any chemical, read the warning label.



Fig. 6 One Dip solution

**Small Screwdrivers:** A good set of jeweler's screwdrivers is important in order to avoid damaging the screws or screw holes. Use the proper screwdriver for the screw.



Fig. 7 Screwdriver set

**Staking Set:** A whole set isn't necessary unless advanced repairs are required. One special punch is needed for removing the hairspring stud from the balance bridge and another flat faced punch for reinserting it. The special punch can be made by inserting pinion wire into the hole of a flat faced hole punch.

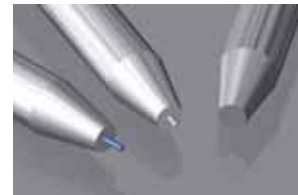


Fig. 8 Examples of punches

**Bench Block:** A nice, slotted bench block will greatly aid in removing and reinstalling the hairspring stud on the balance bridge. It can also act as a balance tack when a toothpick is inserted into one of the smaller holes.



Fig. 9 Handy bench block

**Steady Hands:** Small, detailed work will require a very steady hand. Use breath control, hand support, and don't work in midair. Stay away from caffeine or you may become frustrated handling the small parts.

**Toothpicks:** Used for cleaning the jewels and polishing the plate.

**Watch Cleaning Machine:** Although not fancy, a good machine will get rid of the majority of the dirt and greatly ease the servicing process.



Fig. 10 Simple watch cleaner

**Watch Oil:** The proper oil is as important as where it is applied. Clock oil is normally too stiff or thick for use as oil in platforms.

**Watch Paper:** Used to clean the jewels and is a clean surface to place parts. Controlled breathing will be needed while small parts are on the paper since it is very light and can be “blown” around.



Fig. 11 Watch paper

## II: Work Area

Prepare your area beforehand, including catch tray, bench top, and floor. A clean area will make it easier to find those wayward pieces as well as reduce the chance of introducing contaminants. It may even be advisable to “work in a bag” if this is your first time handling very small pieces. Create an area where pieces can’t get away. The area should be well lit with very few shadows on the work surface.

## III: Common Types of Platforms

### **Lever Escapement:**

**Club-toothed:** This type of platform has the balance, fork, and escape wheel all in a line. The escape wheel has “club” shaped teeth.

**Ratchet-toothed:** This type has the fork off to one side of a line drawn between the balance and the escape wheel. The escape wheel has pointed teeth that are raked.

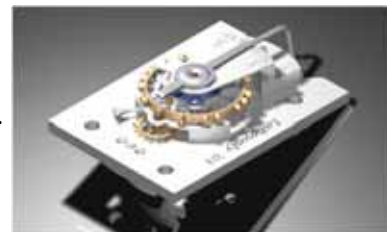


Fig. 12 Ratchet toothed lever platform

**Modern Swiss:** This platform style has a club-tooth, lever escapement with an adjustable hairspring stud holder and regulator. This makes adjusting the beat and rate very easy. The method of mounting the jewels is sometimes with springs rather than screw settings.

**Cylinder:** This type of platform has no fork. The escape wheel has raised triangular teeth that move in and out of a notched cylinder on the balance.

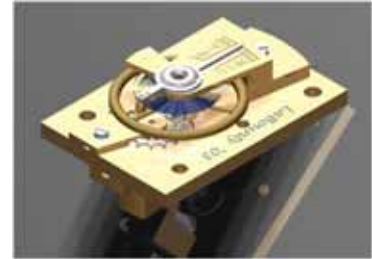


Fig. 13 Cylinder escapement platform

#### IV: Taking Apart

**Make Groupings:** It is important to keep bridges together with their screws and other associated parts. A divided tray or separate portion of the bench works well. In some platforms the screws aren't interchangeable and damage will occur if a screw is forced onto the wrong hole.



Fig. 14 Parts in groups

**Balance Bridge:** Start by removing the balance bridge screw. Use a screwdriver to pry up the bridge, not your tweezers. Tweezers will become damaged if not used properly and would eventually eject small parts. Once the bridge is loosened, use tweezers to lift it straight up and clear of the platform. It may be necessary to “wiggle” the balance until it comes loose. Protect the balance staff pivots at all times and if it is necessary to put the balance and bridge down, place the bridge top side down with the balance up.



Fig. 15 Removing the balance bridge



Fig. 16 Balance and bridge in safe position

**Balance:** Remove the balance from the bridge. The balance staff is at risk of becoming damaged while still attached to the bridge. First, free the hairspring from the index pins. This example shows the style that has a rotatable regulator boot which allows the hairspring to be freed. Press out the hairspring stud using the special stake. Place the freed balance to the side.

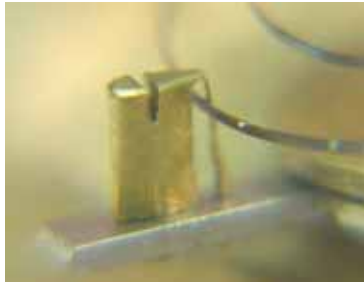


Fig. 17 Rotatable regulator boot

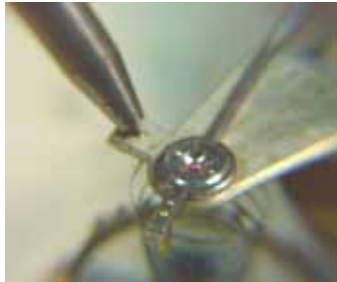


Fig. 18 Special punch to press out hairspring stud



Fig. 19 Hairspring stud freed from balance bridge

**Escape Wheel/Fork Bridge:** Remove the escape wheel bridge screws and pry the bridge up using a screwdriver or by pushing against its “steady” pins from underneath. Pushing against the pins may not produce the control necessary to avoid damage but it is important to use the method that offers the most confidence in the procedure. Pull the bridge *straight up* with tweezers so the fork and escape wheel pivots aren’t bent or broken. Place the bridge, screws, fork, and escape wheel in their proper group.

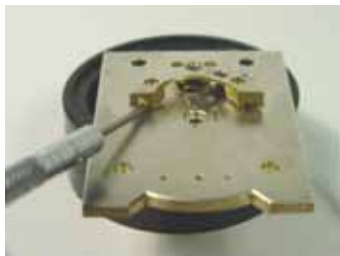


Fig. 20 Prying up escape wheel bridge



Fig. 21 Lifting escape wheel bridge straight up

## V: Cleaning Pivots

**Pith Wood and Craytex:** Shape the craytex stick so it has a flat, tapered end. Shaving it with a razor blade works well. Tapering it down will allow you to see what you are doing. Stick the balance into the pith wood to keep the balance stationary. To clean the balance staff, twist the craytex down onto the balance pivot while holding onto the balance with tweezers. Twist the craytex several times, being sure it is all the way to the shoulder and being careful to keep the craytex upright. Twist the craytex off and examine the pivot. It should be bright and shiny without any dark streaks. If not, repeat the process until it is. Once one pivot is cleaned, turn the balance over and clean the other one. Repeat this process with the fork and escape wheel pivots. This method is just for a basic



cleaning and shouldn't be considered proper practice as a restoration technique. Badly worn pivots should be polished on the lathe and given a final burnishing. Examine the pivots closely for dramatic wear. One common wear problem appears as ruts formed on the escape wheel pinion. Take the time to examine the pinion for wear and make a note if present. Addressing the pinion wear problem will be discussed after final assembly.

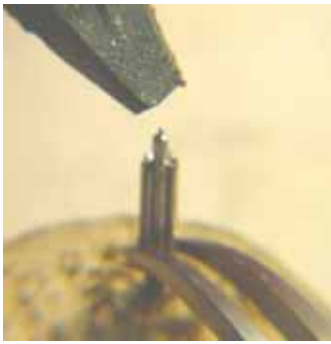


Fig. 22 Craytex shaped to polish



Fig. 23 Polishing pivots

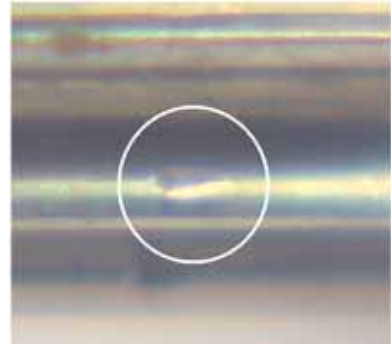


Fig. 24 Wear on the escape pinion

## VI: Run it Through the Watch Cleaning Machine

**Packing the Basket:** Once the pivots are all clean it is time to pack them into the watch-cleaning basket. The platform base should go in the basket first, in the bottom. A stainless steel wire screen is wedged into the basket next to keep the platform base from moving around and also acts as a separator. Place the escape wheel bridge and balance bridge in the bottom of the basket next. The balance, fork, and escape wheel should be arranged in the upper portion of the basket in such a way that they won't become damaged when the top is put on.



Fig. 25 Base in the parts basket first



Fig. 26 Wire separator and bridges next



Fig. 27 Small parts on top, arranged to clear the lid

**Tight Screws or No Screws:** Small screws on the platform should be tightened before the platform goes through the cleaner. Loose screws will fall out and become lost in the solution. Note: The screws on the balance rim are the exception and can be left as is.

## VII: Polish Plates

**The Toothpick Rub:** The platform base and bridge(s) may come out of the watch cleaner looking a little hazy. Rubbing a toothpick over the surfaces while the plates are still warm will remove most of the haze and dirt the cleaner didn't address. When the toothpick starts to show dirt, get a new one. Use the hand blower to remove any loose particulates of dirt or toothpick left behind.



Fig. 28 Polishing the plates with the toothpick rub

## VIII: Cleaning Jewels

**One jewel at a time unless very different:** The jewels of the platform, consisting of hole jewels and cap jewels, must be hand cleaned even though they have been run through the watch cleaning machine. Cap jewels trap dirt and oil residue and therefore it is necessary to separate the cap jewel from the hole jewel and clean each. The jewels are not interchangeable and great care must be taken to avoid misplacing them. Some jewel settings are so greatly different that they can't be confused but, in general, only one set of jewels should be serviced at a time.

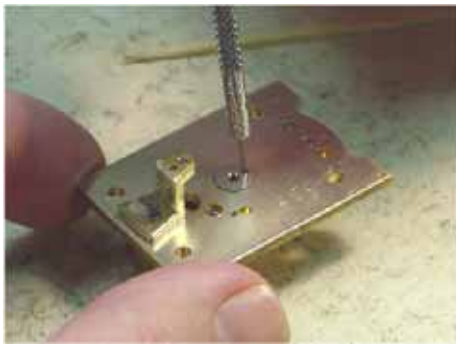


Fig. 29 Removing a cap jewel

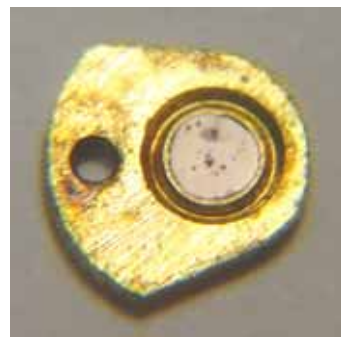


Fig. 30 Dirty cap jewel

**Soaking:** Place the cap jewels in a small, lidded jar, which contains a small amount of One Dip. Allow the jewels to soak for several minutes and in the meantime, service the plate jewels.

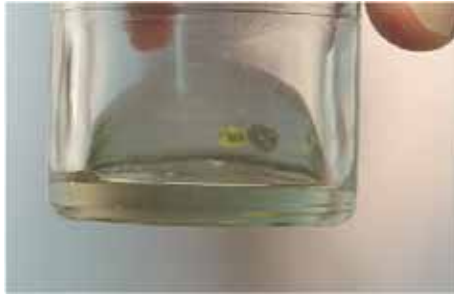


Fig. 31 Cap jewels soaking in One Dip

**Scraping with toothpick and watch paper:** The plate jewels can be cleaned by rubbing with a toothpick which has been dipped in One Dip. If the oily dirt appears to be smearing rather than being removed, use a new toothpick. Once perfectly clean, dust off with the hand blower to remove any fine particulates that may be around the jewel. The cap jewels and/or balance hole jewels that are soaked in One Dip can be cleaned using a combination of scraping on watch paper and rubbing with a toothpick. The jewels should be placed on the watch paper, dirty side down, while still wet with One Dip. Push on the jewel with a toothpick and move it around the watch paper to remove the majority of dirt. Finish up with the same method used on the plate jewels.



Fig. 32 Cleaning hole jewels



Fig. 33 Cleaning cap jewels

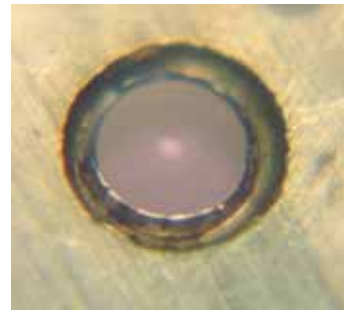


Fig. 34 Clean cap jewel

**Examine jewels for dirt, wear, and cracks:** Examine the surfaces of the jewels using a loupe and be sure they are clean. If not, repeat the cleaning process. Oftentimes, the cap jewels will develop wear in the form of a pitted surface where the staff or pivot rests. Although this problem is outside the scope of basic servicing, the wear should be noted and addressed if excessive. Another area that should be noted and addressed if present is cracked or chipped jewels. Use a loupe and hold the jewel against a white background. Look for a dark line or lines running through the thickness of the jewel and radiating out from the hole. Also, look for hole edges that show chipped portions. Cracked or chipped jewels



are also outside the scope of basic servicing but they should be replaced if damaged.

**Dust off with blower:** Resist the urge to blow small particulates off of the parts of a platform using your mouth. As mentioned, this will introduce water vapor on the parts and could break down the oils or cause rust. Always use the hand blower to dust off the platform and individual parts but be careful not to blow something important off of your bench.



Fig. 35 Dusting off platform

## IX: Oiling First Stage

**Install Cap Jewels:** Once a set of jewels is clean, mount them in their proper position on the platform and service another set. When all of the jewels are clean and installed, the first stage of oiling can be done.

**Oiling cap jewels prior to assembly:** It is easier and more effective to oil hole jewels which have cap jewels prior to assembling the platform. Use a small dip oiler and carefully apply the oil to the hole in the jewel. Be sure the oil doesn't just stay in the hole jewel but makes it all the way to the cap jewel. Apply sufficient oil that it can be seen as a crescent through the hole jewel. Two or three applications of the smallest dip oiler are usually enough. A steady hand is important here so as to apply the oil to the hole and not slop it over to the sides of the jewel. Too much oil on the outside of the jewel could pull the oil out of the hole if it drips or it will attract unwanted dirt.



Fig. 36 Oiling upper balance jewel



Fig. 37 Oiling lower balance jewel

## X: Assembly First Stage

**Escape wheel and fork first:** Carefully insert the fork and escape wheel into proper pivot holes and assemble the bridge(s). While assembling the bridge(s), be sure the fork and escape wheel are properly in their pivot holes.



Fig. 38 Positioning escape wheel and fork



Fig. 39 Assembling escape wheel bridge

**Check for end-shake and freedom:** Before tightening the bridge screws, move the fork and escape wheel to be sure nothing is binding. They should move freely and have a slight end shake. Check repeatedly while tightening the bridge screws.

## XI: Oiling Second Stage

**Escape Wheel and Fork:** The hole jewels which don't have a cap jewel may now be oiled using a small sized dip oiler. One or two applications are usually sufficient. Don't over oil or it may run out and leave a dry pivot. Dry pivots are more likely to occur if the platform and parts have been run through an ultrasonic cleaner. If this is the case, the watch industry is recommending the use of a fluorine-SAS substance (epilame) called Fixodrop in the escape wheel and pallet fork jewels. This chemical causes the jewel to become anti-friction, anti-adhesive, and water resistant, which will tend to keep the oil in the jewel.

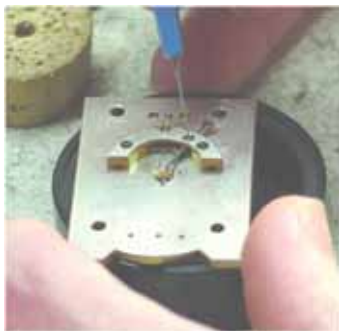


Fig. 40 Oiling upper hole jewels



Fig. 41 Oiling lower hole jewels

## XII: Final Assembly

**Balance Assembled to Bridge:** The balance should be reattached to the balance bridge by reinserting the hairspring stud into the bridge. Be sure the hairspring passes through the index pins and rotate the regulator boot, if present, back into position.



Fig. 42 Pressing in hairspring stud



Fig. 43 Rotating regulator boot to capture hairspring

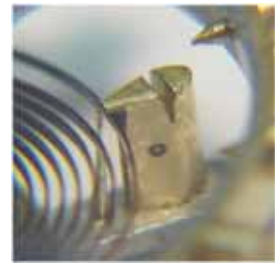


Fig. 44 Regulator boot in proper position

**Bridge and Balance to Platform:** The bridge and balance can now be assembled onto the platform. Pay attention to the relationship of the roller jewel and the fork horns. The roller jewel should rest between the fork horns when the balance is in position and not outside the horns.



Fig. 45 Assembling balance bridge to platform

**Check for balance motion as you tighten:** Just as with the fork and escape wheel, watch for freedom of the balance as the balance bridge screw is tightened. Stop tightening the screw if the balance becomes bound and check to be sure the balance staff is in its pivot holes.

**Watch for Magnetism:** If at any point you find screws or other parts being magnetically attracted to your tweezers or screwdriver, demagnetize the tools and parts.

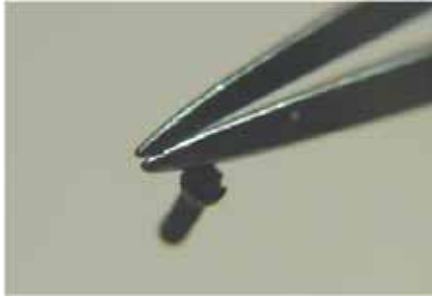


Fig. 46 Screw showing magnetic properties



Fig. 47 Using demagnetizer

**Check for clearance and end shake:** Once the balance bridge screw is tight, check for clearance between the balance wheel rim and the bridges. The rim should not touch the balance bridge, escape wheel bridge, or fork bridge. Also, check for end shake of the balance. Too much or too little end shake could mean one or more of the balance jewel sets isn't seated properly.

**Platform to Clock:** The platform can now be assembled onto the movement. Carefully work the platform so the escape wheel pinion properly mates with the contrate wheel. It may be necessary to loosen the platform screws and shift the platform slightly to obtain proper depthing. The contrate wheel usually has an end shake limiting screw and this should be adjusted prior to depthing the two gears.

**Adjusting platform to account for wear of escape pinion:** As mentioned earlier, the escape wheel pinion will usually show wear in the area where it mates with the contrate wheel. If this wear is excessive, it will be a problem and cause the clock to stop regardless of how well everything else is serviced. There is normally sufficient room on the pinion to raise the platform and have the contrate wheel mate in an area with no wear. The platform can be shimmed using small, thin washers between the platform and clock plate. Be sure the washers are all the same thickness, however, or the platform may bind.

**Depthing:** Although mentioned above, it is important that the depthing between the contrate wheel and escape pinion be checked as a final step in mounting the platform. The two gears should be set to run on pitch circles to minimize engaging and disengaging friction. Any misalignment will cause poor time keeping and/or stoppage.

### XIII: Final Oiling

**Escape Wheel Teeth:** The pallet jewels require a small amount of oil and the current industry method for oiling escapements is to apply a single drop of oil on the exit pallet only, allow the escape wheel to make three to five revolutions, then apply another drop of oil. This method will avoid the application of too much oil which could cause the oil to adhere to the area of the pallet fork where it attaches to the arbor and reduce the balance action. Depending on the person's skill level, it is often easiest to apply the oil to the escape wheel teeth rather than the pallet jewels directly. When applied to a few escape wheel teeth, the oil will be transferred to the pallets and eventually to the rest of the teeth. This is especially true of club-toothed escapements. For ratchet-toothed escape wheels however, it may be more advantageous to apply the oil directly to the pallet faces since the escape wheel teeth are so fine and the oil will wick to the root of the tooth and be a dirt collector.

### XIV: Setting the Beat

**How to do it:** Checking and setting the beat is an important final step in the servicing process. It can be difficult and frustrating but if done properly will make the difference between a clock which is reliable and one that's not. The beat is set by rotating the hairspring collet on the balance staff. It is advisable to remove the balance assembly from the platform to make any adjustments. A balance tack can be made by sticking a toothpick into a hole in the bench block. This would allow the balance to be suspended on the toothpick through the bridge screw hole. Use a small screwdriver, inserted into the slot in the hairspring collet, to put pressure on the collet. A slight, subtle twisting of the screwdriver will allow the balance staff to be rotated one direction or the other inside the hairspring collet. The balance will need to be installed on the platform for the beat to be checked. This process may need to be repeated several times before the beat is satisfactory.



Fig. 48 Balance on balance tack for beat adjustment

**Using sight references:** There are several methods which aid in determining whether the beat needs to be adjusted. These methods will also help in the ease and speed of setting the beat. One method of sight referencing is to align the balance jewel, roller jewel, and fork jewel with the balance at rest and power off of the time train. The balance will be close to being in beat if the roller jewel is on a direct line between the balance jewel and the fork jewel. If it is exactly on this line, the roller jewel will rest in the middle of the fork horns and the horns will be pointed directly towards the balance staff.





Fig. 49 Setting the beat using a sight reference (shown cut-away for clarity)

Another sight reference can be done with power applied to the train, but is much more difficult to see. Situate your eye so as to be looking along the balance jewel/fork jewel line. Watch the roller jewel as it disappears behind the balance staff in one direction and then the other. As more power is applied to the train and the balance action increases, the roller jewel will just peek out from behind the balance staff. If the balance is in beat, the roller jewel will be visible the same amount in both directions.

**Listening:** Another method of determining whether the balance is in beat is to listen to it. Apply just enough power to the train to get the balance working and listen for an even tick...tick...tick. If there is a “long side”, watch the balance and determine which side is “long”. Set the beat as before, by removing the balance and rotating the hairspring collet in the direction of the “long side” or rotating the balance staff in the direction opposite the “long side” depending on your frame of reference.

**Using the Machine:** A watch timing machine will provide the most accurate method of setting the beat. It is far more accurate than using sight references or listening but doesn't tell you which direction to adjust. Sight references and listening will still be necessary to determine adjustment direction but at some point it will become hit or miss. If you have a watch timer, refer to the directions to see what an “in beat” trace looks like. Some models may require a special clock pick-up in order to be useful on a platform.

## XV: The Regulator Pins

**Proper Shape:** The regulator pins on a platform are often made up of a regulator boot on one side, which can be rotated, and a tapered brass pin on the other. The tapered pin should be straight and have the inner side parallel to the regulator boot. If the regulator pins are not straight and parallel, the hairspring will not hit flat against the pin, which will contribute to time keeping errors.

**Regulator Pin/Hairspring Relationship:** On watches, it is advantageous to have the hairspring beat hard against the inner regulator pin to reduce the effect of positional changes. Carriage clocks, however, aren't subject to as frequent positional changes as watches and will show a more consistent rate if the hairspring is adjusted to beat evenly between the regulator pins. It should be noted this adjustment will change the beat slightly!

**Adjusting the Rate:** Some slight adjustment of the rate of the clock can be made by varying the distance between the regulator pins. Increasing the distance between the pins will slow the clock by increasing the balance arc. The clock will keep better time with a larger balance arc but only so long as the hairspring beats against both regulator pins. If the pins are opened to the extent the hairspring doesn't contact the regulator pins properly, there will be no way of adjusting the rate with the regulator arm. Whether opening the distance or closing it, the regulator pins should be kept parallel.

## XV: A few things beyond basic service that should be considered when restoring a platform ...

- Balance Problems
- Banking Pin Problems
- Bent Teeth
- Cylinder Wear (in a cylinder escapement)
- Depthing Problems
- Drops/Locks
- End shake Problems
- Fit-up Problems (when replacing a platform)
- Fork Problems
- Hairspring Problems
- Index Pin Problems
- Repivotting
- Replacing Jewels
- Resilvering Platform
- Straightening Pivots

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