

REVOLUTION

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The Vacuum Watch You May Never Have Heard Of...

VINTAGE

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Part of the appeal of dive watches is those big numbers on the dial, demonstrating just how over-engineered the watch is and how well the precious contents of the case can be preserved from the evils of the outside world. But, I hear you ask, what about the evils that got in there when the watch was being made or serviced? If we are taking over-engineering to its limits then surely the workshop's atmosphere, regulated and filtered though it might be, has to be eliminated?

Back in 2012, Cartier unveiled their second concept watch – the ID Two. Alongside an impressive array of technical innovations, one thing was missing... any air inside the case. With a vacuum measured at 99.5%, no screws are required to hold the back on, it is literally sucked

onto the watch. According to Cartier, 80% of the energy lost at the balance wheel is due to air friction and so removing the air allows the balance to be kept in motion using far less power. This, along with its many other tricks, allows the ID Two a jaw-dropping 32 days of power reserve. [You can read more about the ID Two here.](#)



Cartier ID Two with polycrystalline ceramic case

Such achievements, using cutting edge materials science, seem futuristic to us even today, but the idea of creating a vacuum inside a timekeeper is not a new one. Clocks had their first vacuum-housed regulator as early as 1921 and on January 5, 1966 an entire watch company was launched premised on just this one idea.

In 1921, British railway engineer William Hamilton and horologist Frank Hope-Jones designed the Shortt-Synchronome free pendulum clock. A “master” pendulum swung free in a vacuum tank while being linked to a “slave” pendulum clock by electromagnets. These were the most accurate pendulum clocks ever commercially produced and the first clock to be more accurate than the Earth itself, being used in 1926 to

detect tiny seasonal changes in the earth's rotation rate. They were not surpassed in accuracy until the arrival of quartz.

Stop #18



SHORTT CLOCK

SHORTT CLOCK
The Shortt clock marked a major breakthrough in electro-mechanical clocking. This clock served as the U. S. Frequency Standard from 1924 to 1928 before being used in Healy's second determination of the constant of gravitation. It has two pendulums - a master pendulum (to left) and a slave (to right) which drives the clock mechanism. At a particular position of the master it triggers an impulse to the slave bringing it into precise position.
M 518

Shortt clock

The transition to wrist watches came four decades later, but the aim was a little different. Around 1960, Hans Ulrich Klingenberg, a salesman for Glycine came up with the idea of evacuating a wristwatch case. There is no evidence that the aim was to reduce air resistance in the same way as the Shortt-Synchrone clock and the contemporary Cartier ID Two, rather the purpose was to remove dust, moisture, contaminants and oxygen and to prevent their re-entry. This is not a trivial distinction compared to water resistance. Water molecules are much larger than air molecules and so a watch can be 30m water resistant and yet be unable to sustain a vacuum. It's all down to the gaskets and quality of seal. Klingenberg designed a one-piece case with a flat crystal that was held against a thick O-ring gasket by specially designed bezel clamps. This was combined with an oversized crown fitted with three O-rings. He also developed a special hand-held device to allow the vacuum inside the watch to be re-established after service, an interval he recommended every five to eight years.





The vacuum system was initially used by Glycine, but on January 5, 1966, the day after the expiry of the Statut Horloger (a protectionist cartel that made it difficult to set up new watch companies in Switzerland), Klingenberg set up the Vacuum Chronometer Corporation. Watches were produced for a number of brands including Glycine, Croton, Waltham and Dugena all recognisable by the bezel clamps at 12 and 6 o'clock, but in 1967 Klingenberg changed the name of his company to Century Time Gems and produced watches under his own name. The logo he chose was a stylised illustration of the "Magdeburg hemispheres", a 17th century experiment to prove the power of air pressure in which two copper bowls could not be separated by two teams of eight carthorses once the air had been removed.



Vacuum watches were produced for a number of brands including Century, Glycine, Croton, Waltham and Dugena - all are recognisable by the bezel clamps at 12 and 6 o'clock

Vacuum watches housed a variety of movements. The early Glycines used the ETA 2638, while later Century models upgraded to high-beat movements such as the ETA 2837. To comply with the chronometer aspect of the company's original name, it is said that Klingenberg paid extra to have COSC test the watches fully assembled and evacuated rather than as de-cased movements - quite a radical approach for the time.



While an air-free environment may well have led to better accuracy over the long term along with longer service intervals, it was a feature that the rest of the watch industry failed to recognise as necessary. Like a number of other innovative advances in watchmaking achieved in the late 1960s, it was swept away by the easy accuracy of quartz. Hans Ulrich Klingenberg's vacuum ideas may have died in the early '70s but his company survived with the founder's fertile imagination turning to case construction. Ever in search of the perfect watch he was one of the first manufactures to use boron carbide, a material resurrected by IWC in 2015, before moving on to cases made from corundum, (sapphire) pre-empting the likes of Richard Mille, Hublot, etc. by decades. A man ahead of his time, his ghost must be comforted by Cartier's rarefied vision of watchmaking's future.

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