

Restoration of a Flood-Damaged Pocket Watch



Shaun Clarke

NAWCC San Jacinto Chapter 139

Hurricane Harvey

- In August 2017, residents of Houston, TX were inundated with Category 4 Hurricane Harvey
- The storm dumped trillions of gallons of water, causing over US\$125 billion in damages
- Floodwaters caused damage to over 200,000 homes
- This is the story of complete restoration of a flood damaged Omega pocket watch



Initial Inspections



Initial Inspections

- An attempt was made to remove the balance assembly but unfortunately the hairspring had sustained extensive rust damage and broke almost immediately
- The balance cock, balance assembly and case were separately soaked in Naphtha



Disassembly & Assessment

1. Apart from the obvious water damage, the brass plates (bottom plate, barrel bridge and train bridge) were in salvageable condition but would require careful cleaning.
2. Steel screws had suffered various degrees of rust damage, with all needing polishing and some potentially needing replacing.
3. Other steel components including the balance regulator, crown wheel, ratchet wheel had rust pitting and should be replaced.
4. Balance staff was not broken but the perimeter of the balance wheel was encrusted with hardened residue.
5. Gears and pivots were generally in fair condition. The centre wheel pinion had rust damage to some of the leaves and replacement would likely be necessary. The escape wheel and pallet fork had rust spots forming, but appeared to be mostly cosmetic and should not affect performance.
6. Mainspring was surprisingly in salvageable condition, but appears appeared to be an incorrect length. A replacement would need to be sourced.
7. The setting components appear to be all good.
8. The sterling silver case was in good condition with no damage and a gentle polish should bring it back to a satisfactory finish.
9. The glass crystal had significant scratch marks, and was not period correct.

Owner's Wishes

- With restoration of any sentimental piece, it is important to consult with the owner in order to understand their expectations.
- The owner had expressed a desire to have the watch mechanically and cosmetically restored.



Movement Identification

- The movement number is **4037680** and factory records indicate a manufacture date of approximately 1912
- The movement is 15 jewel, open face, pendent wind/set and gilt finish
- Online investigation determined it is an Omega 19LB movement.
- Searching found a donor in London, England. This partial movement was ordered in November and proved to be a good match. The balance staff and hairspring were found to be in good condition.



Case Identification



- The case is number **4620784** and hallmarks indicate it was imported to London:
 - The standard mark showing the fineness of the metal as .925 for sterling silver.
 - The town mark showing where the article was assayed and hallmarked, in this case the zodiac sign of Leo used by the London Assay Office on imported items.
 - A date letter showing when it was hallmarked, in this case the "q" of 1911.
 - A sponsor's mark showing who submitted the article for hallmarking, in this case the initials "SA" in a diamond, the registered mark of "Selling Agency" (1910-1919), Watch Importers of London.

Assembly



- Brass plates were cleaned with Flitz™ Metal, Plastic & Fiberglass Polish on a piece of paper towel and patting lightly to remove the unevenly discoloration.
- The bottom plate, barrel bridge, train bridge and balance cock were cleaned using this technique.
- These components were then re-cleaned to remove any residual polish.
- Final polishing of the gilt plates was completed using French chalk and a soft dial brush.
- All pivot holes were inspected and pegged to remove and residual dirt and/or debris.

Mainspring

- The mainspring appeared to be an incorrect length and somewhat set, so the decision was made to replace it.
- A replacement was not immediately available so options for a replacement were investigated. The following information was established:

Inner diameter of the barrel: 17.30mm radius 'R' = 8.65mm

Diameter of the barrel arbor: 5.44mm radius 'r' = 2.72mm

Thickness of mainspring 'e': 0.17mm

Height of mainspring: 2.60mm

- Calculation of the theoretical length of the mainspring was made using the formula:

$$L = \frac{\pi (R^2 - r^2)}{2 \cdot e} \quad \therefore L = 623\text{mm (24.5 inches)}$$

Mainspring

- This data was compared with mainspring tables and matched to an alloy **16s Waltham #2247 mainspring** (2.60mm wide, 0.18mm thick, 535mm/21 inches long).
- The end style on the original Omega mainspring was Hole End, but the replacement Waltham mainspring was Double Brace and Hole End
- The protruding double brace tang was removed by file before the mainspring was cleaned, greased and installed in the mainspring barrel.



Reassembly



- Steel parts salvaged from the donor movement were inspected and thoroughly cleaned.
- The gear pivots were burnished in a watchmakers lathe to remove any microscopic pitting and rust spotting.
- Lubrication was completed using *KT-22 Microlubricant Watch Grease* (for Winding/ Setting components), *Moebius Synt-HP 1300* (for Power Train pivots), *Moebius Synt-A-Lube 9010* (for Balance and Escape wheel pivots) and *Moebius 9415* (for Pallet Jewels).

Balance Wheel

- The perimeter of the original balance wheel was encrusted with a hardened residue and the hairspring broke during the disassembly process.
- The decision was made to completely replace the balance assembly with the assembly recovered from the donor movement.
- The size and clearance of the roller jewel in the pallet fork was checked.
- The balance staff pivots were polished and shaped to fit the original movement upper and lower balance jewels.
- The hairspring was adjusted to correctly fit the regulator pins.



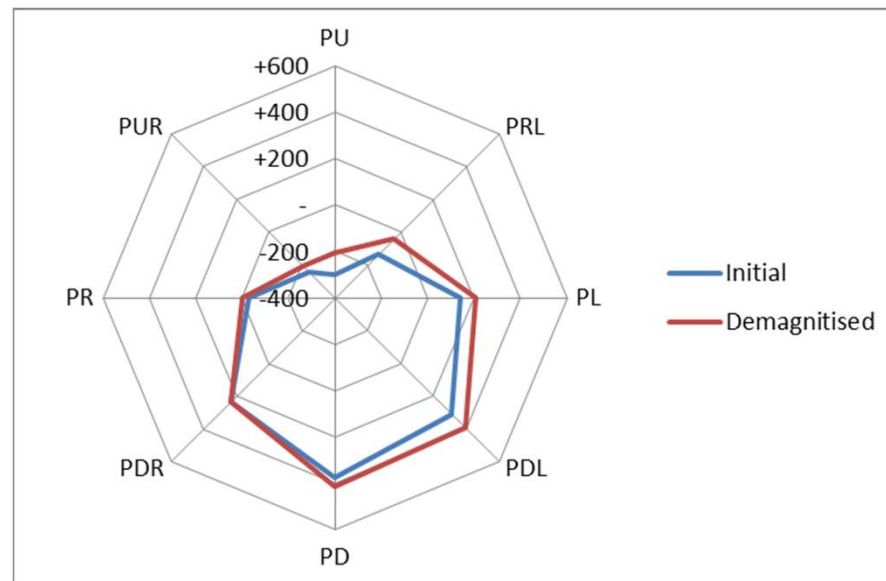
Beat Adjustment

- The movement was checked and put in-beat by aligning the balance staff, roller jewel and pallet arbor with no power on the mainspring.
- The movement was then wound and the beat error checked (and adjusted) using a timing machine.
- Once in-beat, the movement was fully wound and checked for any immediate problems.
- The movement was then cycled through two full wind/unwind cycles to allow the new mainspring to settle in.



Dynamic Poising & Regulation

- The balance had good amplitude in all positions. The initial DU (dial up) and DD (dial down) were close; DD +12 and DD +6 but there was discrepancies in the vertical positions.
- Weight was added to the balance timing screw close to the PU (pendent up). The process was repeated, with weight being added until there was consistency in the vertical positions.
- The movement was then regulated and checked on the timing machine in all positons.



Casework



- The crystal and crown/stem assembly was removed and the sterling silver case hand-polished using Peek™ Polish.
- Although the glass crystal was determined not to be period correct, it was part of the history of the watch. The worst of the scratches were removed using a cerium oxide paste and the cleaned crystal glued back into the bezel using UV adhesive.
- The hour, minute and second hands were given a light polish and installed. The movement was reinstalled in the case and final checks on regulation were completed.

Final Product



Final Product



Final Product



Bibliography

Reymondin, Charles-Andre et.al, **The Theory of Horology**. Swiss Federation of Technical Colleges (2003)

Swigart, E & J, **Illustrated Manual of American Watch Movements**. E & J Swigart Co (1952)

