



Crisis Control



Four decades ago the Swiss watch industry was producing over 50 million watches a year - all mechanical - but the industry was unknowingly heading for the edge of a cliff. At Baselworld this year, three brands: Seiko, Girard Perregaux and Hamilton, will be commemorating the 40th Anniversary of the quartz watch.

Timothy Treffry

The quartz clock had been invented in 1927 but was so large that it needed a small truck to carry it around. Wars provide a great boost to technology and during the Second World War in the US, the use of quartz crystal oscillators as radio frequency standards for military communications developed rapidly. With the post war interest in micro-electronics, some far-sighted individuals in the watch industry began to think that it might be possible to condense that truckload of components, which was the quartz clock, into the confines of a wristwatch.

The attack on the problem was launched by Suwa Seikosha, the forerunner of Seiko, in Japan and Hamilton in the States. In Switzerland a group of watch companies and industry bodies, including Ebauche SA, Le Coultre, Mido, Omega, Rolex and Tissot, formed a consortium, the Centre Electronic Horloger (CEH), to develop an electronic movement



Left: The Hamilton Pulsar prototype from 1970 was the first quartz watch with a digital display. The red numerals were produced by LEDs, which displayed the time for a few seconds on demand. Like its modern successor it has a 32,768Hz quartz crystal. Centre: The Suwa Seikosha Astron of 1969. Top Right: A design sketch of the limited edition commemorative Seiko Astron shows only minor changes from the original from 1969. Naturally the movement is modern.

for use in watches. Meanwhile, Girard Perregaux decided to go it alone and created its own research department with the same objective.

Seiko won the race by a short head and the Seiko Astron, the world's first quartz watch, was offered for sale in Tokyo on Christmas Day 1969. It seemed very expensive, costing Yen 450,000 (£520) - about the same as a basic Toyota Corolla at that time. At the 1970 Basel Fair, the Beta-21 quartz movement developed by CEH was launched by 16 brands in different models. At around SFr.20,000 (nearly £2,000), they were seriously expensive, more than the annual salary of most people in the UK. In solitary glory, Girard Perregaux produced its Elcron at SFr.13,000 (£1,240).



Proud of its hi-tech status the GP Elcron of 1970 had a representation of its electronic movement on the dial.

It is perhaps strange that, in recent years, makers of mechanical movements have been keen to achieve the one-second steps of the analogue quartz



The metamorphosis from Pulsar to Pulsomatic.



The 2010 Hamilton Pulsomatic.

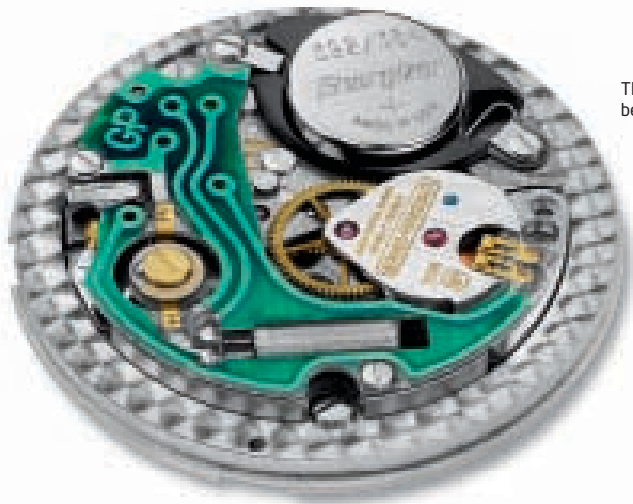
Meanwhile, Hamilton showed a prototype of its Pulsar, the world's first quartz digital watch, but it was not available commercially until 1972.

LED balloon

American electronics companies, notably Texas Instruments who had developed the LED, soon began the mass production of cheap, plastic-cased, digital watches, reducing Hamilton to little more than a brand name, which was eventually sold to Swatch Group. LCD watches from the Far East with continuous displays, as opposed to the high-drain LEDs, which could only indicate the time on demand, soon dominated the market.

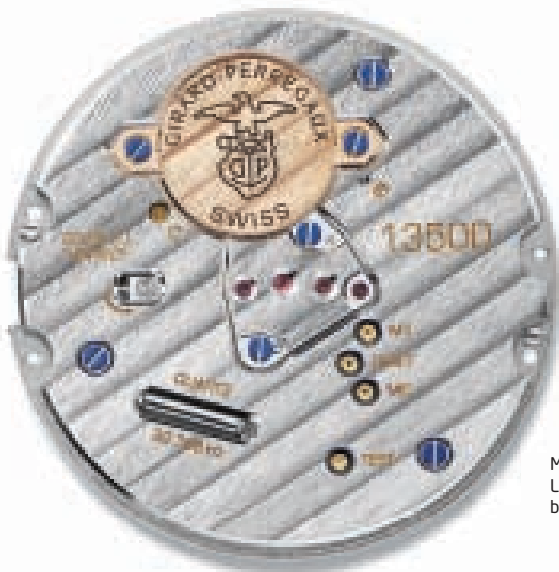
The Seiko Astron and the other models launched at the Basel Fair in 1970 all used a quartz crystal vibrating at a frequency of 8,192 cycles per second. In 10 steps a frequency divider could reduce this to one pulse a second. The Astron had such a circuit and through collaboration with Epson (now merged with Seiko) also had a stepping motor that was small enough to fit into a watch. This meant that, in response to the pulses from the frequency divider, the seconds hand of the Astron moved in one-second steps. This later became standard in quartz analogue watches; at the time, it was a sensation.

CHE's Beta-21, however, showed signs of being designed by a committee. In these early days of integrated circuits, components often had to be soldered in place individually. The electronics in the Beta-21 could only manage five division steps, reducing the pulse frequency of the crystal to 256Hz. This was close to the 360Hz of the Bulova Accutron 'tuning fork' watches introduced in 1960, so it was decided to use a similar mechanism to move the hands. The 256Hz pulses of the Beta-21 were delivered to a vibrating reed, which, as in Bulova's tuning fork watch, was linked to a ratchet to drive the hands. The seconds hand moved quite smoothly, as in a high-beat mechanical watch. It is perhaps strange that, in recent years, makers of mechanical movements (such as Chronoswiss with the Sauterelle) have been keen to achieve the one-second steps of the analogue quartz, whilst Seiko



The 35th anniversary GP Laureato has been made in a limited edition of 40.

(Above) The original 1975 Girard-Perregaux Laureato contained the groundbreaking GP-350 32,768Hz quartz movement. Note the printed circuit board with the soldered contacts. The stepping motor is below the battery, both large by modern standards. The quartz crystal is inserted in the circuit board at 6 o'clock. A potentiometer for adjustment is at 9 o'clock.



Movement of the 35th anniversary Laureato, GP13500. The battery is beneath a gold cover plate.



is justifiably proud of its smooth running, quartz controlled, Spring Drive.

Surviving the storm

Girard Perregaux's Elcron was developed in collaboration with Thomson CSF, a French electronics company. Like the Astron it had a stepping motor but required two batteries. It was with the GP350, launched the following year, that Girard Perregaux made a major contribution to horological history. It introduced the 32,768Hz quartz crystal which was to become the industry standard. It also had 300 transistors in an integrated circuit developed by Motorola.

Its power requirement was reduced to 4 amp allowing greatly improved battery life. Timekeeping varied by less than a minute per year. Over 20,000 GP350 movements were produced, 13,000 of which were used by the company and the remainder sold to Jaeger-LeCoultre (Master Quartz) and Favre Leuba.

By 1972, nearly 6000 Beta-21 movements were produced and used by, among others, Omega, Bulova, IWC, Longines, Patek Philippe, Rolex, Rado, Ebel, Zenith and Movado. The Swiss had managed to produce quartz watches but, until the launch of the

Swatch in 1982, failed to cope with competition from the Far East. Between 1970 and 1984, 'The Quartz Crisis', the market for cheap Swiss mechanical watches completely disappeared. Rolex and the classic brands continued to sell but employment in the Swiss watch industry fell from 90,000 to 30,000 and the number of companies, from 1,600 to 600. Few could have predicted that the future lay in expensive mechanical watches. By 2001 the value of Swiss mechanical watches sold, although costing ten times as much, exceeded that of quartz, and 50,000 employees produced 30 million watches. ☺