HISTORY of BULGARIAN COMPUTING

Kiril Boyanov

East European steps in Computing

- The first Soviet Computers:
  - 1948-1951 Small Electronic Computer, acad. S. Lebedev, Kiev, USSR
  - 1953 - High-speed Electronic computer, 1024 words 39 digits on vacuum tubes, magnetic drum, 8 K oper/sec
- Soviet Computers in the period 1953-60: Strela, Ural, Setun, M-20, Kiev, Mir, HSEC
- Soviet Computers on semiconductors 1962-70: Razdan and Minsk family: Minsk 2, Minsk 22, Minsk 23, Minsk 32
- Romania: CIFA-1, CIFA-2 (1961)
- Bulgaria: Vitosha (1964)
- DDR: D2, R4 (1963-65)
- Poland: Odra family (1961-67)

Where is Bulgaria in Europe

First Bulgarian steps in digital computers

- 1963 – Vitosha computer (vacuum tubes)
- 1965 – ELKA 6521, the first Bulgarian electronic calculator
- 1968 – Facom computer (transistors), license agreement with Fujitsu-Fanuk
- 1969 – specialization of Bulgaria in the production of central processors, disk and tape drive memories within the Council for Mutual Economic Assistance (CMEA)

First Bulgarian steps in digital computers

Basic parameters of the Vitosha Computer

- About 1500 vacuum tubes
- Word – 40 bits, 2 instructions in one word,
- Index registers - 3
- Random access memory – 4096 words on magnetic drum – 3000 rpm
- Parallel arithmetic unit with 20ms time for the “Add” instruction
- Input – punched tape with speed 7 rows/s
- Output – serial printer with speed 20 char/s
- Dimensions – 4m width, 2m height

First Bulgarian steps in digital computers – some photos

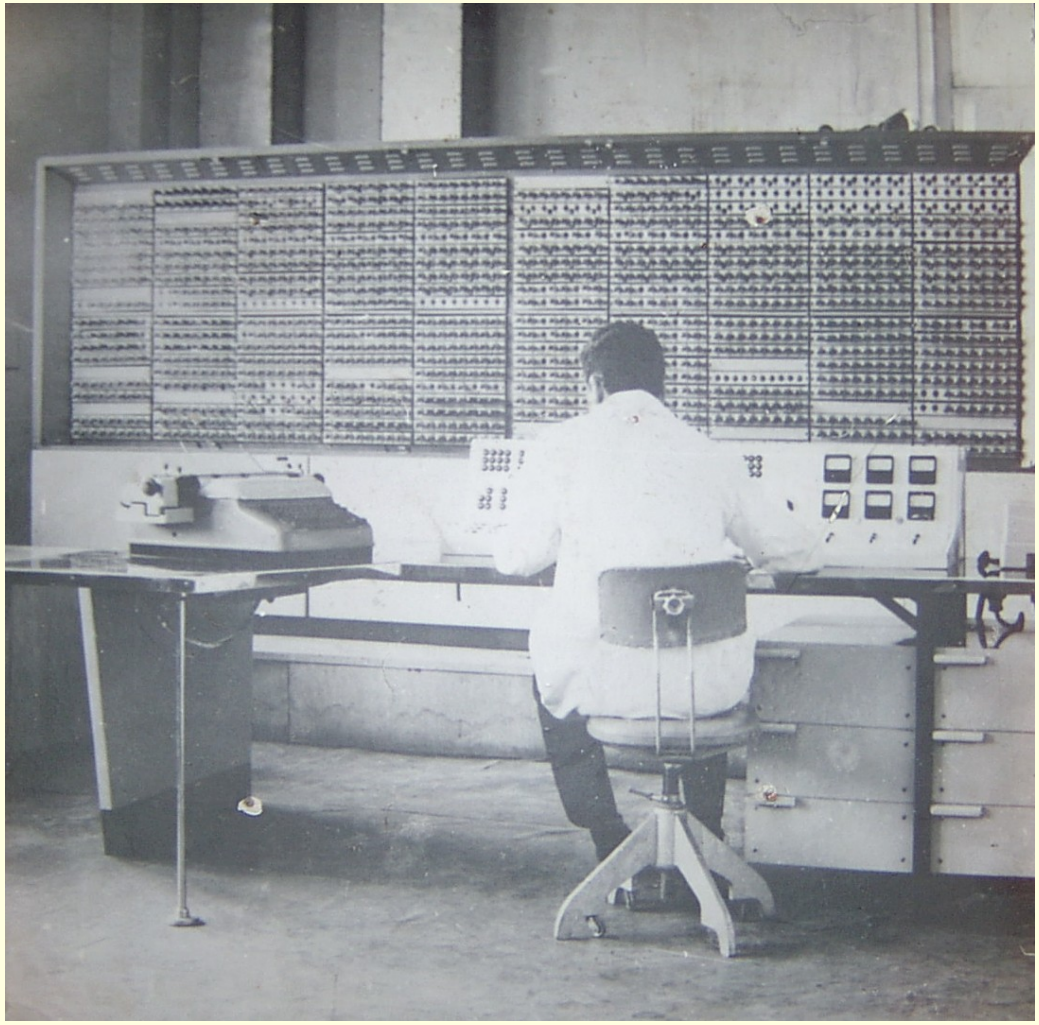
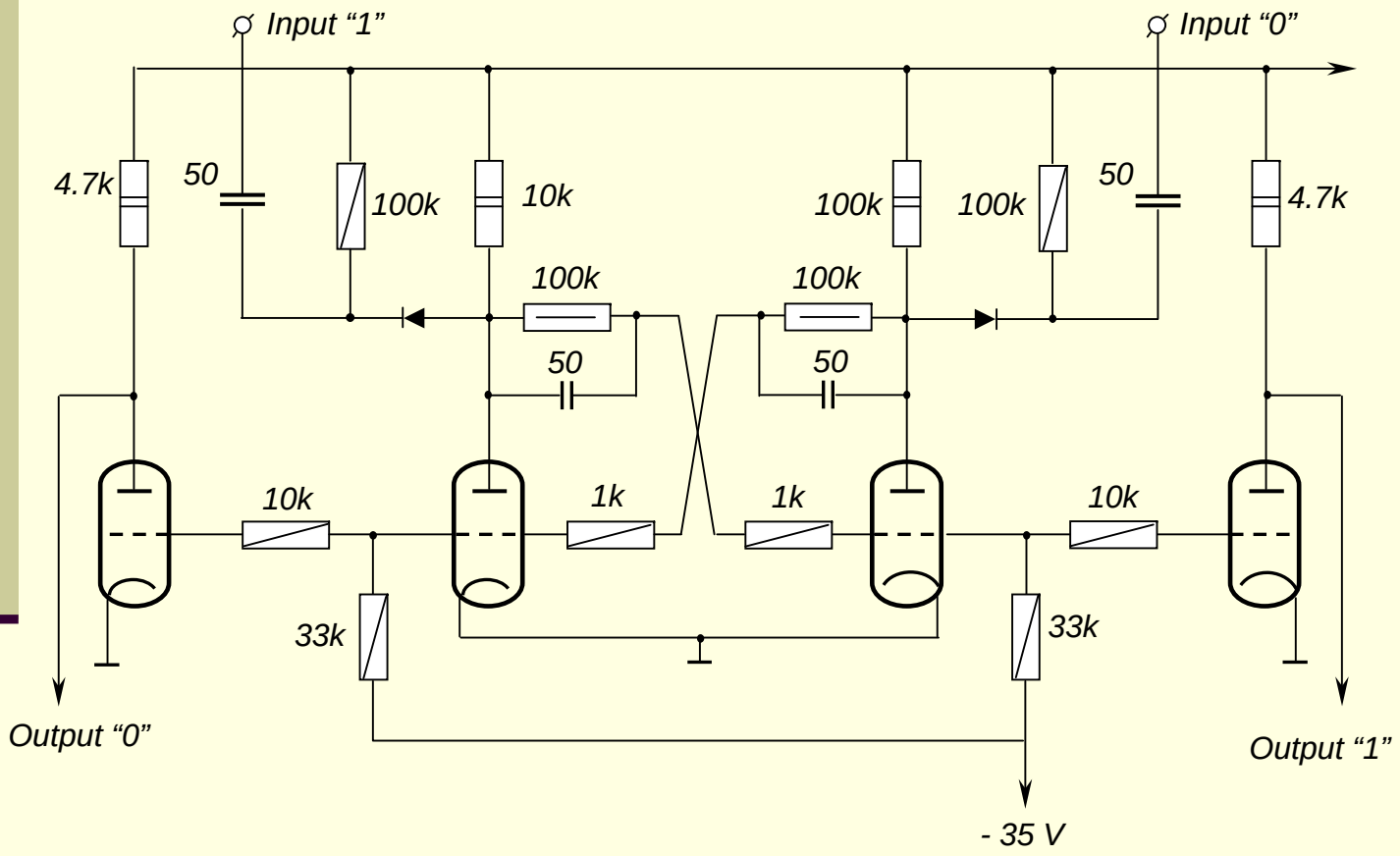


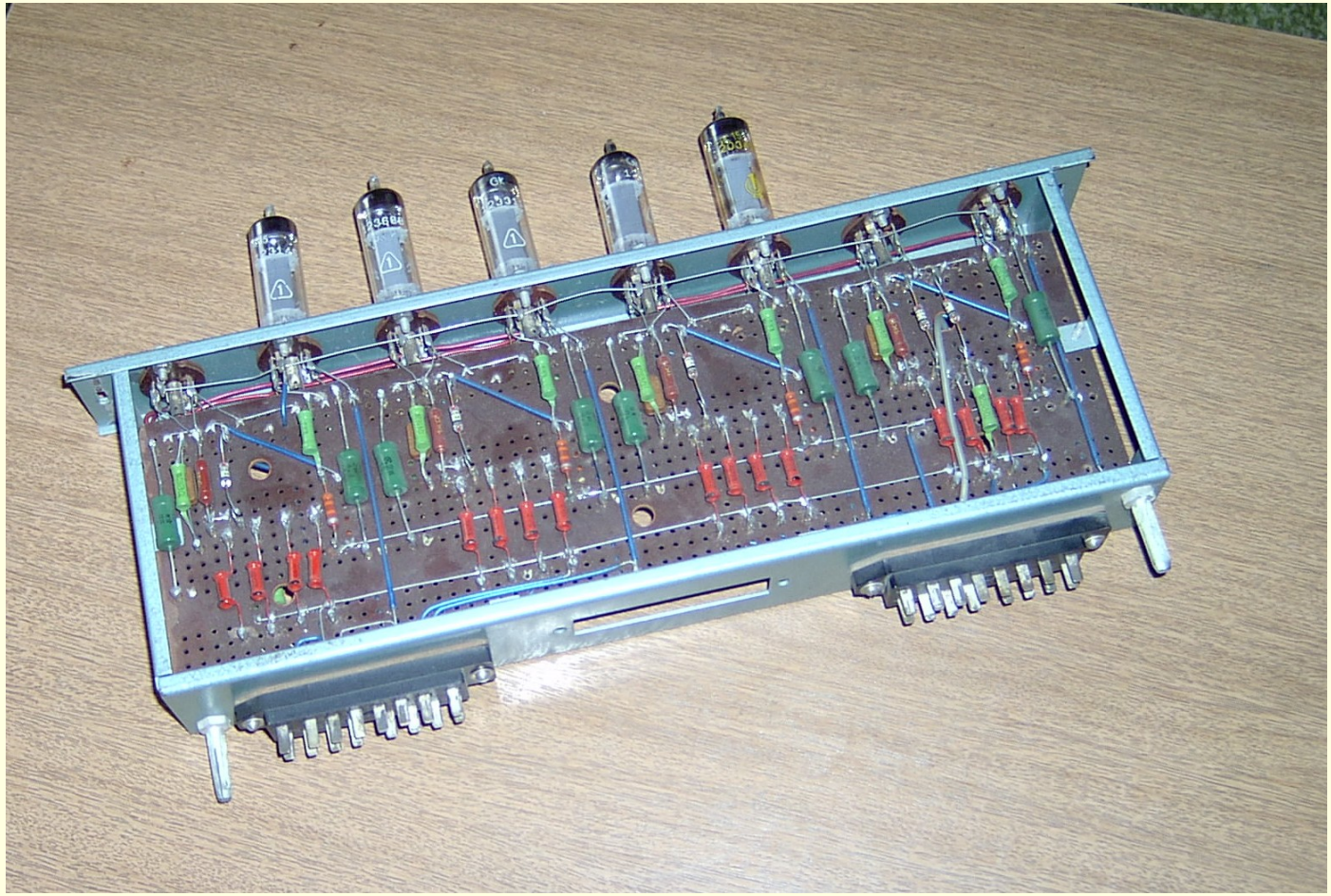
Photo of the first Bulgarian Computer Vitosha

First Bulgarian steps in digital computers



Circuit Diagram of a RS trigger – the basic module of the Vitosha computer (1963)

First Bulgarian steps in digital computers – some photos



Vitosha computer

photo of the basic module containing 4 RS triggers

First Bulgarian steps in digital computers – some photos

Moscow -1963 Demonstration of the Vitosha Computer - The first woman-cosmonaut in the world is in the middle.

First Bulgarian steps in digital computers – some photos

Bulgarian electronic calculators

ELKA

(1966)

First Bulgarian steps in digital computers – some photos

Bulgarian electronic calculators

ELKA

(1966)

Geographical disposition of Bulgarian computer production

- Research&Development - Central Institute of computer technique (2400 persons in 1989) – Sofia
- Mainframe computers, Sofia
- Mini-Computers, Sofia
- Electronic Cash registers, Sofia, Silistra
- Disk Drive Memories, Stara Zagora
- Magnetic Disks, Pazardzik
- Tape Drive Memories, Plovdiv
- Magnetic heads for computer memories, Razlog
- Mechanical constructions, Blagoevgrad
- Printed circuit boards, Ruse, Bjala
- Micro-Computers, Pravetz
- Integrated Circuits, Botevgrad

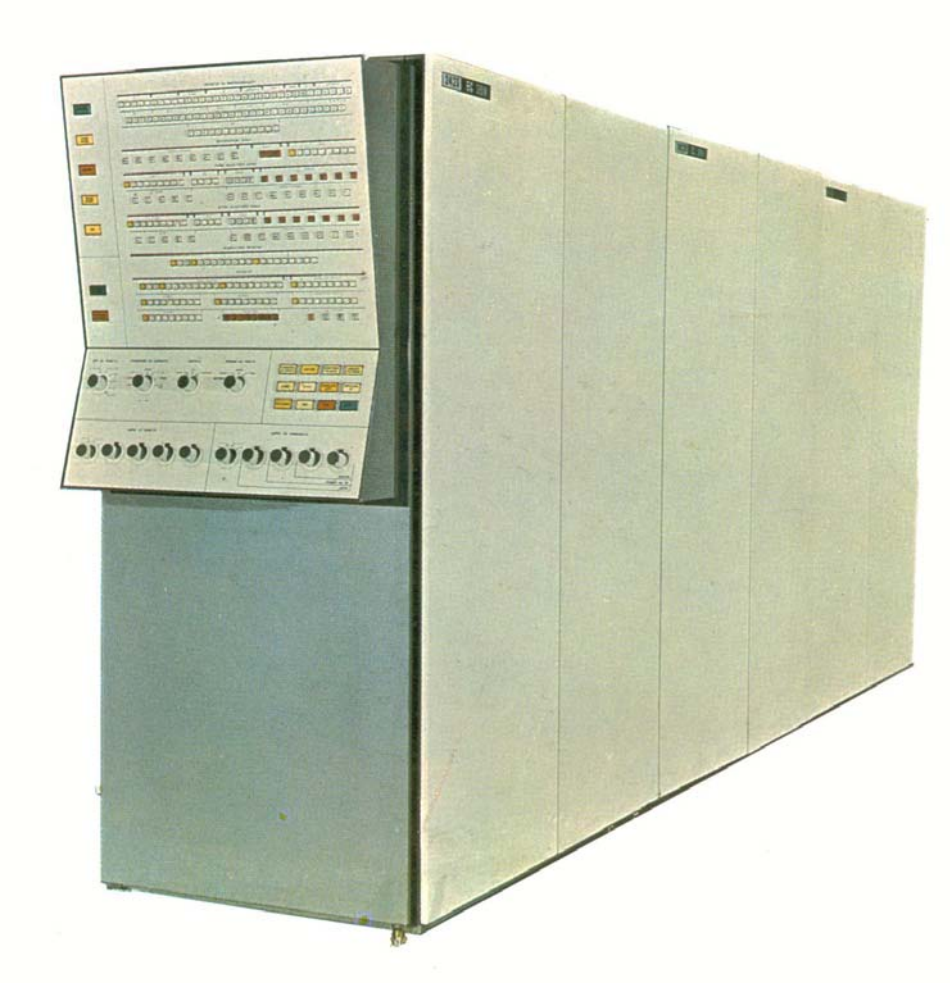
Research & Development

- Central Institute of computer technique (ca.2400 persons in 1989), Sofia
- Institute for Microprocessors Systems (ca.1050 persons in 1989), Sofia
- Bulgarian Academy of Sciences – CICT, ITKR, Sofia
- Technical university, Sofia

Mainframe Computers Production

- 1971 – US1020, IBM 360 compatible
- 1974 – US1022, IBM 360 compatible
- 1980 – US1035, IBM 370 compatible
- 1985 – US2706, Array Processor 40 MIPS
- 1986 – US2709, High Performance Processor, 64 bit word, over 18 MIPS, 4MB RAM, up to 4 processors in parallel
- 1988 – US1037, Computer System with 32bit CPU - 1,8 MIPS, 16MB RAM, 317MB HDD, IBM370 compatible
- 1989 – APS-48, Parallel processing workstation based on 48 Transputers of Inmos Corp.

Mainframe Computers Production – some photos



US1020
Computer System
(1971)

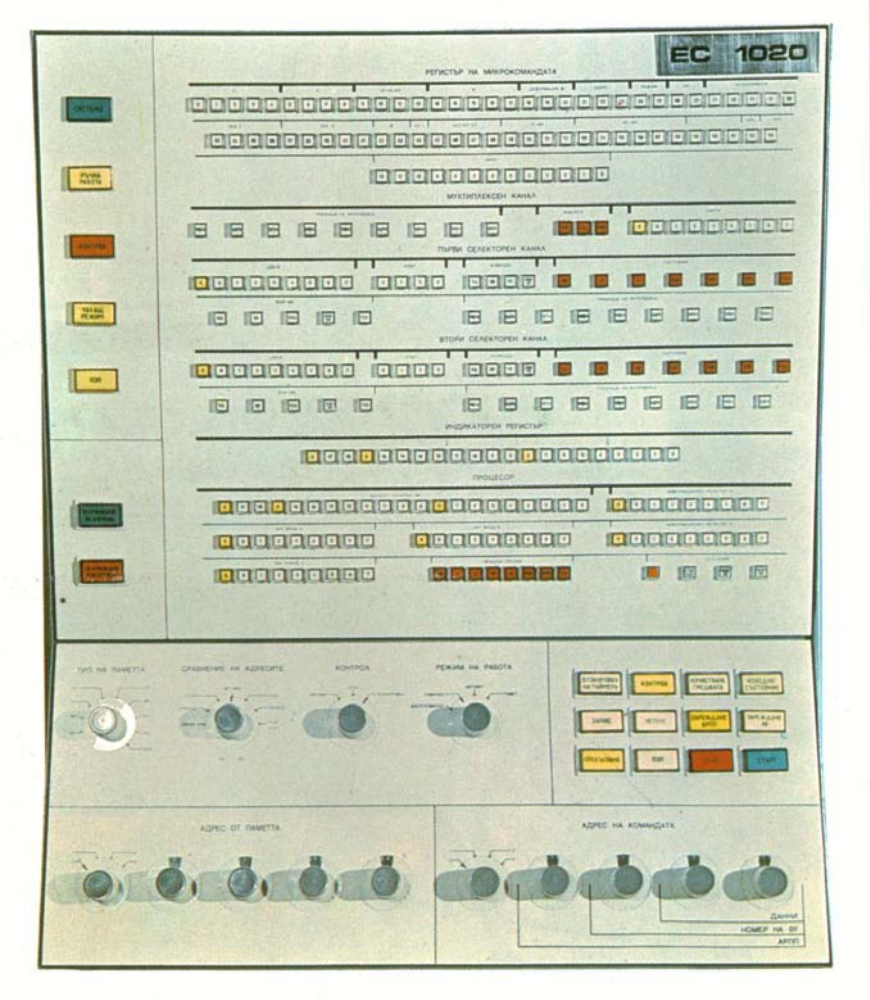
256 KB ferrite core memory

CPU with 142 Instruction Set

Fixed Point Add Instruction - 20-30 µs

Power consumption 4,5KW

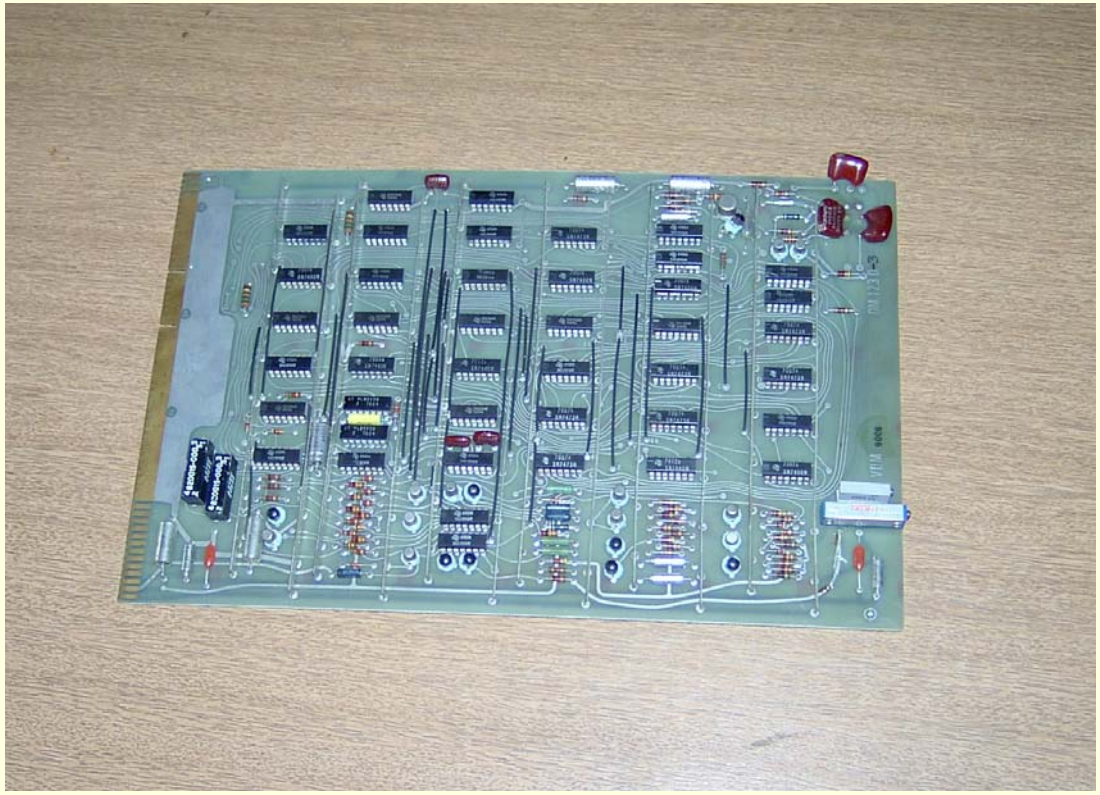
Mainframe Computers Production – some photos



Control panel of US1020 computer system

(1971)

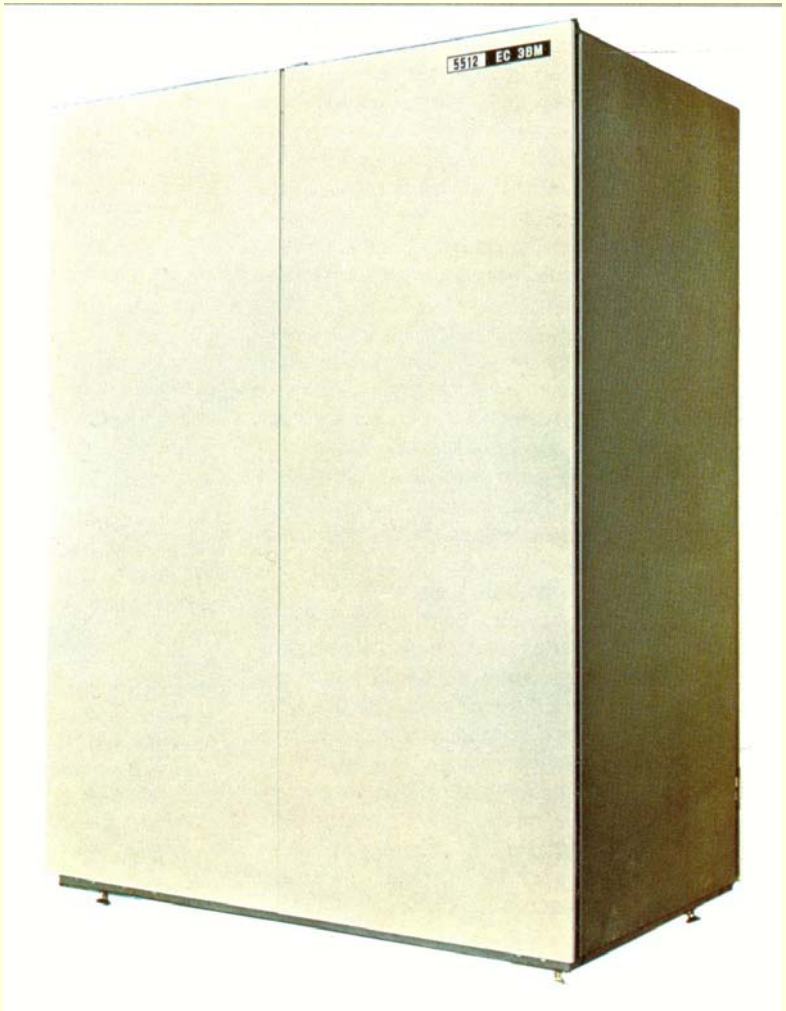
Mainframe Computers Production – some photos



US1020 computer system

Basic module with TTL Small Scale Integration Circuits (1971)

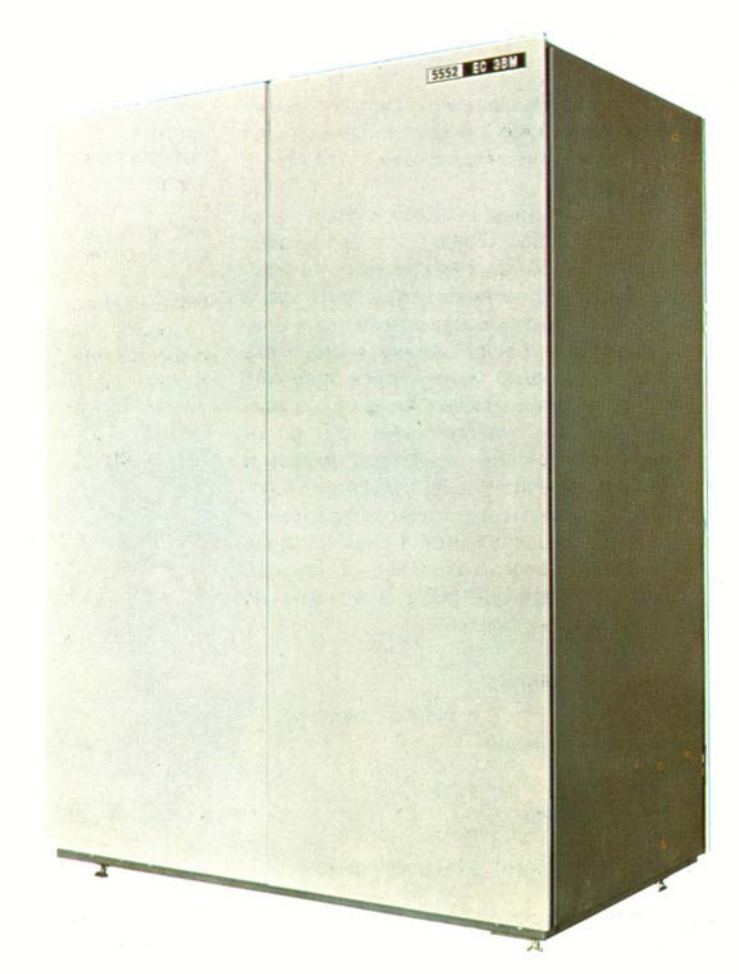
Mainframe Computers Production – some photos



US1020 computer system

US 5512 Tape subsystem controller for 8 tape drives (1971)

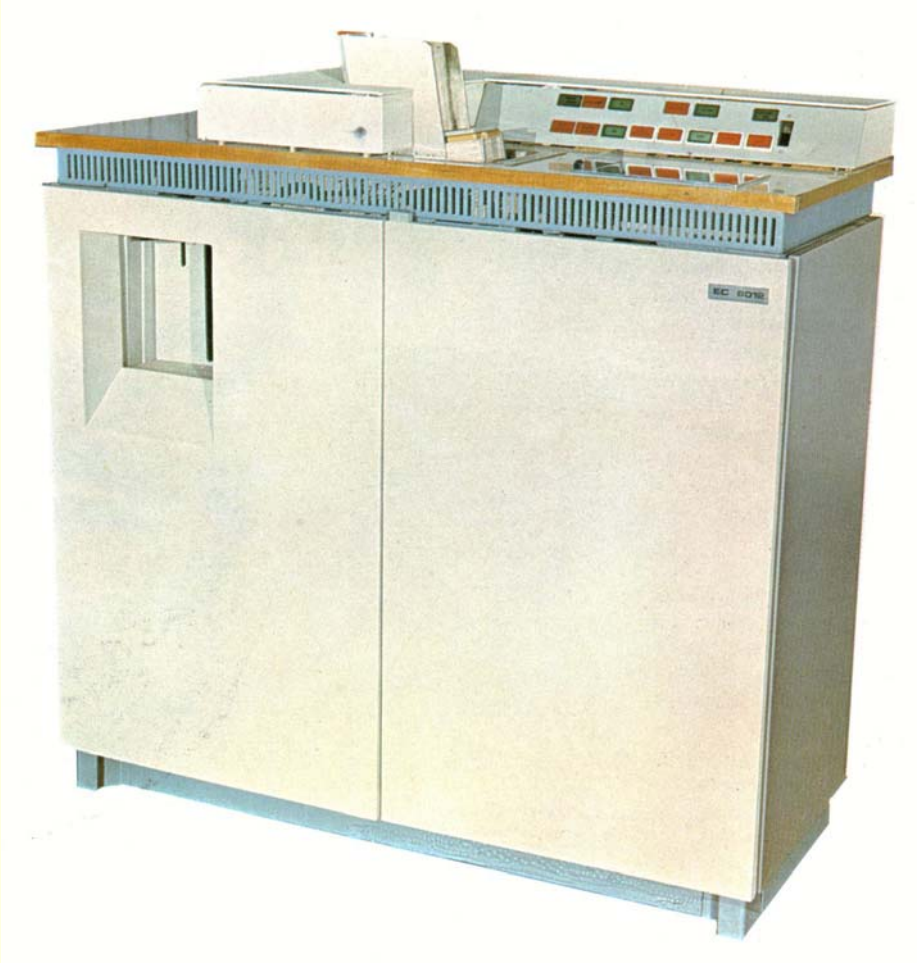
Mainframe Computers Production – some photos



US1020 computer system

US 5512 Disk subsystem controller (1971)

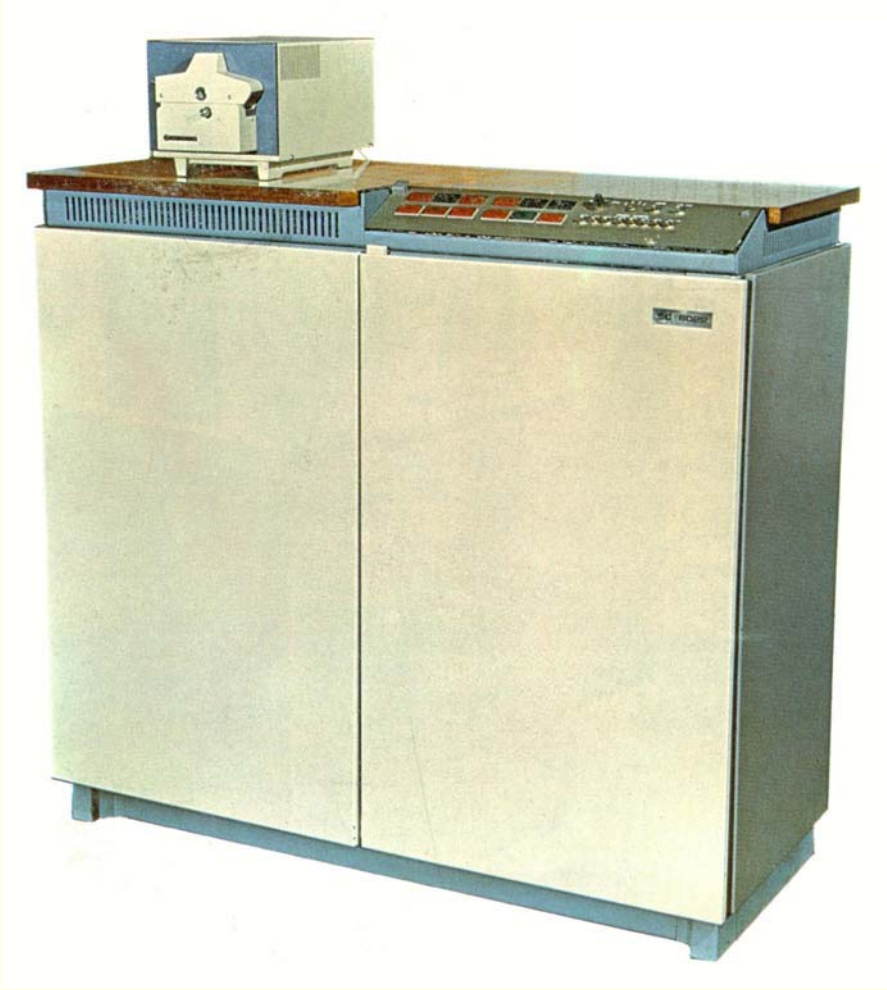
Mainframe Computers Production – some photos



US1020 computer system

US 6012 Punch Card Reader

Mainframe Computers Production – some photos



US1020 computer system

US 6022 Punch Tape Reader

Mainframe Computers Production – some photos

US1020 computer system

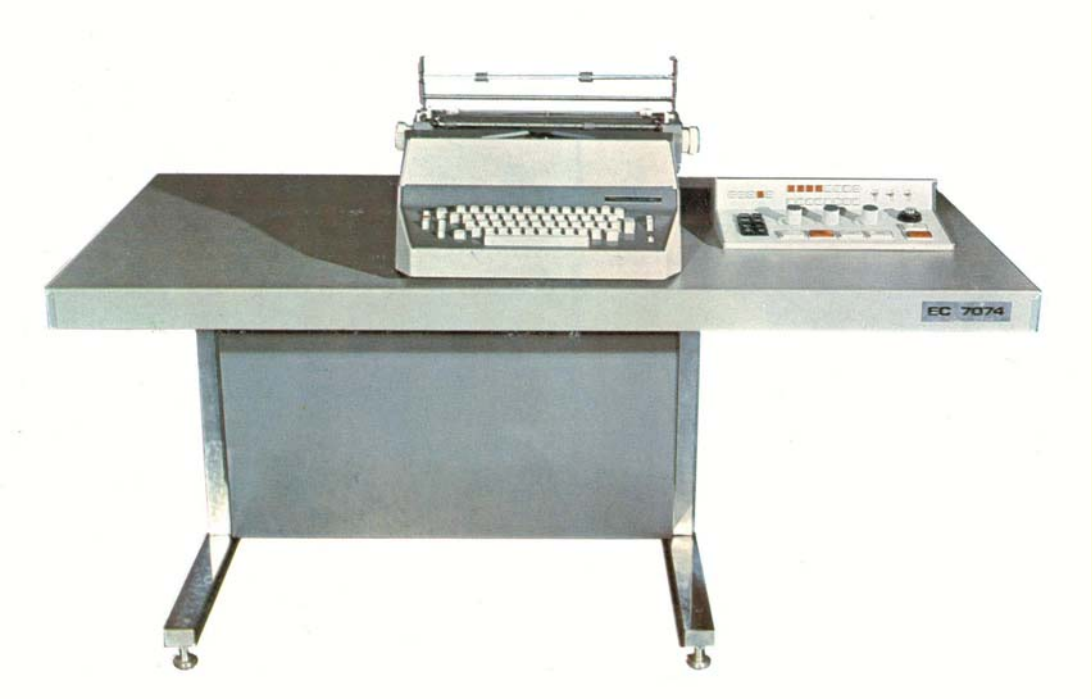
US 7010 Punch Card Output Device

Mainframe Computers Production – some photos

US1020 computer system

US 7030 Line Printer

Mainframe Computers Production – some photos



US1020 computer system

US 8501 Operator's Console

Mainframe Computers Production – some photos

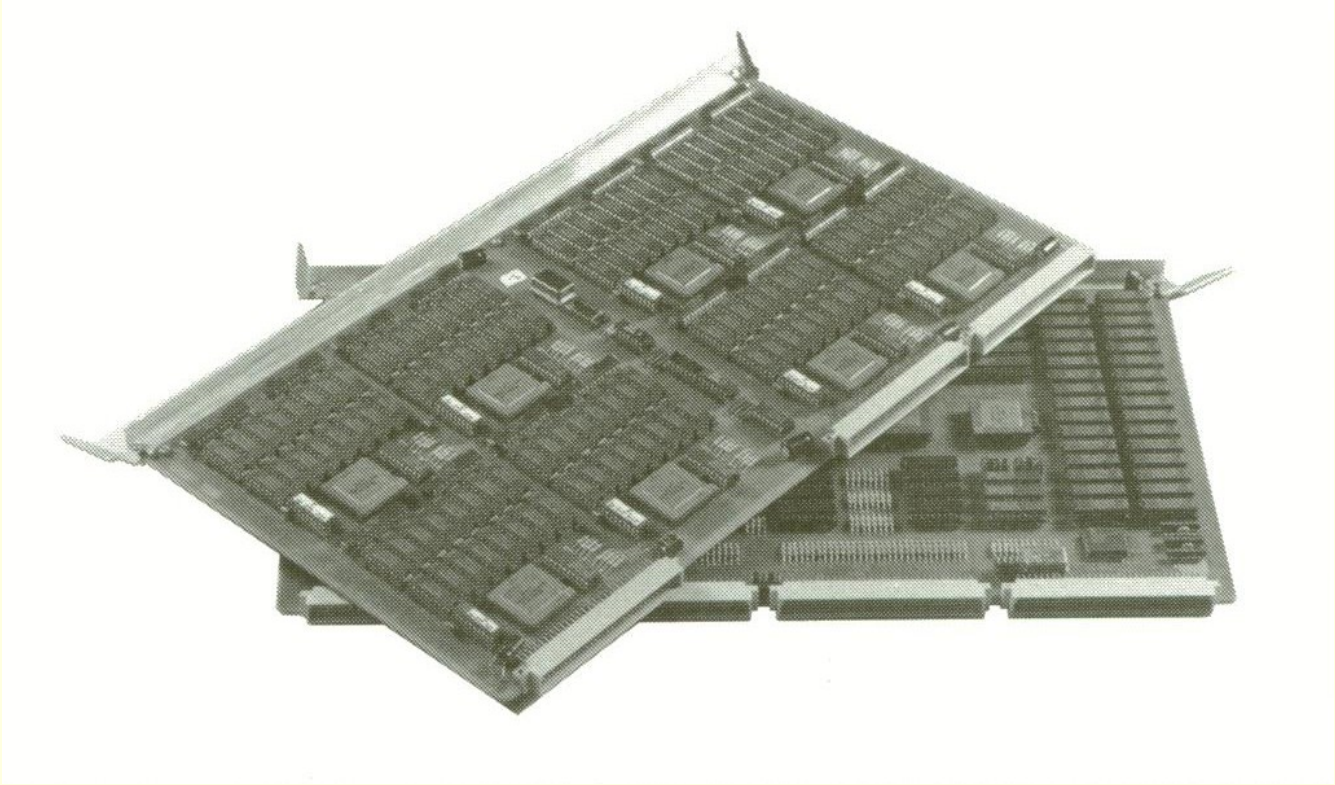
ISOT 1703E high performance computer system based on US 1037 Computer System and US 2706 Array Processor

Mainframe Computers Production – some photos

The Parallel processing workstation APS-48 is based on 48 Transputers of Inmos Corp. (1989)

Mainframe Computers Production – some photos

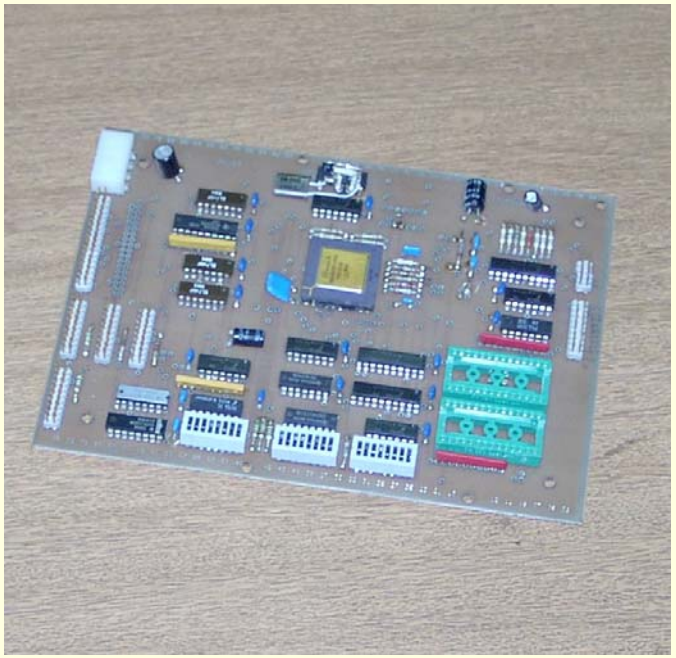
Basic module with 8 processors for APS-48 (1989)



Mainframe Computers Production – some photos

PC module of
Transputer Development System
(1989)

Disk Drive Controller for APS-48,
based on transputers
(1989)

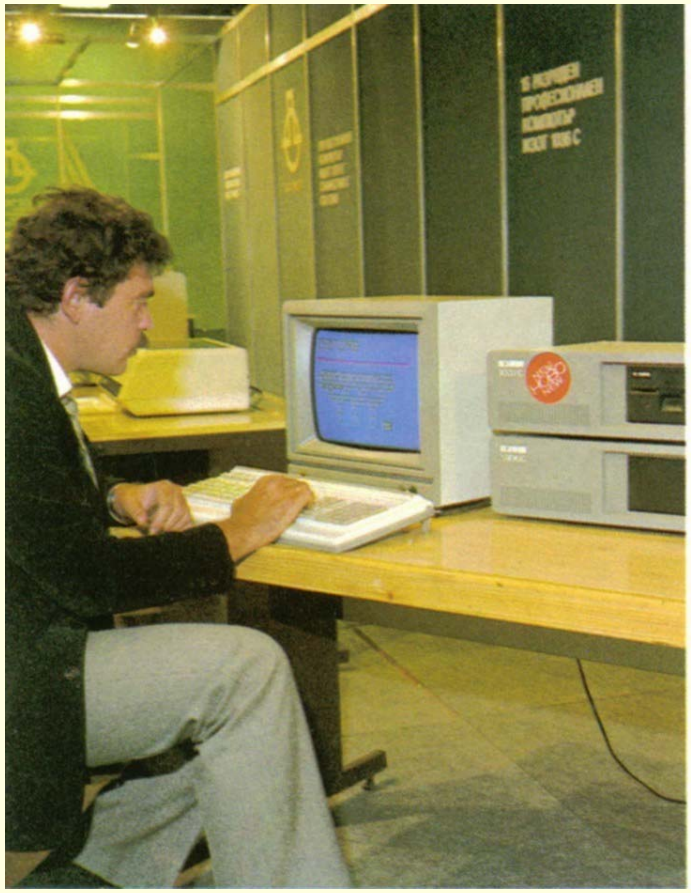


Mini and Micro Computers Production

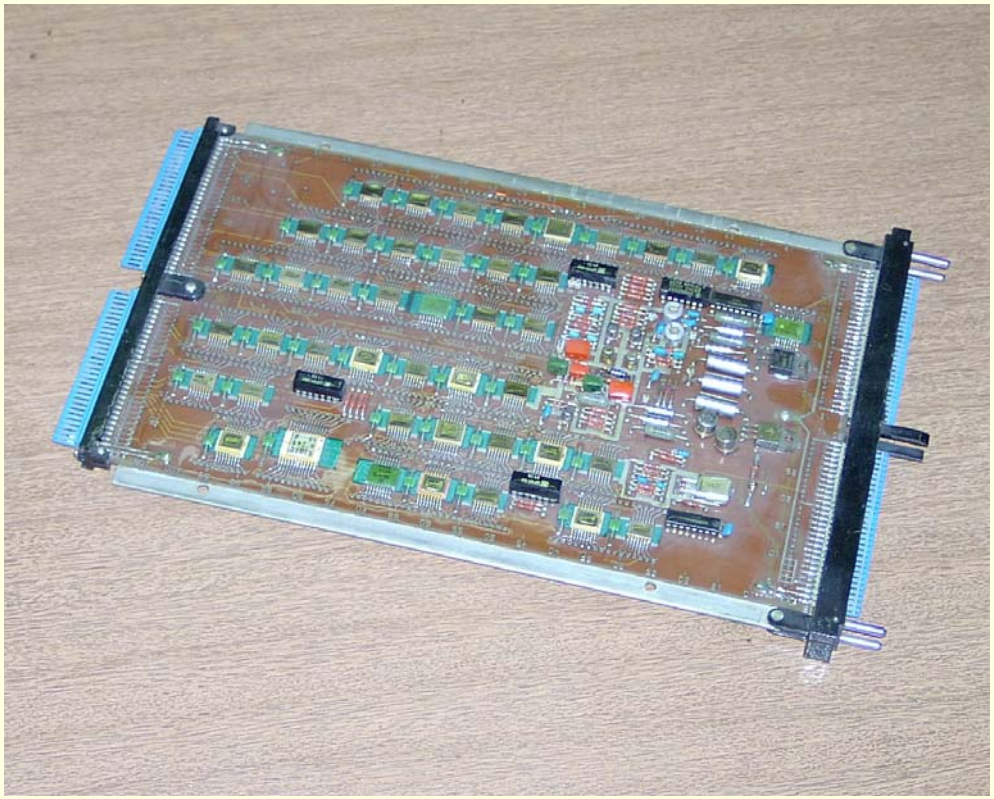
- 1974 – IZOT 0310, 8 bit, PDP 8 compatible
- 1981 – 16 bit, 64KB RAM, PDP 11 compatible
- 1986 – US1832, IBM PC/XT compatible
- 1988 – 16 bit, 1MB RAM, 0.5 MIPS, 20MB HDD, PDP 11 compatible
- 1988 – US1838, IBM PC/AT compatible
- 1989 –32 bit, 8MB RAM, 2x300MB HDD, Vax compatible

Minicomputer MS1706 (1986)

Personal computer US1832 (1986) - IBM PC/XT compatible



Mini and Micro Computers Production - some photos



One of the modules of Disk Drive Controller for Navy Computer System (1985)

Disk Drives Production

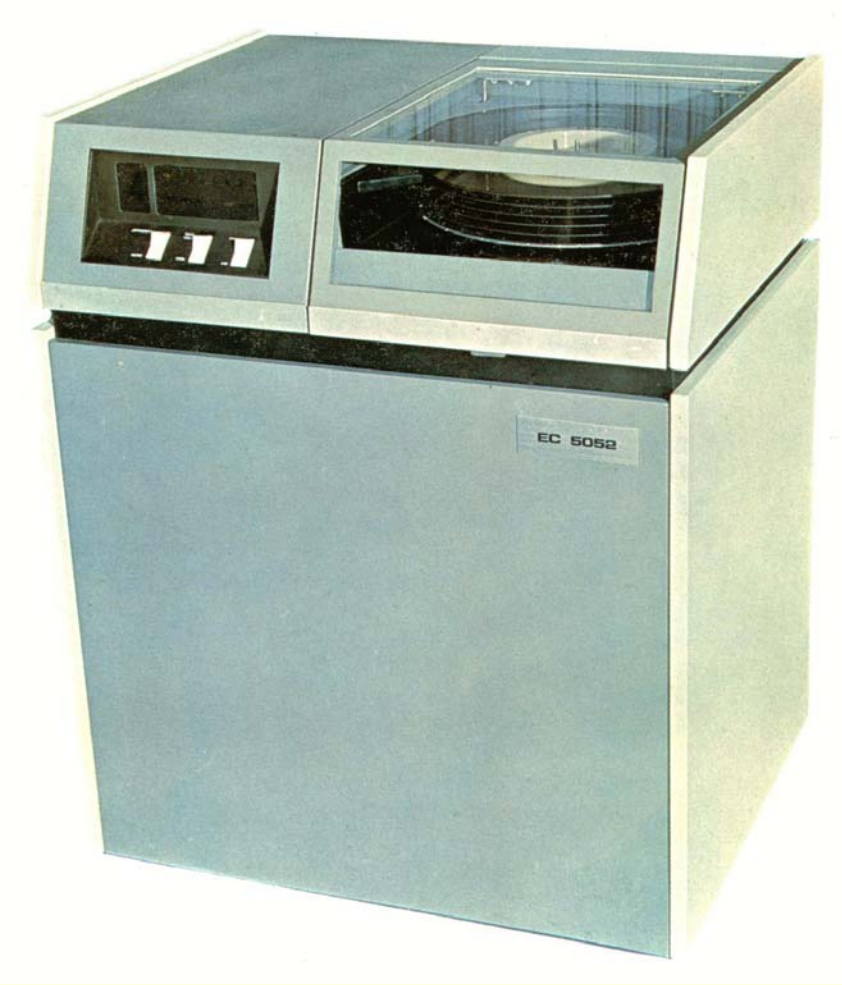
- **1968 –foundation of DZU factory for disc drives manufacturing**
- 1971 – 7,5 MB disc drives 14” (removable disk pack)
- 1973 – 29 MB disc drives 14” (removable disk pack)
- 1974 – 56 MB disc drives 14” (removable disk pack)
- 1977 – 100 MB disc drives 14” (removable disk pack)
- 1977 – 200 MB disc drives 14” (removable disk pack)
- 1982 – 317 MB disc drives 14” (Winchester)
- 1983 – 10 MB disc drives 5.25” (Winchester)
- 1985 – 635 MB disc drives 14” (Winchester)
- 1985 – 20 MB disc drives 5.25” (Winchester)
- **1989 – Summit in the production volume – 1,62 billion USD**
- 1990 – Disintegration of Council for Mutual Economic Assistance (CMEA) and the end of East European Computer market
- 1993 – 250, 360, 540 MB family of 3.5” HDD
- **1994 – End of Disk Drive manufacturing**

Hard Disk Drive Factory at Stara Zagora

Start of disk drive production – 1971, initial investments ca.35 mill's USD

Clean room areas:
Class 100 - 2,197 m2; Class 10 000 - 1,061 m2; Class 100 000 - 40,578 m2

Hard Disk Drive Factory at Stara Zagora – some photos

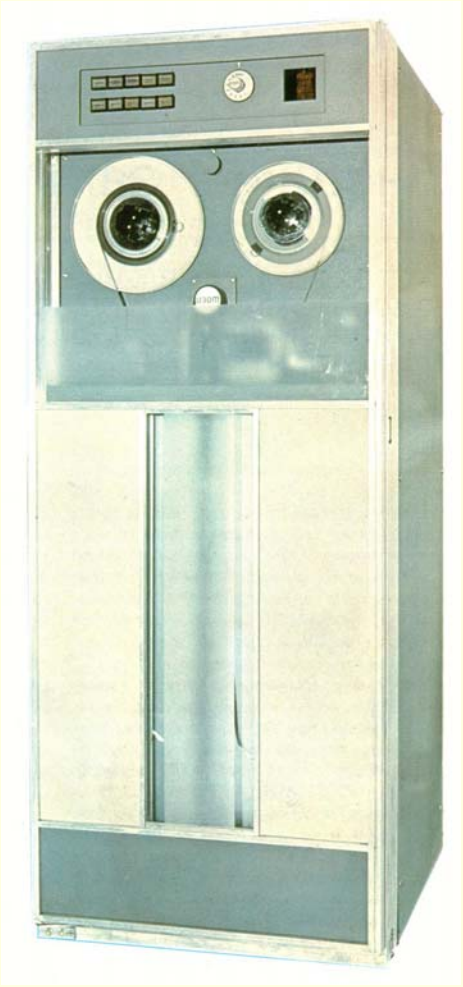


7.25 MB Disk Drive Unit US 5052 with removable disk pack US 5053 (1971)

Tape Drives Production

- 1972 – reel tape unit, 64KB/s, 32 bits/mm
- 1977 – reel tape unit, 126KB/s, 63 bits/mm
- 1985 – reel tape unit, 492KB/s, 246 bits/mm
- 1986 – reel tape unit, 738KB/s, 246 bits/mm
- 1987 – stream tape unit, 160KB/s, 63 bits/mm
- 1988 – 20MB cartridge tape unit, 90KB/s, 394 bits/mm
- 1989 – 60MB cartridge tape unit, 55KB/s, 315 bits/mm

Tape Drives Production– some photos



Reel Tape Drive Unit
US 5012
(1972)

Data transfer speed – 64Kbytes/s
Tape Speed – 2m/s
Weight – 450 kg

Facts about Bulgarian computer production in 1989

- Bulgaria was No.1 amongst the countries of the Council for Mutual Economic Assistance (CMEA)
- Bulgarian computer export was more than the total computer export of all the rest CMEA countries
- There was no other country in CMEA producing Hard Disk Drive memories
- 4675 researchers were involved in computer R&D activities in 1988
- Total Bulgaria export of computers for the 1983-89 period was 18,8 bil.rubles
- The annual computer export from that period has paid the annual import of 6 mil.tones oil, 1 mil.tones of steel, etc.

Facts about Bulgarian computer production in 1989 (cont.)

Year	*1980*	*1985*	*1988*	*1990*
Total amount of enterprises	144	165	204	206
Total personal involved (thousands)	126	148	169	181
Percent of total Bulgarian labor force	9.3%	10.6%	11.7%	13.1%
Assets (mil.USD)	1154	1935	3162	3949
Total production (mil.USD)	3861	4951	7387	5436
Percent from Bulgarian total Industrial production	9.3%	11%	14.5%	12%

Facts about Bulgarian computer production in 1989 (cont.)

	CMEA Countries								
	Total	Bulga-ria	Hun-gary	DDR	Cuba	Po-land	Roma-nia	USSR	Cze-choslo vakia
Export (mil.rubles)	3174	1653	245	472	14.6	404	36	153	197
%	100%	52%	7.7%	14.9%	0.46%	12.7%	1.13%	4.81%	6.21%
Import (mil.rubles)	3174	36	28.6	223	28	80.7	67.7	2390	321
%	100%	1.14%	0.9%	7.02%	0.88%	2.54%	2.13%	75.3%	10.1%
Total turnover (mil.rubles)	6348	1689	273.6	695	42.6	484.7	103.7	2543	518
%	100%	26.6%	4.3%	10.1%	0.67%	7.63%	1.63%	40%	8.17%