Hungarian Scientists in Information Technology

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Abstract. Studying Information Technology, the History of Science and Technology was very rich in Hungarian talents; those who designed 'clever' machines at the very early times of calculators. These calculators are the ancestors of the present-time ones that were called later on, in the 20th century, computers. The computer historians may agree or disagree, but I think the first real-life, early 'calculator-like' machine was developed by *Farkas Kempelen* in the 18th century. It was a real output device, a talking machine. Its input was an organ, a music instrument keyboard and the operator of the machine could enter the text and the output of the operation was a human-like speech.

I start the row of the Hungarian inventors with Kempelen and I finish it in the 20th century with a talented mechanical engineer: *Marcell Jánosi*, who designed and patented the world's first floppy disk. Among the thirteen Hungarian inventors are engineers, mathematicians, priests etc. all developed machines for the information technology.

Keywords: History of science and technology, Hungarian inventors, fist cassette floppy disk.

Introduction

I am an electronic engineer and I was a member of the team that built the first Hungarian computer, the M-3 (see section 8) therefore I always had a bias in favour of hardware stories and not that of software.

Fig. 0.1. Dr hc. Győző Kovács (- when I was 70 years old)

Let me add one note yet. I was very fortune in my life, because I knew the majority of these famous persons. Of course, unfortunately, I did not know the inventors, who were living in previous centuries, such as e.g. Kempelen and Jedlik. I also did not meet István Juhász, but we were living at the same age. Neither have I met John von Neumann, as he died in the year I started my career in computer science. I am proud to say that I was a friend of many other fantastic specialists of the computer technology, whose stories are described in my current essay. I am happy that I have been living at the same age and I could meet them.

Finally, I would like to express my thanks to *Gábor Inokai*, who was my colleague and of course is my friend, for scrutinising my English manuscript. Many thanks again.

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1 Farkas (Wolfgang) Kempelen (1734-1804)

He was a great Hungarian scientist, but he is honoured in two other countries too. The Slovaks call him as a great Slovakian scientist. He was born in Pozsony, in the Hungarian capital at the time. The city's present name is Bratislava and it is now the capital of Slovakia. The Austrians call him a great Austrian scientist, because he served in the emperor's court of Maria Teresia in Vienna. Originally his father, Engelbert, was an Irish citizen and he immigrated to Hungary (Fig 1.1).

Fig. 1.1. Farkas Kempelen, self-portrait

He was educated in Hungary, Pozsony, Győr and Vienna then he began to work for the Hungarian Queen and Austrian Empress Maria Teresia as a mechanical engineer in 1755.

His first construction was a special water pump to solve the water supply of the castle in Pozsony. Then the Empress appointed him the commissioner of the government in South Hungary (Bánát).
He visited in 1769 the Empress in Vienna and she invited him to attend the miracle presentation of magnetism by a French physicist, Pelletier. Kempelen understood the 'miracles' and he gave a plausible explanation to the Empress. He also gave her a short note offering another, more interesting presentation if required. The Empress, who loved such shows, asked him to prepare and present it to the Emperor's court as soon as possible.

Kempelen returned to Pozsony and he constructed a chess automat in 6 months' time and was ready to present it to the Emperor's court (Fig 1.2).

The automat was a closed-desk-like box, with a chess table on its top. Before the desk was sitting a Turkish puppet. In reality a chess champion was hiding inside the 'Turk' who won several tournaments of the court of count of Coblenz (Fig 1.3).

Fig. 1.2. Drawing about the Turks and the Chess-machine by Kempelen

Briefe
über den
Schachspieler
des
Herrn von Kempelen.
Von
K. G. v. Windisch.

Preßburg,
gedruckt und verlegt bey Anton Löwe.
1783.

Fig. 1.3. Windisch's book about his idea of the Chess-player

Before the show Kempelen opened the doors of the desk and everybody could see the desk was empty. Of course this show was a trick. Kempelen has never unveiled the secret of the chess player. Nobody could expose the trick, because unfortunately the chess player was burned to death in a Philadelphia fire on 5th July 1854.

There are different versions of explanations about the secret of Kempelen's chess automat, but nobody was able to figure it out. Probably a gnome friend of Kempelen was hiding in the desk, (Fig. 1.4) but the several mechanical tricks of Kempelen are unknown, e.g. how could the gnome see the chess table from his closed place and how could the 'Turk' move the chess pieces with his hands (Fig. 1.5).

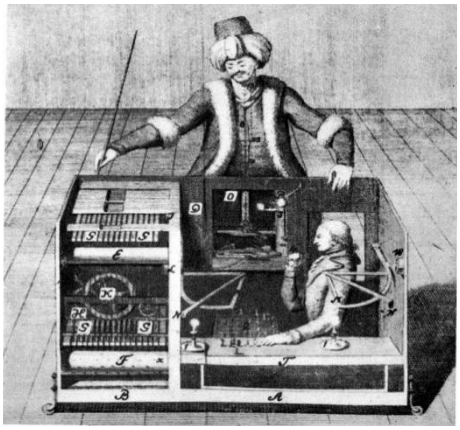

Fig. 1.4. A conception about the chess-machine by Raknitz

Fig. 1.5. A book about the chess-machine of Kempelen written by Rachnitz. 1789

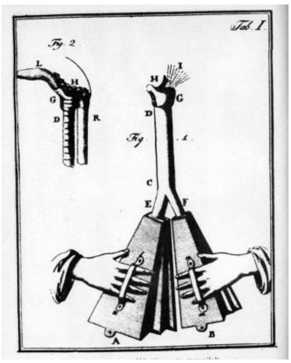

Fig. 1.6. The first model of Kempelen's speaking machine, right and left lungs (A,B), windpipe (CD), larynx (H), tongue (L), pharynx (R)

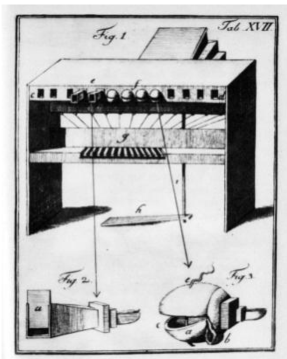

Fig. 1.7. A speaking-machine. Blow-pipe, air suction-pipe, and wind-box, then 13 pieces of mouth elements from wood, with ivory tongues

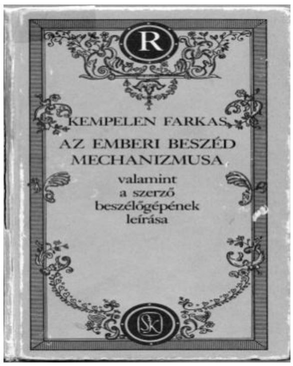

Fig. 1.8. Kempelen's book about the speaking machinme, The Mechanics of the Human Speech. (Orig. German, 1791)

Kempelen usually told his friends the automat player was not a very clever innovation, it was a toy. He had a real innovation too: a *talking machine* that was developed after long research. He conducted very long acoustic and phonetic studies before he started the construction of the talking machine (Fig 1.6).

The machine was ready in 1773 and it was able to say a long sentence: *Venez, Madame, avec moi a Paris.* The machine spoke French (Fig 1.7).

Kempelen wrote a book about the machine in 1791 (Fig 1.8).

The Kempelen talking machine was copied several times, e.g. by acoustical specialists: the Englishman Ch. Wheatstone, the German Posh, the Austrian J. Faber and the French J.S. Lienard, too. A copy of it is preserved in Budapest up to this day.

Another important innovation of Kempelen was a printing-press, which produced a convex script for blind people, including one of his blind friends too.

2 Ányos JEDLIK (1800-1895)

Fig. 2.1. Ányos Jedlik - the inventor-priest

Every secondary school student knows in Hungary that the *concept* of the *dynamo* was invented by **Ányos Jedlik** in the 19th century, in 1861. His results are not known in other parts of the world, because Jedlik did not patent the dynamo and the electrical engine. These machines were patented by Werner von Siemens, six years later, in 1867.

Ányos Jedlik was a professor of mathematics and physics. He was a monk of the Holy Benedictine Order, a priest (Fig 2.1). He finished his secondary studies at the schools of the Order and did his tertiary studies at the Budapest University of Sciences. He earned his PhD degree at the same university in 1839. Then he was an appointed professor of physics and mechanics at the Budapest University of Sciences. He became the Dean in 1848 and in 1863 the Chancellor of University. In 1858 he became an elected member of the Hungarian Academy of Sciences. He retired in 1879 and returned to Győr. He died in 1895.

In the centre of Jedlik's life was the physics. His first interest was mechanics, he wrote several books on this subject matter, but later his main interest was the ultimate science of the time: **electricity**.

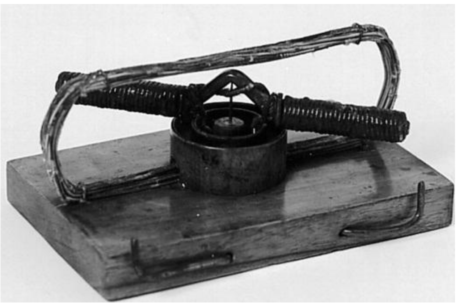

Fig. 2.2. The first electro-motor

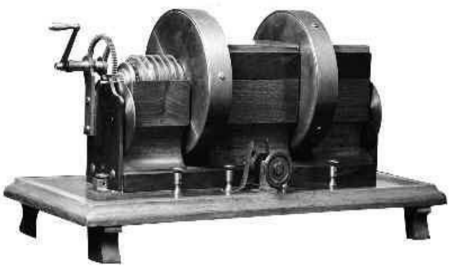

Fig. 2.3. The Jedlik's Dynamo

As I wrote above, he studied the different types of electrical motors, he published first an exact description of the different sorts of electrical motors (Fig 2.2) and he designed the first dynamo (Fig 2.3). He had other electrical inventions too, e.g. voltage multiplication (based on the Leyden jar), this design of Jedlik was awarded at the Vienna World Exhibition in 1873.

Jedlik constructed the first Hungarian **mechanical analogue graphical calculator** in 1878, which was not well-known among the scientists of the time. The Hungarian name of the equipment was: **rezgési készülék (**equipment of vibration). This piece of equipment (Fig 2.4) was able to add graphically two oscillations and one travelling motion, this way the Lissajous curves could be drawn. Bálint Laczik, a lecturer of the University of Technology Budapest, wrote a computer model of the concept of the Jedlik's equipment. He was astonished to see that there was no difference between the results of the more than 120 years old mechanical machine and the computer.

This equipment is now on display in the Hungarian Technical and Transport Museum.

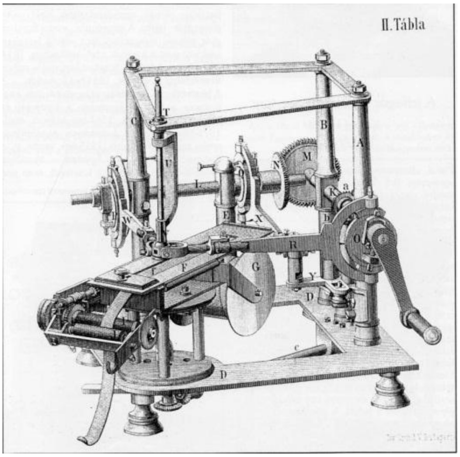

Fig. 2.4. Mechanical graphical analog calculator (Hung. rezgési készülék)

Fig. 2.5. The soda-water

Jedlik had a very well-known and world-wide used innovation, the **soda water** (Fig 2.5). Therefore the owners of Hungarian soda water and sparkling water factories celebrate Jedlik's birthday every year.

3 István Juhász (1894-1981)

He was an excellent mechanical engineer. Together with his younger brother he bought a bankrupted manufacturing plant: **GAMMA Technical Private Listed Company (GAMMA Műszaki Részvénytársaság).** István Juhász was not only an engineer (Fig 3.1), but a very good organiser and businessman too. Therefore his factory was very soon successful.

Fig. 3.1. István Juhász

Their main products were scientific types of measuring equipment for geodesy, but he reorganised the optical division of the company and they started to produce e.g. the Barabas-telescope, the light phone and the artillery periscope etc.

The Juhász brothers served in World War I as artillery men where they saw the first airplane military actions, which was a very useful experience to them. They decided their factory would produce a piece of equipment to help the artillery to shoot down airplanes. They were sure, if a new war broke that out the air force would be the most important division of the military. If the airplane was to be such an important weapon, then the army has to organise a very effective defence.

When WW I came to an end, István Juhász began to test an existing anti-aircraft gun director, designed by a retired artillery officer, *Sándor Szabó,* a reserve lieutenant. István Juhász was not satisfied with the result of the test; therefore he stopped the development of the equipment and designed a new, electro-mechanical one. He found the following problems: the GAMMA-Szabó equipment was inaccurate, it was difficult to transport and their operation was unstable.

He decided to change the main characteristics of the new GAMMA-Juhász anti-aircraft gun director. First of all, his equipment controlled 4 anti-aircraft guns that shot at the same time with parallel gun-barrels (Fig 3.2). He used a Hungarian patent, the self-exploding munitions. The time-controller of the munitions could be adjusted before shooting. The measuring telescope of the anti-aircraft gun director measured very quickly the height, the speed and the direction of the enemy airplane and then the equipment calculated very quickly the parameters of the 4 guns aiming for the target, i.e. the airplane. Then the guns fired, the munitions exploded near the airplane. If the airplane was between the 4 explosions, it was destroyed.

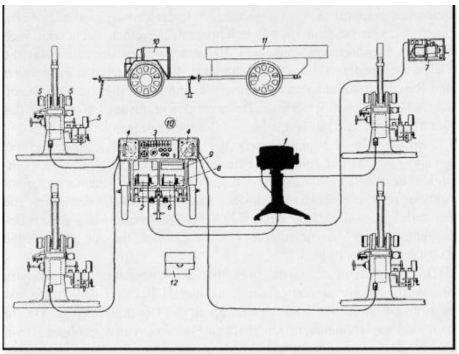

Fig. 3.2. The GAMMA-Juhász anti-aircraft gun-director controlled 4 guns simultaneously

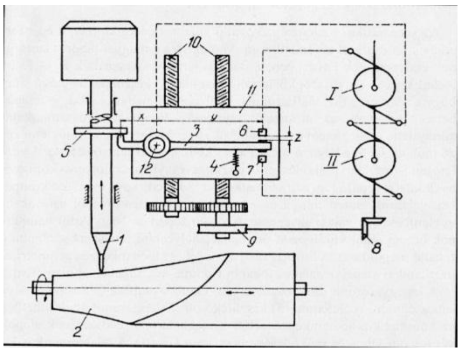

Fig. 3.3. The memory of the GAMMA-Juhász equipment, the ballistic body

The other great innovation in the equipment was a ROM (!), a *ballistic body* (Fig 3.3), which contained the possible ballistic paths of the given gun and munitions, which were selected by the anti-aircraft gun director depending on the measured parameters.

The first official international presentation of the GAMMA-Juhász equipment was in Sweden in 1932, where several companies and military representatives were invited (Fig 3.4). The results of GAMMA-Juhász equipment were the best one. The competition came from the factories of Germany, France, the Netherlands and

Belgium. They were not as successful as the Hungarian one. After the Swedish presentation the GAMMA Works received a lot of orders from the armies of Sweden, Norway, Argentina, China, Finland an Iran. It was a really great business success.

Fig. 3.4. The GAMMA-Juhász equipment in the Swedish army

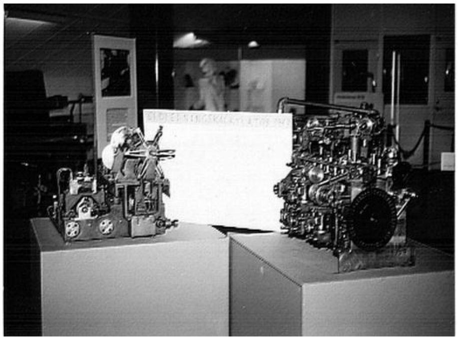

Fig. 3.5. The GAMMA-Juhász equipment - made in Sweden - in the Stockholm museum

The Swedish Industry bought the GAMMA-Juhász licence and organised a joint venture, called ARENCO AB, manufacturing the *GAMMA-Juhász anti-aircraft gun director* (Fig 3.5). This was a barter business: the Diósgyőr Steel Factory received the licence of the famous Swedish BOFORS 75 mm anti-aircraft Machine-Gun. From this time on the Swedish and the Hungarian companies delivered similar, complex anti-aircraft systems to military organisations world-wide (Fig 3.6).

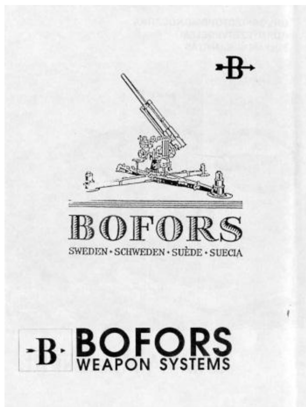

Fig. 3.6. The Swedish Bofors Weapon System

After WW II, when the Soviet army invaded Hungary, they took possession of the GAMMA Works too. The majority of the tool machinery was dismantled and transported to the Soviet Union, as a compensation for the war damages. István Juhász tried to resume the manufacturing with the remaining machines, but his factory was nationalized and the State representatives declared in 1945, he was unfit to manage the company. He retired and died in 1981.

The Soviet authorities instructed the GAMMA factory to manufacture a *Soviet anti-aircraft gun director instead of the Hungarian one: PUAZO.* It was not as modern and as successful to the Hungarian army as the GAMMA-Juhász equipment was. Therefore the leaders of the Hungarian army and the officials decided in 1953/54 that they would stop the manufacturing of the PUAZO and they would resume the development of the GAMMA-Juhász equipment. They renamed the equipment to *Model 'E2'.*

The new *Model 'E2'* was ready in 1956. It was used it in the six-day Arab-Israeli war in 1967, where its legendary achievement was to shoot down a *Mirage hunter-airplane* made in Israel.

4 Tihamér Nemes (1895-1960)

He was a very talented mechanical engineer, who earned his bachelor degree at the Budapest University of Technology in 1917. His first job was at the Lloyd Aircraft Factory. He was interested in the emerging telecommunication opportunities and in 1921 he joined the new ‘Telephone Herald’ company (telefonhírmondó). This system was a Hungarian patent invented by Tivadar Puskás. Tihamér Nemes was appointed as a chief-engineer. He was a very good organiser and therefore he changed his job. He was appointed the director of the Electrical and Precision Mechanics Public Limited Company (PLC).

He did not like the administration and tendered his resignation as director. He resumed his carrier at the research institute of the Hungarian PTT as a scientist.

His first task was the development of a new telephone set: CB 35 that was used in Hungary as well as abroad for a long time. Back then one of his tasks was to check and repair the telecommunications problems of the phone system, e.g. he measured and corrected the intelligibility of the communication through phone lines.

He was one of the first specialists interested in the very early television technology. He had some patents and he was a member of the first team that carried out the first television broadcasting in Hungary.

Tihamér Nemes (Fig 4.1) was the first researcher, who was interested in cybernetic problems in the mid-thirties. However Norbert Wiener (1894-1964) founded the science of cybernetics only in 1948 in his book: *Cybernetics: Or Control and Communication in the Animal and the Machine.*

Fig. 4.1. Tihamér Nemes

Tihamér Nemes decided to construct models to simulate human and animal activities. His first constructions were logical machines, animating human thought. He built a copy of the Jevons logical machine from wood (Fig 4.2, 4.3 and 4.4). His next construction was the pocket logical machine (Fig 4.5) that could be used for solving logical tasks. He constructed a genetic logical machine with relays (Fig 4.6) too.

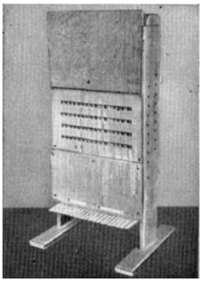

Fig. 4.2. Copy of the Jevons logical machine from wood

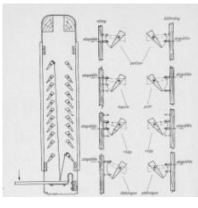

Fig. 4.3. The Jevons logical machine. Wood and String, by Nemes

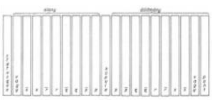

Fig. 4.4. A Jevon’s logikai piano, keyboard

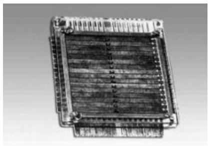

Fig. 4.5. The pocket logical machine

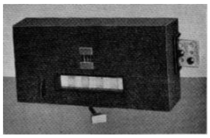

Fig. 4.6. The genetic logical machine (with relays)

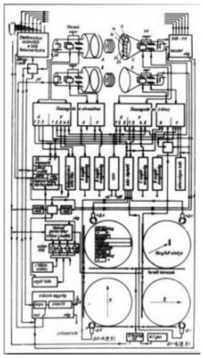

Fig. 4.7. Nemes’ chess machine for solving a chess-task in two steps

Tihamér Nemes was a good chess player and designed in 1949 a chess playing machine. Unfortunately he could not build his machine because the technology was not developed enough at the time to construct such a machine. Unfortunately the majority of his ideas and patents remained only ideas and were not implemented (Fig 4.7). He patented many of his ideas. Some of them were: a letter-reading machine, artificial animals, a gaming machine, a reproducing machine, a walking machine, a talking machine etc.

He was very interested in the computer. Our team constructed the first Hungarian computer, the M-3 between 1957 and 1959. Tihamér Nemes visited me at least once a week in our laboratory where he asked me a lot of questions about the computer as he was interested in all of the details. He was ill at the time and died before he could see a real, working computer based on the von Neumann concept.

His posthumous book *Kibernetikai gépek* (Cybernetic Machines) was published in 1962 from his papers collected by his friends after his death (Fig 4.8).


KIBERNETIKAI GÉPEK

Fig. 4.8. Nemes, Tihamér his posthumous book, Cybernetic Machines

5 László Kozma (1902-1983)

I am feeling a special affiliation with him, because he was my favourite professor at the University of Technology, Electrical Engineering Faculty (Fig 5.1).

His life was not very easy, his parents were not rich and he was a young Jewish man, when the anti-Jewish Law was legislated in Hungary. The law admitted only a limited number of Jewish students to the University. It was the first law against Jewish nationals in Hungary. One of his relatives offered him a job at the largest electric factory in Hungary: *Egyesült Izzó*; its name was changed later to *TUNGSRAM*. He became a phone operator and was working at the manually operated telephone-exchange.

Fig. 5.1. László Kozma, 1959 Aug. 3

His command of English was very good. Therefore the engineers of the factory gave him electric designs of the new automatic telephone exchange circuits that they wanted to manufacture at the factory. Kozma was very soon regarded an authority on automatic telephone exchanges at the factory.

When the engineers saw the talent of the young colleague, they gathered enough money at the factory and they granted him a scholarship to study at the Brno University, where such anti-Jewish Law did not exist.

He graduated from the University as an electrical engineer in 1930. Then the factory suggested to him to go to Antwerp and join the European plant of Bell Telephone Laboratories. This company was the world leader of automatic telephone-exchange products. The Hungarian Plant wanted to buy the telephone exchange licence from this company in Antwerp too.

He was very successful at the factory, he submitted alone or jointly with his colleagues 25 patents between 1934 and 1938.

The director of development tasked him to design calculators from telephone exchange parts manufactured in the factory (Fig 5.2). László Kozma did not know anything about the race in the United States to manufacture super-fast calculators. This effort was driven by the Americans' belief that the next world war would be won by a country that produced the fastest calculators.

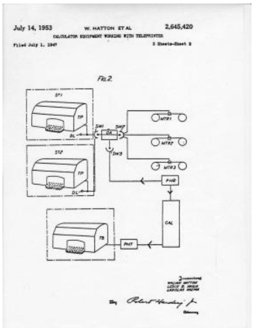

Fig. 5.2. A patent of László Kozma, in Antwerpen 1947

Fig. 5.3. George G. Stibitz

Fig. 5.4. BELL Relay Calculator, designed by Stibitz

Laszló Kozma commenced working on the calculator at the beginning 1938 and it was available before the end of the year. His second calculator was ready before the end of 1939. It was a very interesting design that was used by the whole company. Every department had a terminal that was connected to the calculator through a local telex network. A steel memory wire was connected to the telex-network, too. I believe it was the first calculator network in the world. A similar American network designed by George Robert Stibitz (Fig 5.3), and installed by the American Bell Laboratories was ready only in 1940.The centre of the network was one of the first American Relay calculators (Fig 5.4). The factory protected Kozma's calculators with 10 patents.

On 10th May 1940 the German Army occupied Belgium, but the factory was working continually. The director sent the Kozma calculator to the US, but he was told the machine never arrived there, because a German submarine sunk the ship. (Who knows?)

Kozma had to leave the factory and Belgium too, because the Germans started to collect the Jewish people and delivered them to the concentration camps. Kozma could have travelled to the UK, or US, but he believed in the Hungarian authorities and returned to Hungary in 1942. Soon after his arrival he was deported to Mauthausen, but he survived it (Fig 5.5). His wife did not.

He returned to Hungary and participated in the reconstruction of the demolished telephone exchanges in Budapest. He was one of the professors who established the new Faculty of Electrical Engineering at the Budapest University of Technology and he became one of the first professors. Then he was employed by the Ericsson telephone exchange factory in Budapest and was the technical director of the plant. Kozma was awarded the Kossuth Prize for his role in the reconstruction of the telephone exchange.

The communist government arranged a show trial against the factory at the end of 1949, because they wanted to nationalize the foreign company. They sentenced the leaders of the plant, including László Kozma, to a long imprisonment. The reason was: sabotage, which, of course, was untrue.

Kozma got out of the prison in 1954. He was rehabilitated and was reinstated in the professorship and the Kossuth Prize. He became a correspondent member of the Hungarian Academy of Sciences in 1961, then in 1976 a regular member.

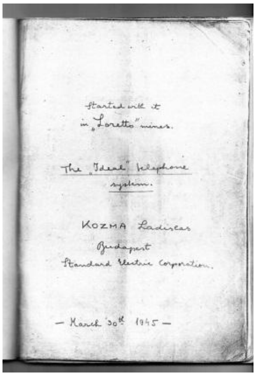

Fig. 5.5. An ideal phone system designed by Kozma in the concentration camp

Fig. 5.6. The MESz-1 computer constructed by László Kozma, in the museum

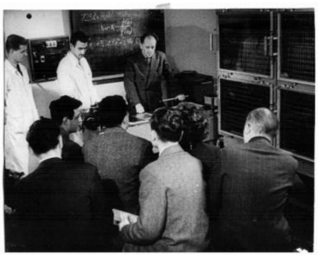

Fig. 5.7. Kozma László teaches before his computer

He constructed the first Hungarian relay computer, the MESz-1 (Fig 5.6), at the University of Technology. This computer operated with 8 digit decimal numbers, i.e. 27 digits binary numbers, its storage capacity was 12 decimal numbers and it could be controlled by instructions. The instruction input was a punched card with a set of 45 possible instructions. The output was a Mercedes typewriter, adapted by László Kozma. The machine was working with 2,000 relays (Fig 5.7).

He died on 9th November 1983.

6 John von Neumann (1903-1957)

Fig. 6.1. John von Neumann (1940)

I think he is the best-known computer scientist in the world. His original Hungarian name was: Margittai Neumann János Lajos (Fig 6.1). His father: Margittai Neumann Miksa was ennobled by the Hungarian king and Austrian emperor Franz Joseph. This was an acknowledgement for his support to the development of the Hungarian economy as a banker at the beginning of the 20th century.

His oldest son was John, the middle one was Michael and the youngest brother was Nicholas (Fig 6.2). The three children graduated at the very famous secondary school in Budapest, the Lutheran Gimnazium, where several Nobel Prize winners studied.

Fig. 6.2. The Neumann family's children, (from left) Nicholas, Michael, John and their cousin, Lily

John was very good at mathematics and physics, but he also learned different languages easily. He spoke fluently French, German and later English too. One of his favourite foreign languages was ancient-Greek.

His mathematics teacher was *László Rátz*. When he discovered the mathematical talent of John he allowed him to visit some famous mathematicians instead of the mathematics class. He visited very famous Hungarian mathematicians on a regular basis, discussing mathematic problems of the time.

When he completed his secondary education his teacher suggested to John's father that his son enrol at the University of Sciences to study mathematics. His father disagreed and decided that John would become a chemical engineer and commence his studies in Zurich. The Jewish families were very well organised; the decision of the father could not be questioned. John followed his father's instructions and travelled to Zurich to begin his studies at the *Eidgenössische Technische Hochschule*. Concurrently he also started his studies in the Budapest University of Sciences, where he learned mathematics, physics and chemistry. He was also a student of the University in Berlin, where he attended the lectures of Albert Einstein.

He graduated as a chemical engineer in Zurich, did his PhD in mathematics in Budapest and a little bit later he habilitated at the Berlin University.

His first job was in Göttingen, because he decided to work with David Hilbert, the famous German mathematician (Fig 6.3).

At that time the Nazi party gained dominance and a Nazi person was appointed the new chancellor of the Göttingen University. This was a strong incentive for the Jewish scientists to immigrate to America. Von Neumann accepted a guest lecturer invitation at Princeton University in the US in 1930. He was appointed very soon an ordinary professor of mathematics at the University, a little bit later the mathematics professor of the Institute for Advanced Study (Fig 6.4).

Fig. 6.3. David Hilbert

Fig. 6.4. The Hall of the IAS

Fig. 6.5. Hermann Heine Goldstine

When the Nazis started WW II, he offered his cooperation to the American Army. He worked in Aberdeen too, but he served most famously in Los Alamos, were the best scientists of the United States were developing the Atomic Bomb. He was an advisor of the Research Institute. His main invention was the *implosion*, a method to detonate the bomb.

He had to perform a lot of calculations to do his job, but the electro mechanic calculators were very slow at that time.

Von Neumann met Hermann Heine Goldstine (Fig 6.5) at the Aberdeen train station in the summer of 1944. Goldstine informed von Neumann about the ENIAC project, i.e. they were working on an electronic calculator that was several thousand times faster than the ordinary electro-mechanic calculators.

Von Neumann was enthusiastic to find a calculator that was needed for his project in Los Alamos. So he visited Moore School at the University of Pennsylvania (PENN) as soon as possible to gain first-hand experience with the ENIAC (Fig 6.6).

Von Neumann joined to the ENIAC team, but he did not maintain a good relationship with the inventors of the ENIAC: John Mauchly and Presper Eckert (Fig 6.7). He criticised the architecture of the ENIAC, because the programming of the machine was very cumbersome. The size of the memory was also not large enough. So von Neumann decided that he would design a new computer. Hermann Goldstine agreed.

Fig. 6.6. The ENIAC in operation

Fig. 6.7. John William Mauchly and John Presper Eckert

Fig. 6.8. The logic unit of EDVAC

Von Neumann returned to Los Alamos. On 30th June 1945 he travelled to PENN again taking a 101 page study with him: *First Draft of a Report on the EDVAC, by John von Neumann* (Fig 6.8).

It was the first description of the *von Neumann stored program concept*. The ENIAC team began to build the EDVAC, but von Neumann was dissatisfied with the new machine.

The war ended, Mauchly and Eckert founded the first computer factory: *Electronic Control Co***.** where they manufactured the successor of EDVAC, the BINAC and later the UNIVAC.

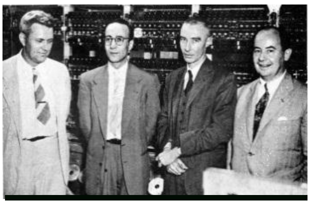

Fig. 6.9. photo before the IAS Computer, (from left), Julian Bigelow, Hermann Goldstine, Robert Oppenheimer and John von Neumann

Von Neumann decided he would design a new computer, a different one from the EDVAC. The Institute for Advanced Study (IAS) started a new computer programme. Some scientists from the earlier ENIAC programme joined to the team, e.g. Hermann Goldstine, Julien Bigelow, (Fig 6.9) Arthur Burks and some new members, e.g. James H. Pomerene and *dr. Jule G. Charney***.** He developed meteorology forecast programs following the von Neumann numerical meteorology concept.

Von Neumann fixed the problems of the EDVAC. In this new computer program, e.g. parallel operations were in the IAS machine, they used one-address instructions, a relatively large (1 k/word, 40 bits/word) operative memory with Williams tubes, a magnetic drum as a background memory and IBM punch card I/O. A brand new element also emerged: a graphical display transformed from an oscilloscope.

This was a very important event: Von Neumann and his colleagues declared that the concept of the IAS computer was freely available for everybody, i.e. they did not patent it. They distributed the design of the computer, not only in the US, but world-wide, making it possible that several IAS computer clones were built simultaneously all over the world. Some of the clone computers were: **ORDVAC** (Ordnance Variable Automatic Computer), **ILLIAC** (Illinois Automatic Computer), **AVIDAC** (Argonne National Laboratory), **ORACLE** (Oak Ridge National Laboratory), **MANIAC** (Mathematical Analyser Numerical Integrator, and Computer, 1952), and the **JOHNNIAC**, (Johnny Integrator and Automatic Computer) etc.

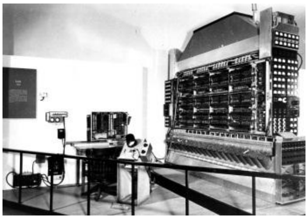

Fig. 6.10. The IAS Computer in the Smithsonian Museum

The IAS computer was ready and presented to the public in 10th June 1952.

Von Neumann died in 1957 and Hermann Goldstine became the head of the IAS Computer Programme. Hermann Goldstine and Robert Oppenheimer, the director of the IAS, foresaw that computers would be manufactured in factories and not in research institutions. They decided to terminate the research programme at the IAS.

The computer installed at IAS was relocated to the Princeton University in 1958, where it was used for some years. Today the IAS machine is in the store of the Smithsonian Institute (Fig 6.10).

7 László Kalmár (1905-1976)

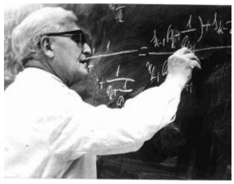

Fig. 7.1. László Kalmár, the university professor

Szeged is quite a large university city in South Hungary. The József Attila University of Sciences is the main university of the city, and at that time it was famous for several mathematical departments and a specialized one was the School of Cybernetics. The founder of the department was Professor László Kalmár (Fig 7.1) in the 1950s, a mathematician and academic of the Hungarian Academy of Sciences.

Professor Kalmár taught mathematics, logic, set theory and analysis. He developed a computer science-mathematics curriculum, the first one in Hungary.

He established the Cybernetic Laboratory in 1963, where a lot of young scientists started their careers: mathematicians, engineers, physicists and other specialists. Szeged was the centre of Cybernetics in Hungary.

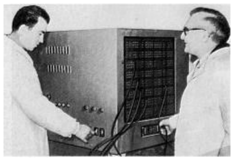

Fig. 7.2. László Kalmár, (right) and Dániel Muszka at the Kalmár Logic Machine

The university had no computer of its own at that time, Professor Kalmár designed a logic machine with relays that was built by Dr. Dániel Muszka, his assistant. Its official name was: *Kalmár's or Szeged logic machine* (Fig 7.2)

The machine was able to solve different logic tasks with a lot of variables and was ready in 1958. It could be controlled by a wired program (Fig 7.3). The control program was a physical net of cables connected to the machine.

Professor Kalmár tried to find real-life applications for the logical machine, e.g. a railway network controller, but the management of the Hungarian State Railways declined his suggestions.

The Cybernetic Laboratory designed several different cybernetic machines, e.g. an automatic traffic lights control system that was installed in Szeged, carried out by Győző Kovács and Dr. Dániel Muszka. Dr Muszka put a lot of efforts into cybernetics aided driver support in the automotive industry.

Dr Muszka designed the first artificial cybernetic animal: the *Szeged Electronic Ladybird*, (Fig 7.4) which was a demonstration of the conditioned reflex in the animals (Fig 7.5).

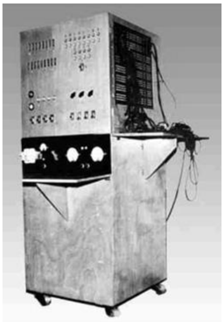

Fig. 7.3. The Kalmár Logic Machine

Fig. 7.4. Dr Dániel Muszka and the Ladybird Logic Machine

Fig. 7.5. The Szeged' Ladybird

The first Hungarian computer, M-3, was installed in 1959 in Budapest. In 1965 it was transported to Szeged, where the computer was in operation till 1968. It was the first computer of the country and the first computer centre established in a countryside town. This centre played a pioneering role in computer use in Hungary.

8 Rezső Tarján (1908-1978)

He was a Hungarian mathematician. During his teenage years he was interested in radio technology and was a passionate amateur radio operator. He graduated from the secondary school in 1925. He could not continue his studies at the Budapest University of Sciences because the 'Numerus Clausus Act' was legislated. This quota limited the percentage of Jewish students at universities.

Fig. 8.1. Rezső Tarján

He was employed as a blue-collar worker for a year and thereafter he enrolled to the University of Vienna. He studied physics, mathematics and philosophy. He earned his PhD degree in physics in the early 1930s, the subject of his thesis was light dispersion.

His first job was at 'Janus', later at 'Adria' Insurance Company, as an insurance mathematician, but he continued his activity as an amateur radio operator, too. He also designed a *signal generator*.

During WW II, in 1944, he had to perform forced labour in-lieu of conscription as young Jewish men were prohibited to serve in the armed forces. During this service he fell seriously ill, but he survived.

After the war he was left a scientist and as such he was appointed to several senior executive positions (Fig 8.1). He joined Tungsram (Egyesült Izzó) and later was promoted to managing director of the Telecommunication Industry. At the beginning of the 1950s he was appointed as a deputy director of the PTT Research Centre.

Tarján had personal connections with a lot of Western scientists from different backgrounds. The communist government of the time deemed it as a crime and he was sentenced for spying on his own country entrusted by Western powers in 1953. He was released from the prison after 2 years.

The Hungarian political police established a 'research institute' called *'KÖMI 401'* in the prison. Lots of scientists, engineers etc. who were sentenced to long imprisonment could continue their work in the prison at a very low 'salary'.

Tarján was in the prison with two of his friends: *József Hatvany*, a physicist and *László Edelényi, a* mechanical engineer. These three prisoners offered to the Mathematical Department of the Hungarian Academy of Sciences (HAS) that they were prepared to design a computer for the HAS. Their conditional offer was subject to the HAS's obligation to carry out and install their computer design. It is noteworthy to mention that the letter was sent via the political police and the names of the authors were omitted. The HAS rejected the offer.

When Tarjan was released in 1955 he contacted some academics of the HAS asking for their help to realize his idea, i.e. the installation of the first Hungarian designed computer. The HAS was in a very uncomfortable situation and took a chance by allowing Tarján to realize his dream of the computer. He headed up a department in a research institute of HAS, where he started building the first electronic computer, the B(udapest)-1. Hatvany, Edelényi and a few new colleagues comprised his team.

Tarján's original idea was to clone the EDVAC or EDSAC to enable him to visit Maurice Wilkes in Cambridge. Wilkes offered him a working installation of the mercury delay line, but Tarján told me it was too heavy to be transported to Budapest.

His team began to develop B-1, but they wanted to design a *nickel delay line*. Unfortunately they did not succeed.

Tarjan did not stop 'bombarding' the HAS, because he desired to found an independent research institute to conduct cybernetics and computer research. Finally, in 1956, the Presidency of the HAS decided to establish a research team and called it *Cybernetic Research Group of the HAS* (Fig 8.2).

The academic circles were enthusiastic, not so Tarján. A Soviet emigrant, Sándor Varga, was appointed as the director and Tarján was the Scientific Deputy Director. The goal of the institute was to conduct cybernetic research and to install *the first Hungarian computer,* under Tarján's leadership. The HAS permitted that the research team begin its work and new members joined as specialists, mathematicians, engineers, economists etc. Four young mathematicians and four young engineers were selected by Tarján, they were 1956-57 university graduates. I was very fortunate to be one of them (Fig 8.3).

The big problem was we had not seen any real-life electronic computer before. The engineers visited the MESz-1 relay computer installed by *László Kozma* at their University, the mathematicians read books, articles about computer programing, but it was not sufficient for designing and installing a computer. Unfortunately Tarján's computer knowledge was also insufficient to organise and control the research work (Fig 8.4). So we did our best without any specific goal and result (Fig 8.5).We had no such opportunity, as e.g. the English, Swedish, Danish or the US specialists, when they designed the *EDSAC, ILLIAC, MANIAC, JOHNNIAC* and the other EDVAC and IAS clone computers (Fig 8.6).

Fig. 8.2. The Nídor utca 7, where the first computer - the M-3, was constructed

Fig. 8.3. A study from the HAS Cybernetical Research Group, accepted by Varga and Tarjan

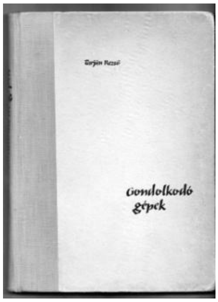

Fig. 8.4. The book of Rezső Tarján, the thinking machine

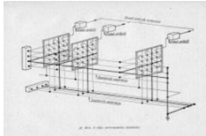

Fig. 8.5. A page from Tarján's book, the ferrite-memory

Fig. 8.6. The first publication possibility in Computing Science

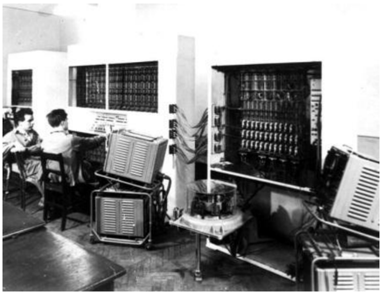

Fig. 8.7. The M-3, is ready, before the computer, Győző Kovács and Bálint Dömölki

Conducting research without any tangible result was not acceptable for Varga because he wanted to see a working computer within the shortest possible time. He stopped the development of B-1 and visited his earlier research institute in the Soviet Union: the *Institute of Energy Policy in Moscow.* One of the first Neumann concept computers, the M series, was being designed there at that time. Varga offered to undertake with him the design of their newest, medium-size computer, M-3, for the use of our team. They told him they were sure the Hungarian team would be unable to install the M-3 based on their blueprints and instructions. Four other countries, China, Estonia, Armenia and Belorussia, asked for a similar support at that time and were given the same blueprints.

The wooden box containing the blueprints and the necessary parts for the computer arrived soon and we started to build the M-3 computer. Varga reorganised the research team, Tarján was stood down, Bálint Dömölki was appointed as the head of the computer installation team, and me, as his technical deputy (Fig 8.7).

The task was very interesting. Dömölki was the first person in Hungary, who interpreted and understood the operation of a computer from blueprints. We, engineers, understood the operation of the circuits and finally the computer was turned on to start its first operation. The main memory of the computer was a magnetic drum, which was not too fast. The first version of the machine was able to execute only from 30 to 50 instructions/sec. It was a fantastically high speed for us, because in the nineteen-fifties our computer was the largest electronic equipment in our country and the fastest calculator (Fig 8.8).

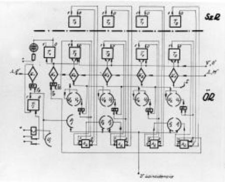

Fig. 8.8. A drawing about the logical circuits of the M-3

Esti Hírlap

Mikojan tanácskozásai Washingtonban elutazása előtt

Fig. 8.9. News from the Newspaper 21st January, 1959. The M-3 is ready

We changed the logic in some parts of the computer, because we felt, we were very ‘smart’. All together five M-3 computers existed in different countries as mentioned above, but they were incompatible with each other. We built in new instructions, our computer was able to play music, I connected not only one, but two magnetic drums via a new drum-controller to the central processor, as a background memory. We changed the original I/O units to an 8 channel paper-tape reader/punch unit etc (Fig 8.9).

The mathematicians solved a lot of interesting mathematic tasks, e.g. we controlled the stability of the longest new bridge across the Danube. The economists also developed several tasks, e.g. they calculated the planning tables, which would be called spreadsheets today, of the 5 year state plans of Hungary.

Varga renamed our team, once the computer was operational, the new name was: *The Computer Centre of the HAS*. (Magyar Tudományos Akadémia Számítástechnikai Központja).

HAS stood down Sándor Varga as managing director soon, because he allowed us to build a new, most modern, computer and he did not ask for the permission of the HAS. It was a very big offence, he had to leave and we had to disassemble the half manufactured second computer. The reasoning behind the HAS’s decision was that the *first M-3 was powerful enough for the HAS’s needs for at least 5 years’ time!* The decision was supported by the whole presidency of the HAS.

Tarján joined the Department of László Kozma at the University of Technology Budapest. A short time later he was invited to the National Committee of Technical Development. He worked in his scientific advisory capacity for the Unified Computer System of the Socialists countries. He passed away in 1978.

9 Árpád Klatsmányi (1923-2007)

He was an eminent student at secondary school and graduated in 1941 with high distinction. He excelled in mathematics and logic and possessed a powerful ability to comprehend new subject matters very quickly.

He was studying mechanical engineering from 1941 till 1947 at the University of Technology (Magyar Királyi József Nádor Műszaki és Gazdaságtudományi

Egyetem). He was a university student for eight years, because WW II interrupted his studies. The young university students were transported to Germany in 1944, where they self-studied engineering. They returned home in December 1945. He received his degree in March 1947.

His first job was at Tungrsam (Egyesült Izzó), where he was involved with the development of different subject matters. These were related to high-power vacuum tube production and a number of various measuring instruments. He also took part in new transistor development projects. He continued his career at the University of Technology Budapest from 1952 to 1957. He took an active role in the 1956 Revolution and therefore he was discharged from his educational duties.

Fig. 9.1. Árpád Klatsmányi

After leaving the university he joined to a team of measuring instruments developers. From 1st June 1959 he was employed at EMG (The Factory for Electronic Measuring Instruments i.e. Elektronikus Mérőkészülékek Gyára) (Fig 9.1).

I heard about him at the university, but we did not meet. I joined SzKI (Co-ordination Institute of Computer Science) in 1969 and our laboratory was located next door to the EMG. I visited him and we became good friends. We informed each other about our work and results as we met every day in the canteen of his factory.

The factory produced traditional analogue measuring instruments, but Klatsmányi realised that the measuring industry was heading towards the electronic, digital technology. His idea was accepted by the management of the factory and he was appointed as the chief designer of the Digital Division.

He recruited a very talented team around him and they produced a lot of digital instruments, e.g.:

- The EDS digital module family, which was a multi-purpose device, e.g. they synchronised the network of traffic lights on the Grand Boulevard in Budapest.
- They designed and manufactured the first 'electronic pocket calculator – the HUNOR series', which was not only technically, but also commercially very successful. Klatsmányi and EMG were the first world-wide manufacturers of this piece of equipment. They started the development in October 1964 and the product was on the market in February 1965 (Fig 9.2).

Klatsmányi decided in 1965 that he would develop a real-life computer using transistors. He and his colleagues designed a computer, which was not only up-to-date, but contained several novel solutions, e.g.

- a BUS system was first used to connect the components of the computer.
- Klatsmányi designed a modular system, because he was thinking about a centralised service to repair the faults of the client computers. If a client ran a test program that detected a problem and the test indicated the problem was in one of the modules, the central service engineer replaced the module and tested the computer again. Later the faulty module was returned to the central service for repair.
- The peripheral devices of the computer were bought abroad and he used a foreign manufactured magnetic tape, a FACIT tape reader and punch and an IBM typewriter.
- Klatsmányi organised the training of the clients, too.

The central maintenance was included in the price of the computer.

The EMG 830 computer (Fig 9.3) was introduced to the computer specialists in 1968 at the first ‘Computer Technology 68’ conference of the John von Neumann Computer Society.

Fig. 9.2. Hunor 131. Electronic table calculator

Fig. 9.3. The control desk of the EMG 830 computer

Fig. 9.4. Jínos Sebesty vice President of the OMFB

1968 was an unfortunate year for Hungarian computer development, because the Soviet Union decided, and the other COMECON countries accepted, that the computer was a strategic product, consequently it could only be produced in the Soviet Union. The other Socialist countries would buy the computers from the Soviet factories. The computer development had to stop in the satellite countries, also in Hungary. EMG contrived that the EMG 830 was not a computer, but it was a controller for tool making machines, therefore they could continue its production. The Hungarian authorities accepted this fake argument and EMG continued to manufacture the ‘computer/controller’.

In January 1968 there was an important event in relation to computer production. A. Kosigin, the Soviet prime minister, overrode the decision of the COMECON and asked the leaders of the COMECON countries to participate in the production of a computer product family called *Unified System.* It was also called by another name: *Rjad.* Parts of the System would be manufactured in different countries. The other decision was that the parts of the System would be cloned from the IBM 360 (later IBM 370 – Rjad-2) series.

Fig. 9.5. The R-10, made by the Videoton (EC1011)

Hungary was responsible for the smallest member of the Rjad computer family: R-10, a small computer that did not even exist in the IBM 360 series. A deputy minister of the Hungarian government, *János Sebestyén*, headed up the Hungarian delegation (Fig 9.4). He and *Dr. Zsolt Náray,* the chief designer of the Hungarian Rjad computer, decided that the Hungarian Rjad Team would not copy any computer. We would buy a licence, together with the computer manufacturing technology.

Finally the French company, CII, sold its licences to Hungary. The first one was the CII 10010, later the CII Mitra 10 computer that was made compatible with the Rjad System by Hungarian specialists. The new name of the computer was: R10.

At that time the biggest experiment of computer design was run in the EMG factory. The Hungarian government appointed EMG to adjust the French computer to the Rjad System and to manufacture the R-10 computers for the other COMECON countries. EMG was also instructed to finish the manufacture of their EMG 380 computers.

Fig. 9.6. Árpád Klatsmányi and Marcell Jánosi

In a socialist system they had no other option, but stopping their own manufacturing, of which a few tens of computers had been produced and EMG started to manufacture the French computer with the new name R-10.

EMG had already produced one R-10 computer, when the government changed their mind and the R-10 production was given to a politically stronger factory, a Radio, TV and military electronic equipment factory: VIDEOTON (Fig 9.5).

The computer production at EMG was in terminal agony for a while, then Klatsmányi and his team, 130 well-trained computer engineers, resigned and the main computer production was continued at VIDEOTON.

Klatsmányi returned to education and lectured at different universities, he published 25 books, articles etc. Árpád Klatsmányi retired in 1983. He was a diamond-level university educated engineer and an excellent computer designer. He passed away on 1st July 2007 (Fig 9.6).

10 The TPA Computer of the Central Physics Research Institute (KFKI)

The Central Physics Research Institute owned the Research Institute for Measurement and Computing Techniques (KFKI MSZKI) (Fig 10.1), where electronic measuring instruments were developed to satisfy the needs of their physics research programme. One of their products was a *multi-channel analyser* which was used for outer space radiation analysis. The first measuring instrument they developed had no memory. Their next idea was, of course, to fit out the analyser with a memory.

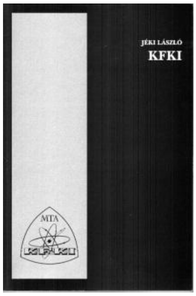

Fig. 10.1. A book about the KFKI by László Jéky

At that time the first URAL-1 computer arrived at KFKI and later the next computer, an ICL 1905. Probably the original idea that triggered buying a computer was to replace the memory equipped. They aimed for best possible computer, a PDP-8 from Digital Equipment Corporation.

They made enquiries about buying it, but DEC could not sell it to Hungary, because selling computers to a socialist country was embargoed by the US. (COCOM embargo)

When they studied the PDP-8, and they visited various computer exhibitions, they got a book distributed by DEC. Its title was: *Digital Small Computer Handbook.* It was also in the same computer exhibition, where I got a similar handbook. This handbook contained the logical descriptions and drawings of a computer. They thought they would be able to clone the PDP-8 computer from this handbook (Fig 10.2).

The handbook also contained another important piece of information, the description of the *instruction set.* Additionally they had a modern ICL computer at their disposal and they could copy its mechanical solutions which were used to reconstruct their own PDP-8 clone. They couldn't believe their luck: it was using the same instruction set.

Around the same time new transistors from Japan became available in Hungary, so the inability to buy active elements needed for computers did not exist anymore. When they were studying the application of the PDP-8 computer, they realised that it could be used for scientific analysis, which was necessary to the physicists of the KFKI (Fig 10.3).

At the end they built a copy of the PDP-8 in an ICL-like form and its new name was TPA 1001 (Fig 10.4), the abbreviation for stored program analyser in Hungarian. The computer was on display in 1968, together with the EMG 830, at the '*Computer-Technology '68'* conference of the John von Neumann Computer Society. This new name of the computer/analyser was important, because the COMECON countries decided: computers would be manufactured only in the Soviet Union, but *the TPA 1001 was not a computer, it was a stored program analyser (i.e. TPA)!*

Fig. 10.2. József Lukács, one of the leading constructor of the TPA computers

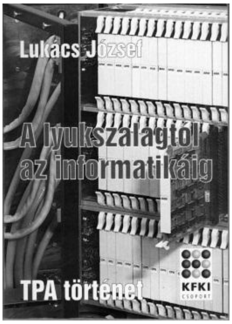

Fig. 10.3. A book by József Lukács about the story of TPA computer: *From the Punched Tape to Information Technology*

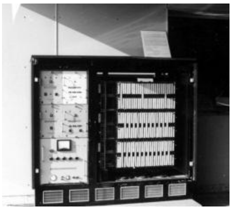

Fig. 10.4. KFKI TPA 1001, the clone of the DEC PDP-8

Fig. 10.5. KFKI TPA computers

The Hungarian PDP-8, i.e. TPA 1001, differed only in minor details from the original one. Because of the close match, all the original DEC PDP-8 programs were running on the TPA 1001 computer, that was demonstrated to the DEC software specialists.

DEC consented silently to the production of TPA computers, so, after cloning the PDP-8, every PDP computer was copied and reproduced at KFKI (Fig 10.5). The Institute became an official member of the DEC computer users group, *DECUS.* The

Fig. 10.6. TPA 70

last copied DEC model was the *Model Microvax 3000*. Only one KFKI model was not a copied one, the TPA 70 (Fig 10.6), it was the design of *János Bogdány* (Fig 10.7). The TPA 70 was used by other institutions in their computer controlled equipment too (Fig 10.8).

After the political and economic changes in 1989, the KFKI 'computer factory' closed down; they stopped the production of the TPA computers. After the fall of the Iron Curtain and at the start of the free Hungarian market economy the original DEC computers were delivered to Hungary; the local DEC experts were available to assist. The Hungarian market was well equipped to use the original DEC computers thanks to the reliable TPA machines. DEC established its Hungarian subsidiary, mainly from ex-KFKI employees, and became soon the most successful Hungarian computer company.

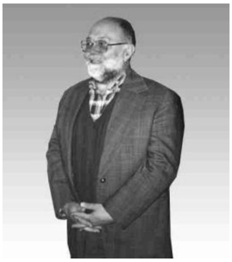

Fig. 10.7. János Bogdány, the constructor of the TPA 70

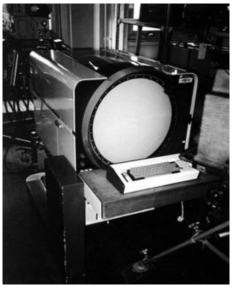

Fig. 10.8. The MTA SzTAKI, a GD 70 graphical display controlled by a TPA 70

11 Dr Náray Zsolt (1927-1995)

He was one of my favourite managers and a very good friend of mine. He graduated at the University of Technology (Magyar Királyi József Nádor Műszaki és Gazdaságtudományi Egyetem) in 1949 as a mechanical engineer. He worked as a physicist in the Physics Institute of the Budapest University of Technology (Fig 11.1).

Fig. 11.1. Dr Zsolt Náray

He joined the Central Physics Research Institute (KFKI) as a scientific research fellow and deputy head of the Cosmic Radiation Department in 1952. Then he was granted a scholarship in France in 1958-59. In 1959 he was appointed as the head of the Physics and Optics Research Laboratory and the Electronic Division of KFKI. From 1963 to 1969 he was the deputy managing director of the Central Physics Research Institute (KFKI).

His special scientific interest was the physics of light and he researched in depth its dual wave-particle nature. He conducted other researches too. He was the first scientist, who introduced the laser technology in Hungary. He designed and installed the first ruby-laser device at KFKI. He was the initiator and the head of the multi-channel analyser programme and later the TPA programme.

He released KFKI's development results to the factories of the Hungarian industry. Several companies started manufacturing KFKI's equipment, e.g. EMG, GAMMA etc. This activity made good economic sense and provided a sound stream of income to the institute. He was appointed as the chief designer of the Hungarian Rjad Computer

(Fig 11.2) in 1969 and he became the chief executive officer of the new Co-ordination Institute of Computer Science (SzKI) in1969. This institute was responsible for the development of the Hungarian Rjad computer system and the management of the co-operation among the Socialist countries in computer development (Fig 11.3).

Fig. 11.2. The SzKI's R10

Fig. 11.3. Computers of the Unified System

Fig. 11.4. The SzKI headquater (Donáti utca)

Fig. 11.5. Dr Náray in an exhibition (with microphone)

SzKI was one of the research institutes (Fig 11.4), which developed not only the Rjad R-10 computer and its software, but also operated a computer centre running mainly Siemens mainframes where SzKI's own departments, other Hungarian institutions and companies conducted their own software development (Fig 11.5). The departments' activities were e.g.:

- image analysis and processing
- computer-product technologies
- design of the next Hungarian computer, R10 and R15, in the series: Rjad-2
- the first micro-computers, the M-05X and M-08X (Fig 11.6).
- SzKI developed and manufactured the first IBM compatible personal computers: PROPER 8 (Fig 11.7) and 16 (IBM XT and AT)
- The SzKI Siemens mainframe computer was the first computer with a time-sharing operating system in Hungary, and was working with a quite large terminal network connected to the computer.
- SzKI's software departments developed several types of software products, such as:
  - o civil engineering programs
  - o static calculations program for the building industry
  - o hospital management systems and
  - o software development for several foreign companies all over the world (Siemens, Triumph-Adler, Ericsson, banks, publishing companies, different factories, airports etc.)
  - The institute developed software tools (software engineering): e.g. Softing,
  - character recognition software: RECOGNITA
  - artificial intelligence language compiler: M-PROLOG
  - one of the first certified ADA compiler in the world
  - a software quality assurance tool: SOMIKA

Fig. 11.6. SzKI made M08X computers donated to the Budapest University of Technologies

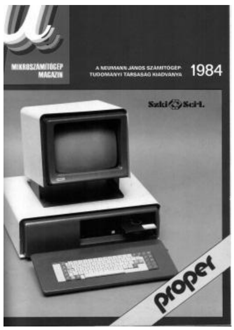

Fig. 11.7. The Proper 8 (IBM PC XT clone)

- production-control and data processing for different companies
- engineering construction sites support by computer (Fig 11.8)
- etc.

Fig. 11.8. Teletherm terminal developed by SzKI

Náray's great idea was to organise a large institute, where the different departments and the computer centre would work in close proximity. SzkI bought a large piece of land near the Buda castle, which was vacant because it was destroyed by bombing in WW II. In this area he built several buildings, where the different departments were working next to each other (Fig 11.9).

Unfortunately he was stood down in 1990 and his successor could not manage the institute as successfully as he did. He died in 1995 and the institute claimed bankruptcy. His spiritual heritage is still living in the loving memory of his more than one and half thousand colleagues (Fig 11.10).

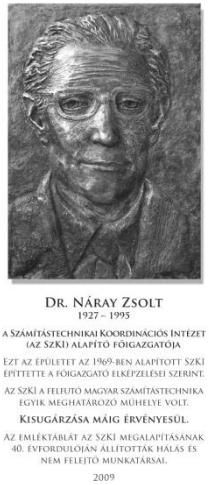

Fig. 11.10. Dr. Náray's Memorial Plaque (Donáti utca)

Fig. 11.9. The SzKI, Group of Application Laboratories (Iskola utca 10)

12 Mihály Kovács (1916-2006)

It was usual for poor families in Hungary to have a lot of children. The older ones started working and earning money at young age. The eldest child supported the youngest one, who attended school and became an educated member of the family.

The family of Mihály Kovács was not rich, his father was a joiner and his mother was a dressmaker. The family had seven children, Mihály was the youngest one. His father died, when he was three years old. One sibling died at baby-age, his two older brothers became also joiners and his three sisters were trained dressmakers.

Fig. 12.1. Mihály Kovács as a military priest, 1941

Mihály Kovács was an eminent student at the elementary school and therefore his mother enrolled him to the secondary school of the Jesuit order. His favourite subjects were mathematics and physics, but he was an enthusiastic traveller, mountain walker and a very good stenographer.

When graduating from secondary school he decided to be a teacher and a monk. He first continued his studies in the seminar of the Jesuit Order, then at the University of Sciences. He also studied sail making and was a category-A licenced pilot. He was consecrated as a priest in 1941 at the start of WW II in Hungary. He completed a military priest training in 1941 (Fig 12.1). He commenced teaching at the very secondary school in Szeged, where he had been a student. He relocated to the Jesuit Secondary School, called Piarist Gimnazium in Hungarian, Budapest as a teacher in the school.term 1943/44. He taught there until his death.

During WW II in 1944 Mihály Kovács and other three Jesuit teachers offered to go to Germany with the secondary and university students who were transported there by the German army. These young children were protected and taught by the priests in the military and later in English prison camps. At the end of the war the young Hungarian students and some other young soldiers returned home together with Mihály Kovács.

He continued his teachingr career, but the communist government in 1945/46 did not maintain a good relationship with church-run schools. Finally the government dissolved these schools and the teachers had to accept parish priest positions. Mihály Kovács also had to.

The government and the church started a dialogue about the nationalized schools in 1950 and as a result of it 8 schools were placed under church management again, the Piarist Gimnasium Budapest was one of these schools. Mihály Kovács was allowed to teach mathematics and physics again. The building that once was owned by the school was occupied by the Budapest University of Sciences. They had no choice, but starting the school-year in a new building, in a long-ago nunnery. The female order had been dissolved so the premises were available.

Fig. 12.2. The flotta of the Jesuist Gimnazium on the Balaton Lake

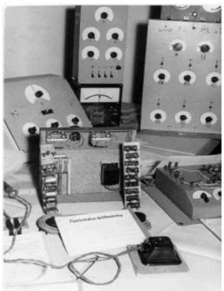

Fig. 12.3. Analog calculators, desig-ned by the students

The centre of Mihály Kovács's life were his students, he was fondly called 'Mr. Teacher Kovács' by his students. He organised all sorts of activities, e.g. he built sailing boats together with his students that were used at the Balaton-lake (Fig 12.2). He organised nuclear physics and physics study circles, where the students gave lectures and presented their own experiments in various subjects.

I first met him and his students, when we were developing the first Hungarian electronic computer at the Cybernetic Research Team in 1957/59. He gave me a call saying that he and his students would have liked to inspect our computer that was being built. Of course I was happy to show the computer, but I was very surprised that they knew a lot about computer technology. He told me his students were members of the Cybernetic Study Circle of the secondary school, where they designed and installed several cybernetic devices (Fig 12.3).

A few days later I visited the Cybernetic Study Circle at the school, where the students showed me their devices, working cybernetic models: e.g. the 'Logi card-playing machine' (Fig 12.4) with electro mechanical elements (*Zoltán Perjés)* 1960, the 'miracle mill', at first a simple version *(Jenő and Zoltán Ágost),* later on an automatic version *(Zoltán Perjés and György Vesztergombi)* 1961, the 'Shanon mouse and the maze', *(György and Ferenc Vesztergombi, with István Káli)* 1963 (Fig 12.5) etc. New students – Zoltán Fodor and Tivadar Lohner – designed new cybernetics equipment of: a well-known mechanical toy transformed to relay circuits. Its name was: Kombinett eithts (Fig 12.6). These all devices were the ideas of the students, because they were not only students of their teacher, Mihály Kovács, but they were also his friends. He assisted them, when they built these machines (Fig 12.7).

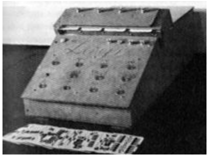

Fig. 12.4. The Logi, a card-playing machine

Fig. 12.5. The Shannon mouth

Fig. 12.6. Kombinett number eight

Fig. 12.7. A book by Mihály Kovács: *Cybernetic toys and models*

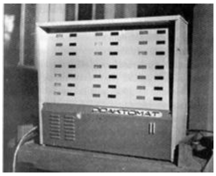

Fig. 12.8. The DIDACTOMAT

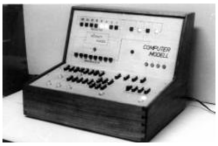

Fig. 12.9. The first computer model made by the students

Fig. 12.10. The students and the first computer of the school

The Cybernetic Study Circle developed modern tools for programmed teaching, too, the *DIDACTOMAT* (1964). (Fig 12.8) It was their teacher colleague's, *Lajos Terényi's*, idea, however the machine was built by the students. The DIDACTOMAT was able to check if the students in the classrooms really understood the lectures. Several DIDACTOMATs were used in the classrooms of the school. The school patented the DIDACTOMAT in 1966 and a company, the *Factory of School Equipment,* produced about 150-200 pieces from the machine.

The Cybernetic Study Circle had another famous device: the MICROMAT (1966). This tool supported the understanding of the concept of the computer. The prototype was built by a student: *Ferenc Woynarovits*. This piece of equipment was also produced by a *small cooperative.* The MICROMAT was a set of digital building elements that could be used for the compilation of about 100 different cybernetic games (Fig 12.9).

Mihály Kovács was very knowledgeable about the new computers. He and his students were regular visitors at the sites of these new computers (1960-1974). Sometimes they were given the opportunity to run their own programs.

When the age of the programmed calculators arrived (1974-79) some earlier students and foreign institutions supported the school and bought a number of programmed calculators for the students (Fig 12.10).

When the first microcomputers became available (after 1969), they started to use microcomputers. Their first real-life microcomputers were two TRS-80s. The students learned the BASIC programming language and wrote programs.

I recall that one of Mihály Kovács's students, *Zoltán Zsuffa,* was a participant in my Garay computer applications contest, where his software won the *first prize.* He analysed several Hungarian translations of the original Finnish national epic

'Kalevala'. His method was later acknowledged by many linguist scientists, when I showed them his work.


Alma Materek és a számítástechnika
A hardver éppoly fontos, mint a szoftver!

Fig. 12.11. A report with Mihály Kovács in the Microcomputer Magazine

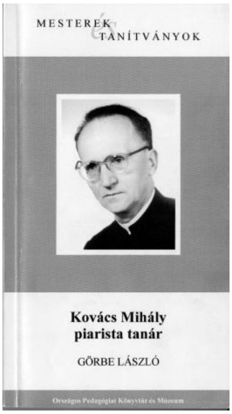

Fig. 12.13. The book of László Görbe: *Kovács Mihály, piarista tanár*

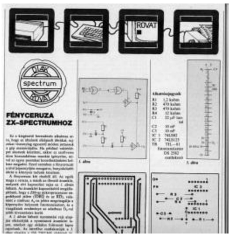

Fig. 12.12. A *light pen* construction of Csaba Káli, student of Mihály Kovács in the Microcomputer Magazine July 1986

The number of computers in the school always increased, they bought e.g. Sinclair computers and the students were awarded computer prizes at various competitions, too. My computer journal, the *Microcomputer Magazine,* published 7 articles and reports with photos (Fig 12.11) about the achievements of the students of the Jesuit school (July 1986) (Fig 12.12).

The first IBM PCs (XT and AT) were donated to the school by CARITAS (Vienna), it was the real start of professional computers in the Jesuit secondary school (1988). Mihály Kovács was the first teacher in Hungarian secondary schools who studied computer programming and technology with his students. The use of the computers was free at the school and older students taught and instructed the younger ones (Fig 12.13).

Mihály Kovács became seriously ill in 1982 and retired in 1995, but he remained in touch with the order and his students. They frequently visited him. He gave occasional lectures occasionally at the school. He suffered a serious accident in December 2005 and he was unable to continue to support his beloved school and students. He died on 23 March 2006.

13 Marcell Jánosi (1931-2011)

He was a talented precision mechanic. He started working in 1946. At the time of his university enrolment he was already qualified in joiner, welder, grinder and miller. He graduated as a mechanical engineer at the Budapest University of Technology Budapest in 1954. He made up his mind to become an excellent designer of mechanical instruments (Fig 13.1).

Fig. 13.1. Marcell Jánosi

He started his career at the Safe Factory and then joined the technology development department of the Phone Factory. Later on he was employed by the Telecommunications Department of the Ministry of Metallurgy and Machinery. His main task was the establishment and elaboration of new technologies, e.g. printed circuits etc. He was discharged from the Ministry in

1957 and his next job was at the Budapest Factory of Radio Technology (BRG).

As a chief designer he recruited a very well trained designer team at the factory in 1960. While being employed at the factory he was also studying at the University of Economics and earned his second degree in 1965.

Jánosi designed and produced the first modern Hungarian made tape recorder that was marketed all over the country under the name CALYPSO (Fig 13.2). The factory produced and sold more than 100,000 devices. After such a resounding success he designed more than 30 different new tape recorders. The product lines of the tape recorder single product ensured steady revenue for the factory that was in excess of 150 billion HUF.

Fig. 13.2. The BRG Calypso tape recorder, designed by Marcell Jánosi

Fig. 13.3. The ABC 80 and the BRG Tape recorder


SZABADALMI LEÍRÁS
170790

Fig. 13.4. The patent of the MC-1 Jánosi - cassette floppy

Fig. 13.5. The MCD-1 driver and floppy 2

Fig. 13.6. The front-page of the Your Computer journal. February, 1983


MICRODRIVE

Fig. 13.7. The MCD-1 in the Your Computer journal 1983, February

Fig. 13.8. The MCD-1 cassette floppy

Fig. 13.9: The handing over ceremony of the von Neumann Society's life work prize by Gábor Péczeli President

His achievements were acknowledged and rewarded with a Hungarian State Prize of the second degree in 1975.

In 1970 he swapped his interest from tape recorder technology to computers. His first design was a piece of data preparation equipment which was using a cassette recorder instead of paper tape punch that was the usual peripheral device for this purpose at that time.

BRG manufactured the cassette recorders for several other computers, such as Commodore, Sinclair, Atari, Acorn and ABC 80. BRG and the Swedish company Luxor, the manufacturer of ABC 80 computers, signed a co-operation agreement.

They agreed that Luxor would use the BRD cassette recorders to their computers and BRG would manufacture the ABC 80 computers for the local market (Fig 13.3).

The success of the cassette recorder triggered Jánosi's new idea to design a 3" cassette-microfloppy as a more up-to-date replacement for the cassette recorder. It was the first cassette microfloppy in the world. Its name was: MCD-1 (Fig 13.4).

The computers were using 8" floppies at that time, the volume of this drive was 10 litres, MCD-1's volume was only 1 litre. The two floppy drives had the same capacity: 250 kBytes (Fig 13.5).

The management of BRG was not satisfied with the success of the MCD-1 cassette micro-floppy, because they preferred the development of a *magnetic bubble memory* that had never made it to be a product. Several managing directors of large foreign companies such as Commodore, Toshiba and Triumph visited Hungary in order to buy the patent and to attend business discussions with the director of BRG or with Jánosi (Fig 13.6). Unfortunately the management of the factory did not answer their inquiries and Jánosi was denied permission conduct negotiations (Fig 13.7). After all BRG did not renew the patent and it expired. Its competition commenced the production of the cassette micro-floppy. Hungary lost a big business opportunity and next year bought cassette floppies in the value of 1 billion HUF from Japan (Fig 13.8).

Marcell Jánosi's last design was a micro motor for the LEGO construction toys. He arranged the production of the motor with a small manufacturer. There was insufficient funding available for the joint venture and so the right of manufacturing the motor became the property of the LEGO Company. Their net yearly revenue from selling the motors was about 1 million USD annually.

Jánosi received a life-work prize from the John von Neumann Computer Society (Fig 13.9), and a university private professor title from the Óbuda University in 2010 (Fig 13.10). He died in 2004 (Fig 13.11).

Fig. 13.10. Jzsef Tik, vice principal of the Óbuda University gives the diploma of private university professor to Marcell Jánosi

Fig. 13.11. Marcell Jánosi Titular university professor 2

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