THE VALJOUX 7750 CHRONOGRAPH

BY WALT ODETS

If there is a single movement ubiquitous in modestly-priced contemporary chronographs, it is the Valjoux 7750. Introduced in 1974--five years after the famed Zenith El Primero automatic--the movement has been supplied in both 21,600 and 28,800 beat versions. It uses an automatic-winding module attached to the top of the movement, winding in one direction by means of a single double-click wheel. Initially using 17 jewels, current versions run in 25. The 7750 is 13.25 ligne (30 millimeter) design, 7.9 millimeters thick.





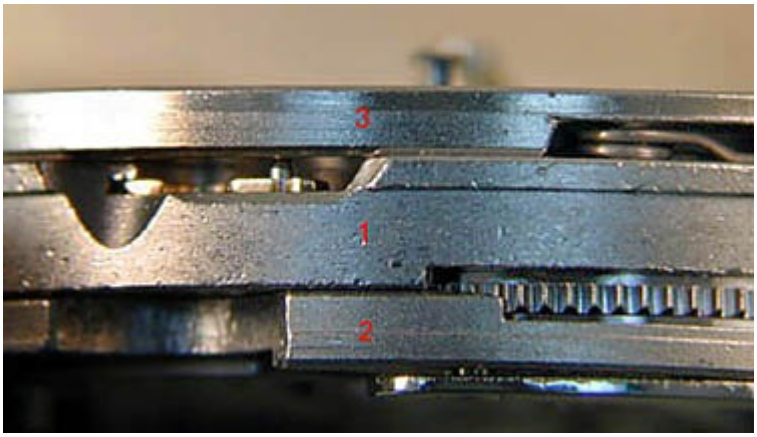
THE CONCEPT OF COULISSE-LEVER DESIGNS

Like many contemporary chronographs, the Valjoux 7750 dispenses with the traditional column wheel for switching functions. Instead a *heart piece limiter* (**left**) is used to coordinate starting, stopping, braking, and reset functions, usually by means of two buttons in contemporary designs (the earliest coulisse-lever calibers used three buttons). The Valjoux 7750 also utilizes a concept first patented in 1941 by a watchmaker, Henri Jacot-Guyot. This is a reset-to-zero (or *heart piece*) lever which pivots to reassure accurate reset-to-zero of both the center hand and minute counter. Previous coulisse lever designs had not been as precise in this regard.

While the parts count of a coulisse-lever design is comparable to that of a column wheel design, the various levers and springs in the lever design require much less precision in form and materials and are much less expensive to manufacture. This--economy of manufacture--was and is the purpose of a coulisse lever caliber.

THE CONSTRUCTION OF THE VALJOUX 7750

For ease of manufacture and service (**right**), the Valjoux 7750 is constructed of a mainplate (**1**), a calendar plate (**2**), and a chronograph top plate (**3**).



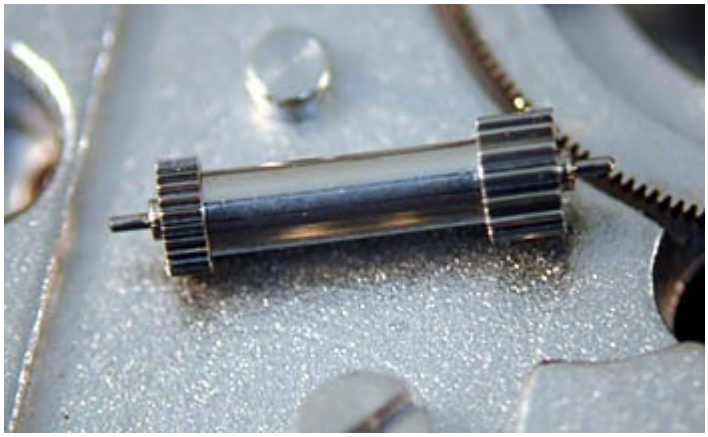


An additional bridge for the automatic winding system is attached to the chronograph plate on the top (watch back) of the movement.

THE CHRONOGRAPH PLATE



With the automatic winding bridge removed, the full chronograph plate is visible (**left**). Parts include (**1**) the heart piece limiter; (**2**) the center wheel with heart piece; (**3**) the minute accumulator with heart piece; (**4**) the Jacot-Guyot pivoting heart piece lever with self-adjusting hammers (**5**); the tilting pinion arm (**6**).



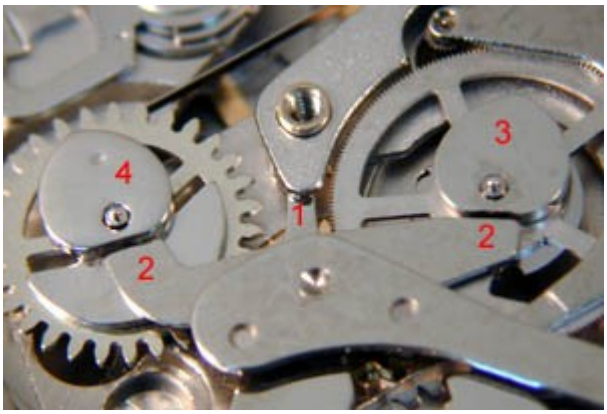
The tilting pinion drive engagement is a design going back to the late 19th century. The design dispenses with the more conventional spur gears and the arm that carries the intermediate spur gear. Shown **left**, the lower (left) end of the pinion is continuously engaged with the movement's fourth wheel. When the chronograph is started, the heart piece acts on the pinion arm to bring the upper (right) part into engagement with the chronograph center wheel. (This action will be observed later.)

THE HEART PIECE IN ACTION

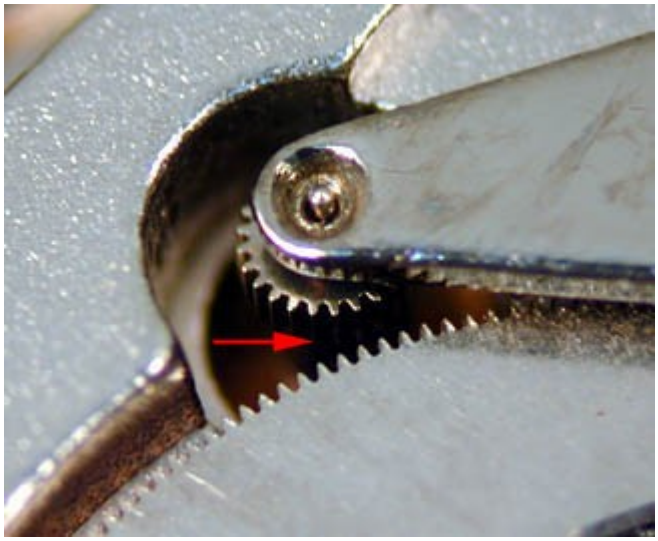
The heart piece is acted upon by one of the two case pushers and rotates back and forth (unlike a column wheel, which rotates continuously in one direction). As shown right, the heart piece is in the zero-reset position.

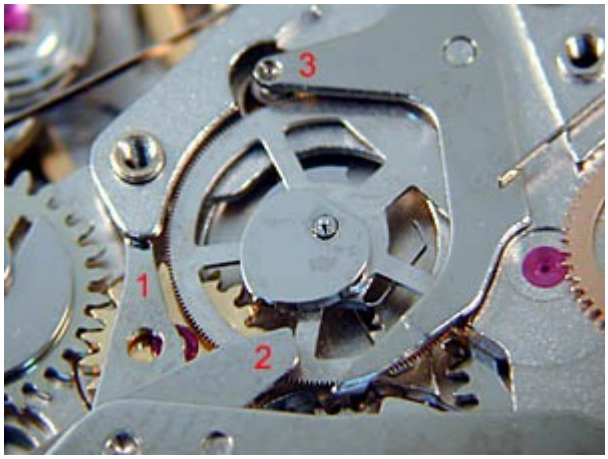


In this position of the heart piece, the center wheel brake (**1**) is clear of the center wheel (to allow reset to zero). The hammers of the heart piece lever (**2**) rest on the flats of the heart cams for the center (**3**) and minute accumulator (**4**), holding them at zero. The tilting pinion drive is disengaged from the center wheel (**right**)



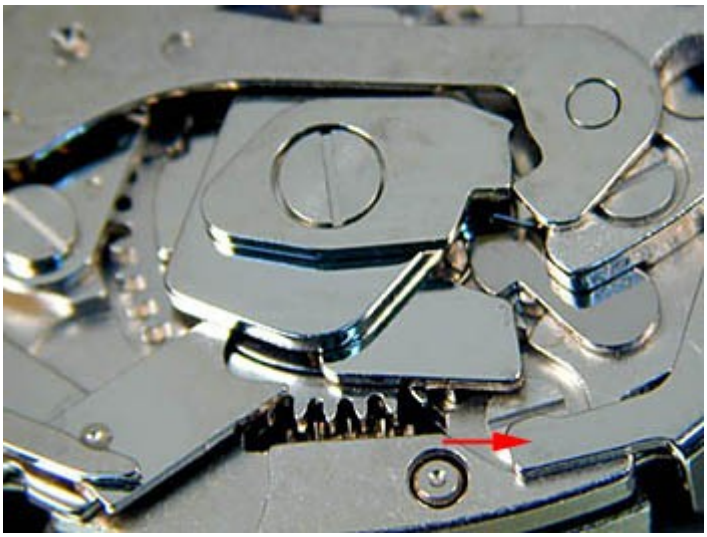
The heart piece is next rotated clockwise by the upper case pusher to start the chronograph (**right**). The case pusher is indicated at the **arrow**.





In this position of the heart piece, it can be seen (**left**) that both the center wheel brake (**1**) and reset hammer (**2**) are clear of the center wheel. The tilting pinion is engaged with center wheel (**3**).

Finally, the heart piece is rotated counterclockwise by the lower pusher (**arrow, right**) to stop the chronograph.



As illustrated **right**, the pinion drive (**1**) is disengaged from the center wheel, the brake (**2**) is applied to the center wheel, and the reset hammer (**3**) is disengaged from the heart cam.

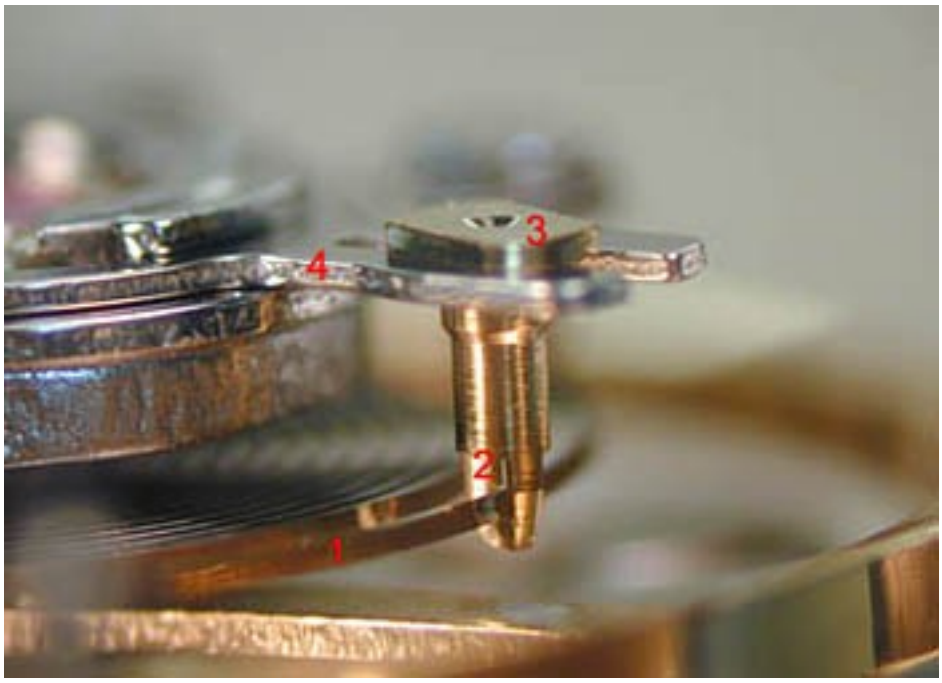


Typically the operation of a coluisse-lever design with heart piece limiter will not be as smooth as that of a column wheel, and pusher forces between various functions will vary. Coordination of functions with a modern design like that of the 7750 will typically be good, though imprecision of hand start, stop, and reset may be greater than that of good column wheel designs.

OTHER FEATURES OF THE TOP PLATE

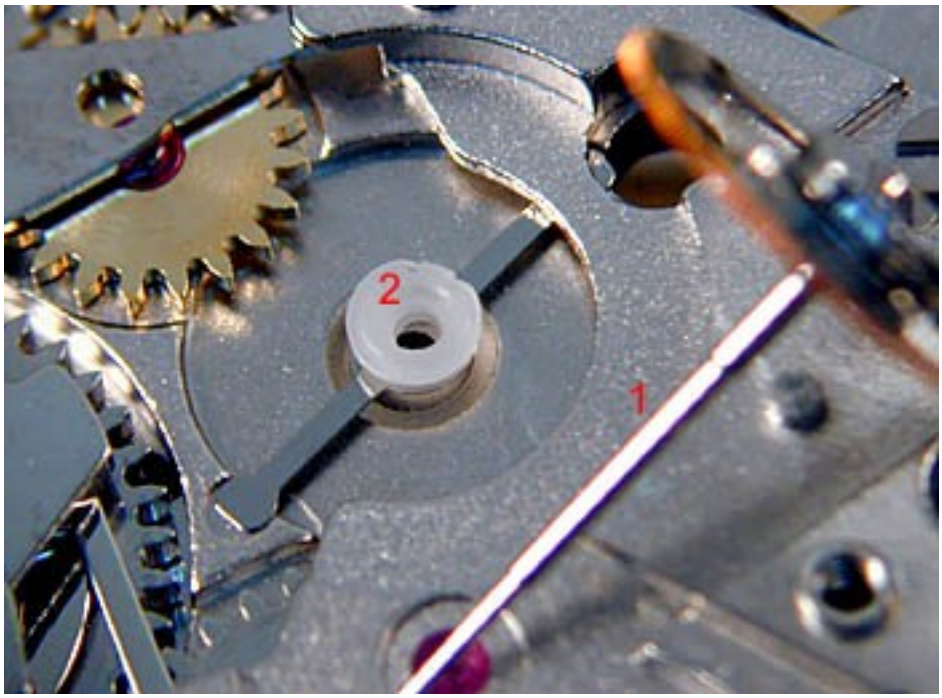
The Valjoux 7750 uses a sturdy and convenient semi-fine rate regulation device. The index (**below**, **1**) is moved to adjust the daily rate of the watch. Attached to an eccentric screw (**2**), this action causes the regulator ring (**3**) to rotate via an arm (**4**), adjusting the effective length of the balance spring.



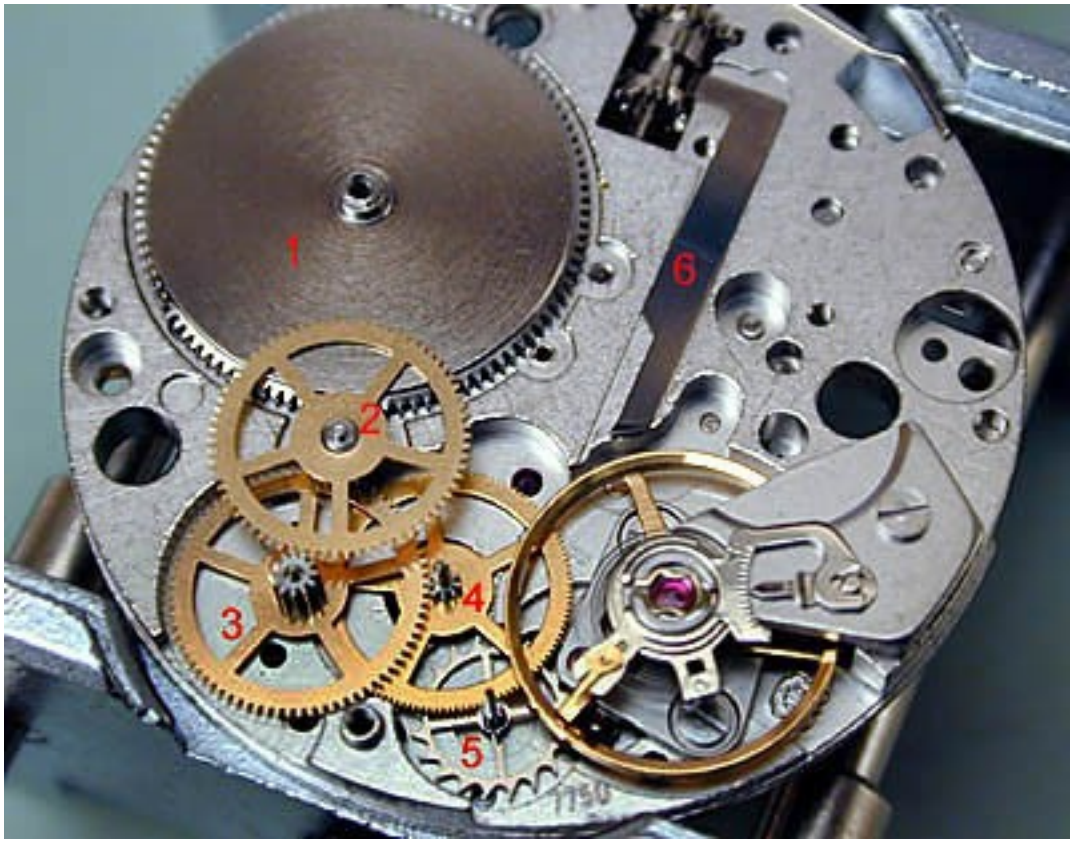


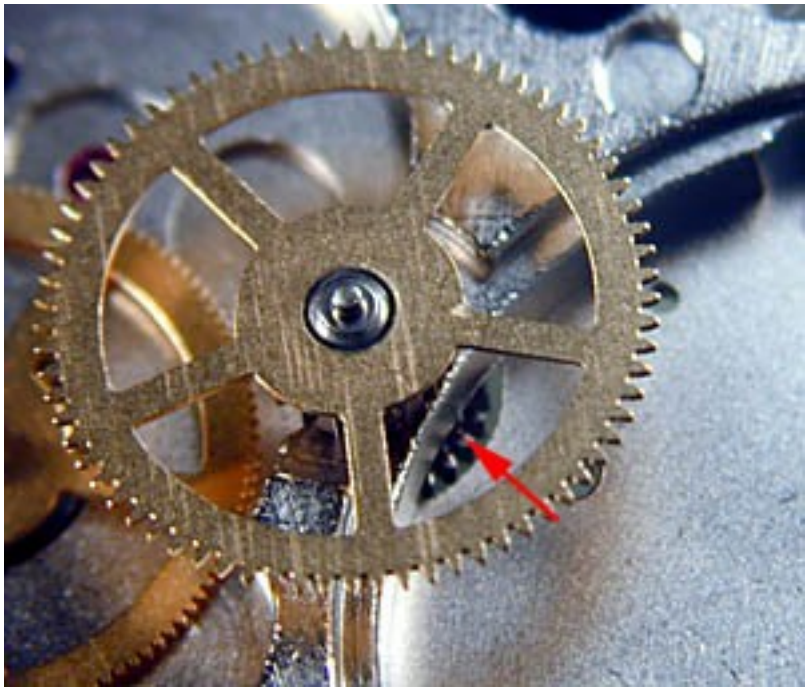
Like most contemporary ETA movements, the Valjoux 7750 uses an *Etachron* regulator and balance spring stud assembly. Illustrated **left**, this assembly is very inexpensively constructed, but unlike some more expensive units, it allows excellent adjustment of the regulator for minimum interference with the balance spring (**1**). The regulator (**2**) and its upper end (**3**) are held in the regulator ring by a clamp (**4**). Thus the regulator can be both rotated and moved towards and away from the center of the spring with ease. It is a shame that more manufactures do not provide such adjustability.

The pinion of the 7750 chronograph center wheel (**right**, **1**) rides in a "plastic" bearing (**2**), reducing cost by saving a jewel. Lubrication issues with this delicate part are thus eliminated.



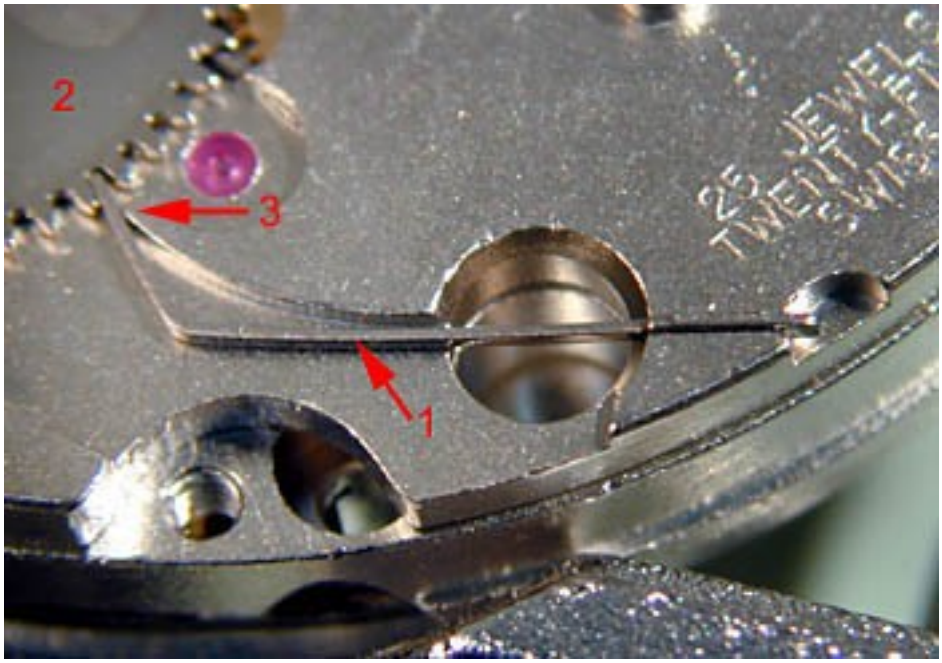
By removing the chronograph plate, the conventional wheel train of the 7750 is exposed (**below**). These parts include (**1**) the mainspring barrel ; (**2**) center wheel; (**3**) third wheel; (**4**) fourth wheel; (**5**) escape wheel. Note also the simple, stamped steel hacking lever (**6**), which arrests the balance wheel when the crown is pulled into the hand-setting position.





As illustrated in the previous photograph, the center wheel is not located in the center of this movement. This design eliminates the cost of boring the delicate center wheel pinion to carry the chronograph sweep hand pinion. Instead, the motion works (and hands) of the movement are driven indirectly through an intermediate wheel (**arrow**, **left**) attached to the extended center wheel pinion.

Another cost-saving design approach is seen in the mainspring click (**right**). Rather than use a conventional click to prevent mainspring unwind, Valjoux has managed to use a simple bent spring anchored in a slot in the plate. The spring itself (**1**) will ratchet as the ratchet wheel (**2**) winds clockwise. Counterclockwise rotation of the ratchet wheel is prevented by the spring butting against a corner of the plate (**3**).



THE BOTTOM PLATE

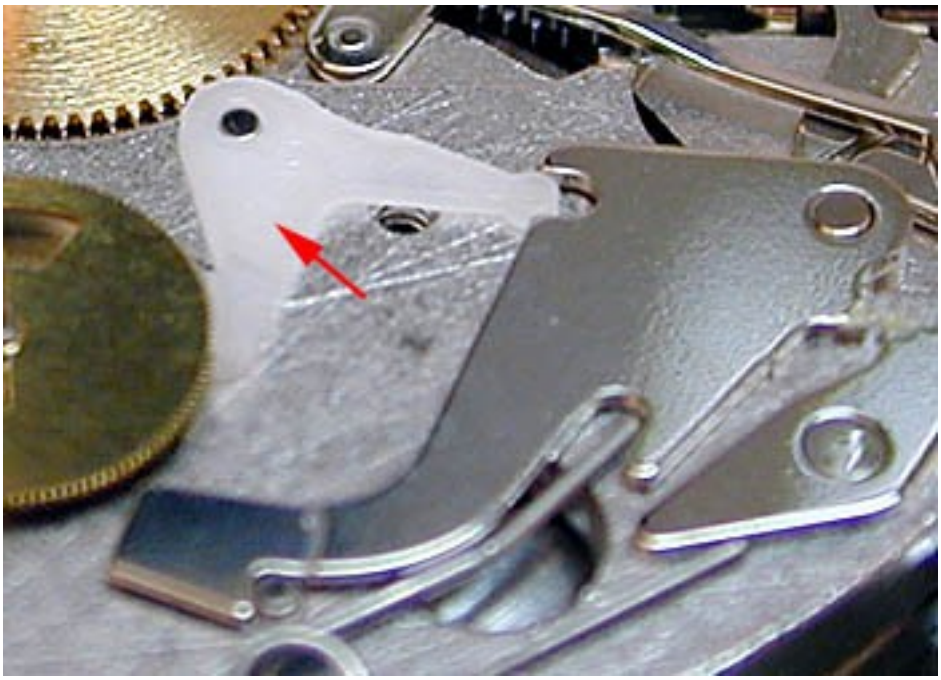
The bottom plate (**below**) carries a conventional calendar mechanism with date, day and date, or other complications. These are modular units that can be switched according to the caliber desired.



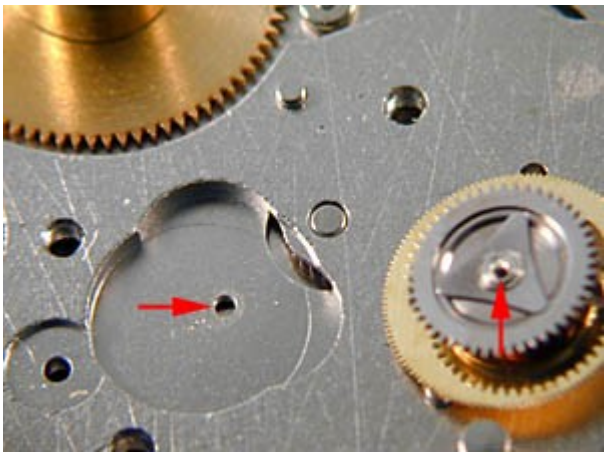
With the calendar plate removed (**below**), we can see the remainder of the movement. Parts include (**1**) the 12 hour accumulator wheel and heart cam; (**2**) bottom plate mechanism for the hour accumulator; (**3**) and (**4**) calendar switching wheels; (**5**) keyless works for hand setting and winding; (**6**) intermediate wheel for indirect minutes drive.



The 12 hour accumulator wheel uses a plastic brake (**arrow**) and simple stamped steel levers to stop, brake, and reset the wheel. These levers are operated directly off of the lower case pusher rather than being mediated by the heart piece.



The hour wheel runs in a hole in the plate (**right**) rather than in a jewel or replaceable bushing. This construction reduces cost, but suggests that care should be taken in overusing the chronograph, particularly without regular service.





Like other levers in the movement, the keyless works components are made of stamped steel parts.

CONCLUSIONS

The Valjoux 7750 expresses an aspect of Swiss engineering skill that we do not normally associate with the Swiss watch industry: economy of manufacture. The 7750 is a good representation of the new, simplified chronographs that began to appear from Ebauches S.A. (now ETA) at the beginning of the 1940s and that provided serious, usually fatal, competition to smaller manufacturers of high-grade chronographs.



The Valjoux 7750 is now used in the vast majority of mechanical chronographs produced in Switzerland, and has allowed the mechanical chronograph function in watches of modest cost. For a caliber obviously engineered from the ground up for economy of manufacture, the 7750 has proved itself a reliable and durable workhorse. Without the 7750, mechanical chronographs might be known only to the buyers of luxury watches.

I wish to thank Bob Frei of the TZ Tool Shop and Frei & Borel for supplying the movement