CURTA

Made in Liechtenstein

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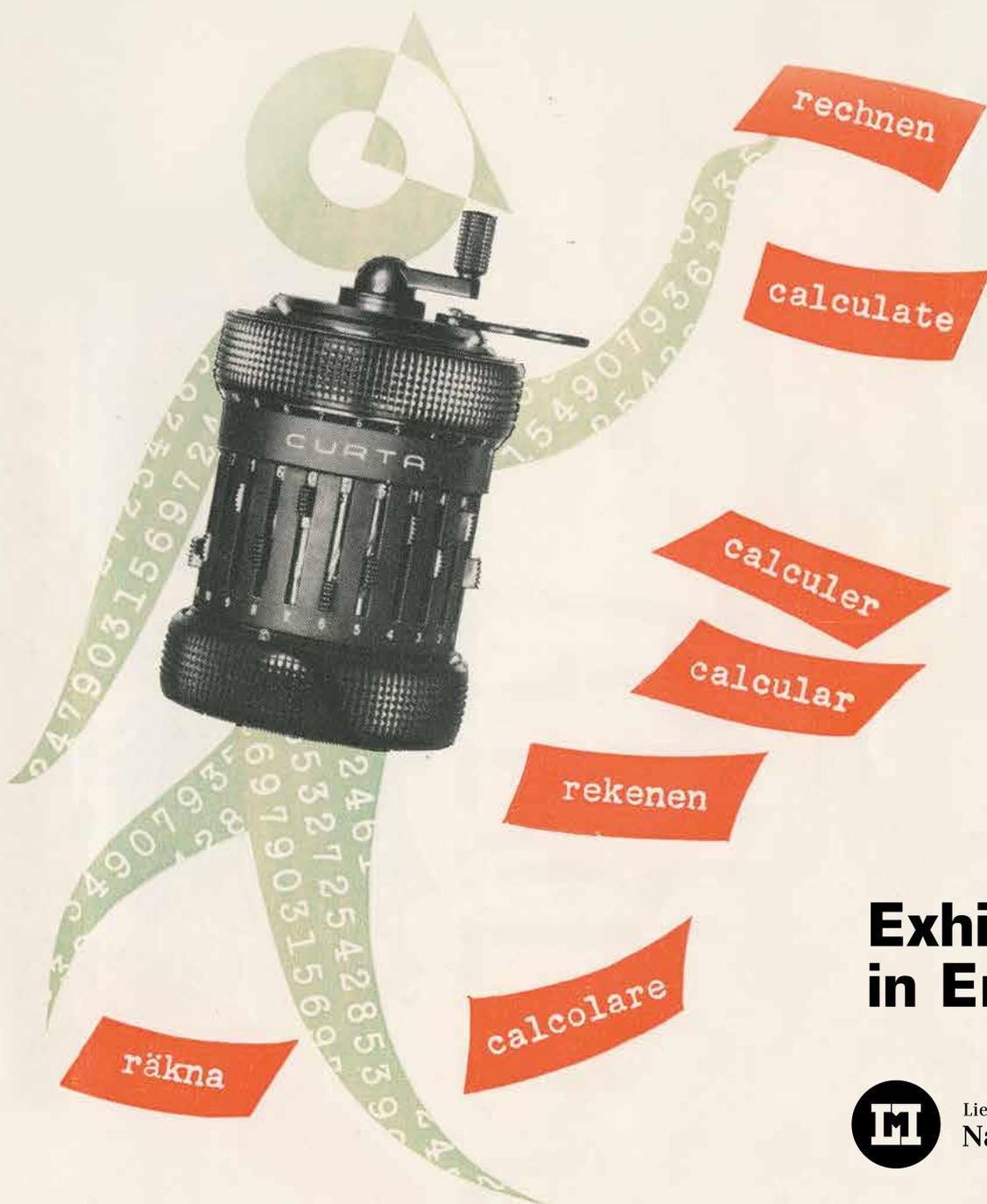
Exhibition in English

Liechtenstein National Museum

Exhibition Panels „Curta – made in Liechtenstein"
20th May 2021 to 29th August 2021
Liechtenstein National Museum, Vaduz, Liechtenstein

The CURTA – made in Liechtenstein
How an inventor's bright idea became an industrial product made
in Liechtenstein.

The CURTA was the world's smallest mechanical calculator to be built in
big numbers. It was patented in 1938 by Curt Herzstark from Vienna.
Development was interrupted by the Second World War. Curt Herzstark
was held in the Buchenwald concentration camp, where he drew plans for
the calculating machine in his spare time.

After the end of the war Prince Franz Josef II became aware of the
invention and founded the calculating machine company Contina AG. Curt
Herzstark set up production despite the challenges of the post-war
climate, including a lack of skilled workers and difficult economic
conditions in Liechtenstein.

The exhibition panels describe the history of the inventor Curt Herzstark,
the calculating machine CURTA and the manufacturing company Contina
AG.

Text, Idea, Curator: Hansjörg Nipp 2021

Calculating Machine Factory Herzstark, Vienna

Curt Herzstark was born in Vienna on 26 January 1902. His father Samuel, Jakob Herzstark, was the owner of the company "Rechenmaschinenwerk AUSTRIA, Herzstark & Co." The company manufactured calculating machines and expanded and modified existing machines.

Curt Herzstark attended the Higher State School of Commerce (Higher Technical College for Mechanical Engineering), completing his schooling with a baccalaureate. Parallel to this, he completed an apprenticeship in precision mechanics and toolmaking at his parents' enterprise from 1916 to 1918.

After completing his training, Curt Herzstark worked at Astra Werke and Wanderer Werke in Germany. Here he was introduced to a state-of-the-art machine park. He was later able to use this knowledge in his parents' enterprise as well as many years later when he set up Contina AG in Liechtenstein.

Curt Herzstark returned to his parents' enterprise after a year in Germany, where he worked as a designer, consultant and salesman for customers. Curt Herzstark spent half of his working hours with customers and the other half in his parents' enterprise.

Curt Herzstark (right) with his father Samuel Jakob, Winter 1936/1937
Photo: Typewriter Machine Museum Stefan Beck

Multimator Calculating Machine
Photo: Hansjörg Nipp

This meant he organised sales in Czechoslovakia, in Hungary, and on occasion in Romania too. He trained sub-agents and visited savings banks and banks, public authorities, companies, architects, etc. in person to demonstrate his own four-species machine "Austria-Herzstark" as well as the addition machine Astra as well as other products.

His construction talent and inventive spirit enabled Curt Herzstark to contribute many improvements to the calculating machines. Many patents were registered for the "Multimator" accounting machine.

Samuel Jakob Herzstark died on 24 October 1937. As sole heir, the entire estate together with the company passed to his wife. The plan at the time was that Curt Herzstark was to take over the company at a later date.

Logo of the "Calculating Machine Works AUSTRIA, Herzstark & Co."
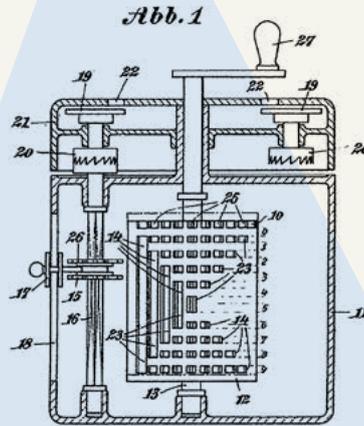Photo: Hansjörg Nipp

The invention

The inventor Curt Herzstark
Photo: Curt Albert Herzstark

Extracts from the patent specification
Photo: Hansjörg Nipp

a mechanical indicator showed the result. In the case of an addition, for example, the first number was set using the setting pins, then the crank was turned once. The second number was then set using the setting pins, the crank was turned a second time and the result could then be read in the result display. The machine could be used to perform additions, subtractions, multiplications and divisions.

While the little device was technically complex, it was very easy to use.
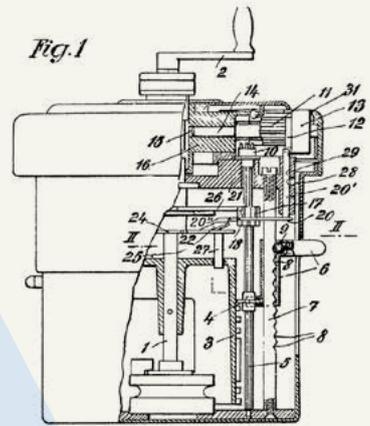
From many conversations with customers, Curt Herzstark knew that a pocket-sized calculating machine would be in great demand. The smallest calculating machines at that time weighed several kilos and were very bulky. The idea of producing a small, handy, light-weight calculating machine driven by a central crank shaft remained with him.

In 1936 he developed the concept for a small machine with a central relay roller. This was not yet able to subtract, however. The crucial breakthrough came in 1938. With a complementary relay roller, it proved possible to derive the subtraction from an addition. This meant the subtraction was performed with the same crank rotation direction as the addition.

Curt Herzstark registered two patents and built an initial functioning sample. While this was still too large, it demonstrated that the principle worked. Herzstark then built a smaller functional model, which was about the size of the final series product. Numbers were entered using the setting pins. Arithmetic operations were performed by turning the crank. At the top of the casing,

First calculating machine prototype, Vienna 1938
Photo: Liechtenstein NationalMuseum (Sven Beham).
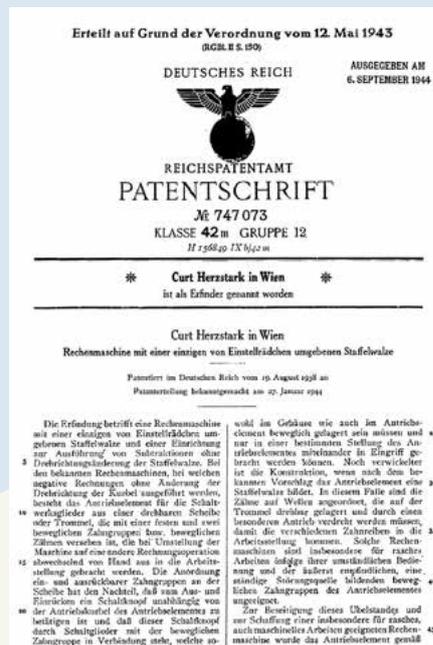
Patent specification No. 747073 for a calculating machine with a single relay roller, submitted by Curt Herzstark on 19 August 1938
Photo: Hansjörg Nipp

Prototype No. 2, small model with plastic components, 1938
Photo: Liechtenstein NationalMuseum (Sven Beham).

Imprisonment and concentration camp Buchenwald

Austria was annexed by the Third Reich in March 1938. On his paternal side, Curt Herzstark was categorised as "half Jewish". Half-Jews were not entitled to own or to manage enterprises. His mother Marie was "Arian" and for this reason was permitted to keep the company. Officially, Curt Herzstark was merely an employee. Shortly thereafter the company was ordered to build mechanical measuring instruments for the German Wehrmacht. The production of calculating machines was suspended. In 1943, Curt Herzstark was arrested without justification and in October 1943 was transferred to Buchenwald concentration camp as a political prisoner.

Thanks to his technical skills, after initially being assigned to work in the camp gardens, he was transferred to the adjoining Gustloff factory, an SS precision engineering plant. Herzstark was given permission to draw plans (pencil drawings on small pieces of card) for his new calculating machine in the evenings and on Sundays. The Buchenwald camp was liberated on 11 April 1945.

Wilma Scherer created the final artwork based on the sketches from Buchenwald. Herzstark had the first components for prototypes built at Rheinmetall-Borsig AG in Sömmerda (Germany). He was also given the opportunity to become a director of this company.

Germany had been divided into four occupied zones in 1945. Because this area had been allocated to the Soviet (Russian) zone, Herzstark fled to Vienna. He was worried that he might be deported to the Soviet Union. Carrying the components for the prototypes, and encountering a number of adventures along the way, he eventually managed to make his way home.

The situation he encountered in Vienna at the Herzstark company was unpromising: worn-out, outdated machinery, no money, hardly any work. During his absence, it had already been contractually arranged that his brother Ernst would take over the company. Under these circumstances, Curt Herzstark was reluctant to set up production for his calculating machine in Vienna.

Canteen at Buchenwald Concentration Camp
Photo: Wikipedia, TobiToaster
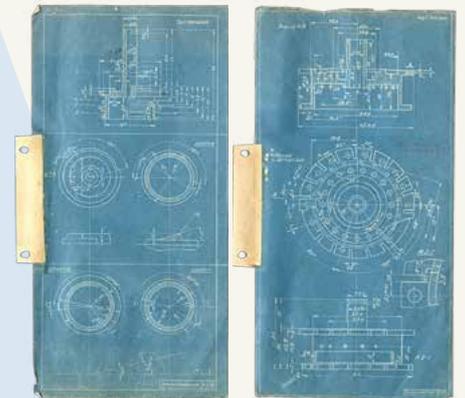
Final artwork produced after liberation. 3 prototypes were built on the basis of these drawings
Photos: Elmar Maier
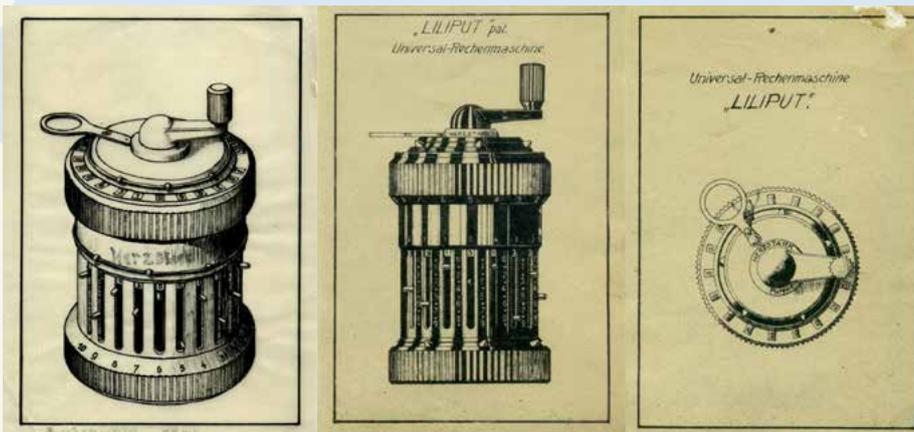
Drawings of the calculating machine produced in the concentration camp
Photos: Typewriter Machine Museum Stefan Beck

Herzstark's flight from Sömmerda was recorded in the minutes of the Works Council Meeting of 4 December 1945 of the company Rheinmetall-Borsig AG in Sömmerda.
Photo: StadtA SÖM, BWS Archive

Curt Herzstark in Liechtenstein with Prince Franz Josef II.

Curt Herzstark assembled his three proto-types in the old company in Vienna, created a first advertising brochure and set out to find money to finance the project.

He received only rejections from Austrian government agencies. There was no money available for new industrial projects. He wrote to six Swiss companies. Two of these expressed interest in his invention. Shortly before leaving for one of these companies, an invitation arrived from the Liechtenstein Princely House. His presentation of the calculating machine at the Palais Liechtenstein in Vienna was so compelling that he was invited to Liechtenstein.

At that time, the Principality was still very much an agricultural country. For this reason, the Princely House and the government were very keen to attract new industrial enterprises and to create jobs.

At the beginning of May 1946 Curt Herzstark was able to present his calculating machine to the Prince of Liechtenstein at Vaduz Castle. Franz Josef II (1906–1989) was very interested in mathematics. He performed a number of calculations on the machine himself. He agreed with the opinion of the experts present that this product should be produced on a monopoly basis in Liechtenstein.

Advertising brochure, 1946
Photo: Hansjörg Nipp

The Prince declared himself willing to provide CHF 4 million to fund the project. Herzstark was to receive 35 % of the share capital in return for his patents and applications.

In mid-July, Herzstark fell ill with severe pneumonia and pleurisy and had to undergo treatment at Vaduz Hospital for several months. In August 1946 the treatments were continued at the hospital. The representatives of the Prince explained that only one million Swiss francs had been earmarked as share capital. The share capital limit was merely a formality for tax considerations. This undercapitalisation would later prove to have far-reaching consequences for Curt Herzstark and the company.

Due to his serious illness, the fact that direct negotiations with the Prince had been suspended and the prospect of becoming co-owner of a company, Herzstark finally agreed.

On 14 September 1946 the company "Contina Bureaux und Rechenmaschinen-fabrik Aktiengesellschaft" was founded, and business premises were established in 1947/1948 in Mauren. Curt Herzstark received an employment contract on 19 September 1946. This appointed him to the position of Technical Director and member of the Executive Board for a period of ten years.

Vaduz Castle around 1955
Photo: Peter Ospelt / Office of Cultural Affairs, National Archive, Vaduz

The calculating machine in the hand of the inventor Curt Herzstark. This machine was presented 1946 to Prince Franz Josef II.
Photo: Typewriter Machine Museum Stefan Beck

Telegram from 26 March 1946 to Curt Herzstark: Invitation to Vaduz Castle
Photo: Typewriter Machine Museum Stefan Beck

Building up the company and departure

At the beginning of 1947, Curt Herzstark began preparatory work for the production of the pocket calculating machine. A large number of experts were required to set up the production. These were hard to find in Liechtenstein and had to be recruited in neighbouring countries.

Herzstark was keen to hire specialists from the previous company in Vienna, but for in-explicable reasons this was rejected by the company's management. There was even resistance from the company's management when it came to procuring machinery and operating equipment. In May 1948, production was set up in the new business premises. Development of the calculating machine had begun one year previously in a room of the Hirschen Inn in Mauren.

It still took more than a year for the machine to be ready for series production. The precision of the calculating machine placed exacting demands on the production equipment. Delivery of the Curta calculating machine in large numbers was possible from the beginning of 1950. Another reason for the delay was that the Board of Directors of Contina AG decided to build gauges. This tied up considerable capacity in the company and would ultimately prove to be a big failure.

The modest amount of share capital, the over-indebtedness and the delay meant that the previous share capital had to be written off in 1950. Ownership of the company Contina AG passed to the bank in Liechtenstein.

This had fatal consequences for Curt Herzstark, because his shareholding of CHF 350,000, which he had received for his patents, had also become worthless.

Contina-Director Curt Herzstark, Winter 1948/1949
Photo: Typewriter Machine Museum Stefan Beck

Fortunately for him, the responsible individuals had forgotten to sign over the patents to the company. Following tough negotiations, he received a settlement for the patents in 1952.

Disappointed, he stepped down from the business. Nevertheless, Contina did not want to dispense with his expertise entirely. And so, after the settlement of the patent disputes in 1952, he was given a consultancy contract, which he fulfilled until 1955. He withdrew into private life. In the 1950s his wife moved to Vienna together with the two children. Curt Herzstark remained in Liechtenstein and had only sporadic contacts with his family.

Curt Herzstark's lifework as an inventor was not properly recognised until many years later. From the early 1980s onwards, a number of articles appeared in trade journals dealing with the little mechanical miracle. Herzstark attended various gatherings of admirers and collectors as well as meetings of inventors and received his due recognition as an inventor.

Curt Herzstark was also fond of visiting former employees to discuss the old days with them. Curt Herzstark died on 27 October 1988 in Nendeln.

Die erste Reaktion des Herrn Herzstark ging dahin: Ihre Proposition, bezw. Ihre Eröffnung bedeutet also, dass Sie weiterhin mein geistiges Eigentum benutzen wollen, ich dabei jedoch vollständig leer ausgehen soll. Reaktion Tschopp: Ja, so ist es, Sie haben eben Pech!

After Herzstark was informed that his shares had become worthless, Johannes Tschopp (Board of Directors Contina AG) cynically told Curt Herzstark that it was "just bad luck". From a letter of a lawyer of Curt Herzstark.
Photo: Hansjörg Nipp

Curt Herzstark (right) and his design engineer Elmar Maier discuss old times, 1984.
Photo: Elmar Maier

The Curta calculating machine – Development

Advertising brochure with model designation "Contina", 1948
Photo: Hansjörg Nipp

Rooms at Hirschen Inn in Mauren were rented in March 1947. One room served as a design office, the room opposite as a development workshop. All the individual components for the Curta could be manufactured on a universal milling machine and a versatile lathe.

On 1 April 1947, Herzstark began development work for the mass production of the small calculating machine together with the Swiss precision mechanic Hans Künzli and two draughtsmen.

The detailed drawings were produced in the design office. By the beginning of 1948, a complete set of drawings of the calculating machine had been created. The first prototypes of the calculating machine, which was originally named "Liliput", were available for testing. The name "Liliput" was provisionally changed to "Contina" at the beginning of 1948.

The fitting out of the new factory building in Mauren was sufficiently complete by the end of May 1948 that the design department and production could be moved there. It had originally been planned to locate the assembly in Eschen.
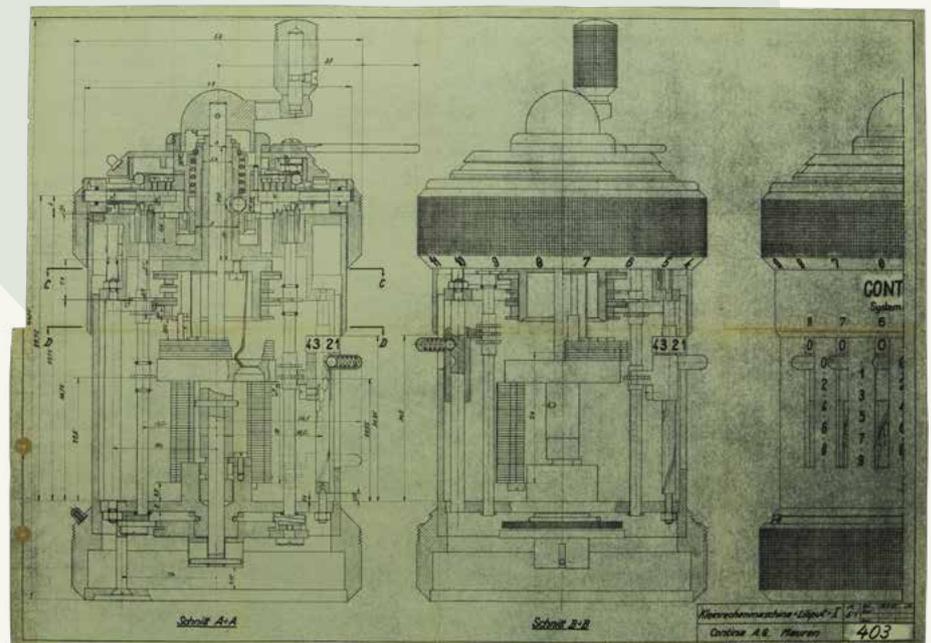
At Contina AG in 1948, the design engineers were busy creating final drawings for the gauges and for the calculating machines.

The internal workings of the machine are extremely complex. It comprises almost 600 individual components. In order to ensure the smooth working of the machine, the components need to be extremely precise. For this reason a great deal of time was devoted to the construction of tools and operating equipment. The production proved to be much more elaborate than had originally been assumed.

Design office of Cortina AG, 1949
Photo: Curt Albert Herzstark

Sample machine "Liliput", 1947 Depiction 1:1
Photo: Liechtenstein NationalMuseum (Sven Beham).

Drawings of the small calculating machine, 1947
Photo: Hansjörg Nipp

The Curta calculating machine – Assembly in Liechtenstein

Workshops for milling, turning, engraving, grinding, anodising, heat treatment and inspection were set up. Components outsourced from external suppliers needed lead time before they could be delivered. Series production required additional staff for manufacturing, assembly, inspection, warehousing and auxiliary functions. The employees needed to be trained and familiarised with their responsibilities.

In 1948, the company management decided to include gauges (measuring equipment) in the production programme. Because of the build-up of additional design and manufacturing capacity for the gauges, practically no calculating machines were produced under series production conditions in 1948.

Probably about one hundred machines were built that year, but not delivered. These machines still required a great deal of additional manual labour to achieve the required quality. Many drawings had to be amended.

The operating equipment was not yet fully in place due to the complexity and the additional time involved. The procurement of outsourced components needed to be organised.

The construction of gauges was soon completely discontinued. The production of calculating machines was ramped up on a larger scale in 1950/1951 following improvements to the design and optimisation of the working procedures. The assembly line in Mauren was modified and reorganised. Now, after an extended development period, the unit volumes and sales figures were increased and the markets were supplied.

Turning machines, 1949/1950
Photo: Curt Albert Herzstark

Small turning shop, 1949/1950
Photo: Curt Albert Herzstark

Assembly room for Curta calculating machines, approx. 1951
Photo: Hansjörg Nipp

Production: Engraving shop, lathe shop, approx. 1951
Photo: Elmar Maier

Curta I with box and operating instructions
Photo: Hansjörg Nipp

The Curta calculating machine – Function

Curt Herzstark's new universal calculating machine used the principle of the relay roller. For the sake of simplicity, the function is shown using the original (1938) patented machine.

The numbers to be added are set to the desired number position (7) with the number sliders (1) along the setting spindle (2). When the crank is turned (4) the little cogs (3) are rotated in accordance with the number of teeth (8) on the relay roller (5). A mechanism performs the automatic ten carry-over (not drawn here). The result is displayed in the results counter (6).

The subtraction is derived from an addition. The nines' complement is also added to the number. A mechanical correction of the result is additionally necessary. A further relay roller is necessary to form the nines' complement. Herzstark integrated it into the relay roller for addition by incorporating extra rows of cog teeth. Combining two relay rollers into one was a key aspect of the ingenious invention.
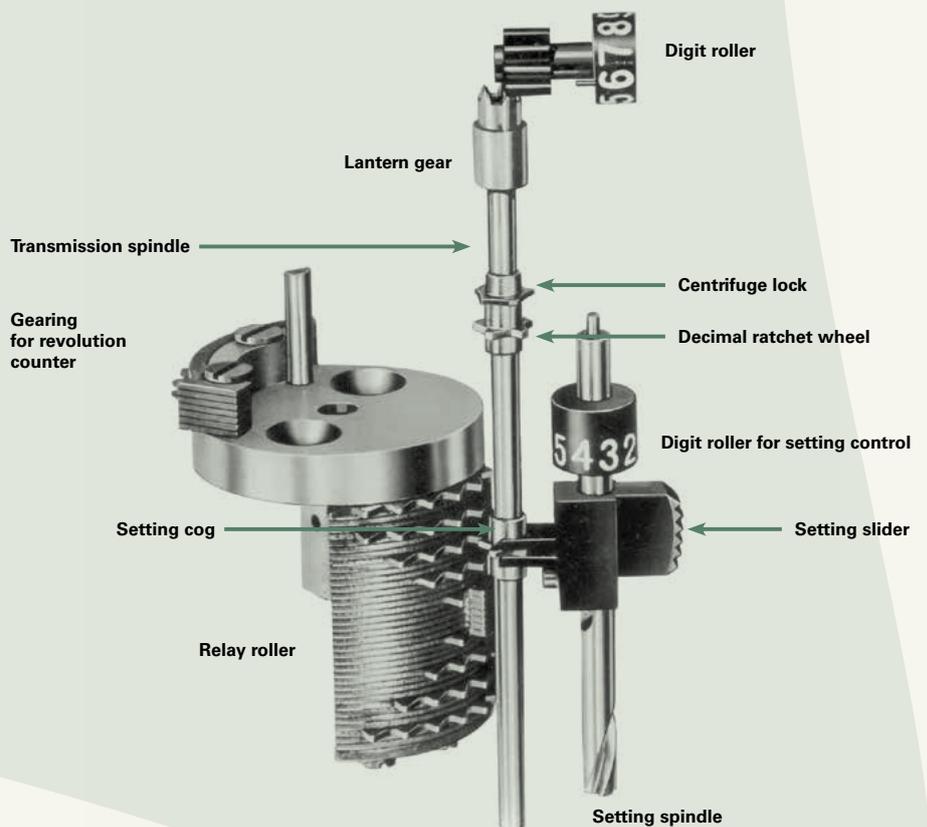
During subtraction, the relay roller is raised, bringing the second rows of teeth into play.

Multiplication and division derive from multiple additions. So that the operator does not have to make so many crank turns when multiplying large numbers, the carriage with the result counter can be shifted by powers of ten if necessary. For example, if the operator wants to multiply by a hundred, the carriage is shifted two places and one turn is now enough.

The design of the calculating machines that later went into series production was much more complex. For example, they had to be protected against operating errors such as reverse rotations. Because of the ultra-compact design, new, unconventional paths had to be taken when it came to the construction. Ultimately, almost 600 individual components were incorporated into the small calculating machine.
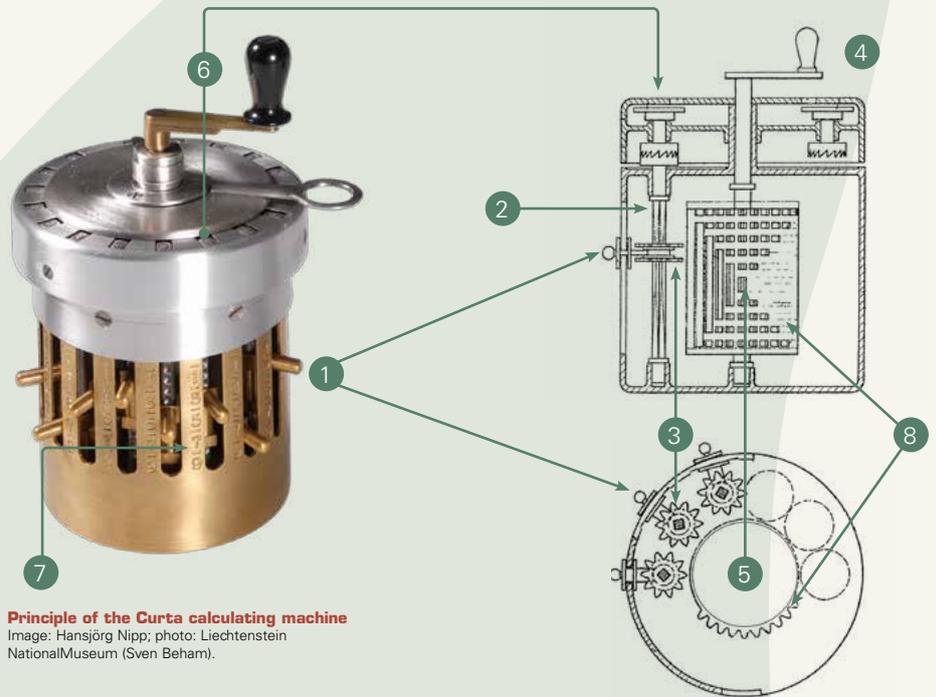
Principle of the Curta calculating machine
Image: Hansjörg Nipp; photo: Liechtenstein NationalMuseum (Sven Beham).

Digit roller

Lantern gear

Transmission spindle

Centrifuge lock

Decimal ratchet wheel

Gearing for revolution counter

Digit roller for setting control

Setting cog

Setting slider

Relay roller

Setting spindle

Curta calculating machine: Details of relay roller with setting slider and counter roller
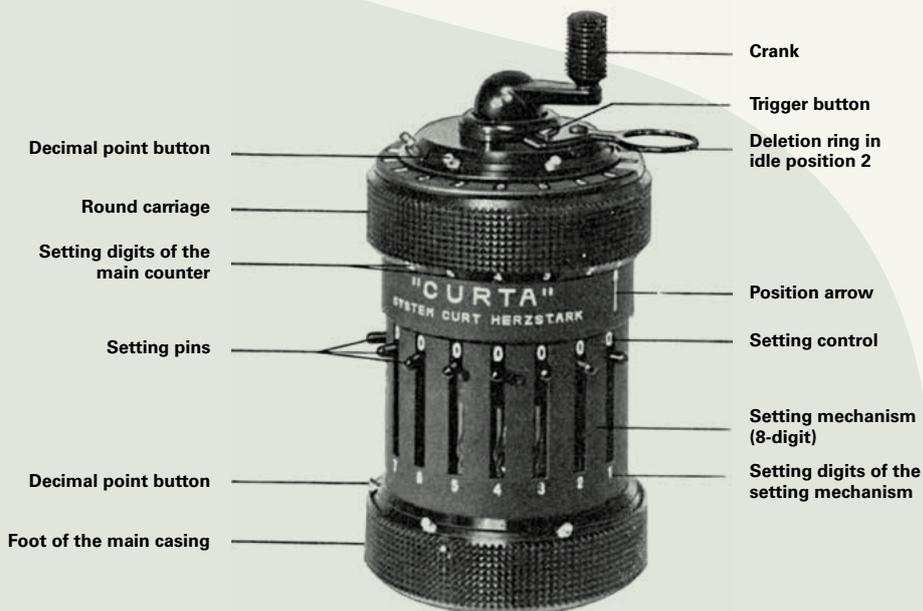Private archive Hansjörg Nipp

Operation of the Curta calculating machine

From today's perspective, the Curta calculating machine seems complicated to operate. With the small calculating machines of the time, it was not possible to enter numbers with a keyboard. These had to be adjusted using sliders (setting pins). A counter presented the result of a calculation (result counter). Today the result is shown on a display.

Before starting a calculation, the counter is set to zero by turning the cancel lever. The number is set using the setting pins. After the crank is turned, the number appears in the counter. To perform an addition, the second number is set using the setting pins, and the crank is then turned once again. The result of the addition is presented in the counter. Further numbers can be added to this by the same means (setting, turing the crank). To perform a subtraction, the number is likewise entered using the setting pin. Then the crank is lifted before it is turned. By this means, the number is subtracted from the counter.

Multiplication is performed by repeatedly cranking a set number. Example: turning the crank eight times has the effect of multiplying the set number by 8. The multiplier is presented in the revolution counter. It is then possible to continue the calculation with additions and subtractions.
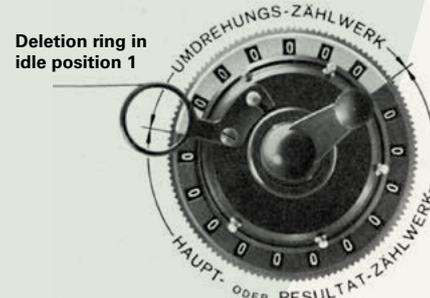
Because it would be very laborious to turn the crank many times for larger multiplications, the round carriage can be moved decimal places by lifting. Multiplication by 135, for example, is performed by turning the crank 5 times, moving the round carriage one place, turning the crank 3 times, moving the round carriage one more place and turning the crank once. The counter presents the result and the revolution counter shows the multiplier.

Divisions are also possible. This process is somewhat more complicated and is performed out with a reduction procedure by multiplications.


Operating elements of the Curta
Image: Hansjörg Nipp

Labels: Crank; Trigger button; Deletion ring in idle position 2; Decimal point button; Round carriage; Setting digits of the main counter; Position arrow; Setting control; Setting pins; Setting mechanism (8-digit); Decimal point button; Setting digits of the setting mechanism; Foot of the main casing

Result counter
Photo: Hansjörg Nipp

Label: Deletion ring in idle position 1

Lifting the crank for subtraction
Photo: Hansjörg Nipp

Setting a number
Photo: Hansjörg Nipp

anheben — verdrehen — wieder einrasten
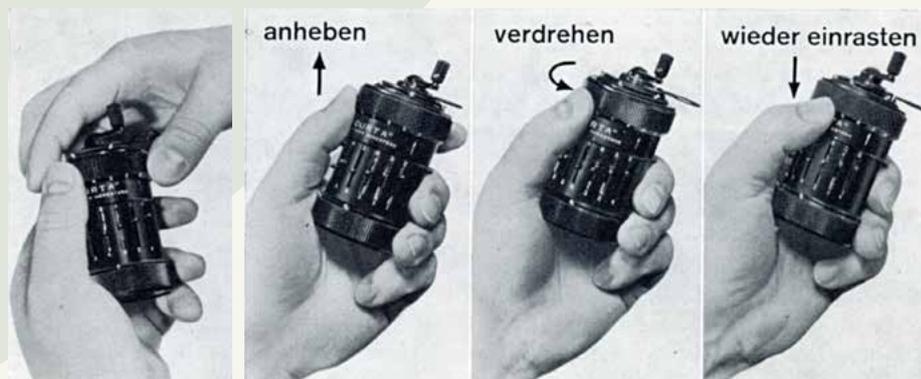
Shifting the round carriage for a mulitiplication
Photos: Hansjörg Nipp

Significance in terms of calculating technology and market success

Curta I and Curta II
Photos: Hansjörg Nipp

The Curta calculating machine was the highpoint in the development of mechanical pocket calculators. By introducing a new principle, Curt Herzstark succeeded in building a small and lightweight machine. This created a fully-fledged calculating machine that could be carried comfortably in a pocket and held effortlessly in the hand while calculating. Two types were built, the Curta I with eight input positions and eleven result positions and the Curta II with eleven input positions and 15 result positions.

The Curta never achieved a big breakthrough as a mass product, even though the market potential was initially estimated at around three million units and there was no real competition throughout the lifetime of the product.

One reason for this was that the machine was not further developed and facilities were not expanded for mass production.

Patents and ideas (increasing the number of positions, costs and weight reduction through plastics) were available, but were not implemented. Other important reasons were organisational and financing problems from the outset, marketing errors and diversification into questionable products during Contina's subsequent history.

Calculating machines continued to be produced after Contina was taken over by Hilti AG in 1965. Optimising the work processes made it possible to reduce manufacturing costs. However, no further major investments were made, as there were already signs on the horizon that calculating machines would one day be replaced by electronic calculators.

Between 1948 and 1971 approximately 79,000 Curta I and 62,000 Curta II machines were produced. Of the total of 141,000 units, 95,000 were manufactured between 1950 and 1965 under the management of Contina AG and 46,000 between 1966 and 1971 under the new management of Hilti AG. The number of units per year increased after the takeover by Hilti, with the same number of employees, and remained at an almost constant level. Production of the Curta ceased at the beginning of 1971.

Advert in "The Office" 1952
Photo: Hansjörg Nipp
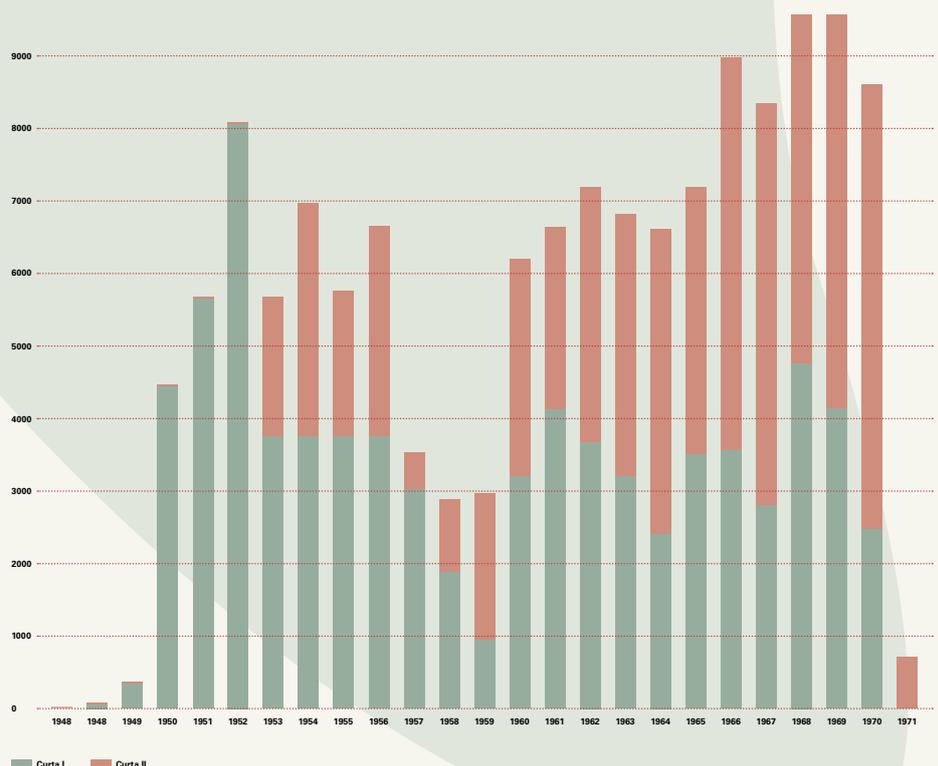
Production figures for the calculating machines Curta I and Curta II
Graphic Hansjörg Nipp

Competition and planned further developments

The Alpina-Werke in Kaufbeuren (Germany) was the only competitor to showcase prototypes of a small, hand-held calculating machine at the Hanover Fair in 1959.

On the Alpina, the display and the setting elements were arranged linearly. This meant the settings and results were easier to read. For stationary applications the machine could be mounted on a base, enabling it to be operated with just one hand. Series production started only in 1961 however, after production defects were rectified. Continuing mechanical defects and the overwhelming competition from Curta led the Alpina-Werke to cease production at the end of 1961.

From the earliest days, Curt Herzstark had drawn up plans to increase the number of calculating positions while retaining the external dimensions of the machines, and even built prototypes. This would have greatly expanded the Curta's range of application. These plans were never realised because Herzstark left the company too soon.

Around 1961, Elmar Maier developed improvements in the design that would have reduced manufacturing costs by up to 40 %. Construction drawings were finalised and prototypes were built. The calculating machine was given the type designation Curta Ia. Pre-series models were distributed to schools for testing.

Despite the considerable cost-cutting potential, the new design was not implemented in production. This would have required investments in tools amounting to CHF 70,000. At the time, Contina was spending a large amount of capital on the development of film cameras. The calculating machine was being sidelined by the management at the time. It was focusing instead on camera technology, and invested the money there (ultimately unsuccessfully).

Curta Ia and the competition Alpina
Photos: Hansjörg Nipp

Brochure Alpina calculating machine
Photos: Hansjörg Nipp

Advertisement for the Curta

Curt Herzstark was not just an ingenious designer, but also an experienced salesman and placed great importance on the marketing of the Curta calculating machine.

Right from the outset, brochures were published depicting the hand-held machine. This made it possible to show just how small the machine was. In one of the oldest brochures, the machine still has the type designation "Contina". In the spring of 1949, it was given its definitive name "Curta", derived from the inventor's first name, Curt.

The diminutive Curta universal calculating machine was first presented to the public at the Basel Mustermesse trade fair in 1949. At the large exhibition stand, attention was expressly drawn to the robust nature of the little calculating machine.

Because of its delicate appearance, some visitors had doubts about its robustness. The company's representatives were prepared for this and arranged the presentation of the machine on the stand accordingly.

Test equipment and cutting models were showcased. To make the functioning of the Curta visible to the eye, a calculating machine with a transparent housing was displayed.

Advertising brochure 1948/1950
"The key to every calculation problem!"
Photo: Hansjörg Nipp

Advertising brochure 1948/1950
Photo: Hansjörg Nipp

Trade fair stand Mustermesse Basel, 1949: from left
Hans Künzli, Graf Anton F. Gerliczy-Burian, Curt Herzstark,
Adolf Asal, Elmar Maier
Photo: Typewriter Machine Museum Stefan Beck

Curta I and II travel the world together
Photos: Hansjörg Nipp

Advert in "Schweizerische Bauzeitung!", 1953
Photo: Hansjörg Nipp

Contina AG – Foundation and Growth

At the beginning of May 1946, Curt Herzstark was able to demonstrate his calculating machine directly to Prince Franz Josef II of Liechtenstein at Vaduz Castle. The Prince subsequently agreed to provide the project with finance totalling 4 million Swiss francs, as proposed by Herzstark. In fact, however, the company "Contina Bureaux- und Rechenmaschinenfabrik Aktiengesellschaft" was founded in Vaduz with a share capital of only 650,000 Swiss francs. The remaining capital was to be raised by means of loans. The owners were Prince Franz Josef II and his siblings and his brothers-in-law, each with 1/8.

The company moved into a new factory building in Mauren in mid-1948. The plan for 1948 envisaged the sale of 5000 machines and the manufacture of a further 10,000 units. 15,000 calculating machines were then to be built in 1949. In reality, however, it was only in 1950 that approximately 5000 machines were sold. There were a number of reasons why the targets were not met. The share capital was not sufficient to build up a larger production, the development of the machines took more time than planned, the management of the company provided Curt Herzstark with far too little support when it came to building up the company and recruiting staff. To make matters worse, the management decided to build gauges, despite Herzstark's opposition.

The consequences were that the company became heavily indebted, the share capital had to be written off in 1950 and the bank in Liechtenstein, which was owned by the Princely House, became the new owner.

When ownership of the business changed, Curt Herzstark's shareholding was also declared null and void and he was left empty-handed. Because the directors had forgotten to sign his patents over to the company, however, he was able to secure a settlement. Shortly afterwards he stepped down from the company.

Production of the loss-making gauges was discontinued and the company concentrated on manufacturing Curta calculating machines instead.

Logo of Contina AG
Photo: Hansjörg Nipp

Contina AG, around 1948
Photo: Typewriter Machine Museum Stefan Beck

Entry of the company "Contina Bureaux- und Rechenmaschinenfabrik Aktiengesellschaft" in the Public Register
Photo: Hansjörg Nipp

Contina AG – Economic Environment During the Foundation Period

At the time Contina AG was founded, the Swiss authorities were responsible for issuing residence permits for the Principality under the provisions of the customs treaty. As far as the Swiss authorities were concerned, there was no economic need for a new calculating machine. They and the Swiss calculating machine industry saw no need and no use for a pocket calculating machine of this nature. They were concerned about the competition for their own products and about employees being poached. Workers were in great demand in Switzerland due to the economic boom. For this reason the Swiss authorities were initially unwilling to give Curt Herzstark a residence permit.

It was only in 1949 that Herzstark received the definitive permit. Liechtenstein was very much a country dominated by agriculture. There were very few industrial enterprises. Practically no specialists were available in Liechtenstein for the development of the calculating machine and the establishment of the production facilities. Above all, there was a lack of precision mechanics and experienced designers. Liechtenstein's industrial enterprises were reliant on international commuters and specialists from Switzerland. Herzstark was not permitted to hire his own experts from Vienna.

"Based on these considerations of a general economic, labour market and trade policy nature, we cannot support the granting of the requested permit."

From a letter from the Swiss Office for Industry, Trade and Labour to the Swiss Aliens Police regarding a residence permit for Curt Herzstark, 4 May 1947
Federal Swiss Archive, Berne

"We wish to emphasise that the present case is of considerable importance. The interests of the Prince of Liechtenstein are involved. The company 'Contina A.G.' is owned by the Prince.
    The success or failure of this industrial project depends upon the person of Herzstark. The negative outcome of the case will therefore undoubtedly have certain foreign policy repercussions in the relationship between Switzerland and Liechtenstein. We believe, however, that we must accept this, not least in order to put a stop to unfavourable developments emanating from the Liechtenstein Princely House and to impose certain limits."

Extract from a letter dated 30 July 1947 from the Swiss Department of Justice and Police to the Swiss Department of Political Affairs
Federal Swiss Archive, Berne

Even in Switzerland, it was sometimes difficult to find specialists who were willing to move to Liechtenstein, as the minutes of a meeting show. Max Held, director of the Press- und Stanzwerke in (Presta) in Eschen, had the same problems as Contina AG when it came to recruiting staff, and told a Swiss official in 1948:

"In terms of transport infrastructure, [Eschen] is a very remote location. It is a place that has no good enterprises, compared to ours. In addition, the schools are bad (nuns). Denominational issues. Because of these various problems, many good workers have moved away."

"Liechtenstein citizens are not suitable for all kinds of work. Their hands are much too rough for certain tasks."

Federal Swiss Archive, Berne

Job advertisement placed by Contina in "Liechtensteiner Volksblatt", 15 April 1950

Mehrere flinke, intelligente
Arbeiterinnen
nicht unter 18 Jahren, für Maschinen- und Kontrollarbeiten gesucht.
Persönliche Vorstellung auf dem Betriebssekretariat der
CONTINA Bureaux- und Rechenmaschinenfabrik A. G., Mauren

Curt Herzstark began training in-house specialists in 1947. In addition, Contina AG placed ads in Swiss newspapers in 1949: It sought precision mechanics, gauge makers, millers, turners, inspectors and toolmakers. Many women worked on the assembly side and were trained by the company. They came from Liechtenstein as well as from Vorarlberg. The latter, like other employees on the design and production side, worked as international commuters. Production of the calculating machines was ramped up in 1950/51.

Contina AG – Exotic Products

Box with various gauges 1949
Photo: Hansjörg Nipp

Gauges for mechanical measurements
Photo: Hansjörg Nipp

In the spring of 1948, the management of Contina AG wanted to produce gauges using the Herzstark system. Curt Herzstark had reservations because there was considerable competition in this field in Switzerland and other countries, as well as because this would delay the manufacture of the calculating machines. Despite Herzstark's objections, the management of Contina AG decided to go into production. The business was wound up at the end of 1949 due to low sales.

Since the production machinery was not being fully used, Contina looked around for contract work. For example, it manufactured lenses for single-lens reflex cameras on behalf of a German company. During this period, the company designed a stereo camera and, after development, found that market demand was very limited. Ultimately, no cameras were sold.

At the beginning of 1955 the company management decided to manufacture a record player. The publisher Liechtenstein Verlag in Vaduz was planning to launch "audio books" (audio plays, fairy tales and stories on records) in its sales programme. The novelty was the plan to achieve the longest possible running time per disk side by using a slow rotation speed.

At a speed of 16 2/3 revolutions per minute, it was possible to play back a recording just under an hour long. However, the developers failed to solve the challenging technical problems. Ultimately, only a small number of record players were actually sold.

In 1957, Contina AG attempted to enter the market for single-lens reflex cameras, which was already highly competitive at the time. The owners of an Italian camera company persuaded the Prince to set up a production facility for single-lens reflex cameras at Contina AG in Mauren. The Italian company was trying to stop itself falling into bankruptcy. Documentation for the camera from Italy was inadequate, the camera still had many technical problems and it did not prove possible to solve these. Contina built approximately 100 cameras, and was then forced to pull out of the loss-making business.

Contina AG Built Lenses for a German Company.
Photo: Hansjörg Nipp

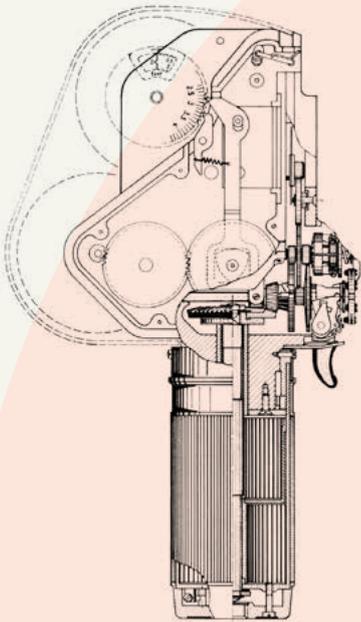**Record player Primafon, 1955**
Photo: Hansjörg Nipp

Lens Makro-Killar for single-lens reflex camera
Photo: Hansjörg Nipp

Single-lens reflex camera Rectaflex
Photo: Hansjörg Nipp

Contina AG – The Standard Film Camera

Modular structure with spring drive in the handle
Photo: Hansjörg Nipp

Small-format cameras have been used for amateur filming since the 1920s. The images were recorded on a light-sensitive film. The exposed film was sent to the film manufacturer to be developed, after which it could be shown with a film projector. To reduce film costs, small-format films tended to be used. The cameras had a spring drive. Jacques Broido invented the spring drive in the handle of a film camera in 1954. Previously, the spring drive and the coil chamber had been fitted side by side. This tended to make the cameras quite bulky.

The company "Carena SA" was founded in Geneva in August 1956. Jacques Broido was a member of the board of directors. In 1962, Carena SA relocated its head office to Liechtenstein.

In 1956 Broido demonstrated the prototype of his Contina AG spring motor and presented the concept of a new camera on the basis of a sketch.

Director Helmut Frick and Prince Heinrich of Liechtenstein, a brother of Prince Franz Josef II, were able to persuade the board of directors of Contina AG to include the film cameras in its product range. Contina AG was to develop and manufacture the camera. Distribution and advertising were to be handled by Gevaert AG, Switzerland. Gaevert AG produced films for small-format cameras in the Netherlands, amongst other things.

Assembly line at Contina AG for the camera Auto-Carena
Photo: Office of Cultural Affairs, National Archive, Vaduz

Contina AG entered a business sector that was new to it and was already being developed by many major manufacturers.

Contina set itself high goals; it wanted to build an innovative, beautifully shaped and precise small-format camera. As a market innovation, the spring drive had been relocated to the handle. This opened up new approaches for the design and construction of the camera.

The designer Peter Schmuck developed the camera according to a modular concept that allowed for extensions. It was the first time that Contina AG built a film camera. The first prototype was assembled at the beginning of 1957. Many improvements, inter alia in the spring drive, were necessary until all the resources for production were established. The camera with the name "Standardkamera" was launched on the market at the end of 1958.

Standardkamera in comparison with the camera Bolex C8
Photo: Hansjörg Nipp

Extract from the operating instructions for the Standardkamera
Photo: Hansjörg Nipp

Contina AG – The Carena Film Cameras

In the case of the Standardkamera, the aperture value for the correct exposure of the film had to be determined either with an external light meter or with the help of a table. At the same time as the Standardkamera came onto the market, cameras with integrated light meters were becoming available. For this reason Contina AG was obliged to modify its camera optics. Even during the development period, cameras came onto the market that had automatic aperture settings. Once again, numerous changes became necessary. Once all tests had been successfully completed, the production equipment had been established and the suppliers had delivered the individual components, production was ramped up from January 1960.

From then on, the film camera was marketed under the brand name "Carena". The type designation of the camera was "Auto-Carena", advertising and operating instructions were produced by Carena SA, Geneva. In 1962, the headquarters of Carena SA were relocated to Vaduz and in 1964 to Mauren. This meant all aspects of the Carena SA business were overseen from Mauren.

Advertisement for the camera Auto-Carena in the magazine "Der Filmkreis", 1960
Photo: Hansjörg Nipp

Zoomex Variogon with accessories, 1963
Photo: Hansjörg Nipp

The competition, most of which were camera manufacturers that had been established for decades, continued to develop their products rapidly. Before long, therefore, another camera with a zoom lens had to be developed in a short time. This reached the market at the end of autumn 1961 under the name "Zoomex". Further models followed.

The development spiral on the market continued to turn fast. The competition was always a couple of steps ahead. In 1964 the Super-8 film was launched around the world as a new film format. This finally heralded the end of the Carena cameras. Contina AG was unable to adapt its cameras, which were based on outdated technology. There was no capital for new developments.

Structure of the Carena Zoomex
Photo: Hansjörg Nipp

Prise list for the Carena, 1964
Photo: Hansjörg Nipp

Contina AG – Industry in Liechtenstein around 1954

During the final years of the Second World War (1939-1945), only a few industrial enterprises were founded in Liechtenstein. The great economic upturn began after the war, when many new businesses were founded, commercial enterprises were expanded and existing businesses were enlarged. The proportion of people employed in industrial enterprises rose sharply compared to those employed in the service sector and in agriculture. In 1954, the number of workers and employees in industrial enterprises exceeded 2100. The industrial sector had become the biggest employer.

The Press- und Stanzwerke in Eschen and the textile factories Jenny, Spoerry & Cie. in Vaduz and Triesen were the largest industrial enterprises, followed by Gerätebau-Anstalt in Balzers and Contina AG in Mauren.

The proportion of men amongst employees in industrial enterprises increased sharply. The molder textile industry had created above all jobs for women. The proportion of employees in industrial enterprises compared to the workforce as a whole was now already above the Swiss average.

The agricultural and commercial sectors were worried about their ability to attract sufficient workers. In fact, however, the authorities had steered a middle course. They did not issue permits indiscriminately, but neither did they hold back over-cautiously.

When it comes to the issue of "excessive immigration" – which was a hotly-discussed topic during the years of strong economic growth in the industrial sector of the 1950s – it is safe to say that the development of the metal-working industry would not have been possible without foreign technicians, master craftsmen and skilled workers. They were active in the fields of research and development, and trained apprentices and trainees.

"The phrase is used in particular in the industrial sector, and is a matter of concern. Existing industrial enterprises are concerned not only about wage competition on the labour market, as more work permits are issued. Above all, however, they see risks to their development opportunities."

However, some people began to speak out against "excessive industrialisation": Schoolteacher Otto Seger at a further training course for teachers
"Liechtensteiner Volksblatt", 4 October 1955

"Favouring the establishment of industrial enterprises made it impossible for the agricultural sector, for example, to find suitable workers. Ideally, a healthy balance needs to be struck between the three major sectors of industry, agriculture and commerce, and maintained over time."

From a lecture heard by the schoolteacher Otto Seger at a further education course for teachers
"Liechtensteiner Volksblatt", 4 October 1955

Advertisement placed by Contina AG to attract apprentices in "Liechtensteiner Volksblatt", 14 January 1956

Ab 1. April 1956 werden

2 Feinmechaniker-Lehrlinge

eingestellt. Bewerbungen mit Lebenslauf, Schulzeugnissen und Foto sind bis 31. 1. 1956 zu richten an

CONTINA Bureaux- und Rechenmaschinenfabrik, Aktien-Gesellschaft, Mauren.

There was a steady and substantial rise in the number of apprentices: In 1940 there were 107, in 1949 then 167 and in 1954 no less than 231 apprentices. This welcome rise in the number of apprenticeships was only possible because of the expanding industrial sector. The training of local specialists was particularly important in a country that had still been a largely agrarian economy prior to the 1940s.

One of the fastest-growing industrial enterprises was Hilti AG in Schaan. Factory building, 1954
Photo: Hilti Aktiengesellschaft

Contina AG – Resumé 1965

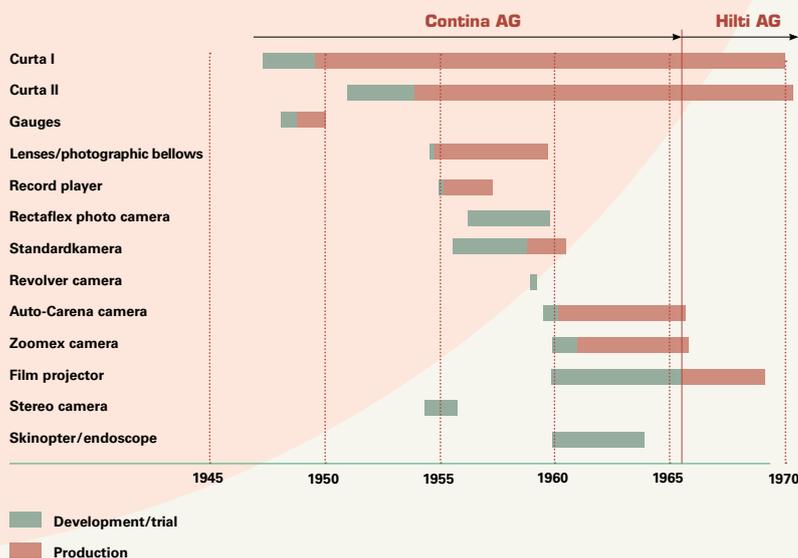**Company site Contina AG in Mauren, 1965**
Photo: Hansjörg Nipp

behind the market-leading competition when it came to camera technology, however. From 1964 onwards, from a sober economic perspective, the future no longer looked so rosy. Following the introduction of the Super 8 film format and the arrival of motorised drives, there was an urgent need for steps to be taken.

A new camera design was urgently required. The company, however, continued to rely on technology developed in 1956. The competition, by contrast, launched cameras with new features, built with the latest technologies at short intervals.

No fundamentally new camera models were planned or prepared by Contina's development department.

Contina AG passed its zenith in 1965, as it lacked innovative products and the capital to develop new products and expand production capacities. In October 1965 the company was acquired by Hilti AG. With the exception of the Curta calculating machine, production of Contina products was discontinued. The Curta continued to be produced until the beginning of 1971.

In October 1965, Contina AG had 230 employees, compared to 300 two years previously.

Production of the calculating machines remained stable for many years. Competition for mechanical calculators did not exist. Likewise, in 1965, the development of electronic calculators had not yet reached the stage where they could match the Curta. No investments were made in the calculating machines after the product was finalised, even though this would have substantially reduced manufacturing costs. Only minor adjustments were made to take account of new technologies or to optimise production processes.

No new developments were made, neither in small calculating machines nor in other areas of computing technology. The company continued to rely on the technology that Herzstark had invented in 1938. Much of the market potential remained untapped. Up to 1956, the development of alternative products, which never reached market maturity, consumed large amounts of capital.

From 1956 onwards, the company focused fully on film cameras and, after initial difficulties, enjoyed great success on the market thanks to the good mechanism and excellent design. The company always lagged

Products of the company Contina AG

		Contina AG	Hilti AG
Curta I			
Curta II			
Gauges			
Lenses/photographic bellows			
Record player			
Rectaflex photo camera			
Standardkamera			
Revolver camera			
Auto-Carena camera			
Zoomex camera			
Film projector			
Stereo camera			
Skinopter/endoscope			

1945   1950   1955   1960   1965   1970

- Development/trial
- Production

Developments and Products of the Company Contina AG
Chart: Hansjörg Nipp

Contina AG – Acquisition by Hilti AG

The economy in Liechtenstein grew fast after 1945. The country quickly transformed itself from an agricultural to an industrial state. Industrial export volumes rose rapidly.

Industrial corporations had strong demand for skilled and managerial workers as well as low-skilled workers. There was also major shortages of labour in the agricultural and domestic sectors as well as in the hospitality industry. Liechtenstein businesses called increasingly for a more generous admission of qualified and unqualified workers. On the other hand, in the early 1960s the employees representatives saw excessive immigration as the number one problem. The commercial sector complained about workers moving to industrial corporations.

In December 1962, the Liechtenstein government took measures to restrict the immigration of third-country nationals. This was followed in January 1963 by regulations restricting the number of international commuters. Industry was no longer able to expand by means of foreign labour. An increase in the number of international commuters was prevented. Industry was only able to increase its production through greater efficiency measures and investments in operating equipment. As a consequence, during the course of the next five years, Liechtenstein companies established 17 non-domestic subsidiaries.

Numerous companies in Liechtenstein were enjoying strong growth and therefore urgently needed to expand their workforces. One of the fastest expanding companies at the time was Hilti AG. In 1965 it was becoming apparent that production capacities at the Liechtenstein site would soon no longer be sufficient. Company premises and personnel were urgently required. However, it was very difficult to hire new people, due to the restrictions that were in place.

Hilti AG was able to solve its personnel problem by acquiring Contina AG in October 1965. In one fell swoop, the company obtained additional qualified staff and further premises for manufacturing. Contina AG's products did not fit with the Hilti portfolio and were discontinued, with the exception of the calculating machine. The workforce was kept on. The former Contina premises were massively expanded during the ensuing years, and production lines and warehouses were built.

As part of a strategic realignment of its plants, Hilti AG took the decision in 2008 to close the plant in Mauren. In 2012 the municipality bought the site. The buildings were demolished by Hilti AG, contamination was disposed of and the site was restored to its original condition. Contina's one-time factory site has once again become a meadow.

Total employment and foreign employees

Year	Employees Total	Foreigners
1941	4,161	676
1950	6,338	2,007
1960	9,096	3,893

Source: Statistics Annual 2002, Office of Economic Affairs
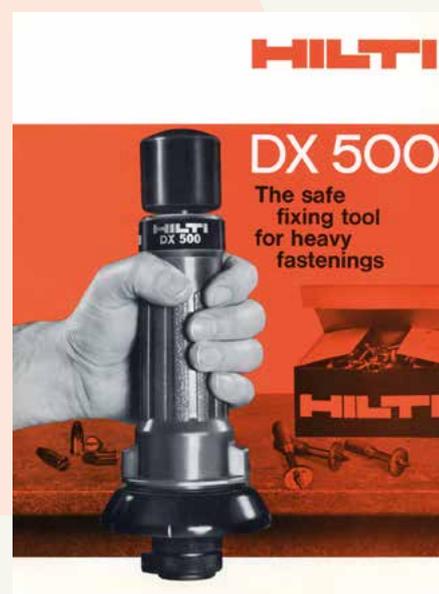Table: Hansjörg Nipp

Residential population from 1930 to 1963

Year	FL	CH	Other	Total
1930	8,257	436	1,255	9,948
1941	9,309	584	1,201	11,094
1950	11,006	1,191	1,560	13,757
1960	12,485	1,563	2,580	16,628
1963	13,130	1,778	3,517	18,425

Source: Statistical Tables, Office of Economic Affairs, 1965
Table: Hansjörg Nipp
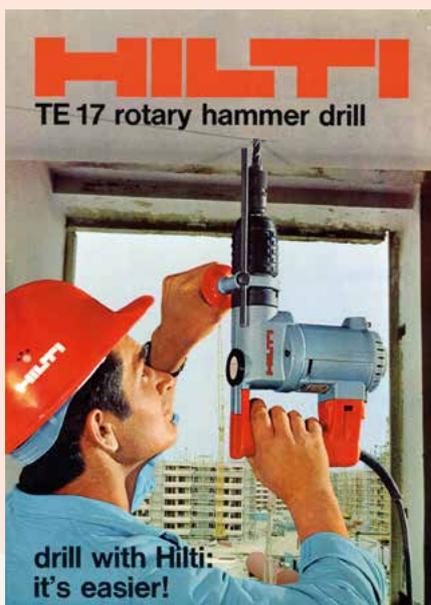
Hilti hammer drill
Photo: Hansjörg Nipp

Hilti Direct Fastening Technology
Photo: Hansjörg Nipp