The short history of M-3, the first Hungarian Electronic Digital Tube Computer

by Győző Kovács

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The M-3 computer was constructed by members of the Cybernetics Research Group of the Hungarian Academy of Sciences (Magyar Tudományos Akadémia Kibernetikai Kutató Csoportja, abbr. MTA KKCs) from 1957 until 1959. The Group was established for the sole purpose of constructing the first Hungarian electronic tube computer, the M-3. The M-3 was and still is the symbol for the beginning of the age of computers in Hungary.

The M-3 Story

The Cybernetics Research Group of the Hungarian Academy of Sciences (MTA KKCs) was initially launched in 1955 as a department of the Measurement Industry Research Institute (Műszeripari Kutató Intézet) , headed by Dr. Rezső Tarján. He was imprisoned politically and became free during this time, together with his two colleagues: József Hatvany and Dr. László Edelényi. They started to construct an electronic – EDVAC like – serial computer, the B-1.

In 1956 this department became an independent research group of the Hungarian Academy of Sciences under the direction of Mr Sándor Varga. Dr Rezső Tarján was appointed as the Scientific Deputy Director of the Research Group.

The main task of this Research Group was the construction of the first Hungarian electronic computer. The group, the youngest members of which had just finished the University of Sciences and Technology – I belonged to this category too – followed the construction of B-1, but our activities were not really successful.

Since Mr Sándor Varga wanted to construct a computer as soon as possible, he acquired the logic and the constructional designs of a newly developed Soviet (Russian) medium size computer, named M-3. We received the original Soviet design in Budapest which had not yet been constructed, therefore the members of our group had to correct – step by step - about 10-30 % of the logic and constructional design of the electronics.

The result of this work was that our version of the M-3 featured a lot of new solutions, such as, a part of the arithmetic unit, some new instructions of the instruction set, the magnetic drum controller, the input/output devices etc. It is interesting that the M-3 design was also given to research groups in Estonia and of China. They constructed their own M-3 computers, but we did not have any scientific connections, therefore these four M-3 computers – the Soviet, the Estonian, the Chinese and the Hungarian – were not compatible with each-other. We could not exchange any software between us, but – during this time – we believed it was not necessary.. We did not recognise the importance of the compatibility and the exchange of software.

In the first version of M-3 we used Russian tubes and kuprox diodes, later - around 1960 - the Group decided to rebuild a part of the logic circuits – first the drum controller, then other parts of M-3, Hungarian long-life tubes made by the Tungsram factory were used.

The developing group was headed by Dr Bálint Dömölki, a young mathematician, and I was appointed as his deputy. I was responsible to instruct the electronic engineering activities.

The acceptance test of M-3 was conducted and successfully concluded on January 21, 1959, in the presence of Mr. G. P. Lopato, chief constructor of the Soviet M-3.

After the successful acceptance tests, our mathematicians and economists solved several problems on the new computer, not only in the scientific domain, but also in technical and economic areas, as engineers, economists, mathematicians, linguists and many others started to study computer programming using the machine in their own fields of study. Already in the first few months of M-3 operations, calculations were carried out for some sections of the so important 5 year economic plans of the socialist planned economy, important operations research tasks, lingual statistics analyses, static calculations for a number of large building constructions, like the Elisabeth Bridge over the Danube, and many other tasks.

Our research group organised the first programming courses in Hungary, we published the first computer periodical, it's title was: "Tájékoztató" (Informatory). Our mathematicians proposed the organisation of a new computer programming faculty at the University of Sciences.

Our colleague Dr Béla Kreko proposed and started another new faculty at the University of Economics: "Planing and Economics", where the students began to study economics, mathematics and computer science for the first time in the history of Hungarian universities (1960). I was invited to organise and teach this subject matter. I wrote the first university learning book about computers. Dr Kreko and I also organised the first university-computer centre – using an URAL 2 computer - at this university (1965).

When M-3 was successfully tested and accepted by the Hungarian Academy of Sciences (1959), Mr Varga or-

dered to set up within the framework of MTA KKCs the first Computer Centre in Hungary. This Centre had a Computer Operations Department which was headed by me. We started to work very soon in three shifts, the running of programs was interrupted every 8 hours, only for maintenance purposes. Because of the relatively short lifetime of the tubes, they needed to be changed every two-four weeks.

The members of the different research institutions and universities – coming to our Computer Centre - solved a lot of mathematical, economic and technical tasks on our computer, it was the first opportunity for the scientific researchers to use an electronic computer in Hungary.

M-3 operated at the Hungarian Academy of Sciences' Computer Centre till 1965. Then, the M-3 computer was transferred to the Cybernetics Laboratory of the József Attila University of Sciences, Szeged, which was headed by Academician László Kalmár, Professor of Mathematics and Logic in the University. This was the first Computer Centre outside of Budapest. The head of the University's Computer Centre was Dr Dániel Muszka.

In 1968 the M-3 became outdated, the computer was disassembled and the parts of the M-3 were then distributed among the various institutes of the university.

The greatest consequence of the development of M-3 was the very early introduction of a computer culture to the Hungarian scientific and research community. (See [1] – [9]). The M-3 was and still is the symbol for the beginning of the age of computers in Hungary.

Technical characteristics of M-3

Arithmetic unit

- 31 bits/word,
- parallel computing,
- four registers,
- operational speed:
  - addition: 60 microsec,
  - substraction: 70-120 microsec,
  - multiplication: 1,9 millisec,
  - division: 2,0 millisec.

Input/output device

- Siemens T-100 teletype, tape reader and puncher, 5 position telex code,
  - input/output speed: 7 chrs/sec.
  - later: a Ferranti photoelectric tape-reader, 8 position code, speed: 300 chrs/sec
- Creed puncher, 8 position code, speed: 100 chrs/sec.

Memory

- First a magnetic drum, 1 kWord (later: 1,6 kWord) capacity,
- later two - simultaneously - running drums as back ground memory) were operating together (2x1600 Words),
- then: ferrit memory, its capacity was: 1 kWord.

Control Unit

- two address code,
  - 31 bits instructions
    - 1 sign bit,
    - 6 bits for operational code,
    - 12 bits first address,
    - 12 bits second address

Power supply

- total power dissipation: about 10-15 kW

Parts used *(approximate numbers)*

- about 500 logic units,
- about 1000 vacuum tubes,
- about 5000 cuprox diodes,
- about 4000 resistors,
- about 3000 capacitors

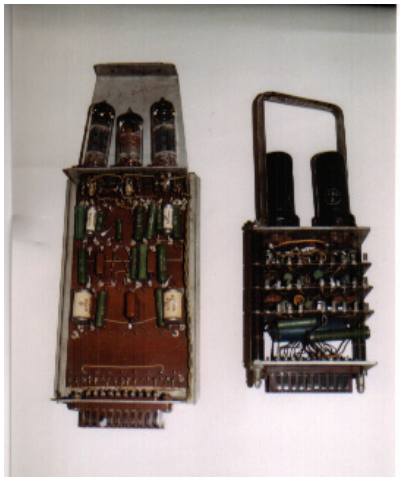
First Hungarian Computer-related Export

Two colleagues from the University of Timisoara (Romania), Viliam Loewenfeld and Joseph Kaufmann, were working on a tube computer (MECIPT 1) but were not able to acquire or purchase a memory device. I had some drum-memories for our computer and our director, Istvan Aczel, permitted me to deliver free-of-charge to Timisoara a drum-memory as well as the technical design of the memory controller. They built the controller, we delivered the memory and the second Romanian computer - the MECIPT 1 - became operational soon. This friendly support was the first Hungarian computer-like 'export'.

Original photos of the M-3 computer

The engineering Group of the M-3: From left to right: Pohradszky S., – later: Röhrich, A. – Ábrahám I., Molnár I., Szanyi L., Kovács Gy., Várkonyi Zs., Dömölki B.

I. MOLNÁR and Gy. KOVACS with the M-3 drum memory.



The new (l) – constructed by me - and the old, originally (r) logic units of the M-3 computer:

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Airports – ICT Control

Control of Ground Vehicles in the Airside of an Airport

by Augusto Casaca and Isabel Rebelo

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