

# LEDERER

TIMELESS INNOVATIONS

presents  
a new development of excellence,

a decidedly contemporary chronometer, featuring  
a dual system movement.

# CIC

CENTRAL IMPULSE CHRONOMETER

Awarded the innovation prize at the prestigious Grand Prix d'Horlogerie de Genève (GPHG), this high-performance chronometer with a revolutionary escapement is housed in a 44 mm case, surrounded by two round and domed crystals that have the effect of slimming the timepiece. Inside, an entirely new caliber, the result of several years of research, that merges a new type of escapement, constant force and a double gear train. The Central Impulse Chronometer's dial captures the imagination with a pair of synchronized seconds hands moving in opposite directions – within two openings in the watch face bordered by interlaced circles forming the figure eight. The movement's architecture and performance are matched by a refined execution and meticulous finishing down to the smallest detail.



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[www.ledererwatches.com](http://www.ledererwatches.com)

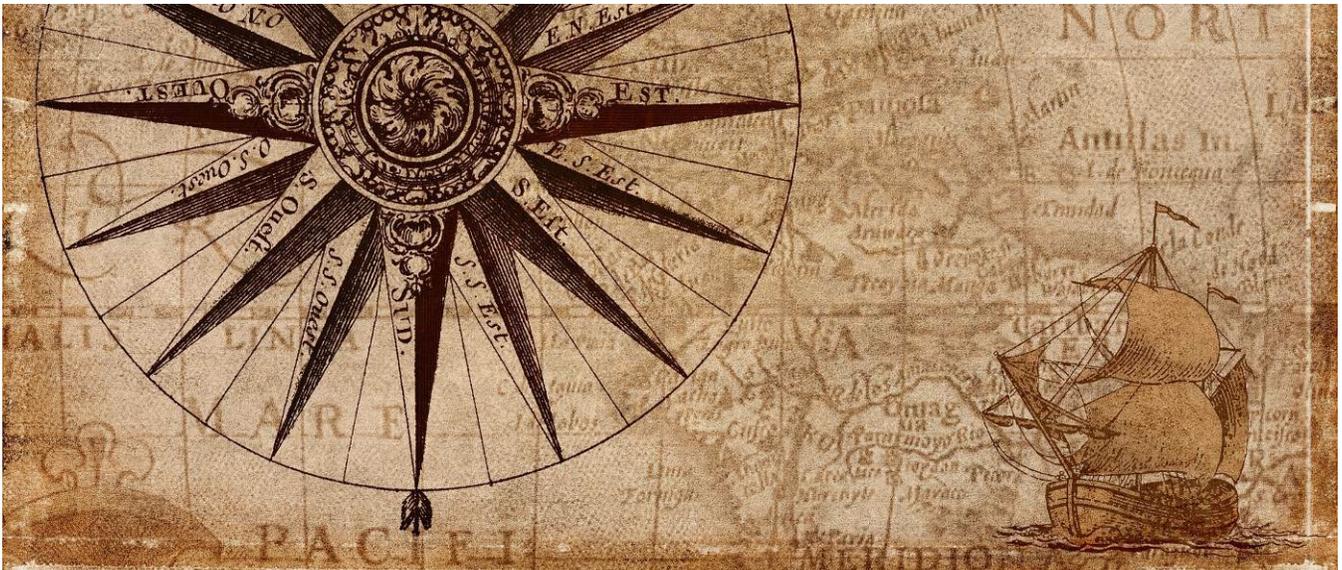
## History

**Going back in time to better understand the context in which the Central Impulse Chronometer is a technological feat in itself.**

In the days of the traditional navy before the invention of radio signals and GPS, the reliability of a chronometer determined the accuracy of the geolocation of the place of navigation. A stopwatch that lost ten seconds a day over a week of sailing caused a drift of more than 13 kilometers. Thanks to John Harrison and his H4 marine chronometer, only a few fractions of a second were lost each day, which is why John Harrison has become a legend in the watchmaking world.

However, the major problem with this style of escapement used in the marine chronometers of the time was their fragility despite the case in which they were housed. In the middle of the 19th century, the Swiss lever escapement, less fragile and easier to industrialize, relegated these escapements to the rank of obsolete, especially with the appearance of wristwatches.

Since John Harrison, many watchmakers have tried to design this first style of chronometer escapement to adapt it to pocket watches in the pure design style of the time...



## Completed

In his workshop in St Blaise near Neuchâtel, in the Jura Mountain range known as the cradle of Swiss watchmaking, Bernhard Lederer, well known as a developer for international brands and a watchmaker of grand complications (Gagarin Tourbillon, Tourbillon MT3, lunar perpetual calendar, 100'000 GAUSS divers' watch, e.g.) decided to turn his nearly 40 years of experience to the Independent Double Wheel Escapement conceived in the late 20<sup>th</sup> century by George Daniels. It is important to note that Daniels himself had been standing on the shoulders of Abraham Louis Breguet who developed the concept of a natural escapement around the time of the French Revolution. What Bernhard Lederer set out to do, was to solve the weaknesses linked to this kind of escapement. For this reason, the escapement of Lederer's Central Impulse Chronometer is of a different design.

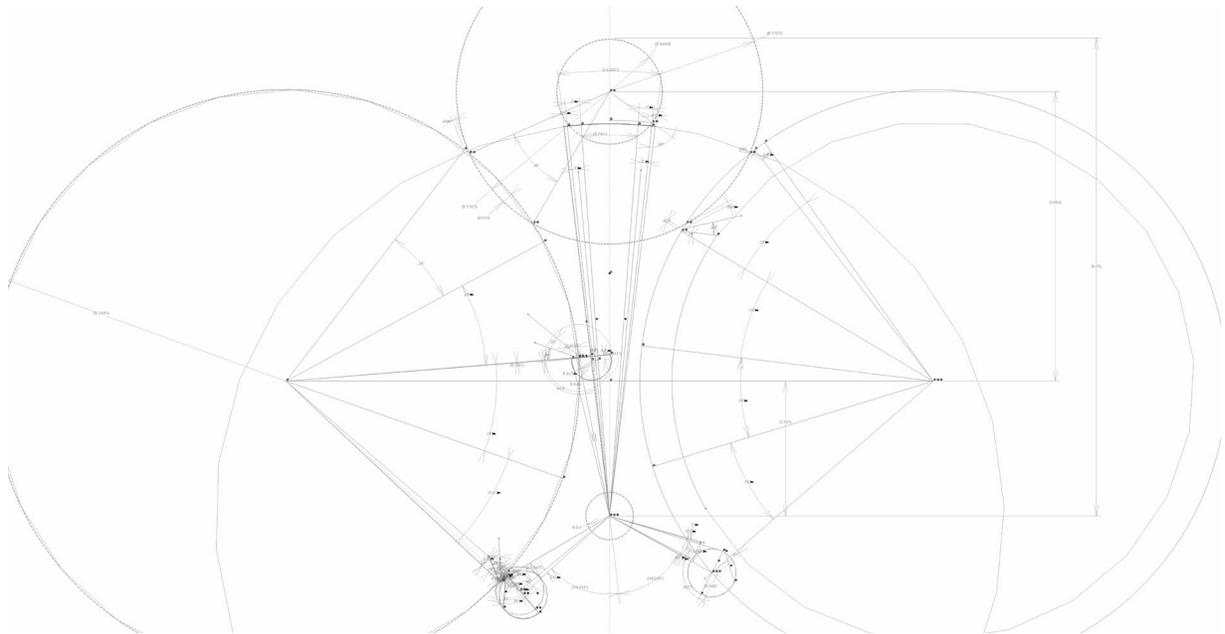
It incorporates two independent escapement wheels, each connected to its own barrel. These wheels work in alternation with an absolutely unique anchor. Its profile, its jewels, its angles of lift, its central impulse, the way it comes into contact with all the components it guides, make it an extraordinary system.



## The freedom to optimize

To further optimize precision of his Caliber 9012, Bernhard Lederer installed these two escapement wheels at the end of two separate gear trains, each with its own barrel and its own 10-second constant force *remontoire*. In smoothing the driving force to the extreme, optimizing the geometry of the escapement parts, paring down the weight of these energy-intensive components and reducing the internal friction of the escapement to a minimum, Bernhard Lederer has achieved a degree of watchmaking perfection rarely seen. By making the two escapement wheels independent of each other, he essentially freed them.

This sophistication also comes through in the fact that the two second hands, each linked to its own escapement wheel, are permanently synchronized and show no drift in relation to each other. The precision of each watch is attested by a chronometer certificate.



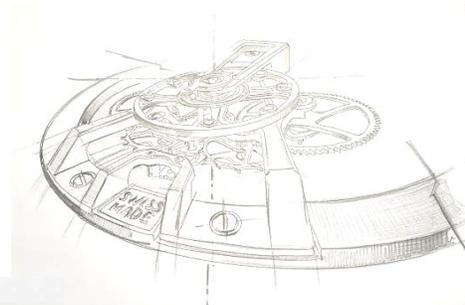
## Central Impulse Chronometer escapement

The initial spark for this project came from George Daniels work, with whom Bernhard Lederer had had numerous exchanges. Lederer decided to revisit Daniels' development and adapt it to a wristwatch, well aware of all the challenges this implied. For one thing, he opted for a frequency of 3 Hertz to address how a watch is worn on the wrist arm constantly passes on shocks to the movement's regulating organs. They must adapt to changing dynamics and resume normal operations as quickly as possible, a sine qua non requirement for precision under everyday conditions.

### Inertia where it matters

One of the innovations introduced by the Central Impulse Chronometer is to use titanium for the components – instead of traditional steel. Much lighter, the moving parts now have less inertia, which enables them to restart more quickly and consume less energy. As a result, the impulses generated by the escapement wheel to the balance wheel are optimized and disturbances are reduced, which ensures isochronism and therefore movement precision.

The energy to power the movement is transmitted from two barrels via two independent gear trains, each linked to a dedicated escapement wheel. Furthermore, Bernhard Lederer has integrated a *remontoir d'égalité*, i.e. a constant-force mechanism, to accumulate a buffer stock of energy in a spring similar to that of the barrel, but slightly less substantial. It is recharged at 10-second intervals, thus equalizing the driving force with a homogeneous degree of torque to ensure the energy delivered to the balance wheel varies extremely little if at all.



### Poetry in the science of tribology

One element that sets the Central Impulse Chronometer escapement apart is the anchor – the metronome of the timepiece. Here, Lederer reimagined the geometry of the central pallet to increase performance. Now concave, it reduces the contact

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surface, avoiding any recoil of the escapement wheels.

The impulse, given directly along a straight line connecting the escapement wheel to the balance wheel, is thus theoretically perfect. The axis for the impulse is constant in time, even when the balance wheel has a low amplitude, as caused by a shock for instance. This reduces friction, further ensuring that energy distribution to the balance wheel is optimally timed to obtain improved isochronism, hence improved stability.

## The elegance of an authentic chronometer

Besides technical mastery, Bernhard Lederer timepieces exemplify sophisticated design, each creation bearing witness to a strong artistic sensibility – and the Central Impulse Chronometer is no exception. The 44 mm round case in white gold has soft, elegant lines. Its thin polished bezel enhances the view on the dial. Two circular openings for the seconds hands offer a view of the Calibre 9012 and its most distinctive components, the remontoire mechanism and escapement.

On the case back, a second sapphire crystal, domed and beveled – and a challenge to machine – that is identical to the crystal on the front. It showcases the three-dimensional, symmetrical, oblique and openworked architecture of the Calibre 9012. The barrel, wheel, winding mechanism, escapement, and balance bridges are all skeletonized with slender geometric shapes.



## Pinnacle of watchmaking creativity, engineering, and design

The two large golden barrels contrast with the movement's rhodium-plated finishes. The wheel spokes are tangential curves with a unique profile, a Bernhard Lederer hallmark. The level of finishing is commensurate with the level of mechanical sophistication the Central Impulse Chronometer embodies. The variety and quality in the execution – from polishing, inward and outward beveling, graining, engraving and satin-finishing to juxtaposing matte and glossy surfaces – only serve to further magnify the Central Impulse Chronometer's spectacular three-dimensional architecture of movement.

The Central Impulse Chronometer by Bernhard Lederer is a masterpiece of meticulous and discreet watchmaking whose technical prowess and design excellence is underscored by accomplished craftsmanship and exceptional finishing. The Central Impulse Chronometer is available in two limited series in white gold, 25 pieces with a blue dial and the other 25 pieces with a rhodium-plated dial.



## Limited edition

Available in two series of 25 pieces each, the Central Impulse Chronometer comes in an elegant white-gold case measuring 44 mm in diameter and 12.2 mm thick, a profile refined by its two round and domed crystals which underline the slim silhouette of this masterpiece of watchmaking. Its dial is distinguished by a double opening. This original window on the exceptional mechanics in motion also highlights a resolutely artistic vision of the passing of time, marked by two synchronized hands moving in opposite directions. Two intertwined circles forming a double opening in the shape of a figure eight in the dial bring a symbolic message of harmony, infinity and rebirth, and even of luck and prosperity for other cultures.

Within it, the calibre 9012 presents a unique three-dimensional architecture and is the product of several years of research. This included the system that gave the piece its name, a high-performance, double impulse escapement, entirely new, called the Central Impulse Chronometer.

### For more information

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