

HISTORIA KOMPUTERÓW

2015/16

Bartosz Klin

`klin@mimuw.edu.pl`

`http://www.mimuw.edu.pl/~klin/`

Oś czasu

Mauchly



Eckert



Watson Jr.

IBM



digital

Olsen



Anderson



Cray

**CONTROL
DATA**



1950

1955

1960

1965

PDP-8

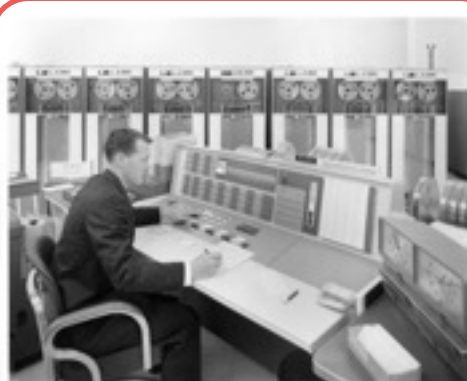
IBM 704



UNIVAC



IBM 7090



IBM 360

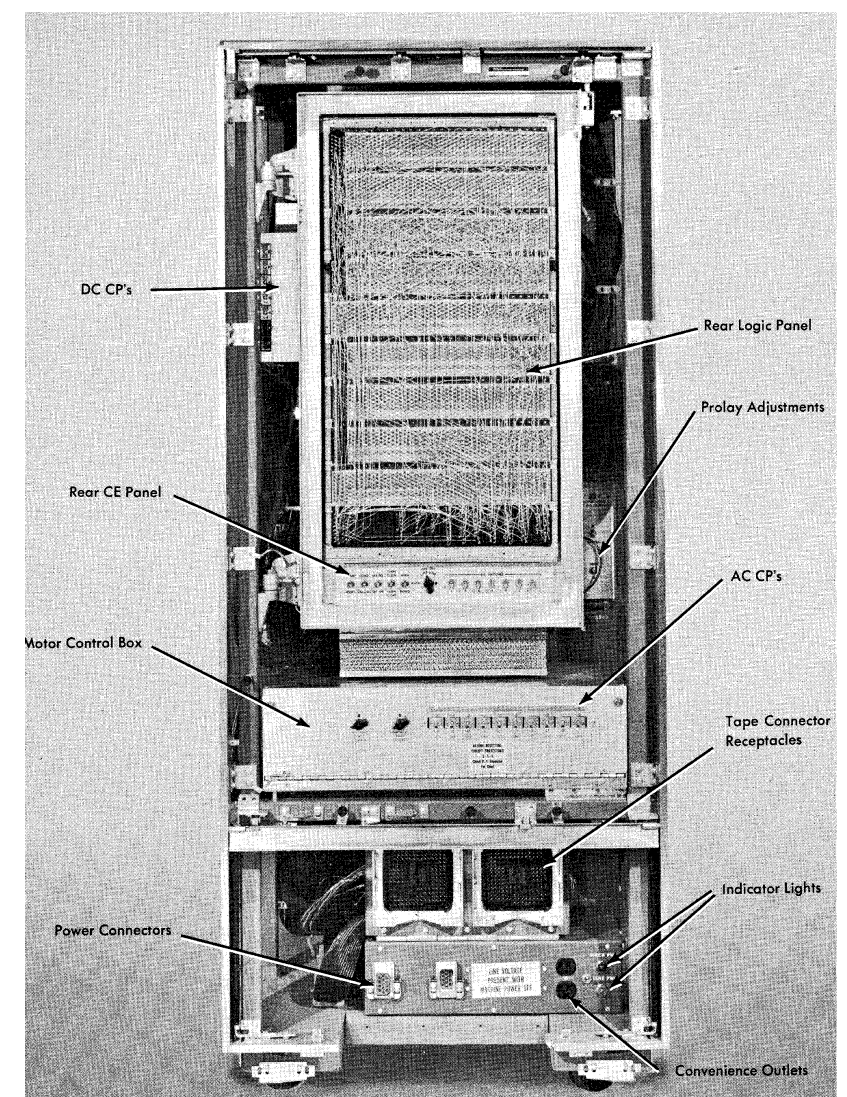
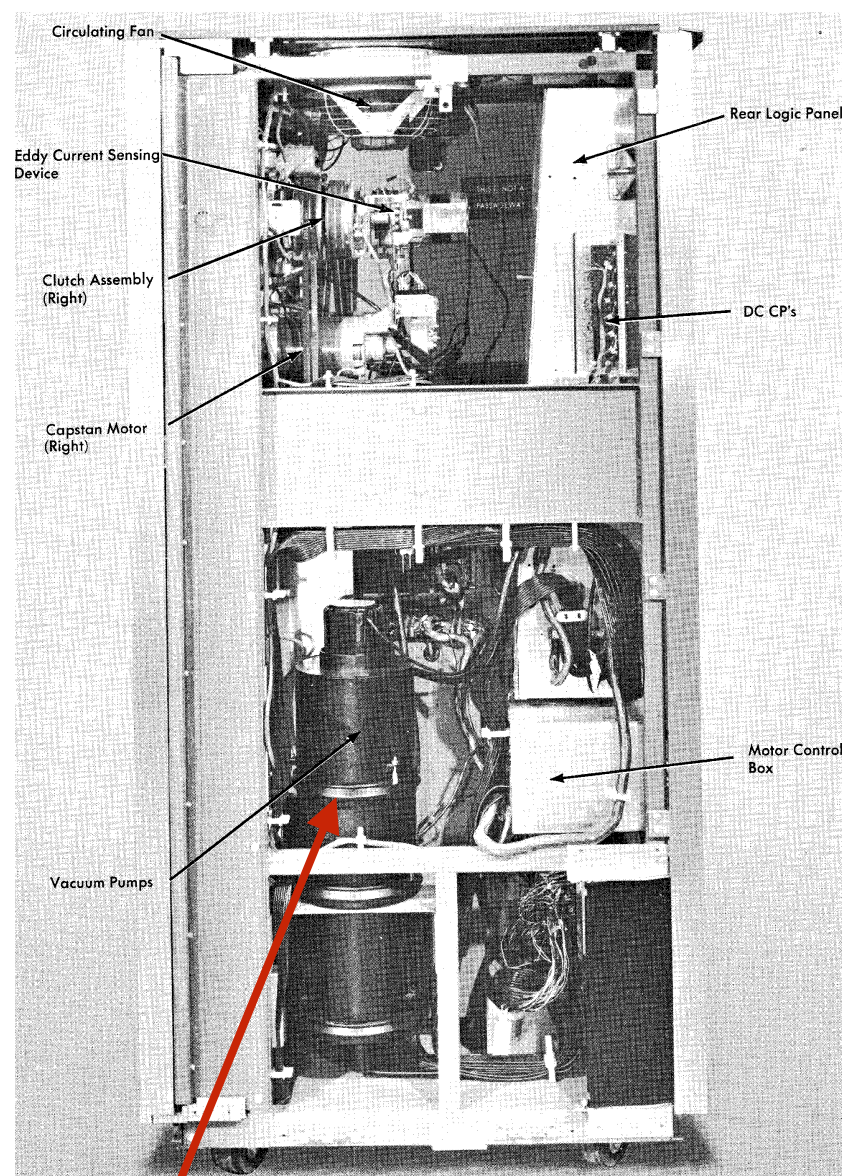
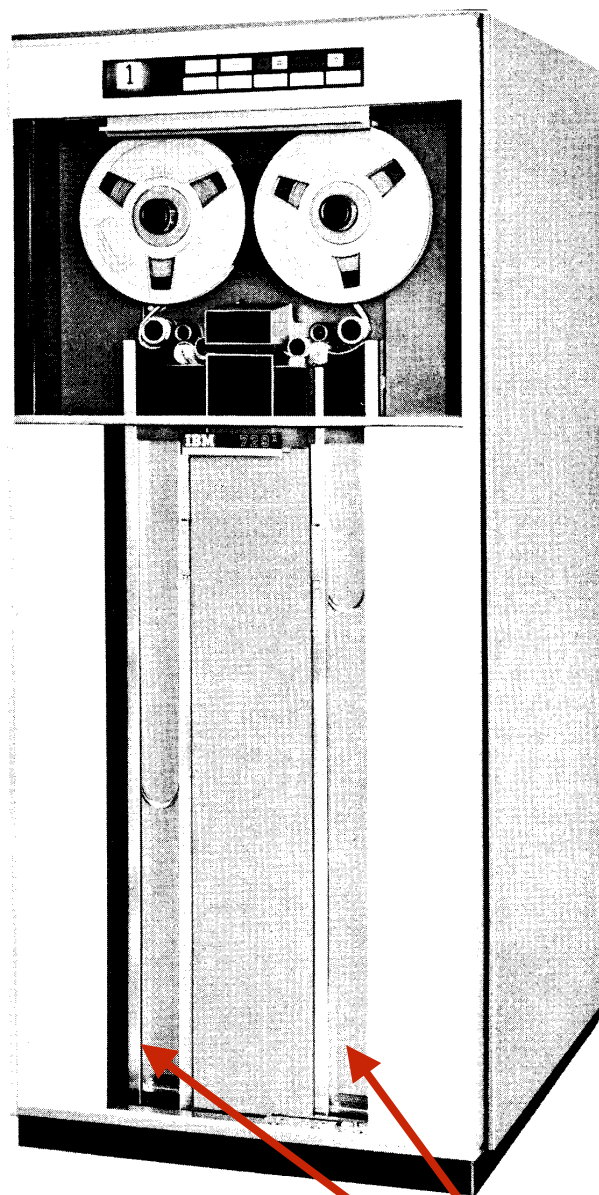


CDC 6600



IBM 729 (1959)

- jednostka I/O, taśmy magnetyczne
- prędkość 2.8m/s, 550b/m, waga 600kg



pompy ssące

IBM 729

- zbliżenie układu sterującego

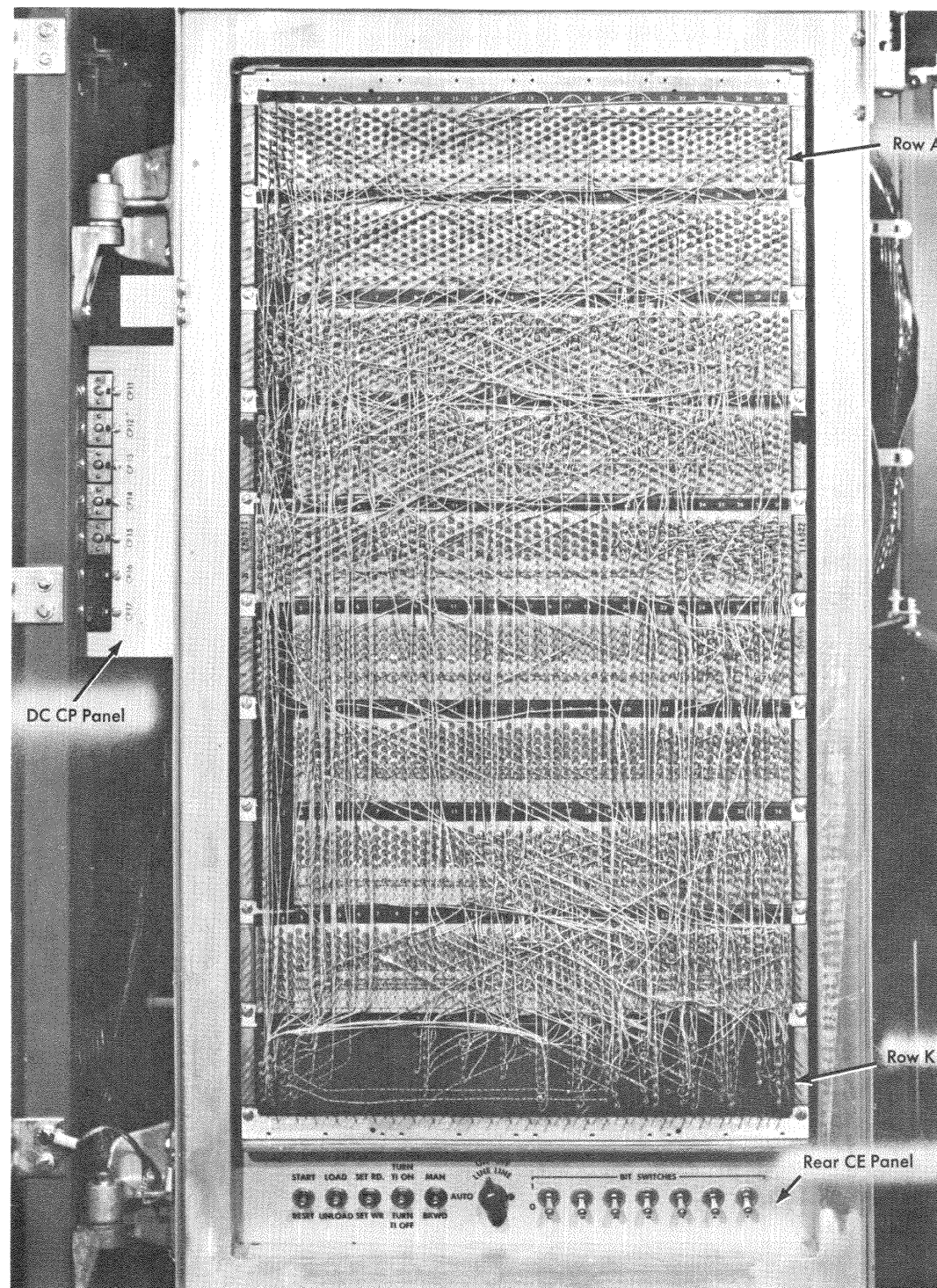


Figure 7. Rear Logic Panel

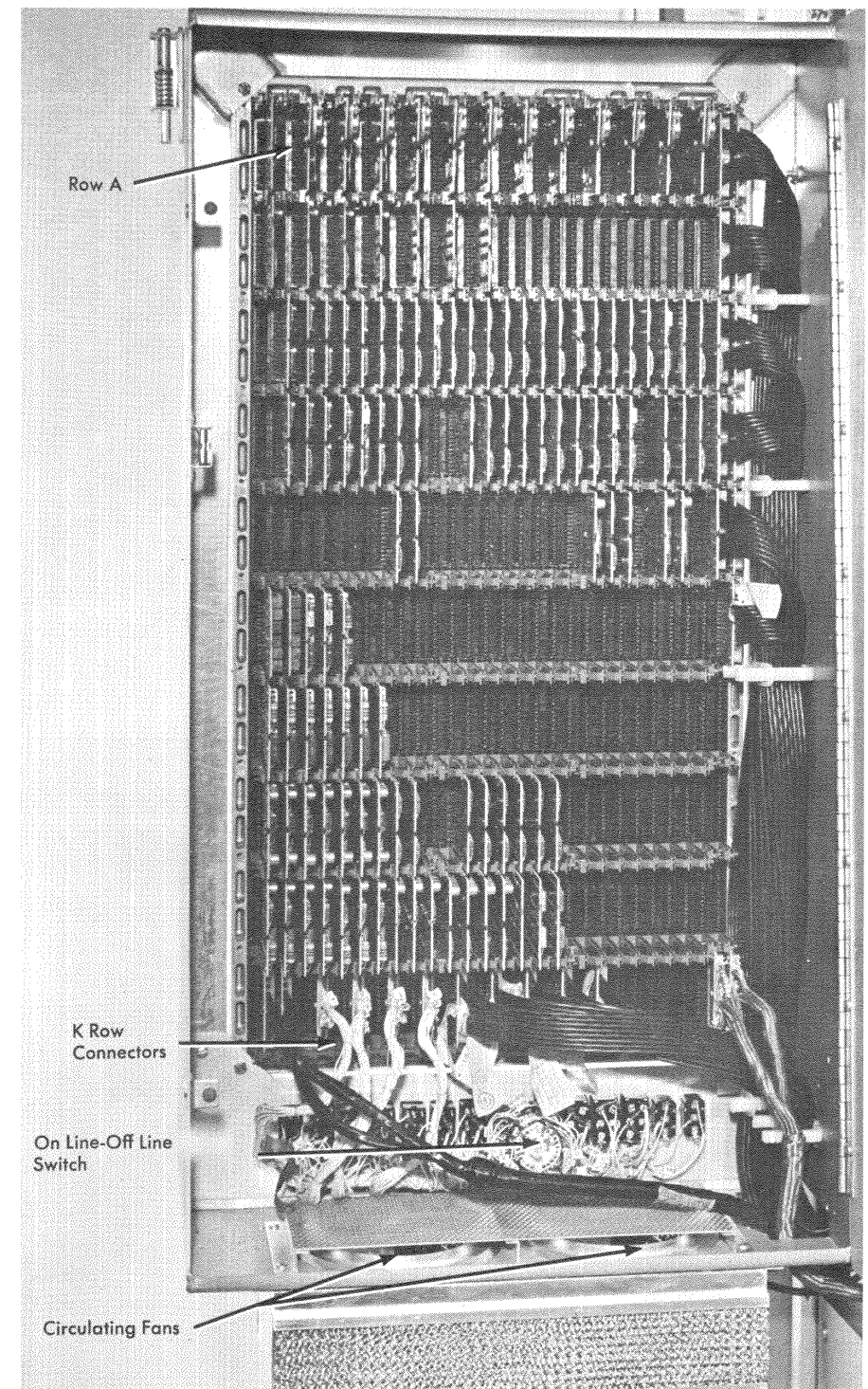
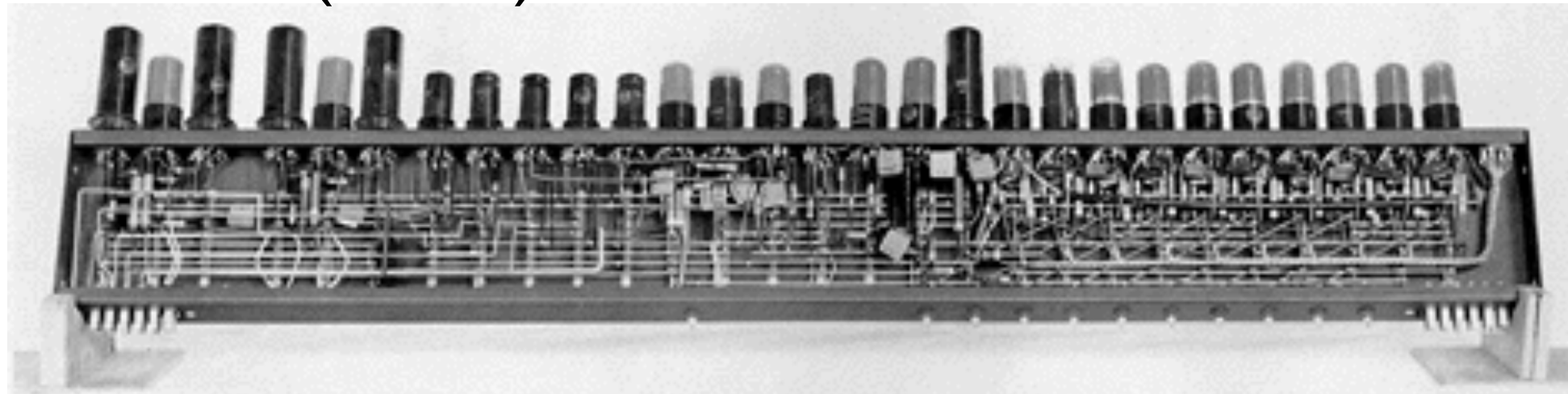


Figure 7A. Read Logic Panel (Card Side)

Moduły w komputerach lampowych

ENIAC (1946)



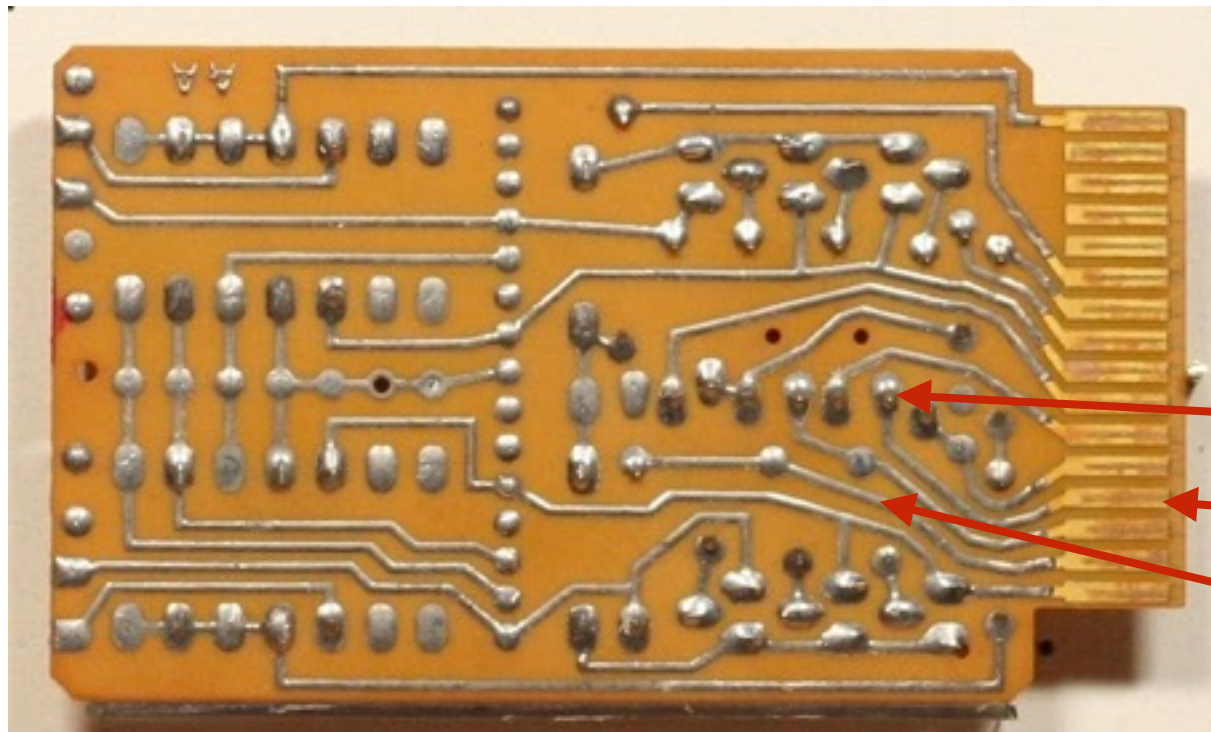
IBM 701 (1952)



Point-to-point
wiring

IBM Standard Modular System (1959)

Zestaw (ponad tysiąc) płytek drukowanych

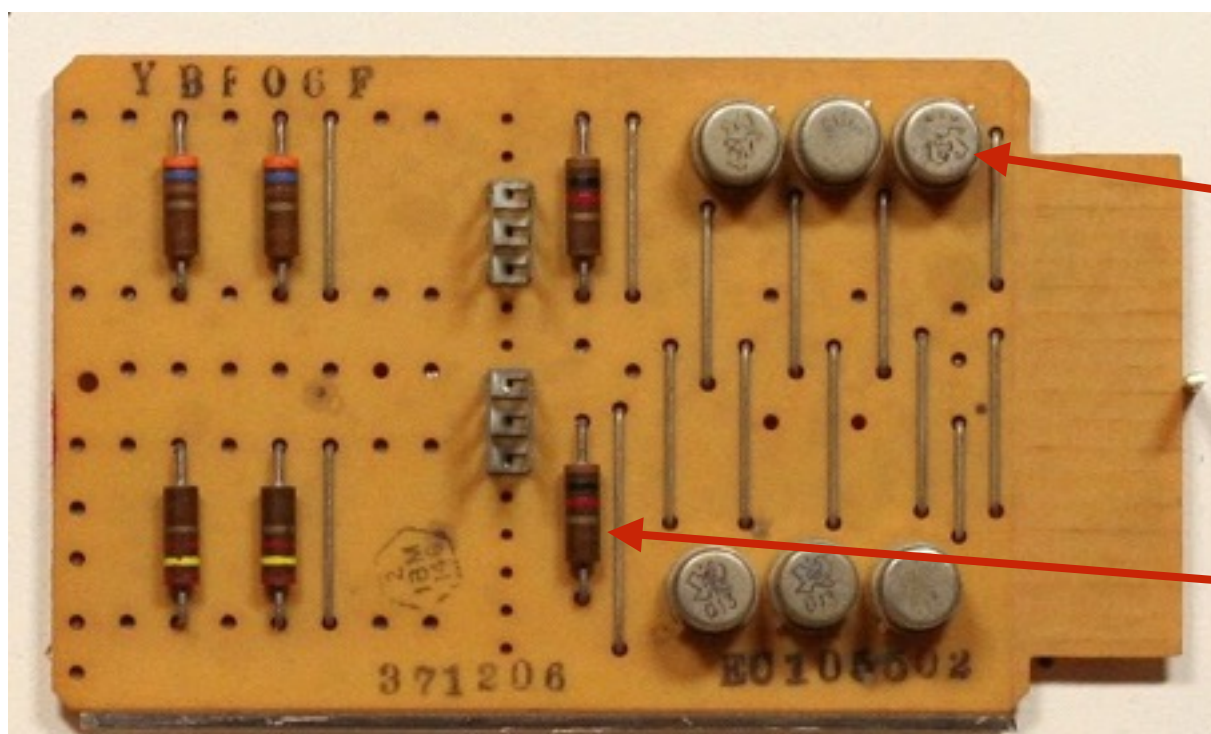


Płytki AAZU:
binarna bramka AND

lut

styk

ścieżka



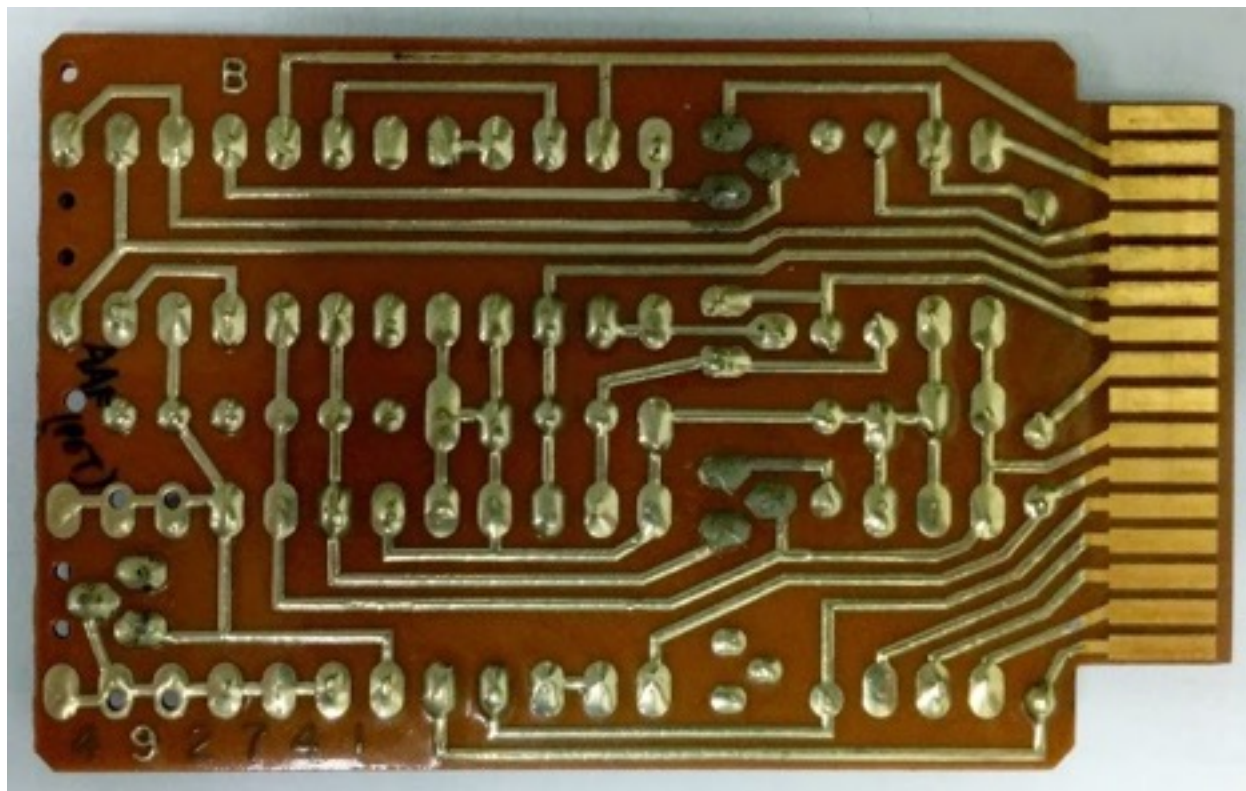
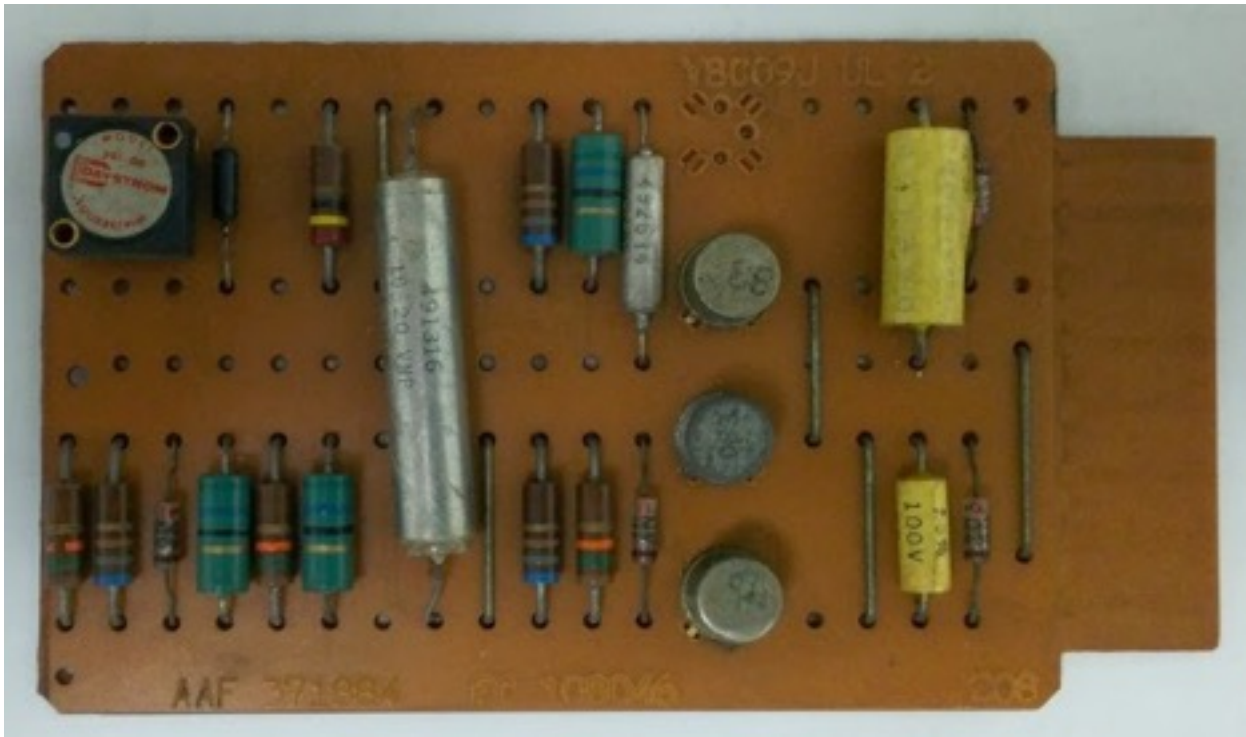
tranzystor

dioda

IBM Standard Modular System (1959)

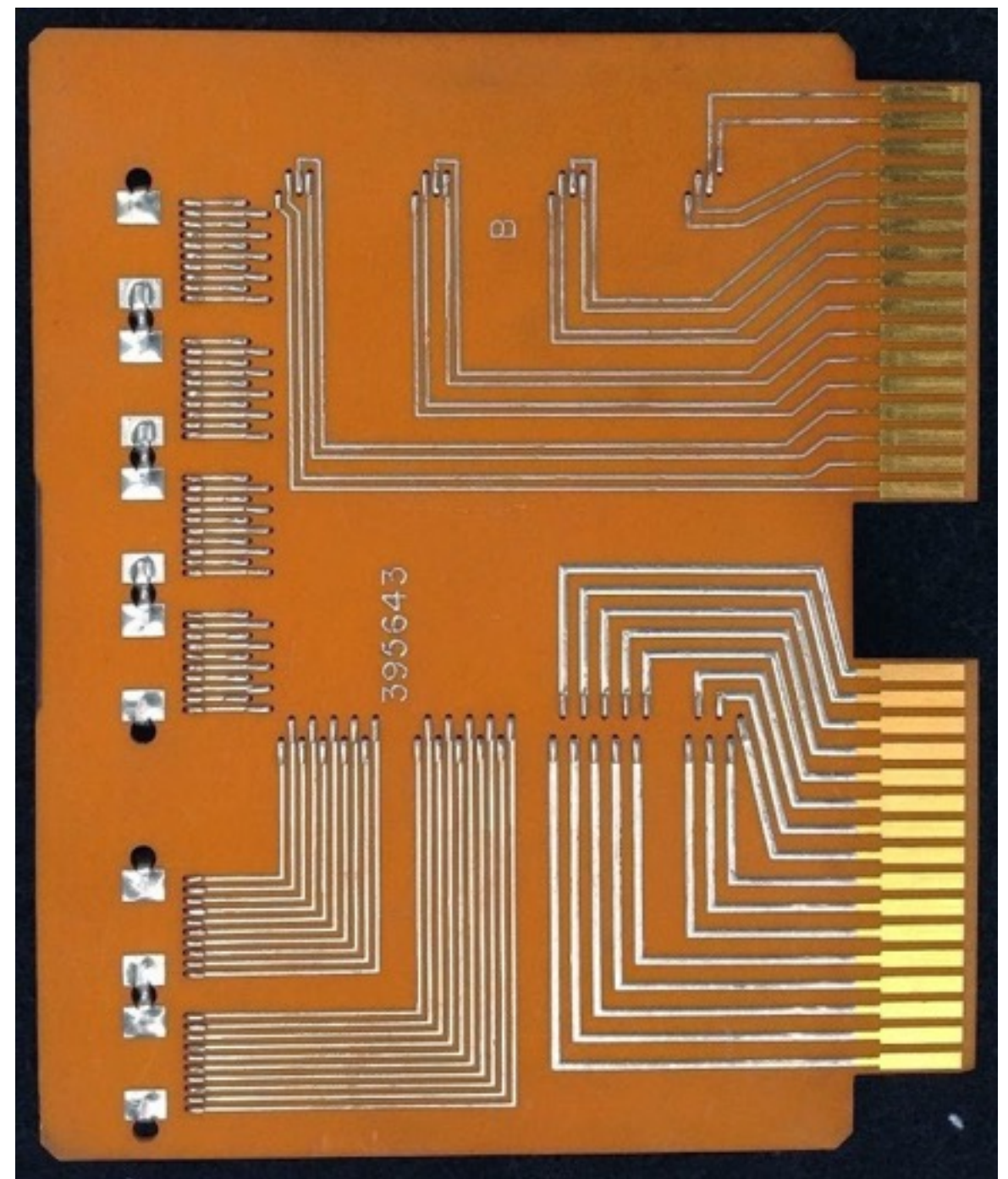
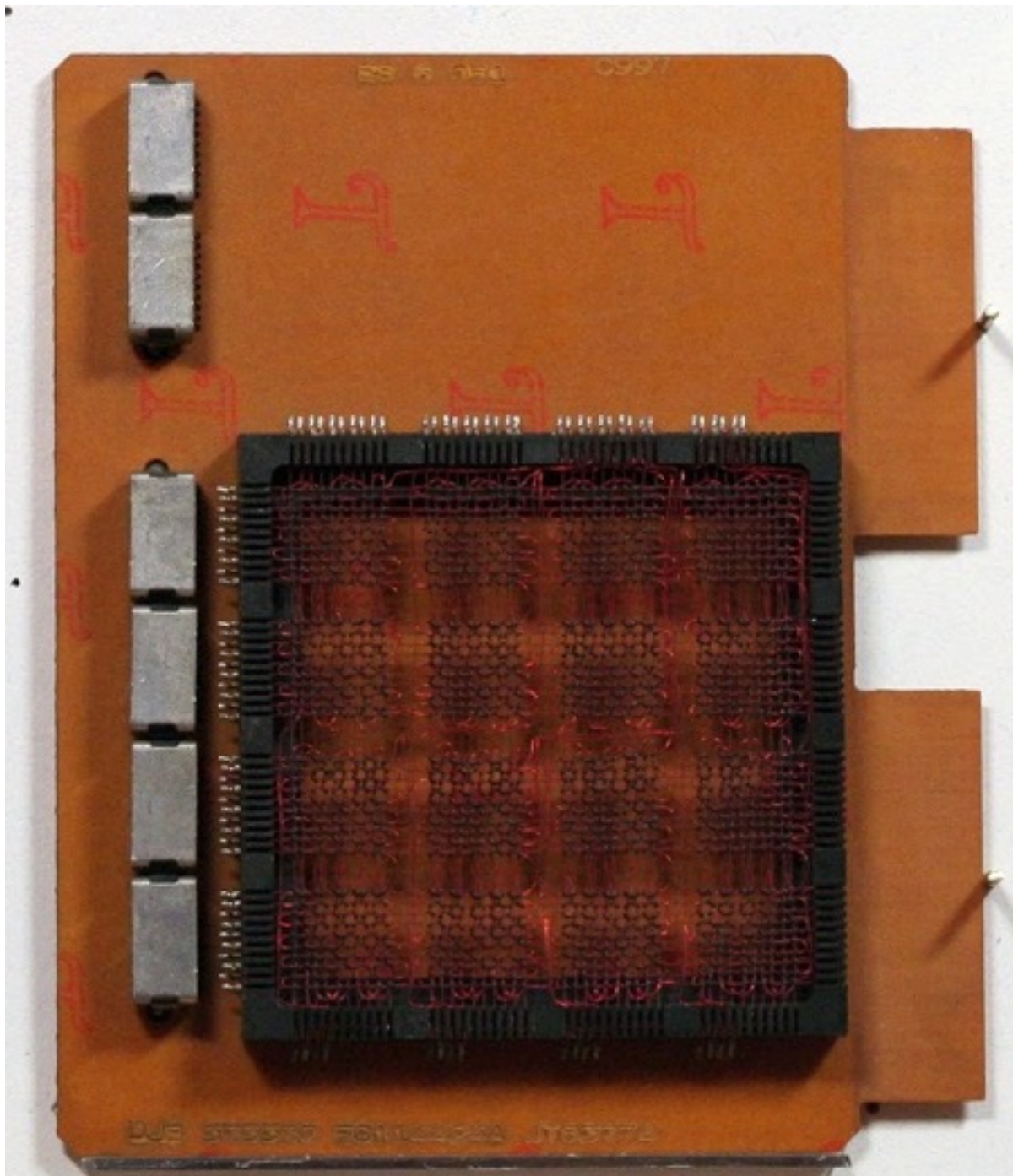
Zestaw (ponad tysiąc) płytek drukowanych

Płytki AAF:
opóźniacz sygnału

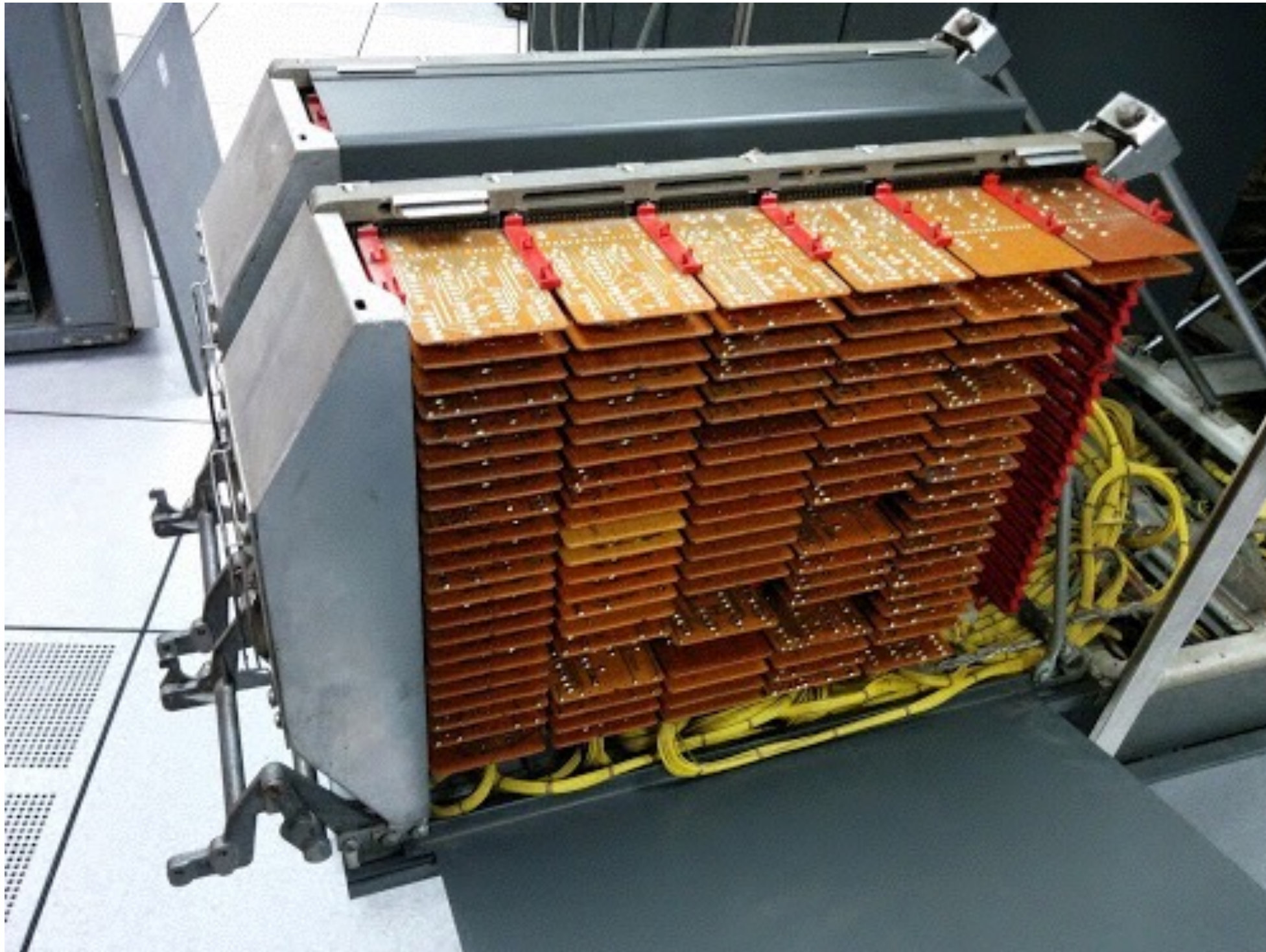


IBM Standard Modular System (1962)

Płytki DJB: pamięć ferrytowa

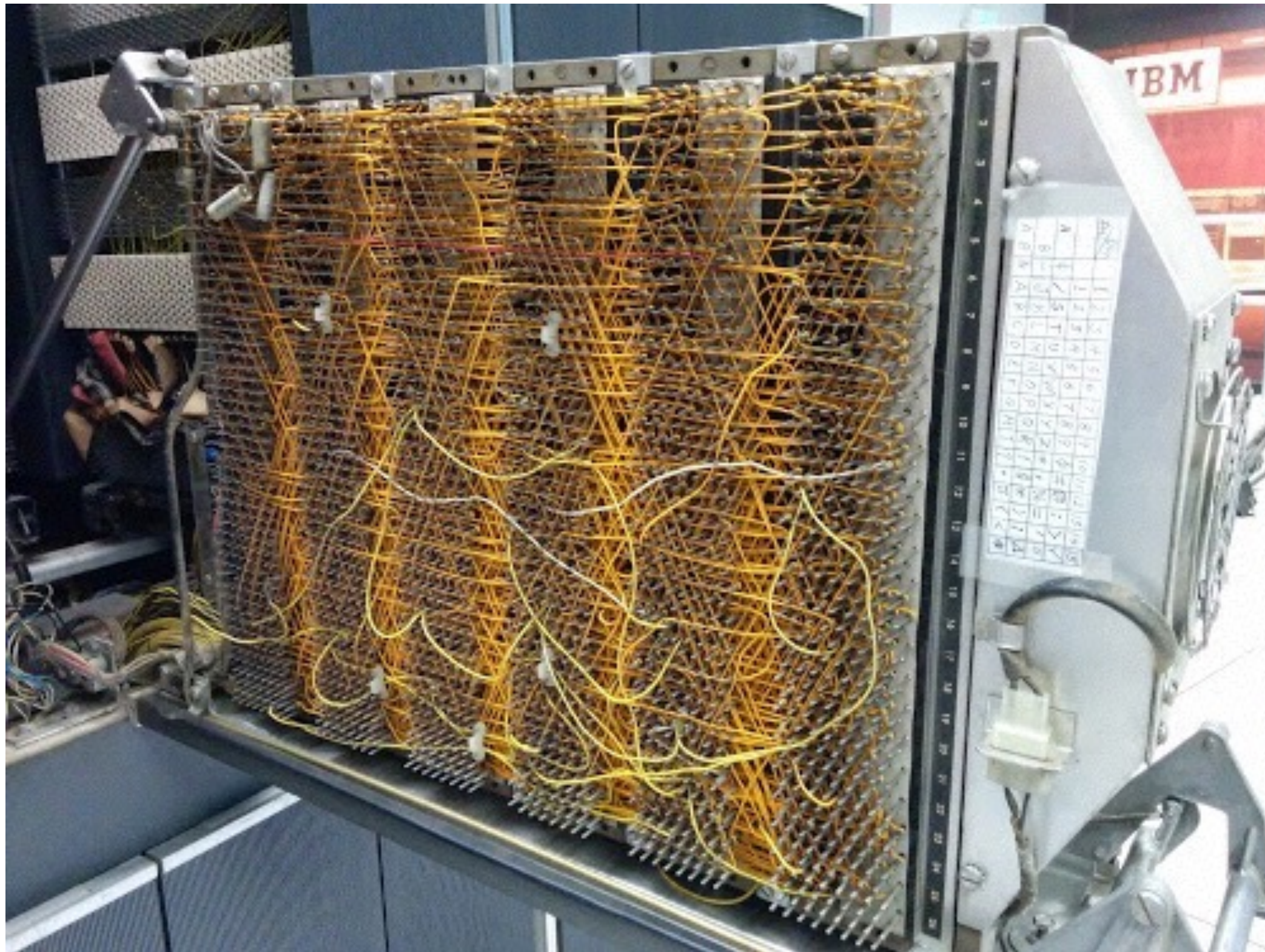


IBM Standard Modular System



fragment komputera IBM 1401 (1959)

IBM Standard Modular System



IBM Solid Logic Technology (1964)

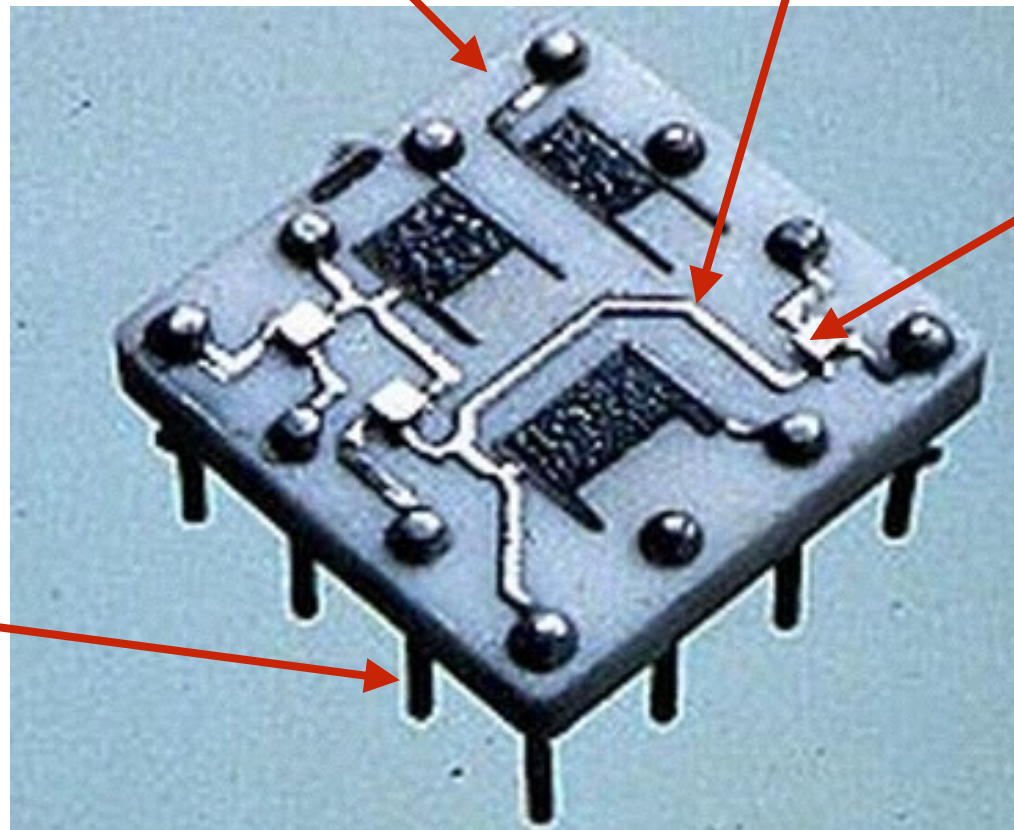
Technologia opracowana dla IBM System/360

ceramiczna płytki, ok. 1 cm^2

ścieżka

transzystor

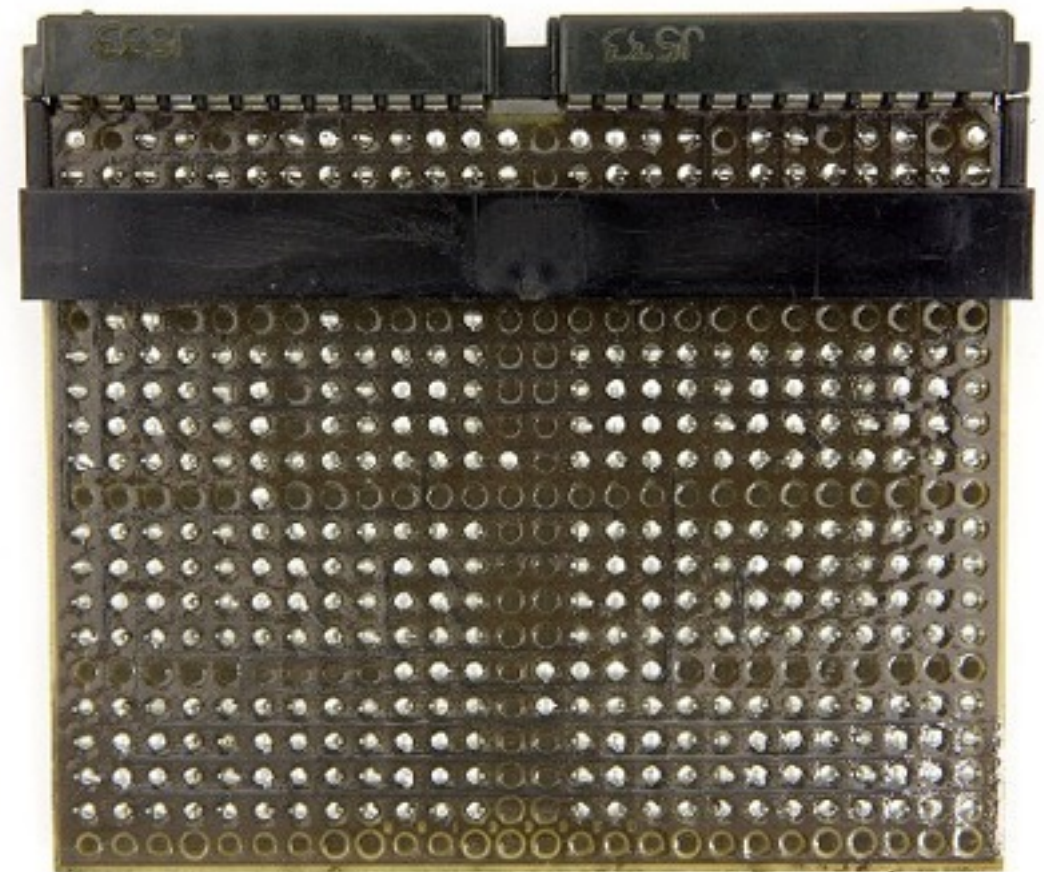
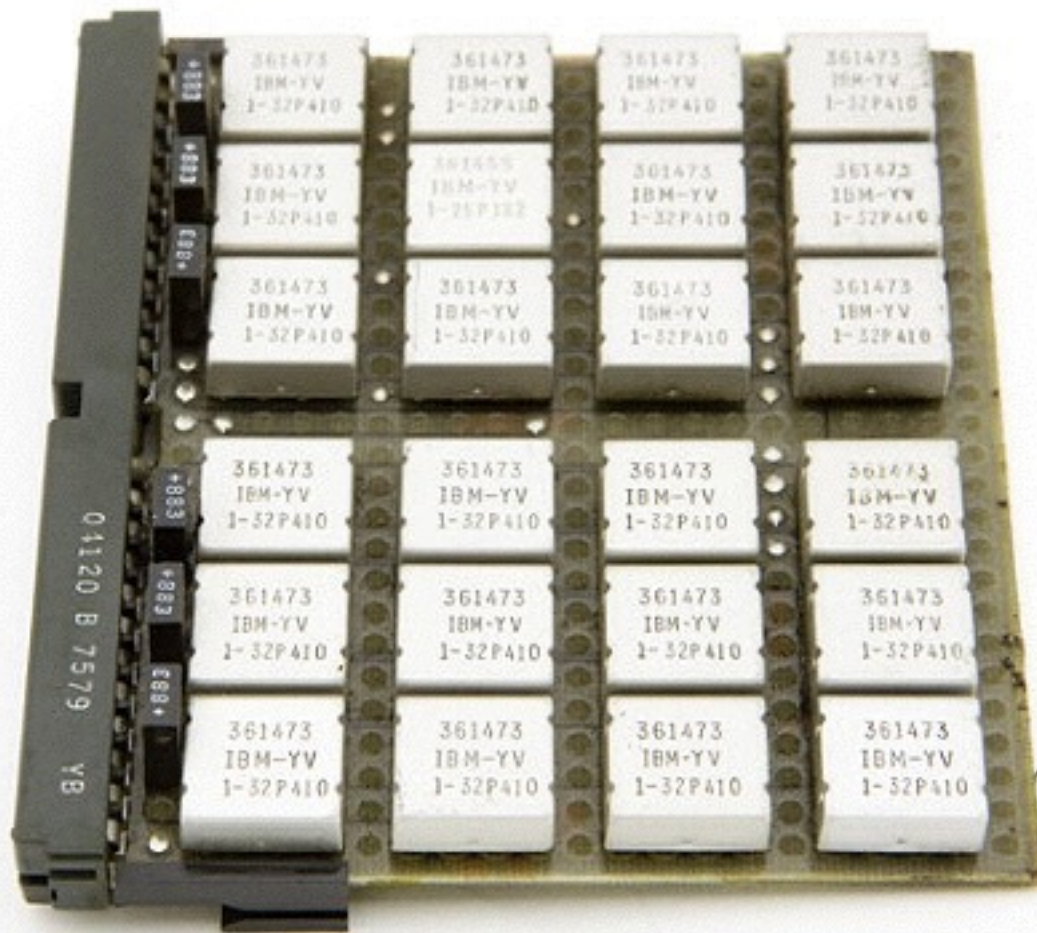
12 nóżek



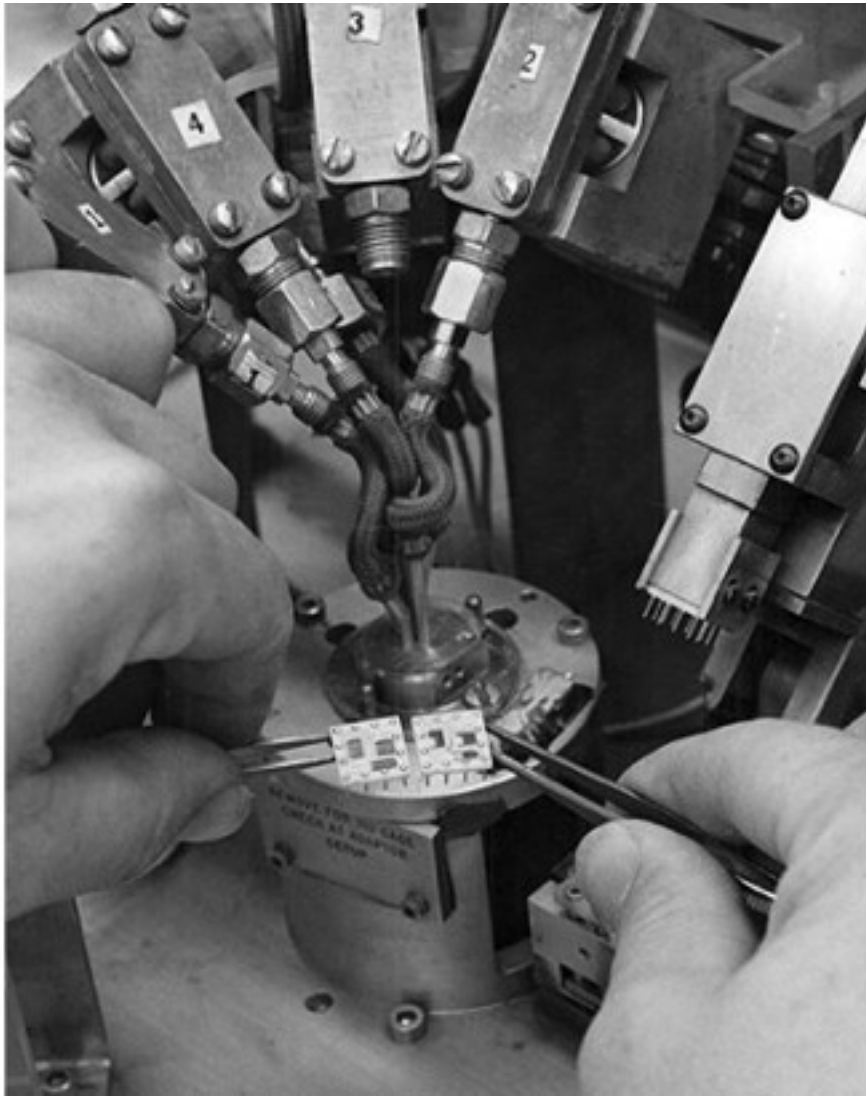
Taki układ zalewano żywicą epoksydową

IBM Solid Logic Technology (1964)

Karta STL: płytki drukowana

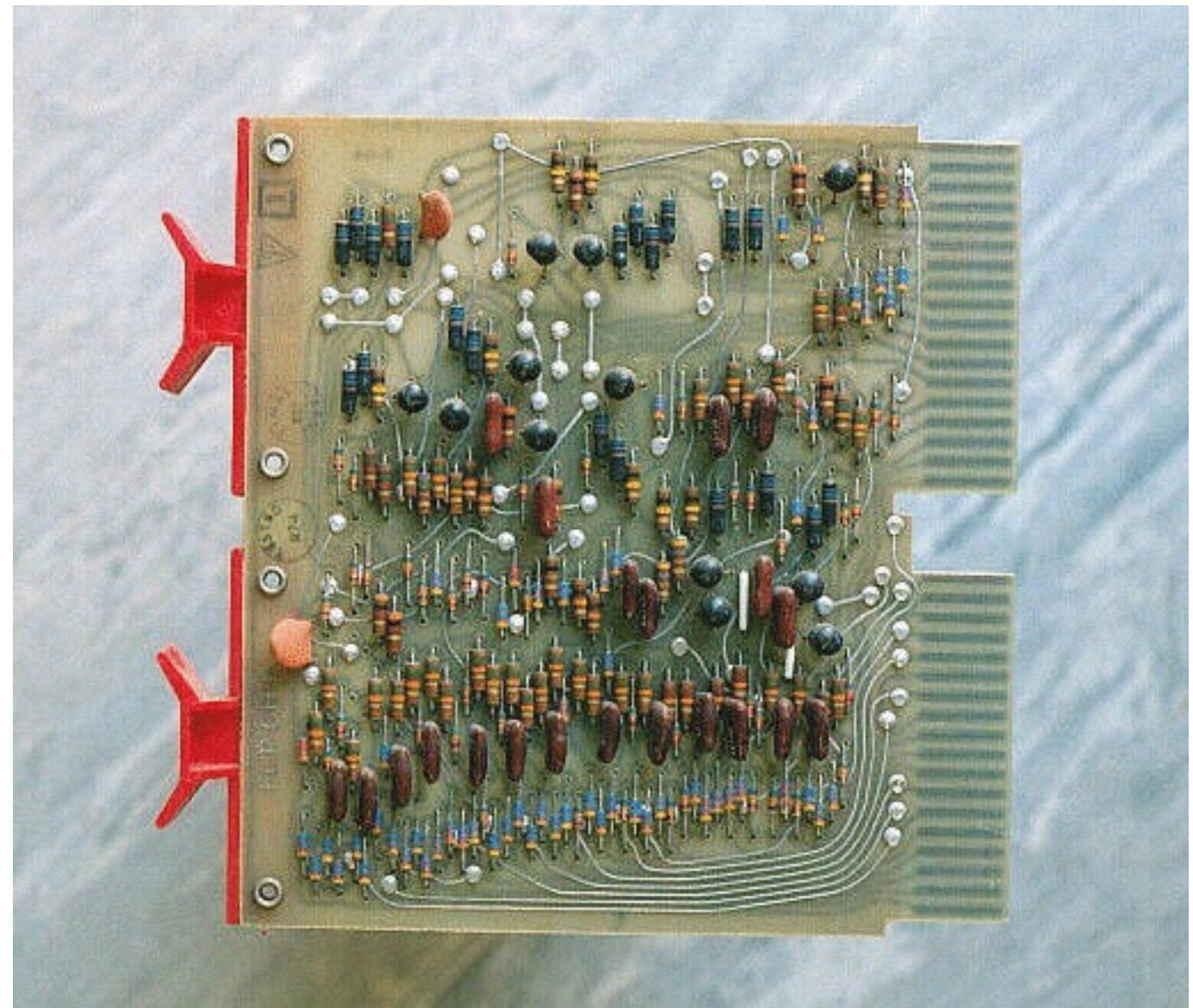


IBM Solid Logic Technology (1964)



DEC Flip Chip (1965)

Moduły w komputerze PDP-8

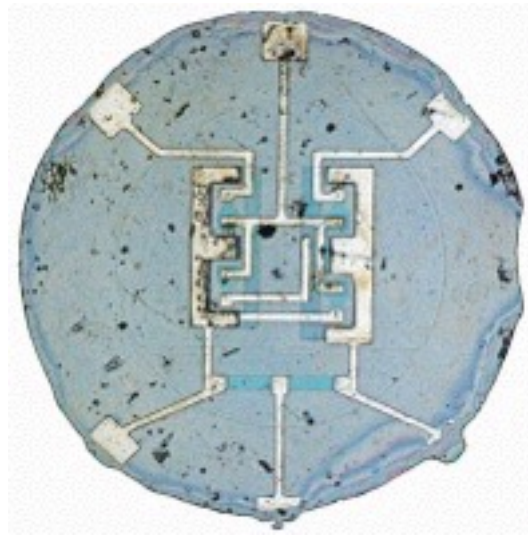


Obwody zintegrowane (czipy)

- Idea: cały mikromoduł na jednym kawałku krzemu



Jack Kilby (1923-2005)
Texas Instruments

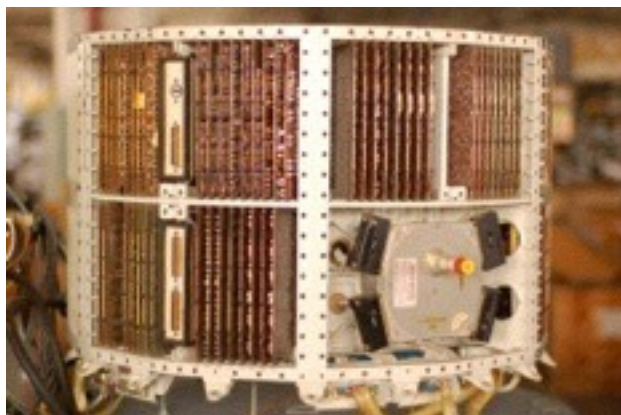


1957-9

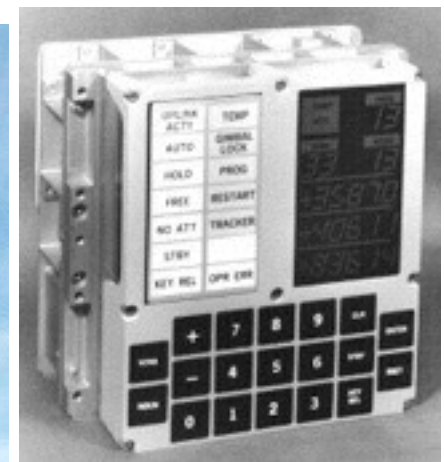


Robert Noyce (1927-90)
Fairchild Semiconductor

- Motywacja i zastosowanie:



Minuteman



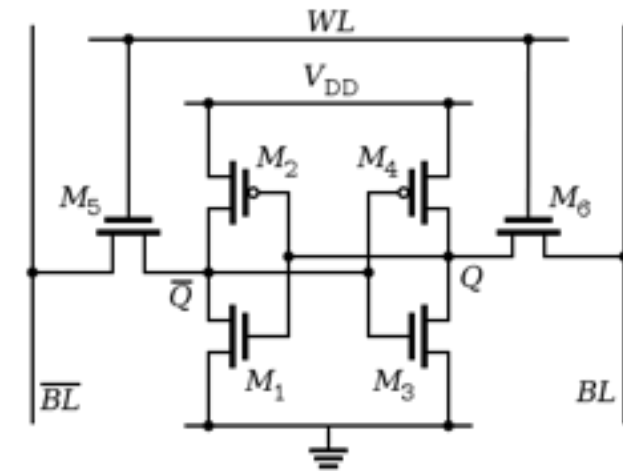
Apollo

Pamięć półprzewodnikowa

- bity można przechowywać w tranzystorach
- od końca lat 60tych tańsze niż pamięć ferrytowa

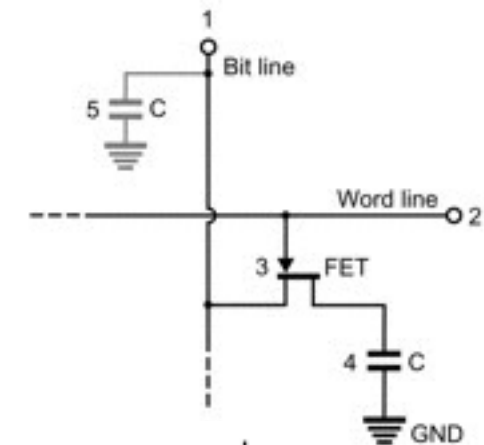
- Static RAM (SRAM):

- 1 bit = 6 tranzystorów



- Dynamic RAM (DRAM):

- 1 bit = 1 tranz. + 1 kondensator



- Programmable ROM (PROM):

- 1 bit = 1 tranz. + 1 bezpiecznik

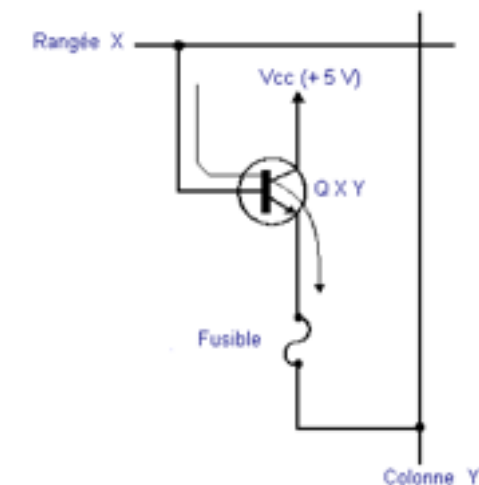
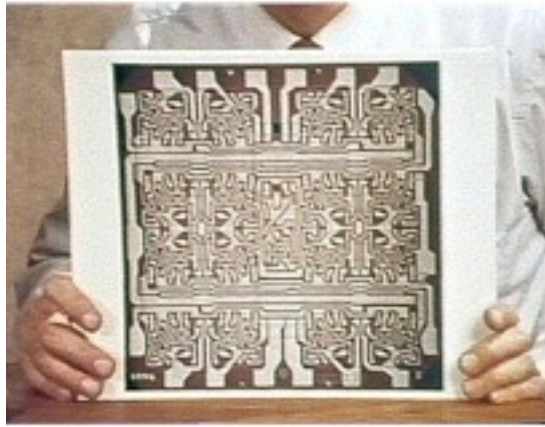


Fig. 43. - Cellule de mémoire PROM bipolaire.

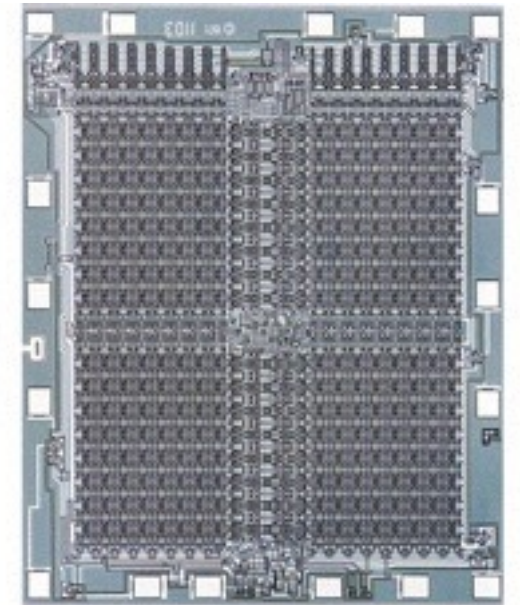
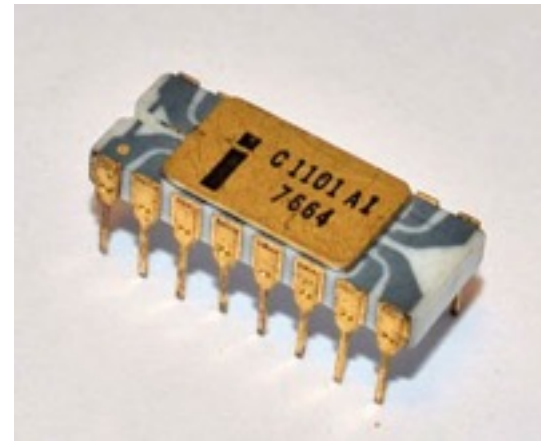
Kości pamięci



16 bitów (1967)



256 bitów (1969)



1KB (1971)

- 1968: Gordon Moore i Robert Noyce zakładają
- pierwsze produkty: kości pamięci



Liczba tranzystorów na jednym chipie podwaja się co dwa lata

G. Moore, "Cramming components onto integrated circuits", *Electronics*, 1965