

PRESS RELEASE



L'Aventure de la montre à quartz

07.02 – 20.10.2002

« *Mission impossible, The adventure of the quartz watch* »

*A technological mutation initiated by the Centre Electronique Horloger (CEH),
Neuchâtel*

Exhibition from 7th March to 20th October 2002

I. Introduction

In 1998 the Centre Electronique Horloger (CEH) of Neuchâtel, Switzerland closed its doors after 36 years of existence.

Initiator of the wristwatch with quartz, this laboratory independent from the State financially is backed by its shareholders (watchmakers). Its work in low power microelectronics, applied more particularly to watchmaking, is renowned worldwide. It has allowed the creation of the Centre Suisse d'Electronique et Microtechnique (CSEM) which pursues work in this field.

In 1967, after less than 5 years of research, the movements put forward by the CEH (without the knowledge of its Board of Directors !) in the Chronometric competition of the Neuchâtel Observatory obtained the first ten prizes, the results being about 10 x better than those reached by mechanical watches.

They are the calibres Beta 1 and Beta 2. The quartz watch is born.

Thanks to their performances in this competition and to the resulting publicity, the CEH works again on calibre Beta 2 with a view to realising an industrial product :

Beta 21 is the industrial prototype which comes on the market in April 1970.

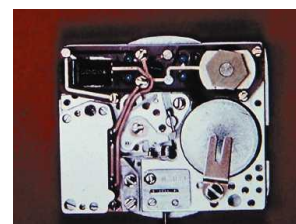
Since this date the CEH has continued its research with an aim to improving still more the performances of the quartz movements, as well as their miniaturisation. It has also exploited a new microelectronic technology (CMOS) allowing a drastic reduction of electrical consumption.

Calibre Beta 21



Watch Beta 21 placed on the enlargement of its integrated circuit (1970)

The movement of the watch Beta 21



The Adventure of the Quartz Watch

In all its years of activity, the CEH has generated more than 350 technical reports and is at the origin of more than 75 groups of registered patents in the whole world.

II. The quartz watch and the Swiss watchmaking industrial production today

Statistics and figures of the production of the Swiss watchmaking industry in 2000 taken from the website of the Fédération de l'industrie horlogère suisse.

The Swiss manufacturers produced approx. 31 million finished watches in 2000.

PIECES (in millions)		VALUE (in millions of francs)	
Mechanical	2,7	Mechanical	4826
Quartz analogue	27,9	Quartz analogue	5248
Quartz digital	0,8	Quartz digital	64
Total	31,4	Total	10138

This chart shows the current importance of the quartz watch in the Swiss production.

III. A book

At the end of this amazing venture, Max Forrer and former executives of the Centre Electronique Horloger (CEH) wished to write a book about the activity they had for several years. A financial contribution of the last shareholders made it possible.

This book is not only a human, historical and technical account of the people involved in the conception and birth of this technical revolution, which constitutes the quartz wristwatch, but also shows in part the history of the evolution of the Swiss watchmaking industry and how it adapted to this new leading technology.

IV. An exhibition

When the authors of this book approached the Musée international d'horlogerie management to offer the collection of objects of the CEH (in particular prototypes of the first quartz wristwatches) on loan, with a view to organizing an exhibition when the book came out, the MIH agreed to the suggestions with great enthusiasm.

V. Communicating the venture

Our objective was to present the research, which led to the creation of the first prototypes of quartz wristwatches in 1967, to a large audience.

The option chosen was to remain linked to the work of the authors of the book, while favouring, however, an attractive and seductive presentation, showing assemblies of laboratories, models, documents, prototypes, modules amongst others and permitting everyone to understand the innovations of the CEH.

We must not forget that most of us today wear quartz watches, the reliability, autonomy and precision of which are remarkable.

The Adventure of the Quartz Watch

VI. Mission impossible, the adventure of the quartz watch

The exhibition is integrated in the promontory zone of the Musée international d'horlogerie, with access through three porticos.

The scenario centres around a mission to be accomplished by a team of researchers and engineers.

Title, orders of mission, presentation of the people in charge and objectives initiate the visit.

Inside the exhibition, 3 ways of visiting are suggested :

- **The royal way** which ends with the achievement of the challenge : displays and panels exhibit prototypes and diplomas and explain the course of the discovery.
- **The careful way** is based on known principles and studies in progress, without any totally innovatory visions and which is unfortunately unsuccessful
- **The strange way** explored different technologies (nuclear quadripolar resonance, source of radioactive energy, watch receiver of hourly signals).

VII. The mission

Neuchâtel, in 1962

...Battery electromechanical watches have already been successfully commercialised...To miss the turning for electronics would be tragic for the Swiss watchmaking industry !

A team of engineers has to start work to produce a high performance Swiss made electronic wristwatch in the shortest possible time.

To accomplish this mission, they will have at their disposal a laboratory which will be created in Neuchâtel under the name of Centre Electronique Horloger (CEH).

Message passed by Gérard Bauer and Sydney de Coulon, President of the Fédération horlogère suisse and Managing Director of Ebauches SA respectively.

IX. The ventures

The CEH felt it was important to create a new watch with at least one important advantage compared to existing watches. And here are the results:

- **Precision** : The Beta 21 watch is 10 x more precise than the mechanical watch of the 60s !
- **Volume** : Its movement is 300 x smaller than that of the best quartz marine chronometer of that time!
- **Autonomy** : The Beta 21 watch has an autonomy 200 x more important than the mechanical watch (2 days), i.e. about 400 days!

X. The realisation

- **The miniaturised quartz resonator**

The geometry of the resonator must assure an ideal mechanical vibration of the quartz and the suspensio is designed to avoid too big a loss of energy and to assure a good resistance to shocks.



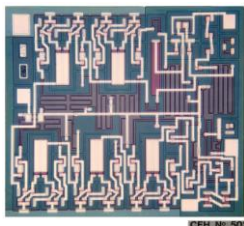
Quartz bar from the Beta 21 watch

- **The electronic circuit**

It has three functions : maintenance of the vibrations of the quartz, division of the frequency (to obtain a useful value at the frequency at the command of the time display) and command of the display.

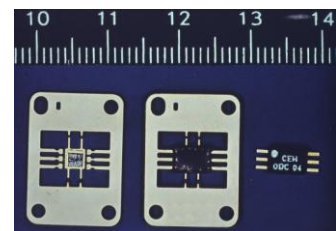
- **The microelectronic technology**

New technology of integrated circuits born in the USA in 1958, the CEH adapted it to demands of watchmaking: a low tension and a very low consumption.



Integrated circuit of the beta 21

Incapsulating of the microchip



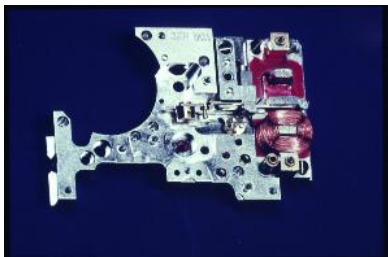
Real size of an integrated circuit



The Adventure of the Quartz Watch

Micromotor for the driving of the hands

The CEH has opted for the classical display (analogue) of the hour and has developed a vibrating motor needing less dividers of frequency than a pitch by pitch motor thus allowing a longer life to the battery.



Motor of the Beta 21

XI. Organisation of the exhibition

Scientific committee

Messrs. André Beyner, Max Forrer, René Le Coultre, Henri Oguey

Conception and graphism

Polygone SA

Technical assistance

M. Michel Perdrix

Organisation Musée international d'horlogerie

Jean-Michel Piguet, Assistant curator

Nicole Bosshart, Management assistant

Cécile Aguilleaume, archivist

Assembly and decoration

Atelier Slutter, decorator

Yvon Flückiger technical manager MIH, Jacky Bader, technical assistant MIH

Exhibition from 7th March to 20th October 2002

Opening hours : 10 – 17 Closed on Mondays

Guided visits on request

The book *L'aventure de la montre à quartz, Mutation technologique initiée par le Centre Electronique Horloger, Neuchâtel* [Authors : Max Forrer, René Le Coultre, André Beyner, Henri Oguey] is on sale at the Musée international d'horlogerie shop.