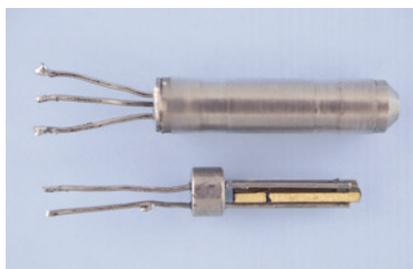


Seiko Quartz Astron 35SQ

December 1969



Center second: One step per second
 Mechanical dimensions: Outer diameter 30.00 mm
 Thickness 5.30 mm (battery unit 6.10 mm)
 Driving method: Crystal oscillation circuit controlled stepping motor
 Vibration frequency: 8.192 Hz
 Accuracy: Room temperature (+4°C to +36°C)
 Daily rate ± 0.2 sec
 Monthly rate: ± 5 sec.
 Battery life: 1 year or longer
 Jewels: 8
 Price: ¥450,000 (18-karat solid gold case)

Product Features

The Seiko Quartz Astron 35SQ is etched in the annals of horological history as the world's first quartz watch. The commercialization of this quartz wristwatch, which materialized via the fusion of precision processing and electronics technologies, triggered a huge global response.

The 35SQ housed a tuning-fork crystal resonator, a watch IC, and an ultra-small stepping motor within the confines of a watch case. The watch was extraordinarily accurate for the day. At a time when the daily rate for mechanical watches was 20 seconds, the Astron boasted a monthly rate of ± 5 seconds and a daily rate of ± 0.2 seconds.

The tuning-fork type crystal resonator was the first in the world, and was developed by Epson* specifically for quartz watches. The company also developed an ultra-small stepping motor to convert electric signals into mechanical movements. This newly designed stepping motor's coil, rotor and other components were dispersed in the watch movement.

The oscillator circuit, frequency-divider circuit, and driver circuit comprised a hybrid IC whose 76 transistors, 29 capacitors, and sundry other components were hand-assembled and hand-soldered onto a ceramic board. The wristwatch IC is the component that enabled Epson to give the 35SQ a unique structure: the inside of the watch was entirely devoid of mechanical parts except for those needed for indicating the time.

The watch was also equipped with a battery cover, which simplified the replacement of a battery. The second hand traveled in steps, and a second-setting device allowed the watch to be set with excellent accuracy. The 35SQ was replete with many other distinctive features that departed from conventional wisdom, including, for example, a rounded movement that gave the watch both a highly reliable structure and a fetchingly elegant design.

Background

In the latter half of the 1950s watchmakers were vying to outdo one another in the area of wristwatch accuracy. So it was, in 1959, that Epson launched the "59A Project," a program to develop a next-generation, high-accuracy, battery-operated wristwatch. The project team members researched several types of battery-operated watch structure — spring balance, tuning fork and quartz. Eventually, however, they began to concentrate on the target of developing a quartz timepiece in a transportable size. This happened to coincide with a program to develop an official timekeeping device for the Tokyo Olympic Games, and synergies between the two programs helped to accelerate that research, leading to the development of the Seiko Crystal Chronometer QC-951. Meanwhile, the company announced in 1966 that it had developed a pocket-watch style quartz prototype. The following year, it announced the development of a prototype quartz wristwatch. The prototypes came away from the prestigious Neuchatel Observatory chronometer contest, winners. Finally, in 1969, came the commercialization of the world's first quartz watch, the Seiko Quartz Astron 35SQ.

Impact

As a timepiece whose name would be etched in the annals of wristwatch history, the world's first quartz watch attracted widespread interest, and its advent was even chronicled by the *New York Times*. Epson contributed to the worldwide popularization of analog quartz watches by publicly disclosing the technology for which the company had prosecuted intellectual property rights.

Epson continued to develop the key technologies behind the 35SQ — the tuning-fork crystal resonator, the IC (which was the stepping stone for the successful development in 1971 of a CMOS IC for watches), and a stepping motor. These products and technologies eventually grew to form the backbone of Epson's quartz device and semiconductor businesses. The "energy saving" concepts that came about at this time are a major part of the Epson heritage. The development of crystal resonators, watch ICs, and ultra-small stepping motors during the course of quartz watch commercialization contributed to the advancement of energy-saving technologies in the electronic devices industry as a whole. Epson was recognized for its contributions in 2002, when the IEEE (the Institute of Electrical and Electronics Engineers Inc.) honored the company with the Corporate Innovation Recognition Award.

*Then known as Suwa Seikosha Co., Ltd.