A balance vibrating tool – 1

by Guy Gibbons

What is a balance vibrating tool?

A balance vibrating tool is a tool that permits a spring-balance assembly to be brought approximately to the desired rate before fitting into the clock or watch. The balance of the vibrating tool is adjusted to a standard rate, typically 18,000 beats per hour (but could be 14,400 bph for a marine chronometer or 21,600 bph for some watches) and then sealed in a glass-topped casing. The spring-balance assembly to be tested is lightly gripped by a clip in the form of a pair of tweezers at the approximate position of the boot or curb pins and dangled so that the lower end of the balance staff just rests on the glass cover. The vibrating tool and the spring-balance under test are set in motion by a sharp twisting action and the spokes of the two balance wheels checked for synchronisation. By altering the position of the grip on the balance spring the balance wheel under test can be brought into synchronisation with the vibrating tool balance. The position of the 'tweezers' is now marked (perhaps with a fine felt tip pen). If the spring-balance assembly is now fitted to the platform escapement with the felt tip pen mark on the balance spring lying between the boot or curb pins, the escapement should only need final adjustment in the watch, clock or platform escapement to which it is fitted.

Acknowledgment: Politikaner/Wikmedia

The photograph shows a Swiss Luthy-Hirt balance vibrating tool which, as you can see is of sophisticated construction. Using the lever on the table (left hand side in the photograph), the table and scaffold can be flicked to rotate it and so set oscillating both the vibrating tool balance and the spring-balance being tested. The scaffold has a comprehensive range of adjustments to centre the spring-balance under test with the vibrating tool balance so that the balance staff pivot just rests on the glass cover.

Target audience: One consideration was designing an tool that would appeal to both to watch and clock horologists alike, and with a lever escapement being central to many watches as well as mass-produced balance wheel clocks and clocks with platform escapements, the vibrating tool remains as relevant today as it was fifty years ago.

The primary target audience are students who want to gain the practical skills needed for their future career.

Design features: First and foremost the tool makes use of commercial items (notably jewel holes and endstones, the balance spring and the glass disc) that are available from material suppliers at the date of writing. All other items are made from stock materials (brass sheet, tube and section, pivot steel, and silver steel).

The design also embraces a wide range of horological repair activities such as jewelling, making small components and screws and, most importantly, accurate assembly, fitting and timing. The manufacture of larger components is also required, and lacquering is

recommended for some parts – a skill that clock students will need at some stage in their future careers.

Unlike a normal escapement the balance spring is below the balance so that the balance (and its spoke in particular) gets the maximum visibility for comparison with the balance assembly under test. No timing weights are fitted, fine adjustment relying totally on adjustment of the index after the balance spring has been brought to its approximately correct length.

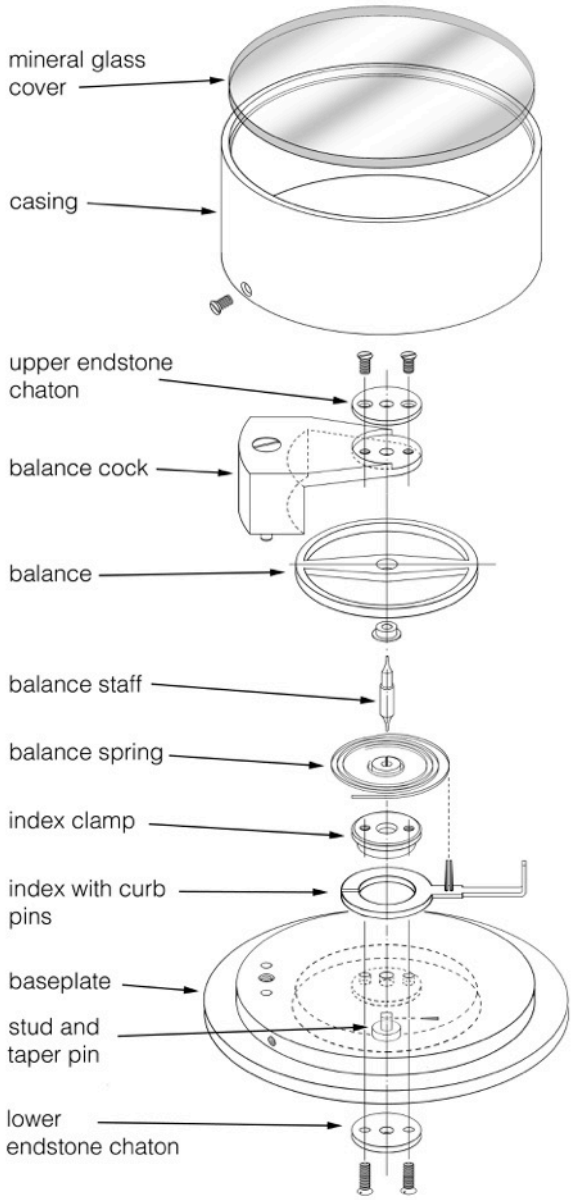
Compared with a commercial vibrating tool, the design has been greatly simplified so that its manufacture should be within the abilities of all with good technical workshop skills. There is no temperature compensation, so a change in rate can be expected between warm and cold weather. Indeed the curious student may with to check the rate at different temperatures to see just how the rate of an uncompensated balance can vary with temperature.

Drawings: The drawings are presented at the start of each section. They are all presented in first angle projection, though perhaps the more modern preference for third angle projection would have been a better choice. Providing you can read the drawings unambiguously, the difference is not something that needs to be worried about as far as manufacture of the vibrating tool is concerned.

Exploded diagram: Before going any further, study the exploded diagram of the tool so that you can start to think about how you might make the parts.

One of the most obvious differences between the exploded diagram and the photograph of a commercial tool is the absence of the 'scaffold' for supporting the spring-balance to be tested. This is deliberate; manufacture of the scaffold does not practise the unique skills needed to service a clock or watch. Of course one can be made, and a simplified design is described towards the end of this series. If made it does allow the tool to be used for testing spring-balance assemblies.

Manufacture: The design does not have to be followed slavishly and constructors may even have better ideas for the design, or may wish to make modifications better suited to your method of working or the manufacturing tools available to you. Remember, you are a horologist, not a copy machinist with no interest in how the components fit together. So it you think you have a better way by all means try it, though you are encouraged to think carefully about the consequences elsewhere of any change you make.



This series is in twelve parts:

1. Introduction
2. The casing
3. The baseplate
4. The balance cock
5. The index, index clamp and endstone chatons
6. The screws
7. The balance
8. Jewelling and the balance staff
9. The balance spring and stud
10. Preliminary timing
11. The scaffold
12. Using the tool

If you can, it is strongly recommend that constructors read through the whole twelve sections describing this project and study the drawings before getting started on the work.
