The story of the first computer in Hungary

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John von Neumann Computer Society
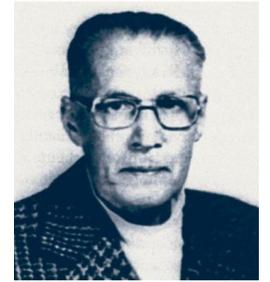
Hungary

Prehistory

- Computing in Hungary started … in a prison

- In 1953 Hungarian Academy of Sciences received a letter…

- Preliminaries:
  - many high level scientists and engineers among political prisoners
  - working in „engineering buro" within the prison
  - better access to Western literature !
  - $\Rightarrow$ a group of inmates read about computers and convinced prison management to write a letter to the Academy, proposing to build a digital electronic computer
    - o offered to make the design and
    - o suggested academic institutions, where it can be implemented, with their „remote" help

- Academy sent a politely negative answer, BUT…

Hungarian Academy of Sciences

- **1954**: Presidium decides to establish a group „to study the building of high capacity computing machines in our country" within one of the academic research institutions

- **1955**: *Rezső Tarján*, one of the authors of the „prison-letter", comes out of the prison and becomes the head of this group

- Many discussions, lectures and publications about computing, led by *Tarján* and also academician *László Kalmár*

- **Jan. 1956**: Academy decides about the „necessity of purchasing high-speed digital computers from the Soviet Union"

- **Sept. 1956**: Government approves the proposal of the Academy to establish Research Group on Cybernetics of the Academy, with the main task of obtaining and operating an electronic digital computer. BUT…

Research Group on Cybernetics (KKCS)

- Approval was on condition, that director of KKCS will be not *Tarjan*, but a high-level government official *Sándor Varga.*
  This – seemingly outrageous – decision had some merits, as
  - Varga was an experienced technical manager, with a long track record in the Soviet (military) industry, and
  - he had very valuable connections in Soviet industrial and academic circles.

- First action of KKCS was to initiate an order for a *Ural* computer from the USSR. The order was confirmed by the relevant Soviet foreign trade organization and delivery was foreseen in the 1957 plan of Soviet-Hungarian commerce.

- BUT, in early 1957 the Soviet foreign trade organization **withdraw** from the deal !

- Now, the connections of Varga proved to be useful: succeeded to arrange receiving – through academic channels - of the full documentation (together with some key components) of a newly developed Soviet computer, the M-3.

Academician *I. Bruk* was a leading expert of analog computers since the late 30s. After the war his attention turned to digital technologies, becoming popular in the West.

In early 1948 a young assistant *B.Rameev* joined his institute, being interested in digital computing.

In December 1948 they submitted the invention application for **the "The Automatic Digital Computer"** and received notarized **Invention Certificate No. 10475** on December 4, 1948 – the first computer invention document in the Soviet Union.

Isaak Bruk (1902-74)

December 4: Day of Informatics in Russia !

1949: *Special Constructor Buro 245*, established as the first (deeply secret) computer development organization (Order signed by J. *Stalin*!)

Became cradle of Soviet computer industry (*Rameev* was one of its key designers)

Bashir Rameev (1918-94)

First computer in Russia

- The Bruk's computer "M-1„, completed in 1952 had several thousand semiconductor devices and only **730 vacuum tubes**. This significantly reduced size of the computer, which occupied a room as small as **15 square meters**.

- It used two-address command system, a magnetic drum , widescreen TTY output and transmitter for their input from a punched tape. Number of bits - 24 . internal memory on the tubes of electrostatic and magnetic drum - 256 25-digit numbers.

- It's performance was **20 operations per second**. Operations: addition, subtraction, multiplication , division and a number of auxiliary operations. **Power consumption - 8 kW.**

- Computer "M-1" was used to calculate operation mode of electrical networks in Moscow, heating of ballistic missiles during the motion in the atmosphere, for a number of projects of the Institute of Atomic Energy.
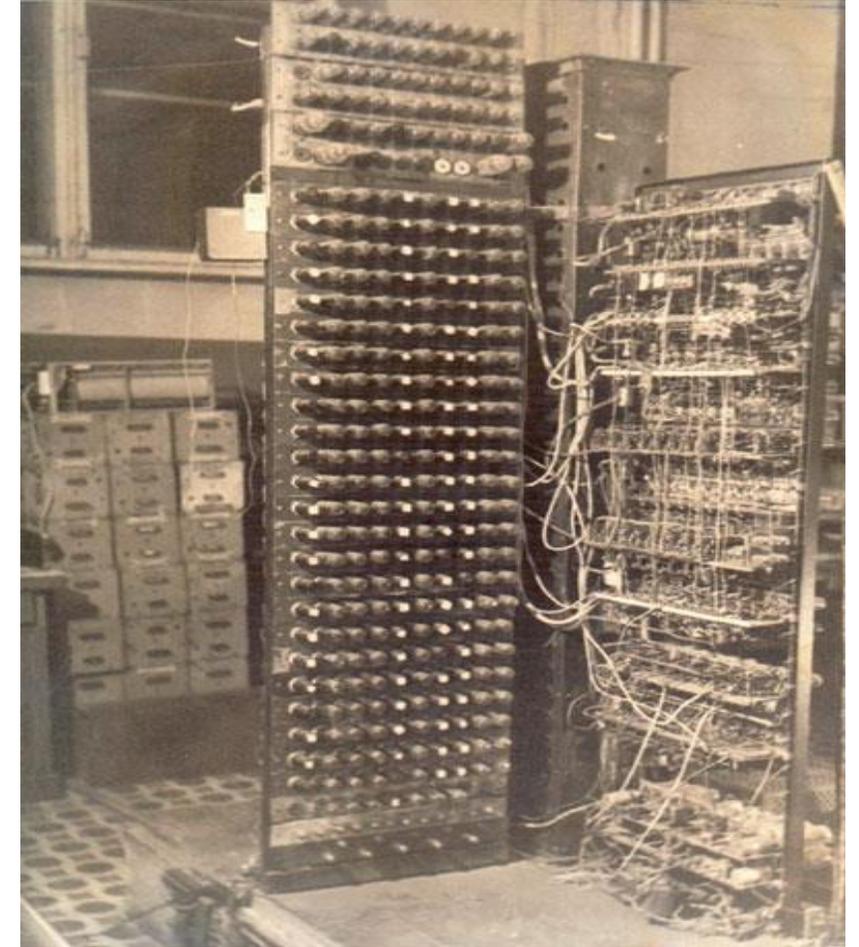
Continuation of the „M" series

- Computer "M-2" was developed in 1952-53.
    - 34 bit, 4k ferrit, 3-address instructions
    - speed: 2000 floating point operations/sec

    Operating through15 years performing calculations of atomic energy, missile design and other scientific areas.

- In 1955-1956 Bruk created the concept of small computers based on experience in the creation of computers "M-1" and "M-2".

- After a while the computer "M-3" was created, which operated 30-bit binary numbers with fixed point, had two-address instruction format, the memory capacity of 1024 numbers on a magnetic drum, and had an initial average speed of 30 operations per second.

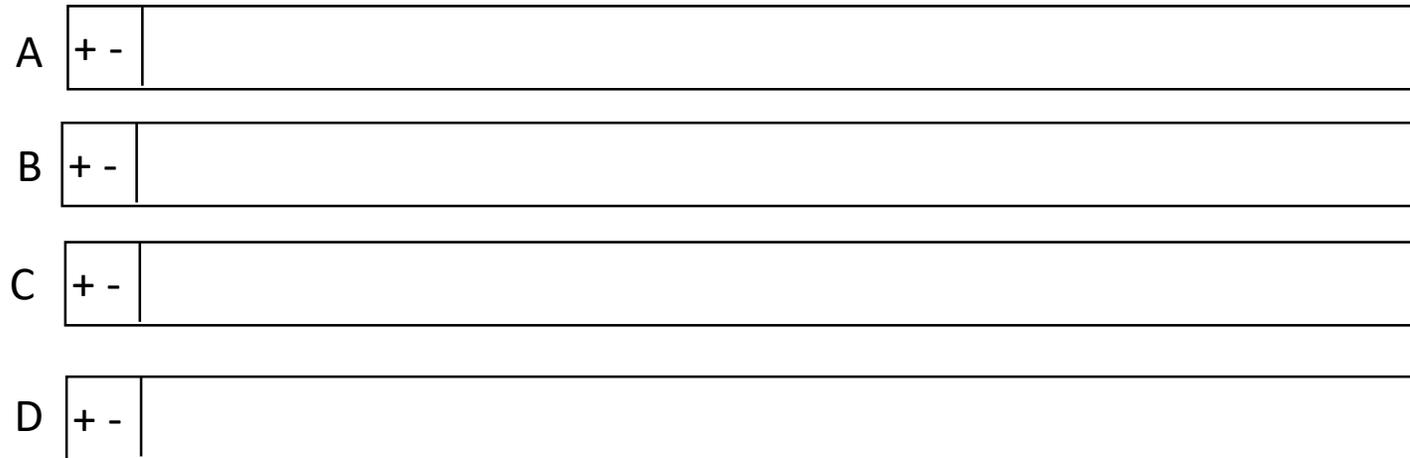**M.A. Kartsev**
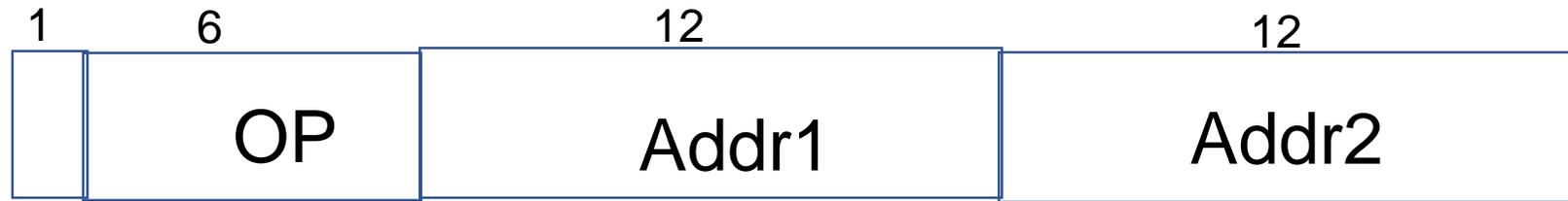Chief constructor of M-2

N.J.Matjuhin
Chief constructor of M-3

Basic units of M-3

- Arithmetic unit: four registers (31 bit)

A | + - | |
B | + - | |
C | + - | |
D | + - | |

- Address register (12 bit)
- Instruction counter (12 bit)
- Code control (6 bit + logical circuits)
- Storage- and i/o controllers

M-3 command structure

1	6	12	12
	OP	Addr1	Addr2

Two-address command set:

Addr1 # Addr2 => Addr2
Addr1 # Addr2 => REG
REG # Addr1 => Addr2
REG # Addr1 => REG

Operations:
+,-,*,/, AND, OR, …

The fate of M-3

- State committee acceptance in 1956

  - Technical features OK

  - BUT: bureaucratic problems: it was developed outside the official plan

  - State committee acceptance was delayed, so could not go to industry

- In the meantime it was distributed through informal channels: personal connections in academia…
  Tallin, Erevan ,Beijing , …. Budapest

  → Razdan

- Finally, serial manufacturing started in Minsk from 1959

  = M-3 was born as an illegitimate child of a very respectable family

Starting to work

- KKCS started actual work in mid-1957
- Premises in downtown Academy office building
- Staff: (34 in October 1957)
  - mostly freshly graduated engineers and matematicians,
  - plus a few „adults" (including most authors of the prison letter)
  - mechanical workshop: : cabinets, cooling …
  - electronic workshop: circuits, wiring, …
- Packets from USSR arriving late 1957:
  - technical documenation
  - critical components (tubes, diodes, etc.)
    arriving outside of normal foreign trade channels

Steps of building the M-3

- manufacturing the cabinets and the cooling system

- producing and testing the basic circuits

- designing and manufacturing the magnetic drum and solving the problem of galvanizing of its surface

- producing and wiring the frames

- independent testing of the different units

- testing and „putting to life" the computer

Exported to MECIPT (Timisoara)

The M-3

in Moscow
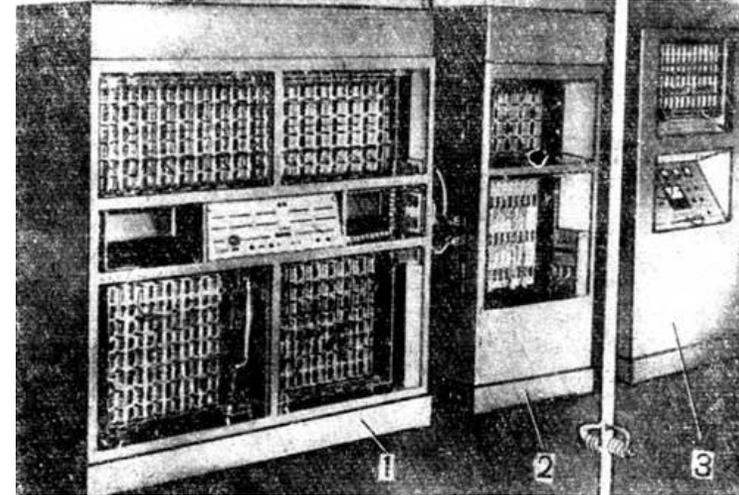
and in Budapest

Difficulties of „debugging" the M-3

- Purely technical documentation did explain the circuits and wiring only, but not the operation, the execution of the instructions
  - = (tiresome) activity to discover the „architecture"
- Low reliability of components, especially the electronic tubes
  - o testing in extreme circumstances (e.g . high/low voltages)
- The year 1959 was spent with testing (and very low reliability operation)
  - Visit of G.P. Lopato, member of the team designing the M-3, helped the final tuning
- Starting from early 1960 M-3 was in normal regular operation
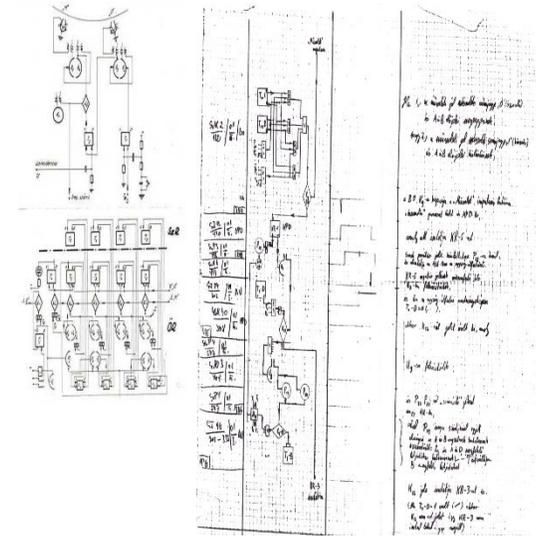
G.P. Lopato
1924-2003

Operation of the M-3

- Despite its low performance, M-3 was successfully used for the solution of many real-life problems both for
  - scientific-engineering calculations (e.g. optical lenses, statics of a bridge) and
  - in mathematical economics (e.g. balance of intersectoral relations, linear programming).
  - Applications in other fields started too, like e.g. linguistics (text analysis, early experiments with machine translation)
- The most important contribution of M-3 to the computer field in Hungary was its role in educating computer experts: many of the future leading personalities - both on the development and on the application side - got acquainted with computing around the M-3

After M-3

- M-3 served academic computing until 1965, extended with three more years at Szeged University.
- In the first part of the 60s commercial computers started to arrive to Hungary both from
  - the USSR (Ural 1, 2) and
  - the West (Bull Gamma, Elliott-803, Gier).
- Production of computers started in the second half of the 60s, with EMG-830 and the - PDP compatible - TPA series.
- Hungary participated in the Unified System (Riad) project with its smallest model (R-10) manufactured under French license.