L’informatica, una lunga storia

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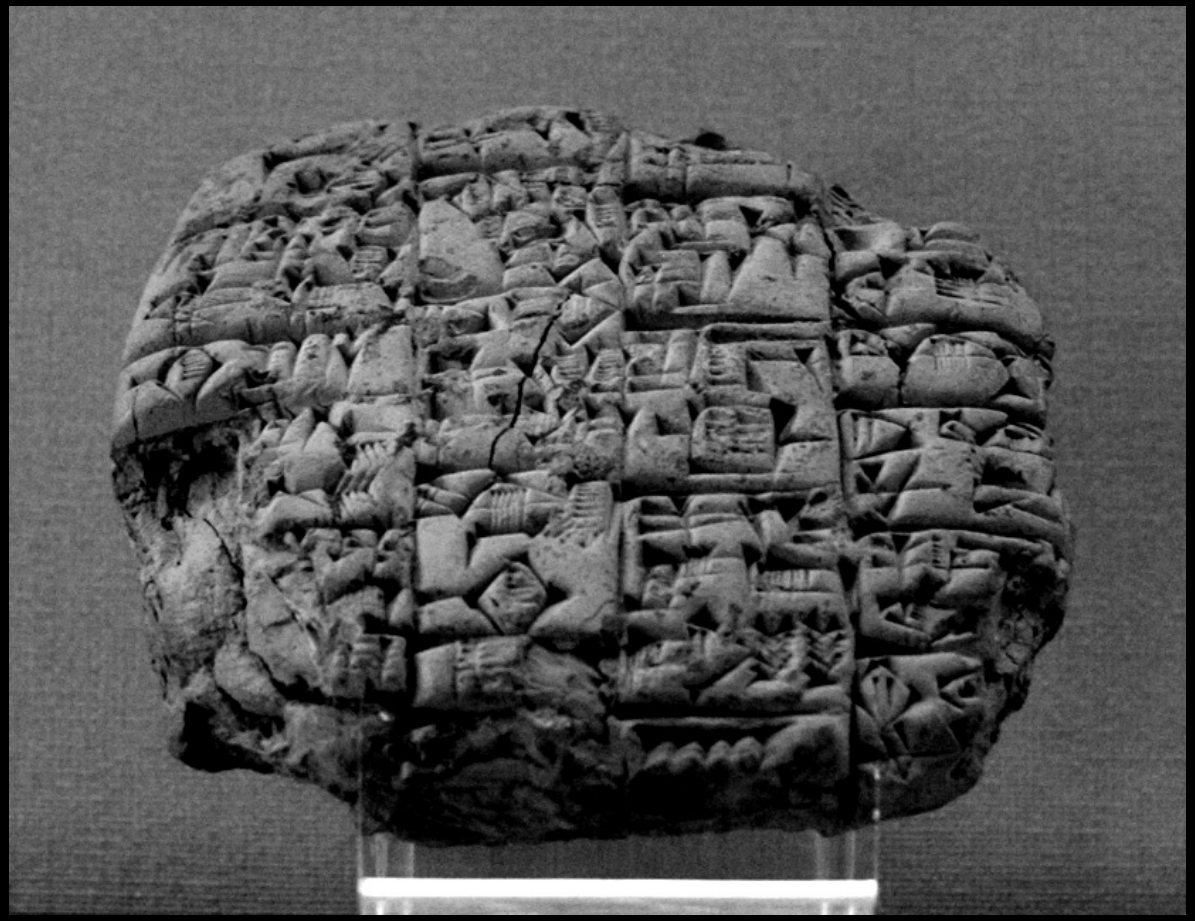
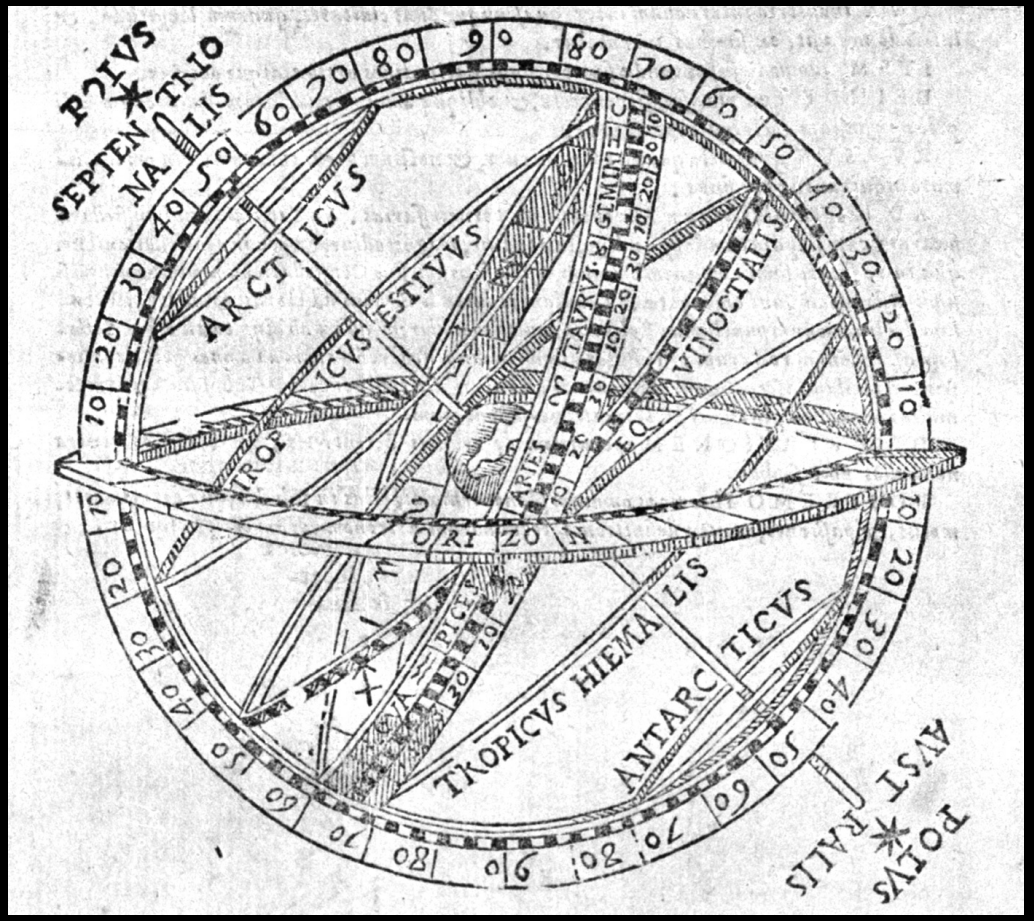
-3000, scrittura alfabetica



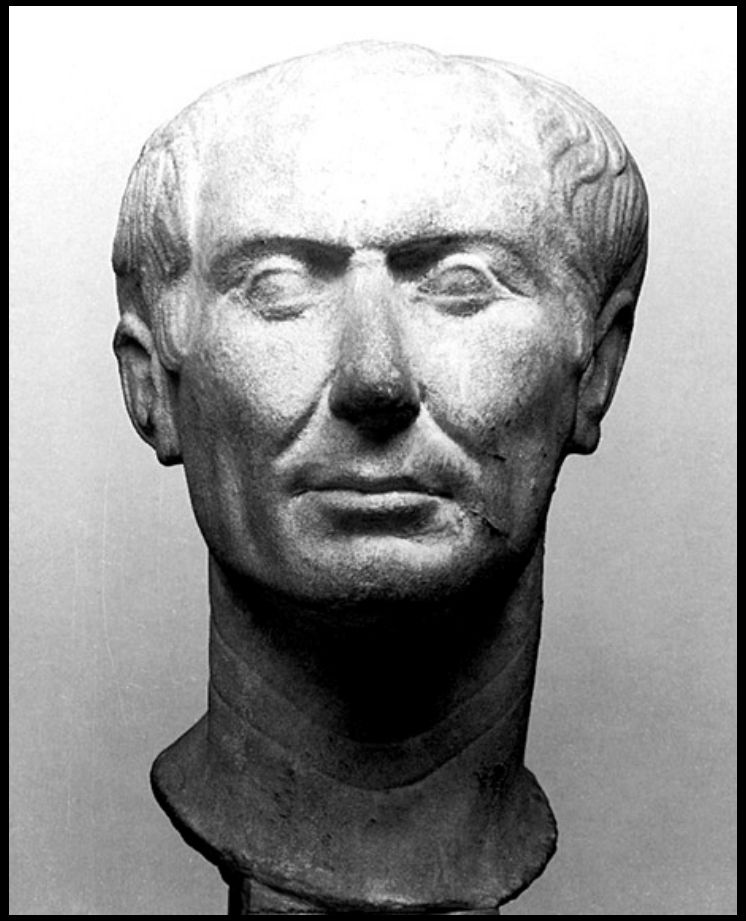
-255, sfera armillare

Eratostene di Cirene
-275, -195



-54, cifrario di Cesare

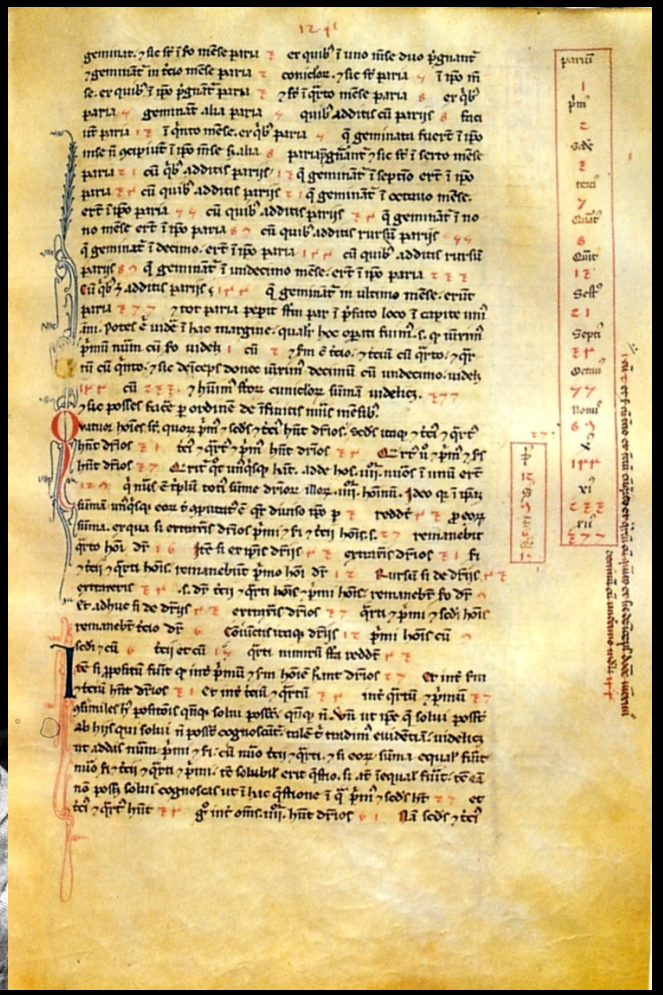
Gaius Julius Caesar
-100, -44



100, macchina di Antikythera

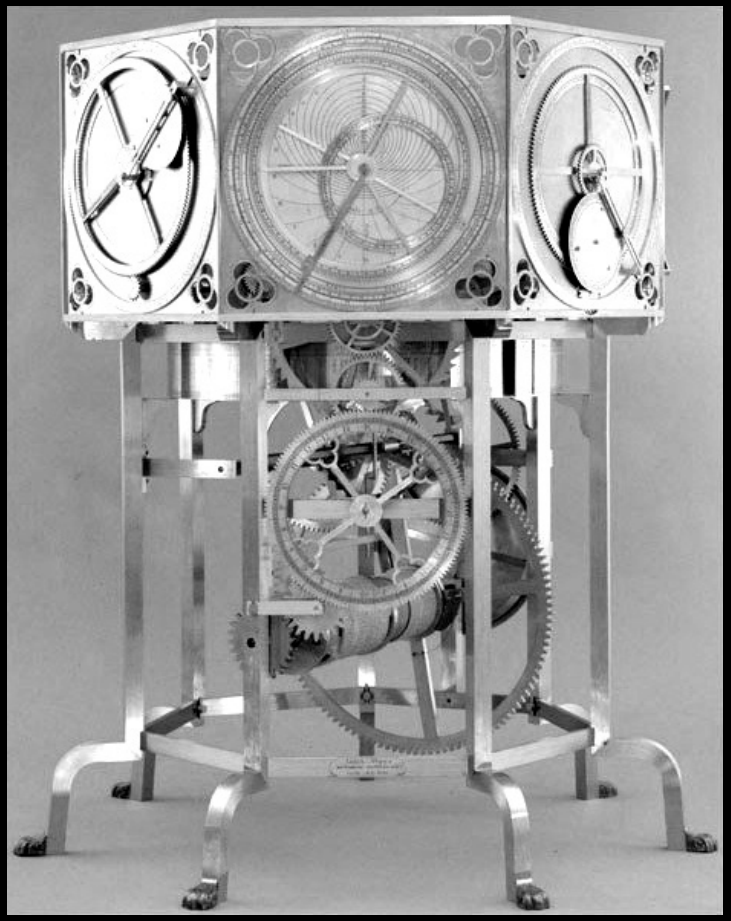
1202, Fibonacci, Liber Abaci

Leonardo Fibonacci
~1170, ~1250



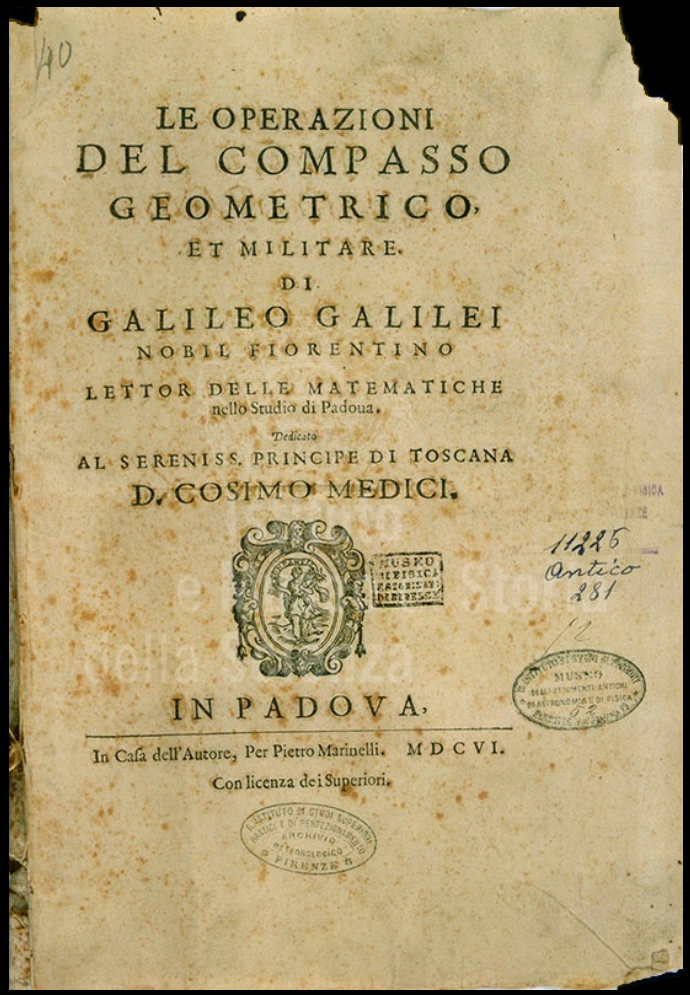
1381, Astrarium di De' Dondi

Giovanni De' Dondi
1330, 1388



1606, Compasso di Galilei

Galileo Galilei
1564, 1642



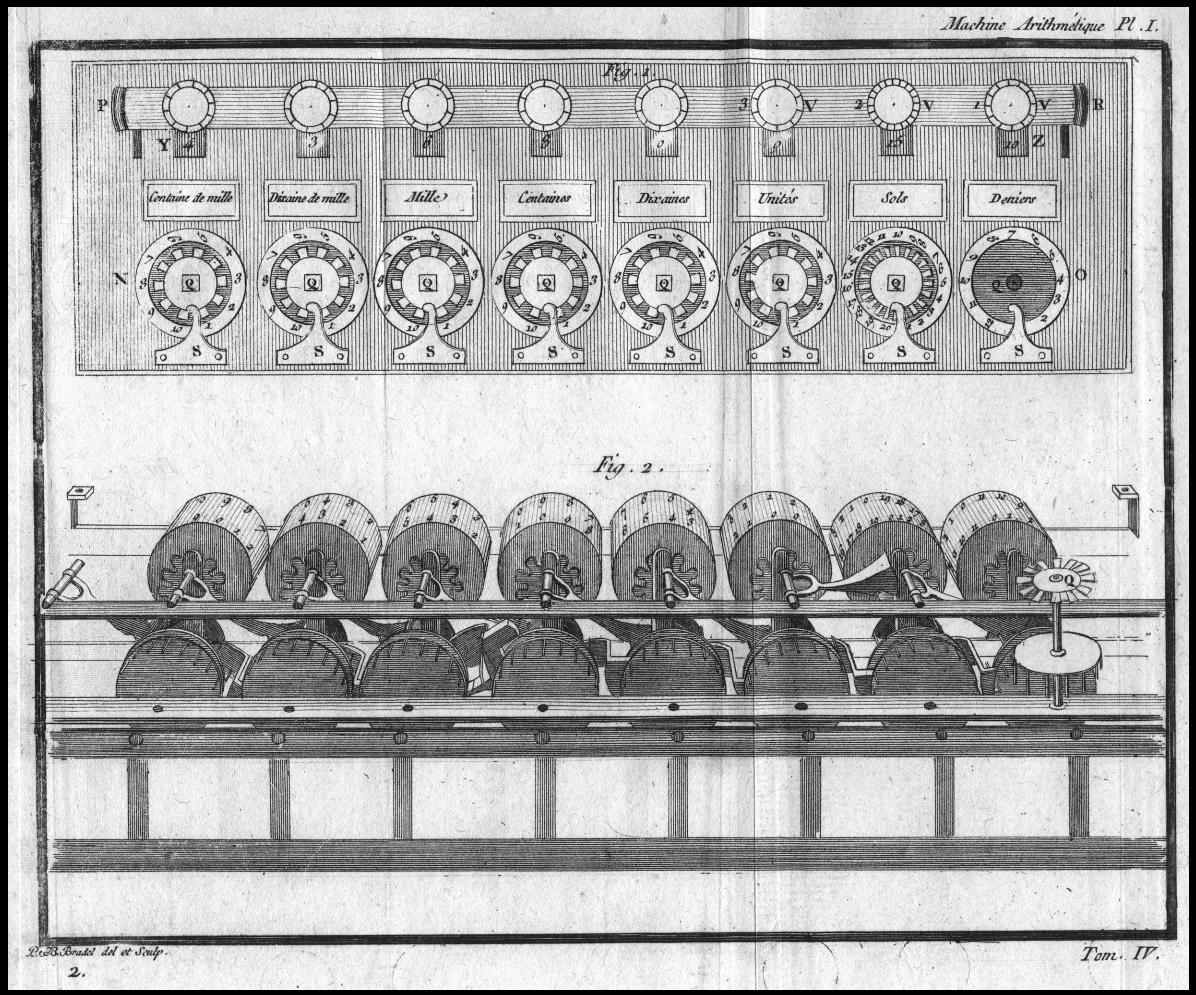
LE OPERAZIONI
DEL COMPASSO
GEOMETRICO,
ET MILITARE.
DI
GALILEO GALILEI
NOBIL FIORENTINO
LETTOR DELLE MATEMATICHE
nello Studio di Padoua.
Dedicato
AL SERENISS. PRINCIPE DI TOSCANA
D. COSIMO MEDICI.

IN PADOVA,

In Casa dell'Autore, Per Pietro Marinelli. M D C V I.
Con licenza de i Superiori.

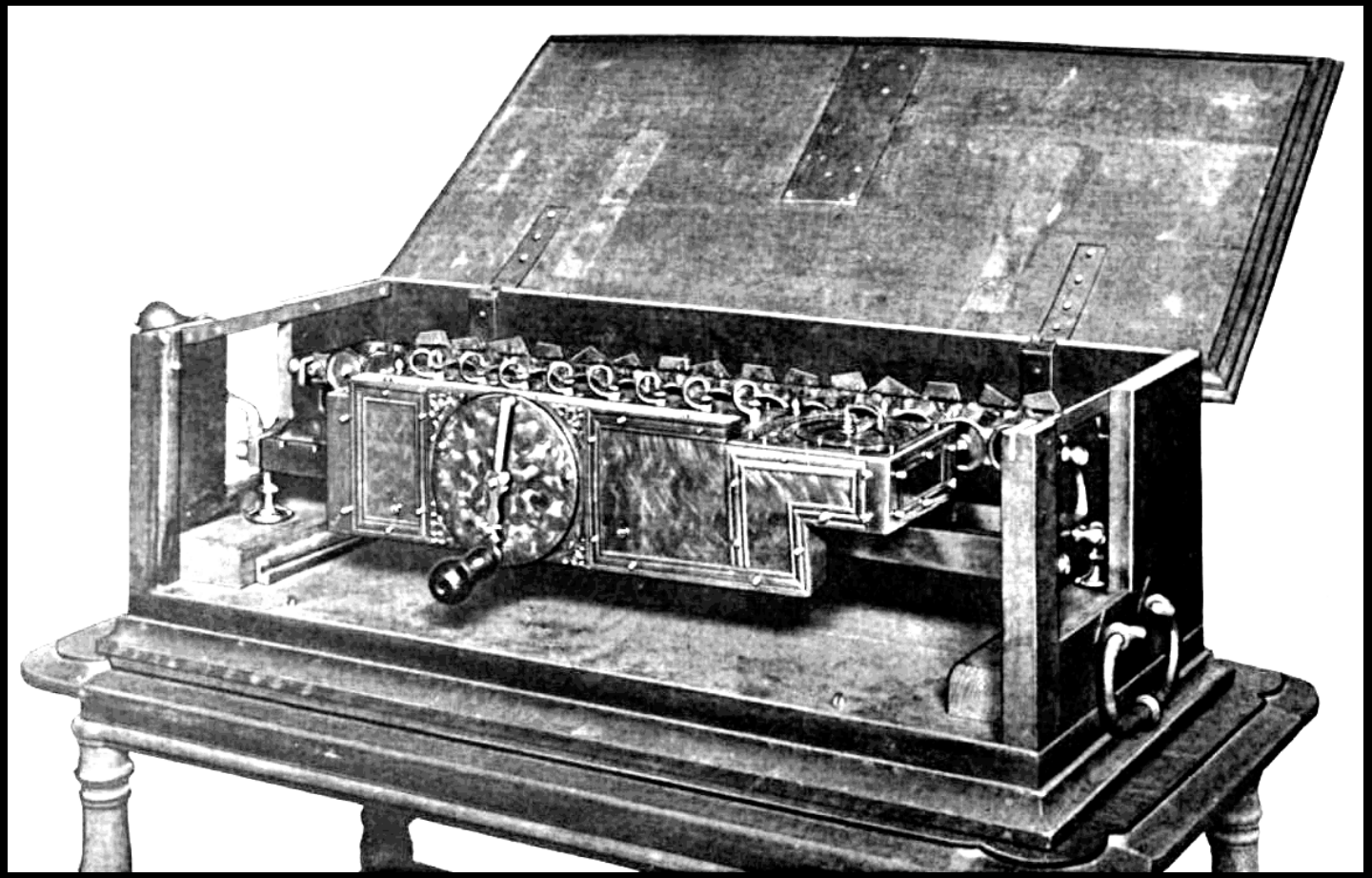
1643, Pascaline

Blaise Pascal
1623, 1662



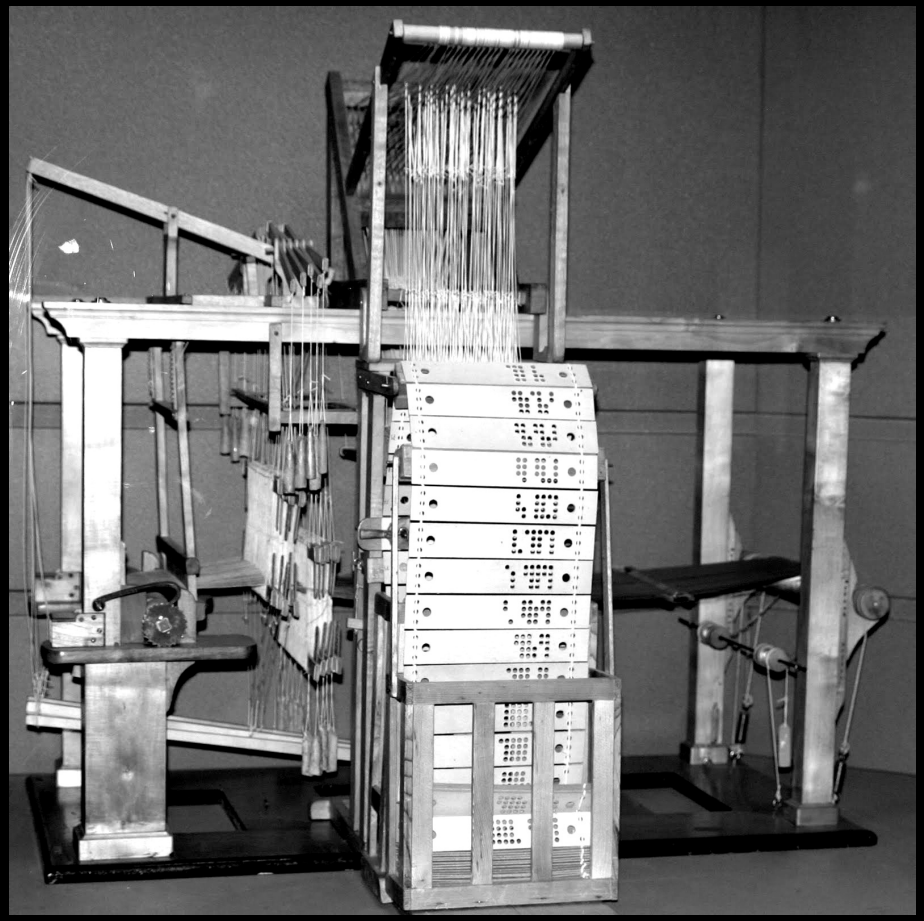
1694, Reckenmaschine

Gottfried Leibniz
1646, 1716



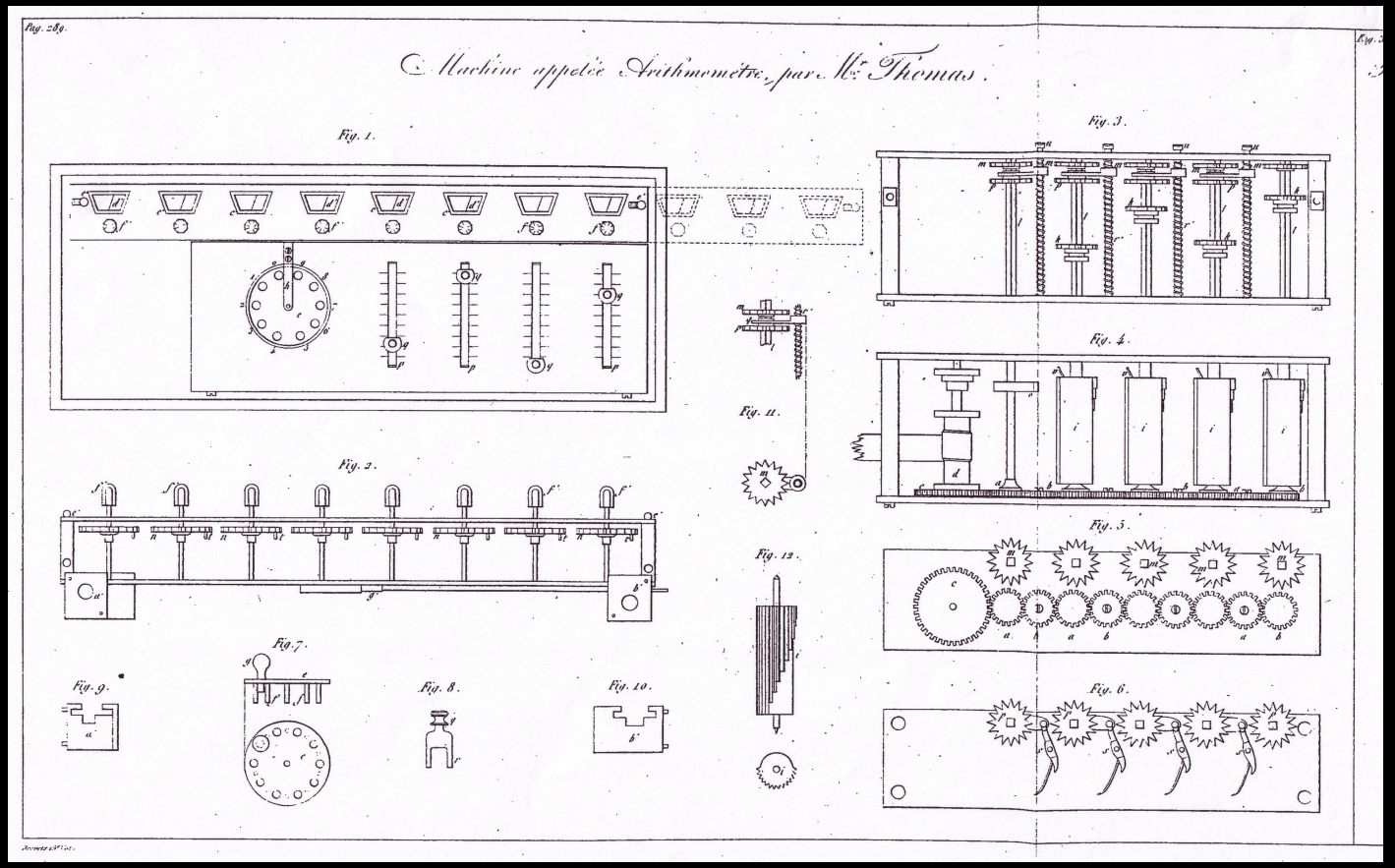
1801, telaio Jaquard

Joseph Marie Charles,
dit Jacquard
1752, 1834



1820, Thomas De Colmar

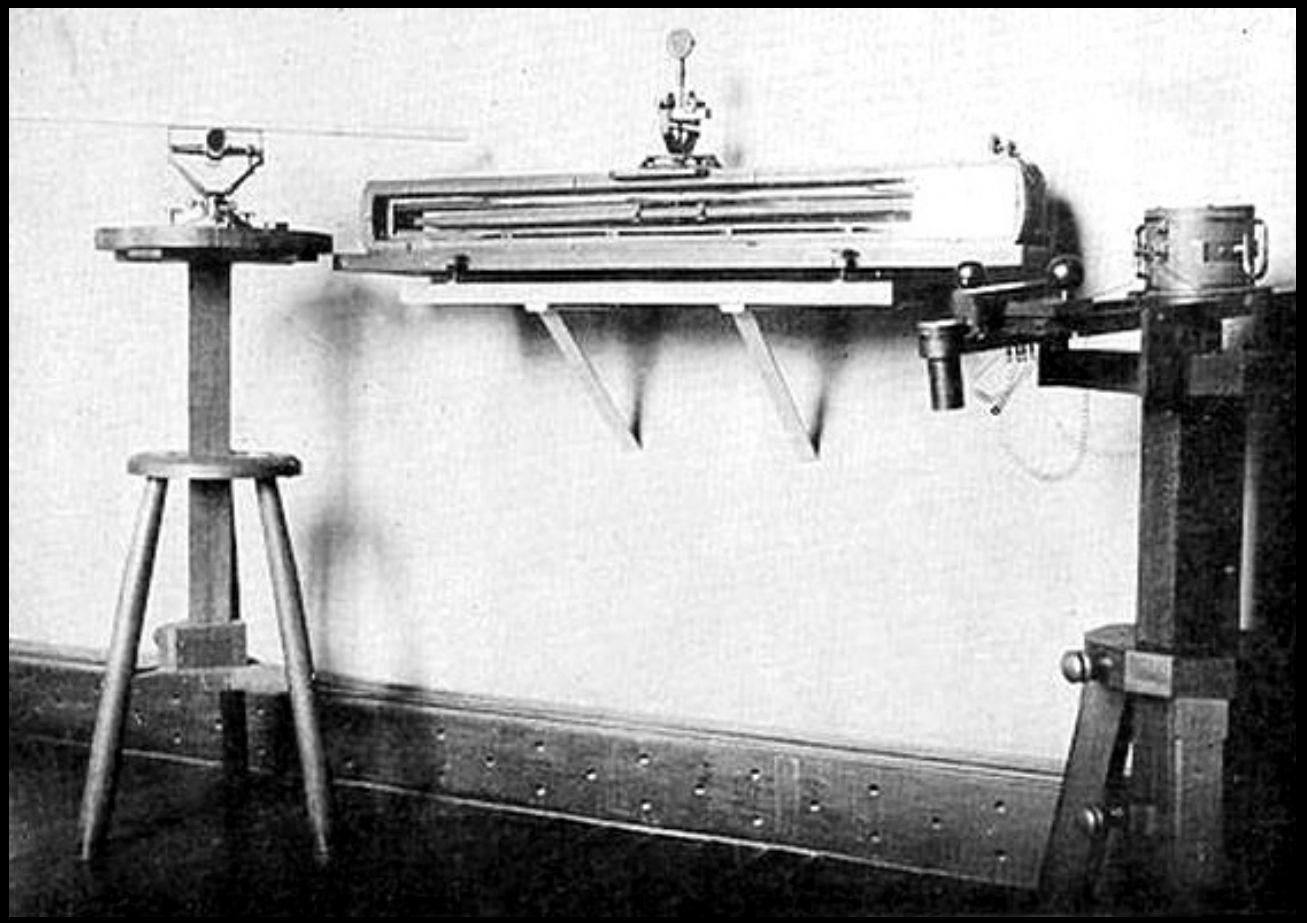
Charles Xavier
Thomas De Colmar
1785, 1870



1833, telegrafo Gauss-Weber

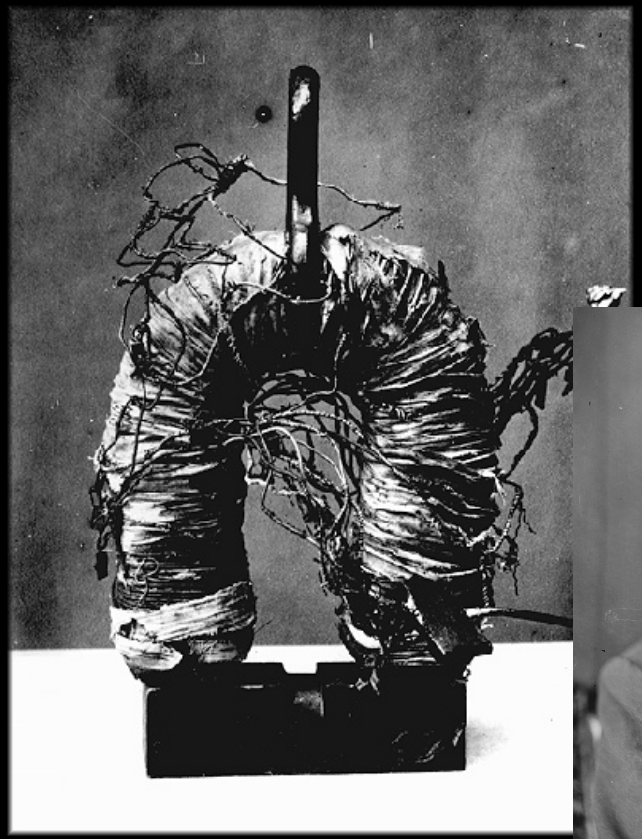
Carl Friedrich Gauss
1777, 1855

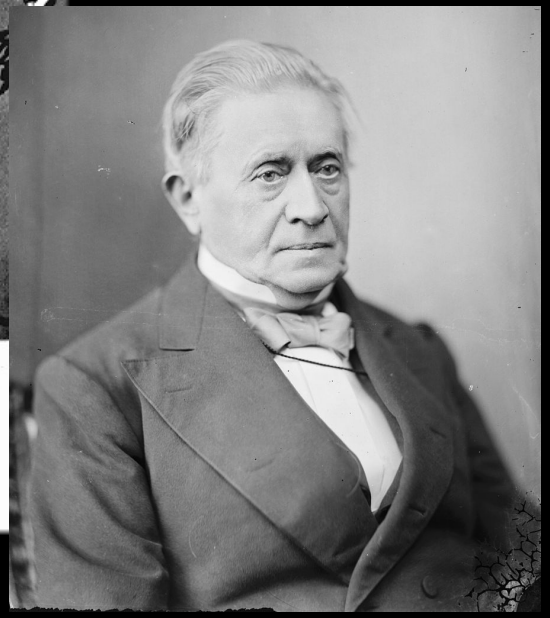
Wilhelm Weber
1804, 1891



1835, il relé di Henry

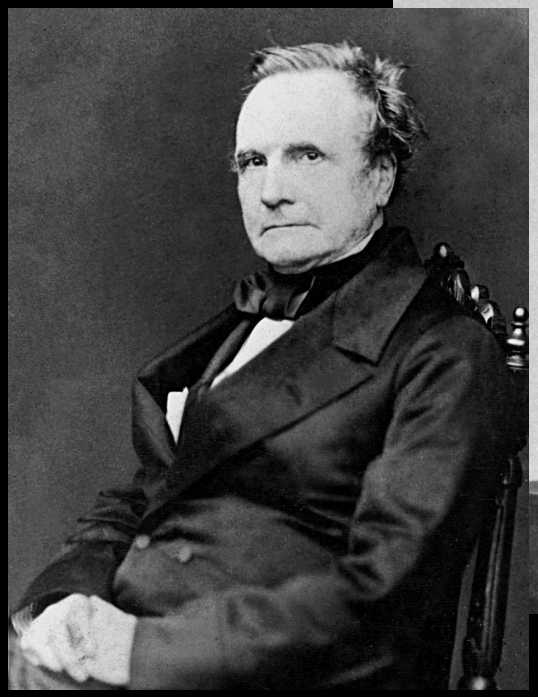
Joseph Henry
1797, 1878

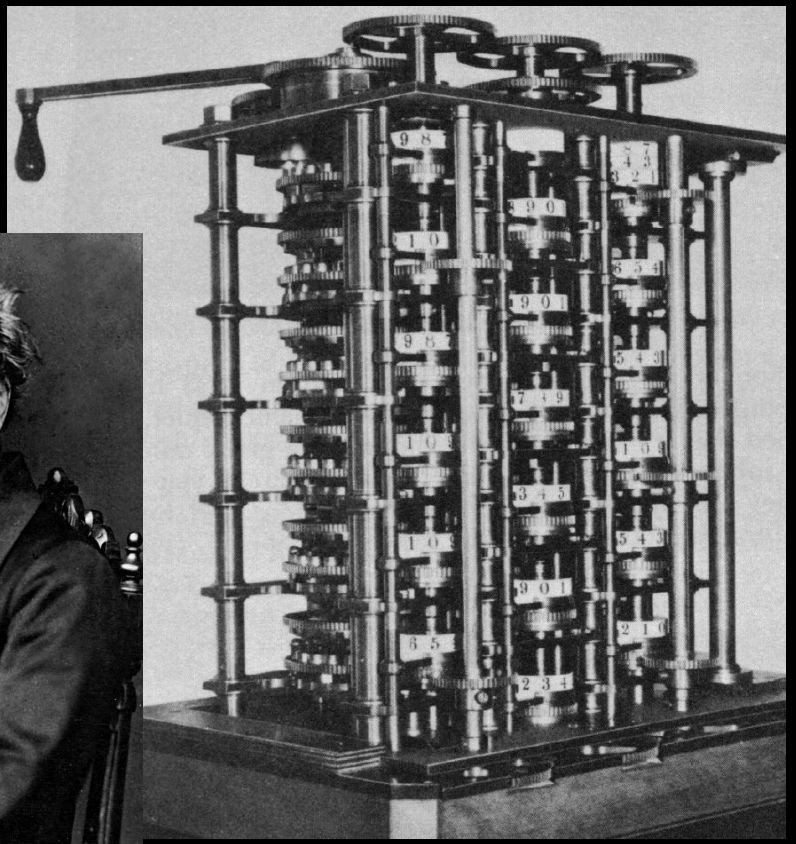




1842, Charles Babbage

Charles Babbage
1791, 1871





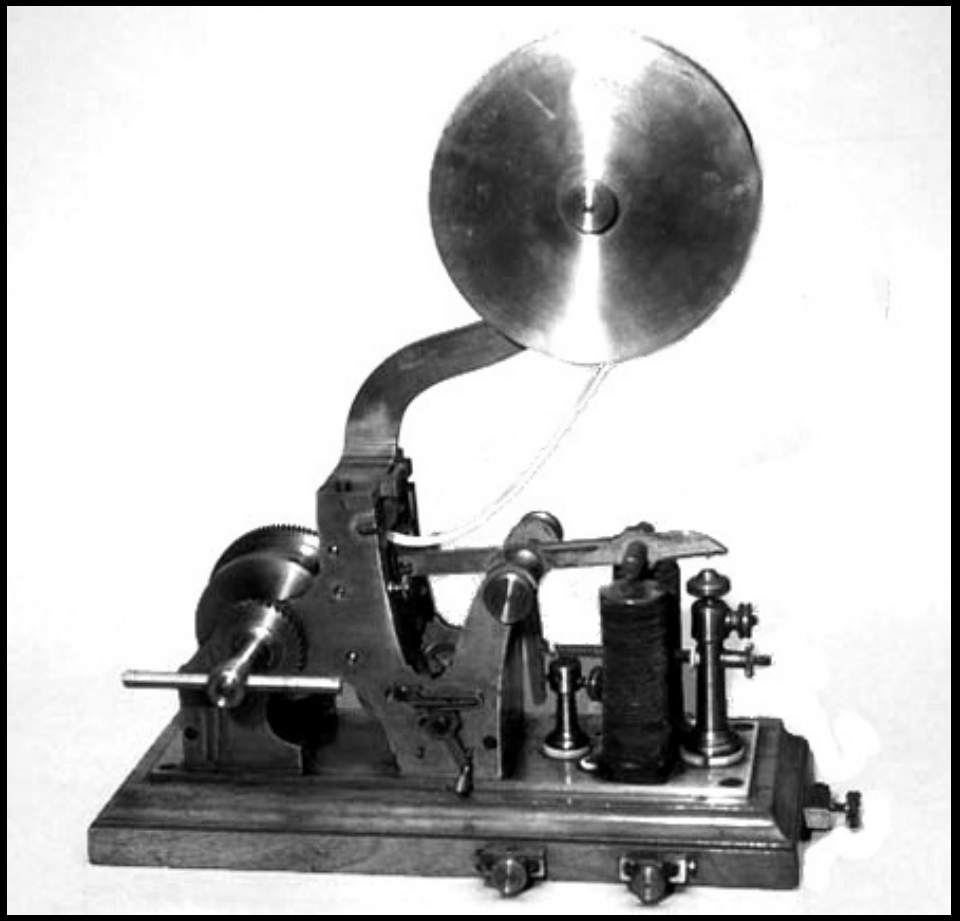
1943, Ada Lovelace

Augusta Ada Byron-King,
Countess of Lovelace
1815, 1852

Luigi Federico Menabrea
1809, 1896

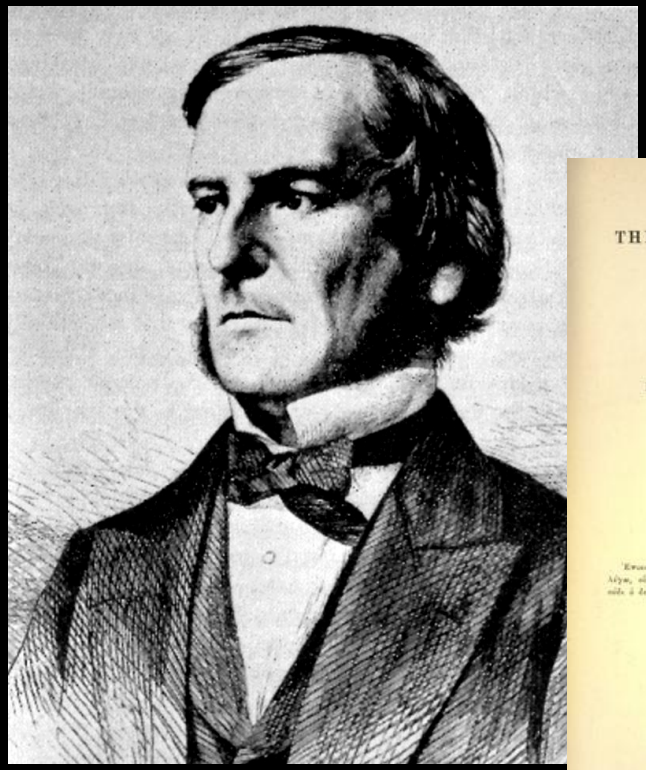
1844, telegrafo Morse

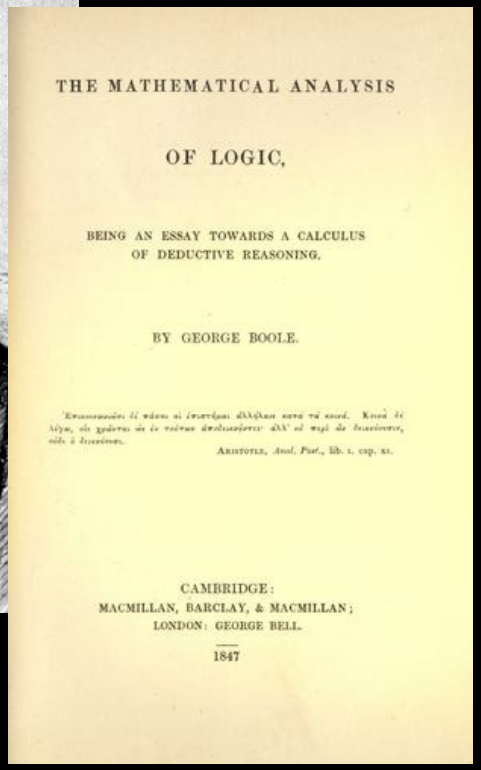
Samuel Morse
1791, 1872



1847, algebra di Boole

George Boole
1815, 1864





THE MATHEMATICAL ANALYSIS

OF LOGIC,

BEING AN ESSAY TOWARDS A CALCULUS
OF DEDUCTIVE REASONING.

BY GEORGE BOOLE.

Ἐπισκοποῦμεν δὲ πάσας αἱ ἐπιστήμας ἀλλήλων κατὰ τὸ κοινόν. Κοινὸν δὲ λέγω, οὐ χρῶνται οἱ ἐν ταύταις ἀποδείκνυντες ἀλλ' οἷ περὶ ἑκατέραν, οἷον ὁ διαγράφων.

ARISTOTLE, *Anal. Post.*, lib. i. cap. xi.

CAMBRIDGE:
MACMILLAN, BARCLAY, & MACMILLAN;
LONDON: GEORGE BELL.

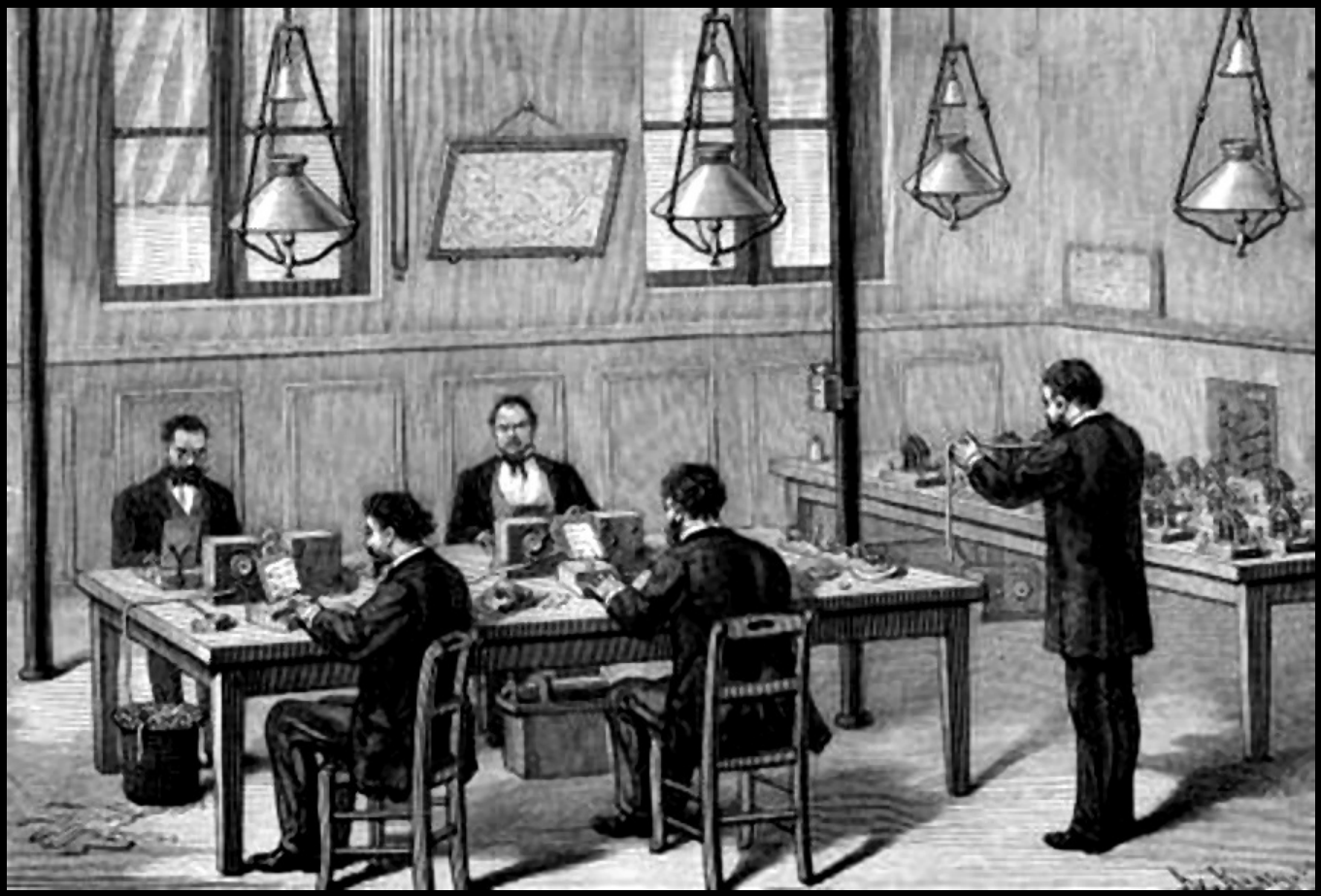
1847

1851, aritmometri in serie

De Colmar →1870
De Bojano →1881
De Rancy →1887
Payen →1902
v. Payen →1915

1874, codifica Baudot

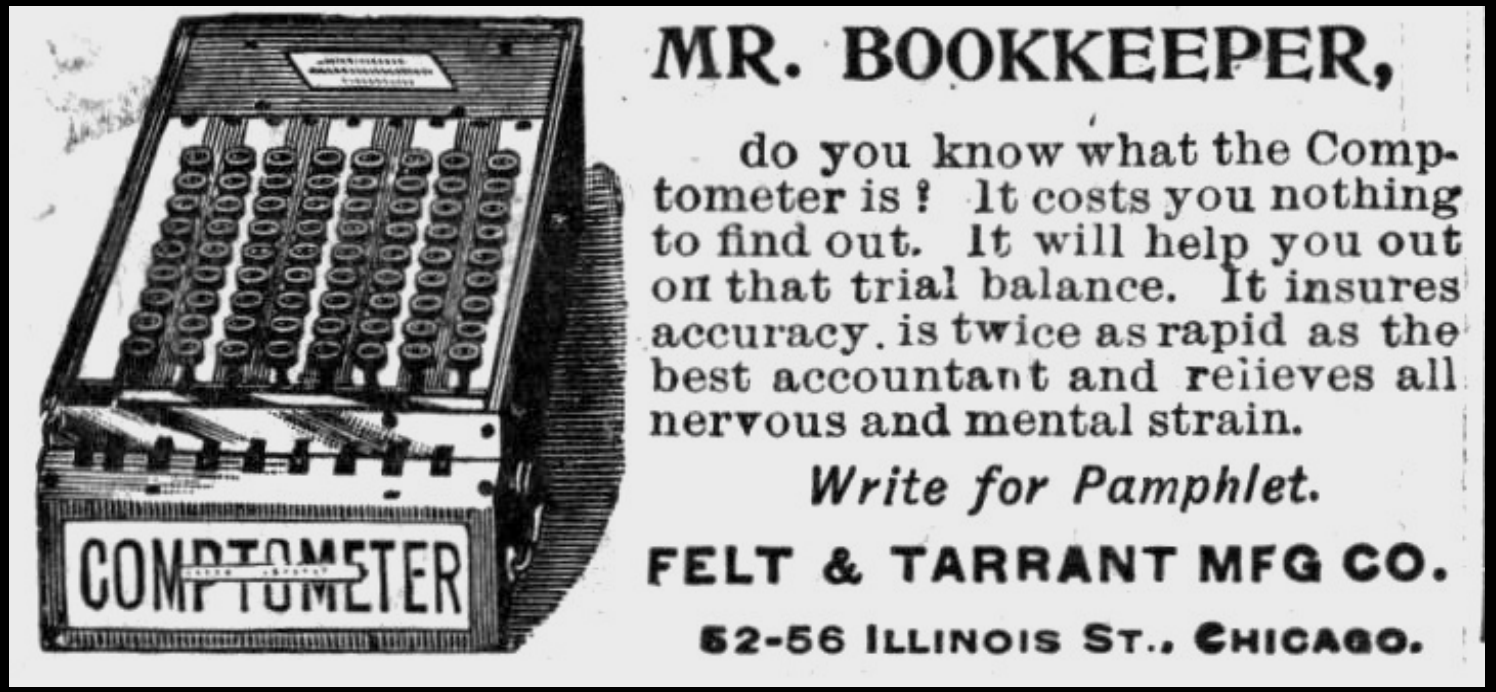
Émile Baudot
1845, 1903



1880, ticker tape

1887, Comptometer

Dorr Eugene Felt
1862, 1930



1892, Burroughs

William Seward Burroughs I
1857, 1898

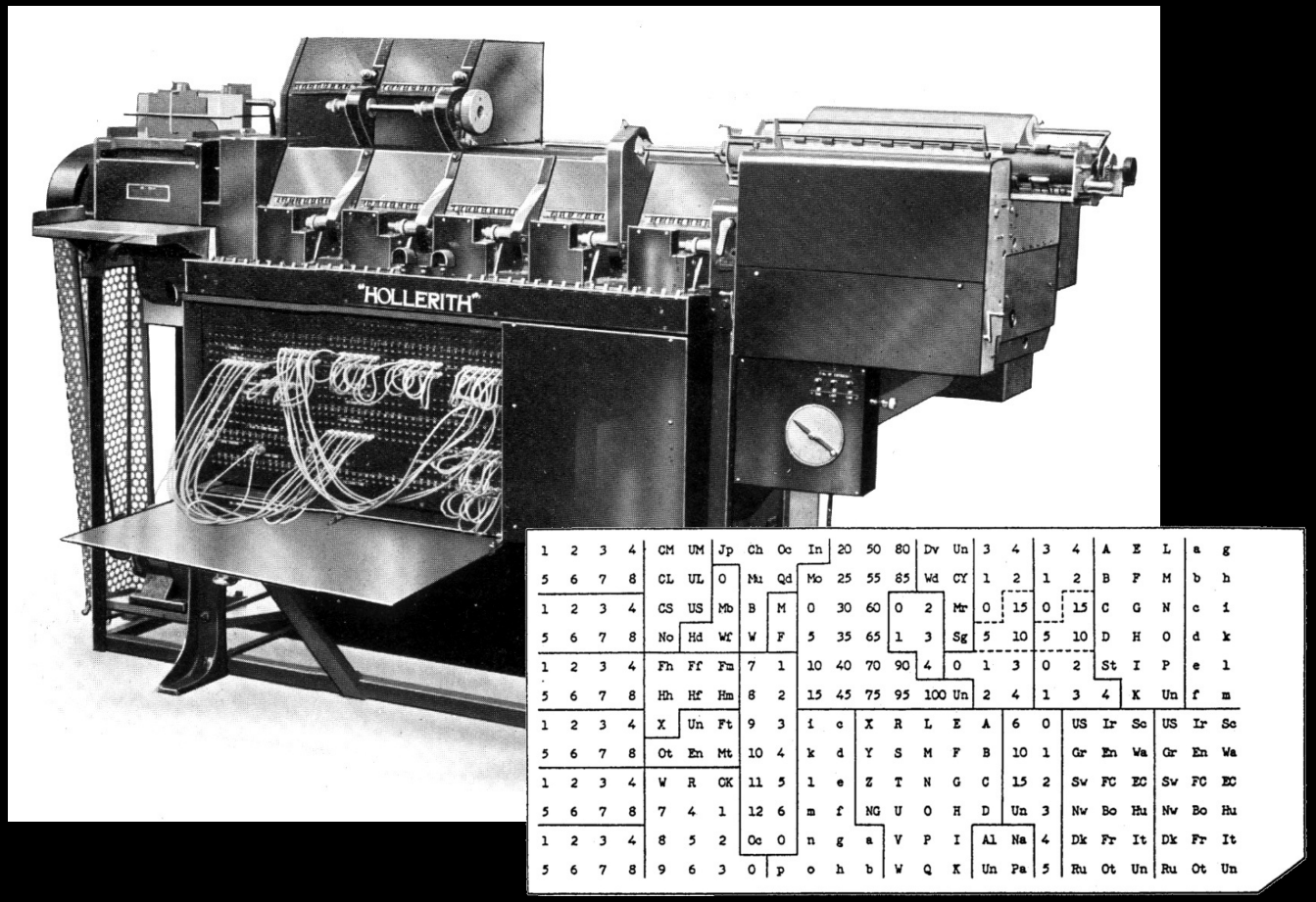
1892, Odhner & Brunsviga

Willgodt Odhner
1845, 1905

1896, Hollerith programmabili

Herman Hollerith
1860, 1929

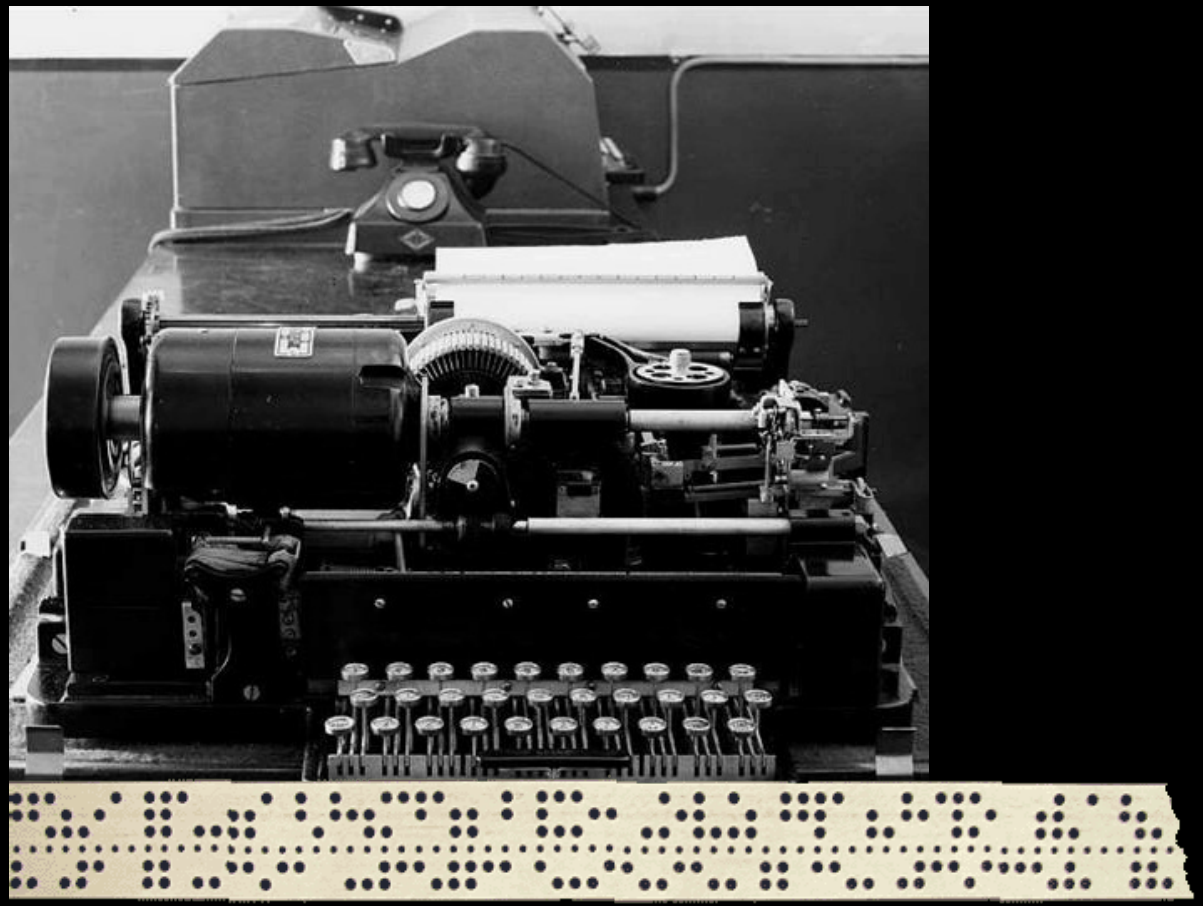
1890	US Census
1896	Tabulating Machine Company
1911	Computing Tabulating Recording
1924	International Business Machines



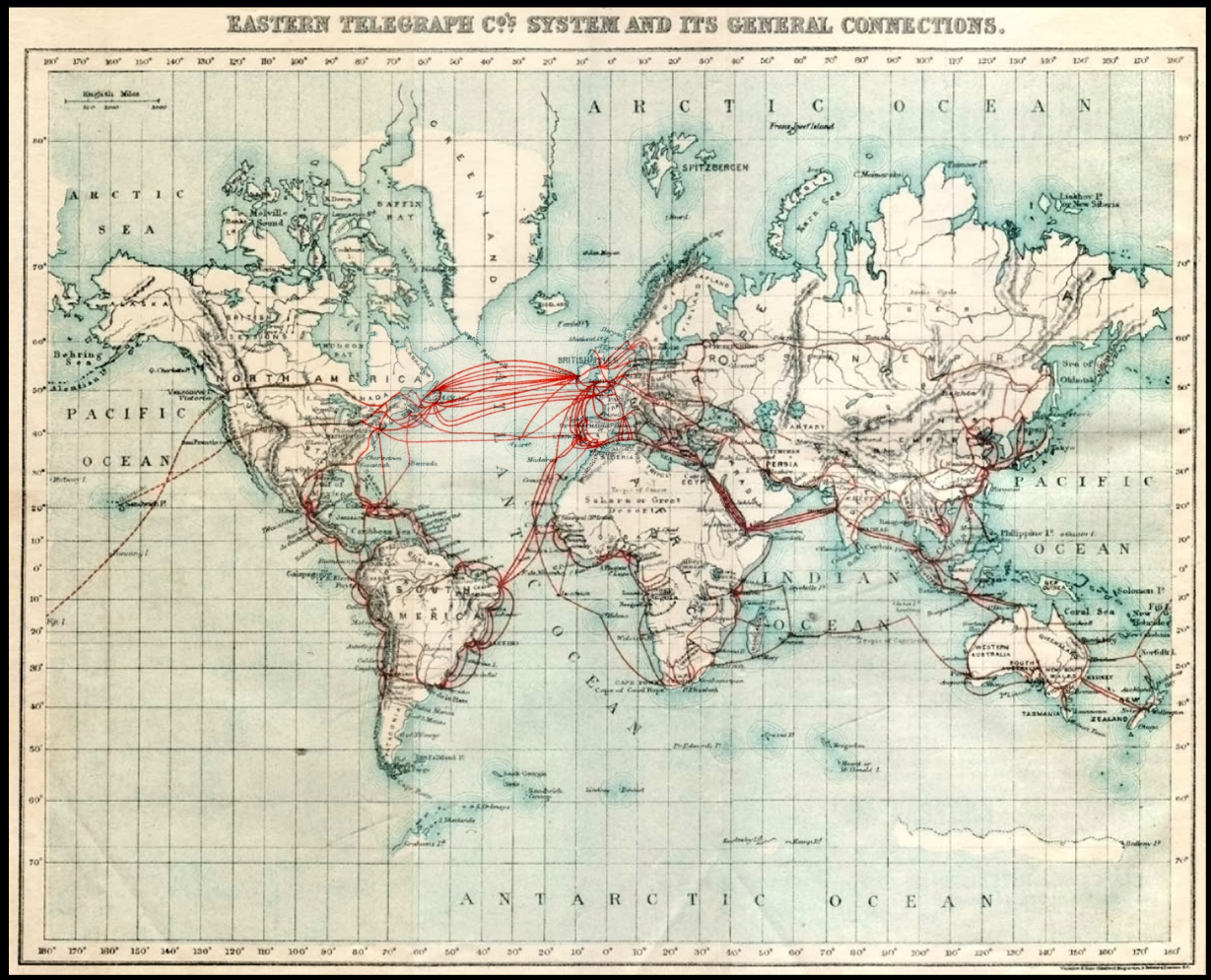
1901, telescriventi di Murray

Donald Murray
1865, 1945

1930 ITA2
International
Telegraph
Alphabet No. 2

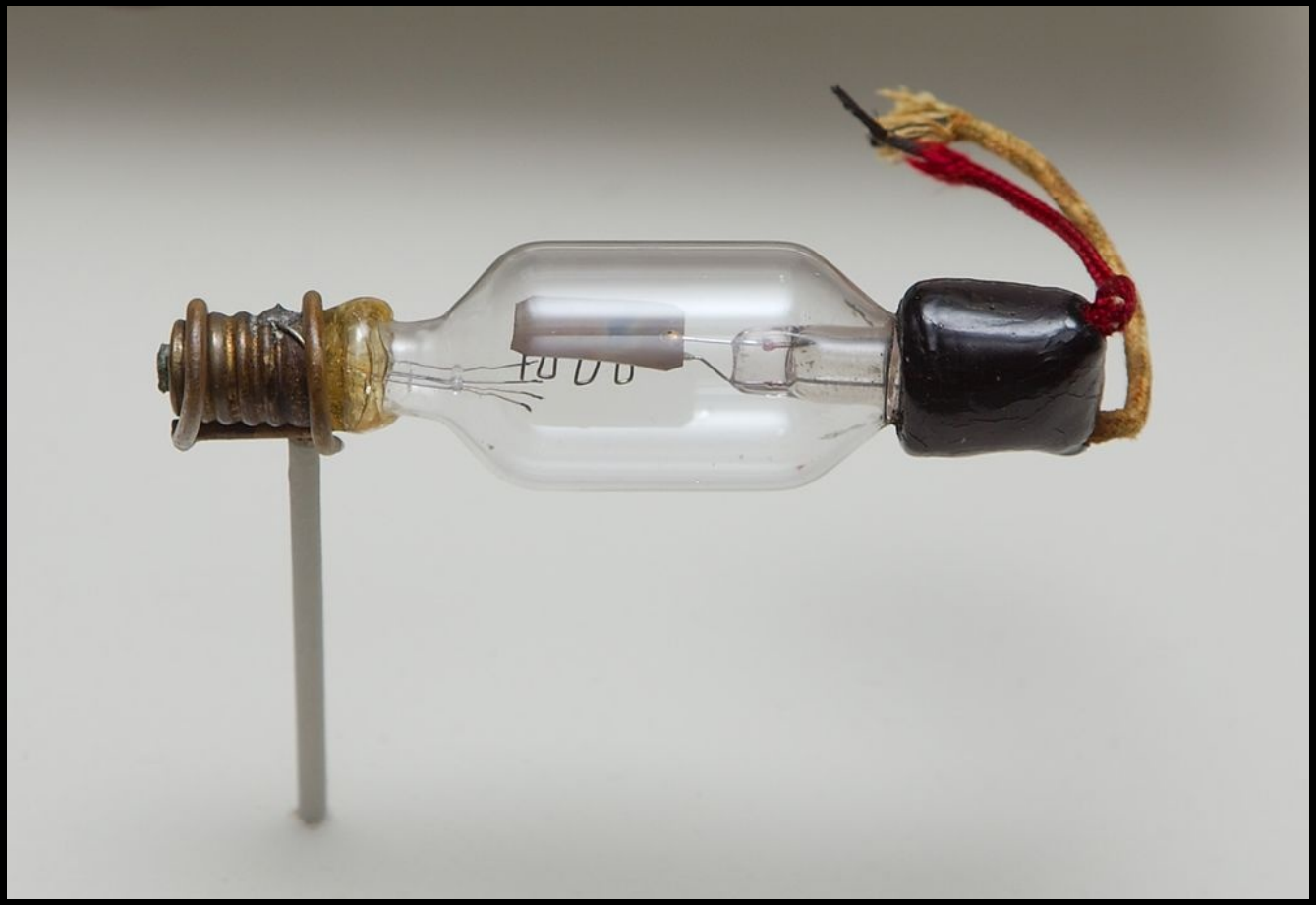


1901, l'Internet Vittoriana



1908, il triodo “Audion”

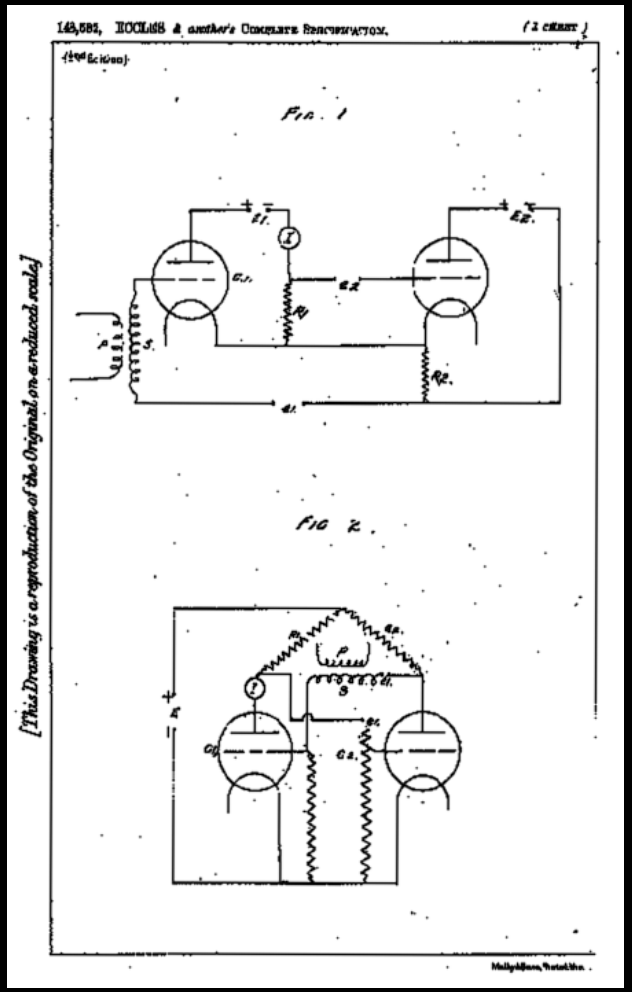
Lee de Forest
1873, 1961



1918, il flip-flop

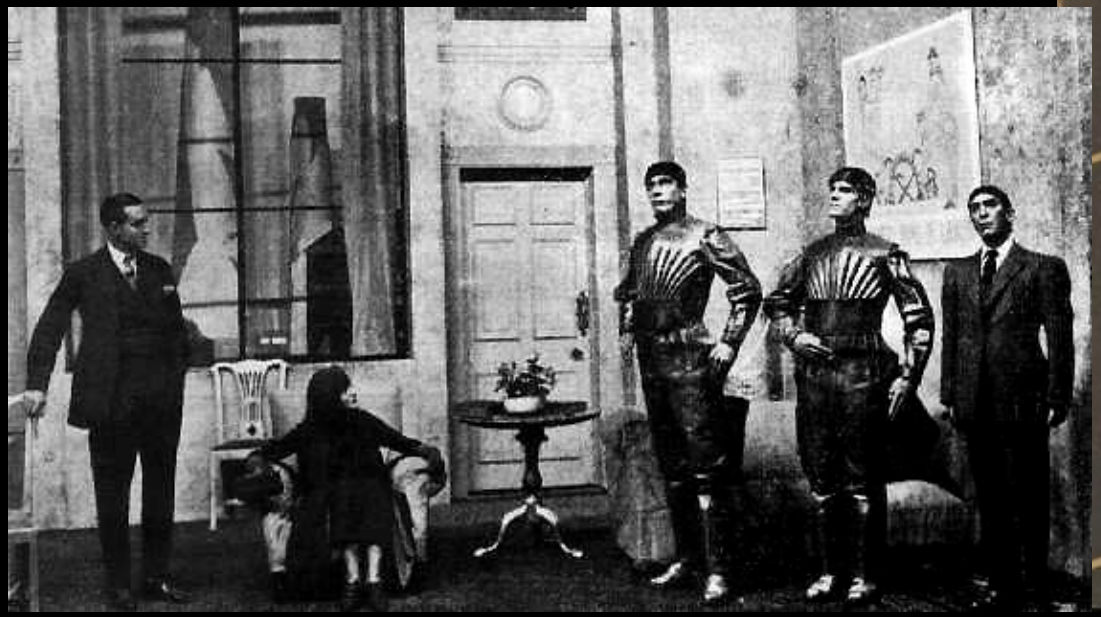
William Henry Eccles
1875, 1966

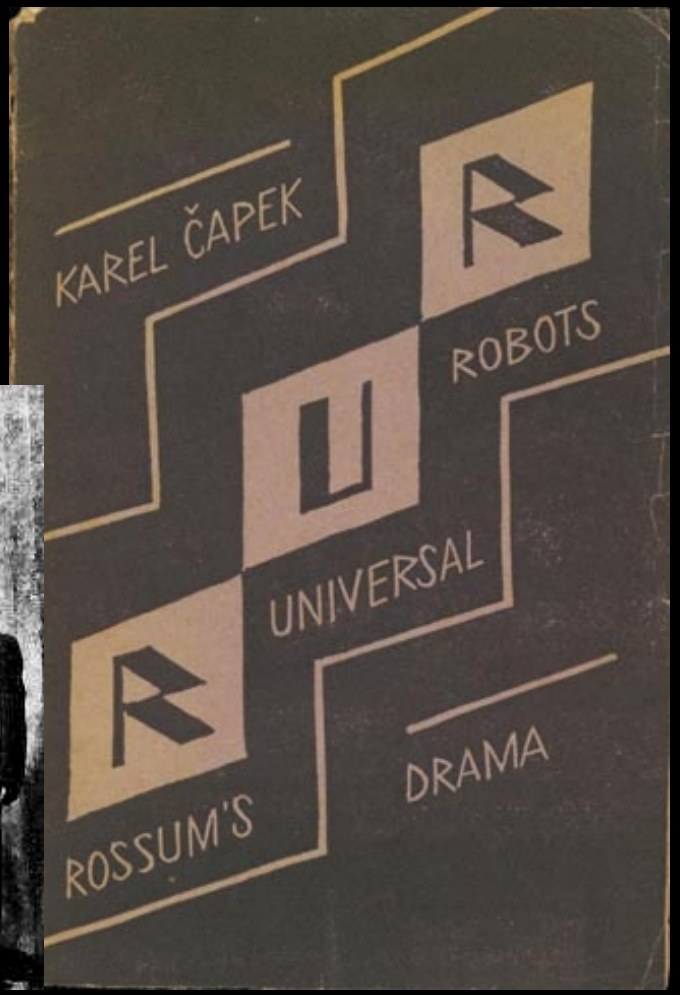
Frank Wilfred Jordan
1882, ?



1921, R.U.R.

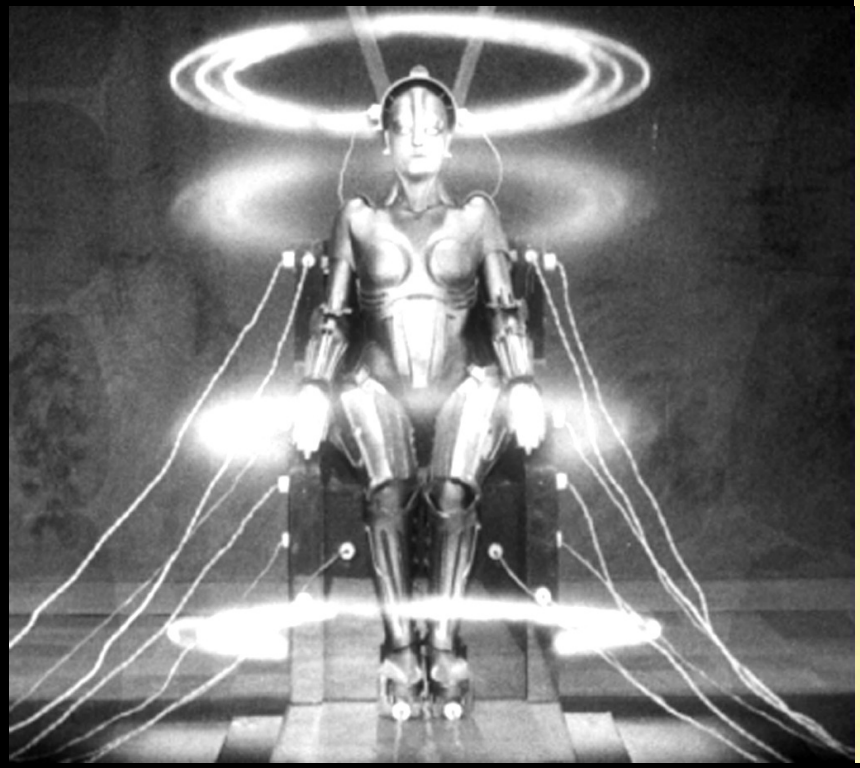
Karel Čapek
1890, 1938





1927, Metropolis

Friedrich “Fritz” Lang
1890, 1976



1928, Entscheidungsproblem

David Hilbert,
1862, 1943

1900 Congresso di Parigi
1902 Pubblicazione dei 23 problemi
1928 Congresso di Bologna,
riformulazione del 2° problema:
- la matematica è completa?
- la matematica è consistente?
- la matematica è decidibile?

1931, teorema di Gödel

Kurt Friedrich Gödel
1906, 1978

Albert Einstein
1879, 1955

Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I[1].

Von **Kurt Gödel** in Wien.

1.

Die Entwicklung der Mathematik in der Richtung zu größerer Exaktheit hat bekanntlich dazu geführt, daß weite Gebiete von ihr formalisiert wurden, in der Art, daß das Beweisen nach einigen wenigen mechanischen Regeln vollzogen werden kann. Die umfassendsten derzeit aufgestellten formalen Systeme sind das System der Principia Mathematica (PM)[2] einerseits, das Zermelo-Fraenkelsche (von J. v. Neumann weiter ausgebildete) Axiomensystem der Mengenlehre[3] andererseits. Diese beiden Systeme sind so weit, daß alle heute in der Mathematik angewendeten Beweismethoden in ihnen formalisiert, d. h. auf einige wenige Axiome und Schlußregeln zurückgeführt sind. Es liegt daher die Vermutung nahe, daß diese Axiome und Schlußregeln dazu ausreichen, alle mathematischen Fragen, die sich in den betreffenden Systemen überhaupt formal ausdrücken lassen, auch zu entscheiden. Im folgenden wird gezeigt, daß dies nicht der Fall ist, sondern daß es in den beiden angeführten Systemen sogar relativ einfache Probleme aus der Theorie der gewöhnlichen ganzen Zahlen gibt[4], die sich aus den Axiomen nicht

[1]) Vgl. die im Anzeiger der Akad. d. Wiss. in Wien (math.-naturw. Kl.) 1930, Nr. 19 erschienene Zusammenfassung der Resultate dieser Arbeit.

[2]) A. Whitehead und B. Russell, Principia Mathematica, 2. Aufl., Cambridge 1925. Zu den Axiomen des Systems PM rechnen wir insbesondere auch: Das Unendlichkeitsaxiom (in der Form: es gibt genau abzählbar viele Individuen), das Reduzibilitäts- und das Auswahlaxiom (für alle Typen).

[3]) Vgl. A. Fraenkel, Zehn Vorlesungen über die Grundlegung der Mengenlehre, Wissensch. u. Hyp. Bd. XXXI. J. v. Neumann, Die Axiomatisierung der Mengenlehre. Math. Zeitschr. 27, 1928. Journ. f. reine u. angew. Math. 154 (1925), 160 (1929). Wir bemerken, daß man zu den in der angeführten Literatur gegebenen mengentheoretischen Axiomen noch die Axiome und Schlußregeln des Logikkalküls hinzufügen muß, um die Formalisierung zu vollenden. — Die nachfolgenden Überlegungen gelten auch für die in den letzten Jahren von D. Hilbert und seinen Mitarbeitern aufgestellten formalen Systeme (soweit diese bisher vorliegen). Vgl. D. Hilbert, Math. Ann. 88, Abh. aus d. math. Sem. der Univ. Hamburg I (1922), VI (1928). P. Bernays, Math. Ann. 90. J. v. Neumann, Math. Zeitschr. 26 (1927). W. Ackermann, Math. Ann. 93.

[4]) D. h. genauer, es gibt unentscheidbare Sätze, in denen außer den logischen Konstanten: ¬ (nicht), ∨ (oder), (x) (für alle), = (identisch mit) keine anderen Begriffe vorkommen als + (Addition), . (Multiplikation), beide bezogen auf natürliche Zahlen, wobei auch die Präfixe (x) sich nur auf natürliche Zahlen beziehen dürfen.

1932, INAC a Roma

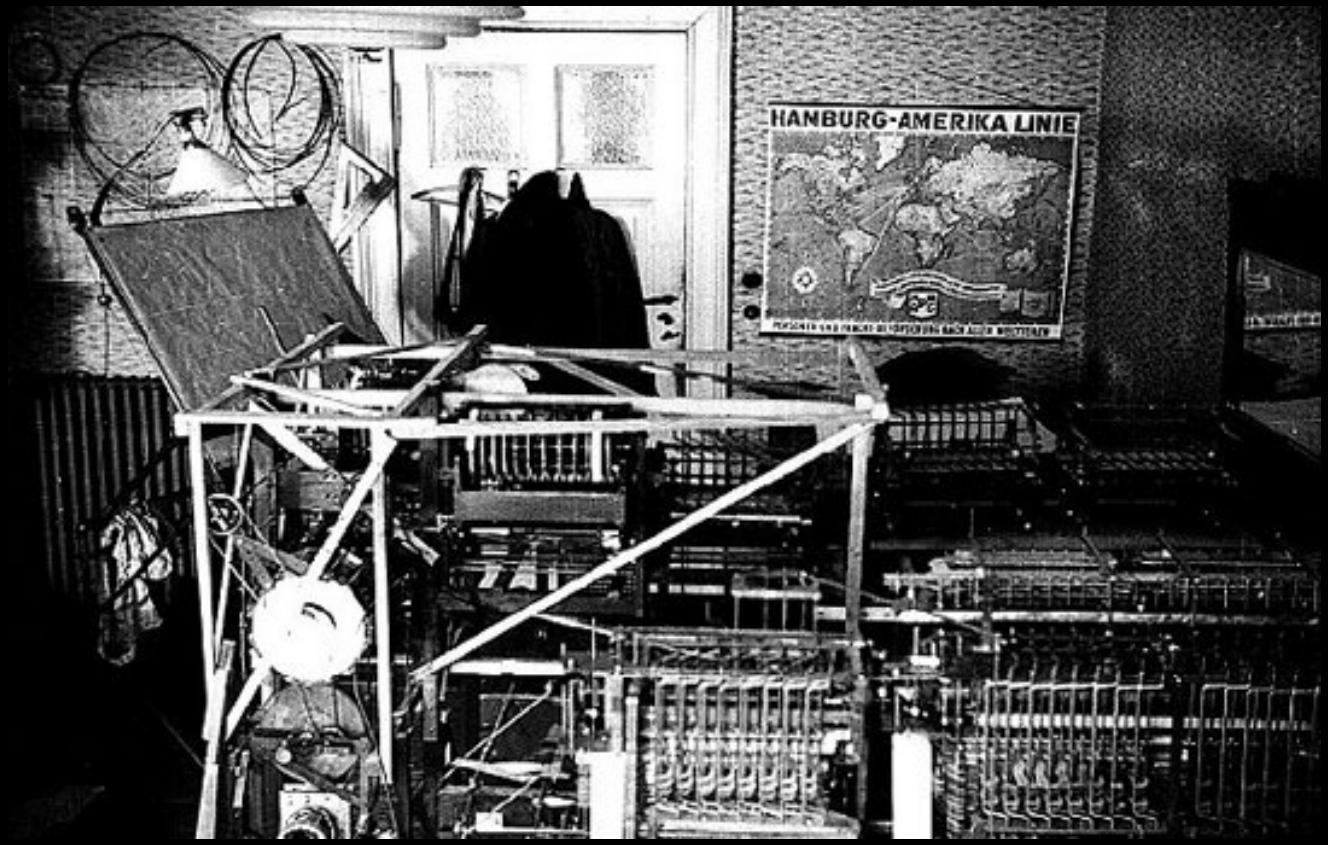
Mauro Picone
1885, 1977

1932, le coincidenze di Rossi

Bruno Rossi
1905, 1993

1934, Zuse Z1

Konrad Zuse
1910, 1995



1936, Church e Turing

Alonzo Church
1903, 1995

Alan M. Turing
1912, 1954

1937, Monroe

Frank Baldwin
1838, 1925)

Jay Randolph Monroe
1883, 1937

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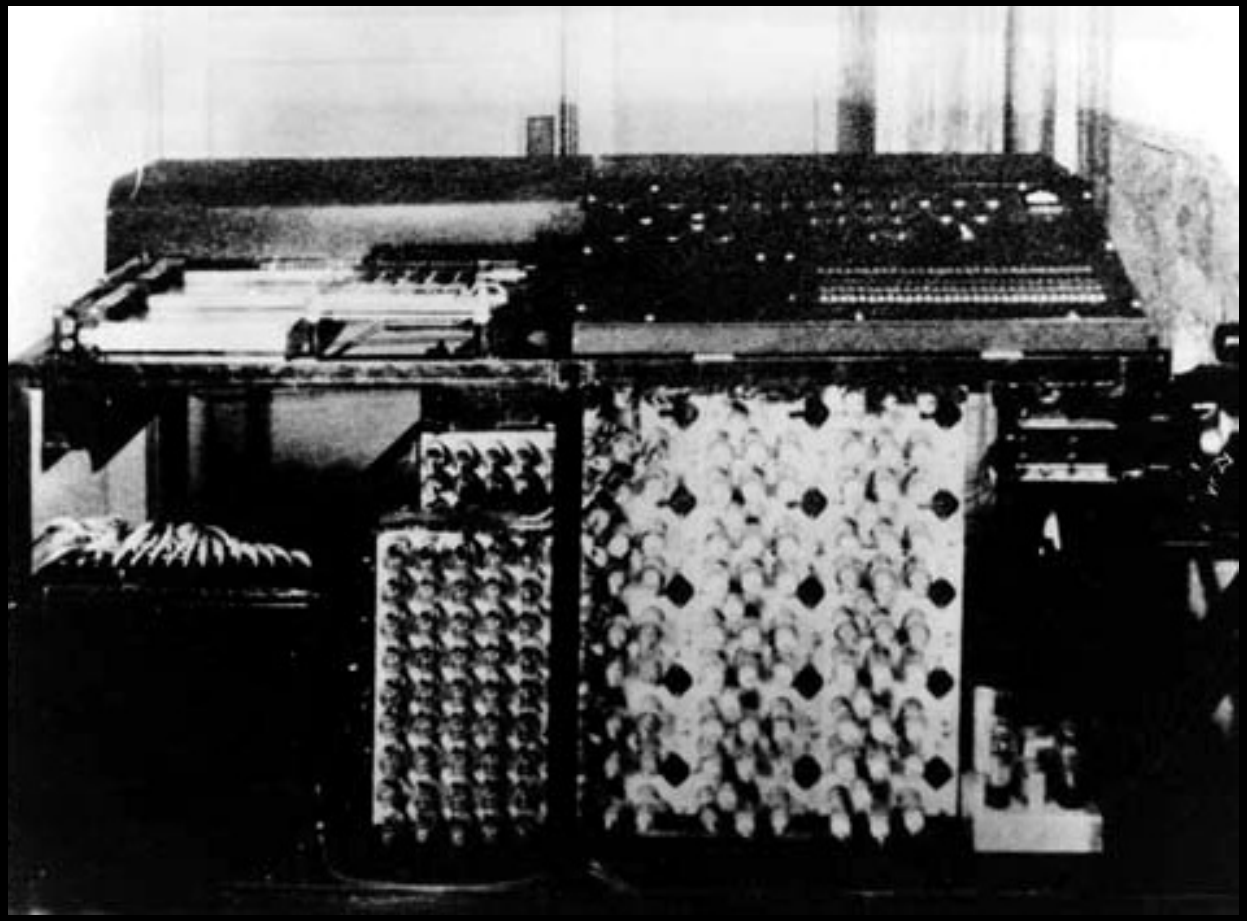
• 217 •

1939, Atanasoff-Berry

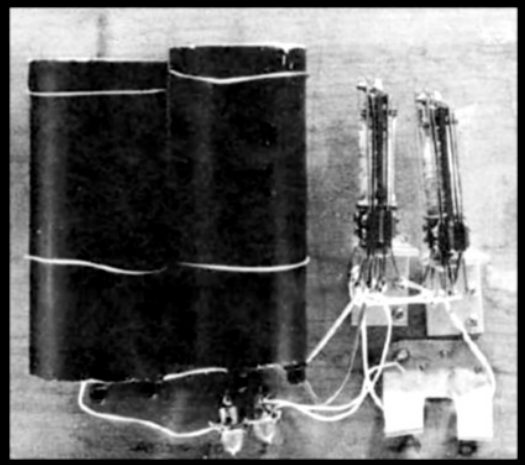
John V. Atanasoff
1903, 1995

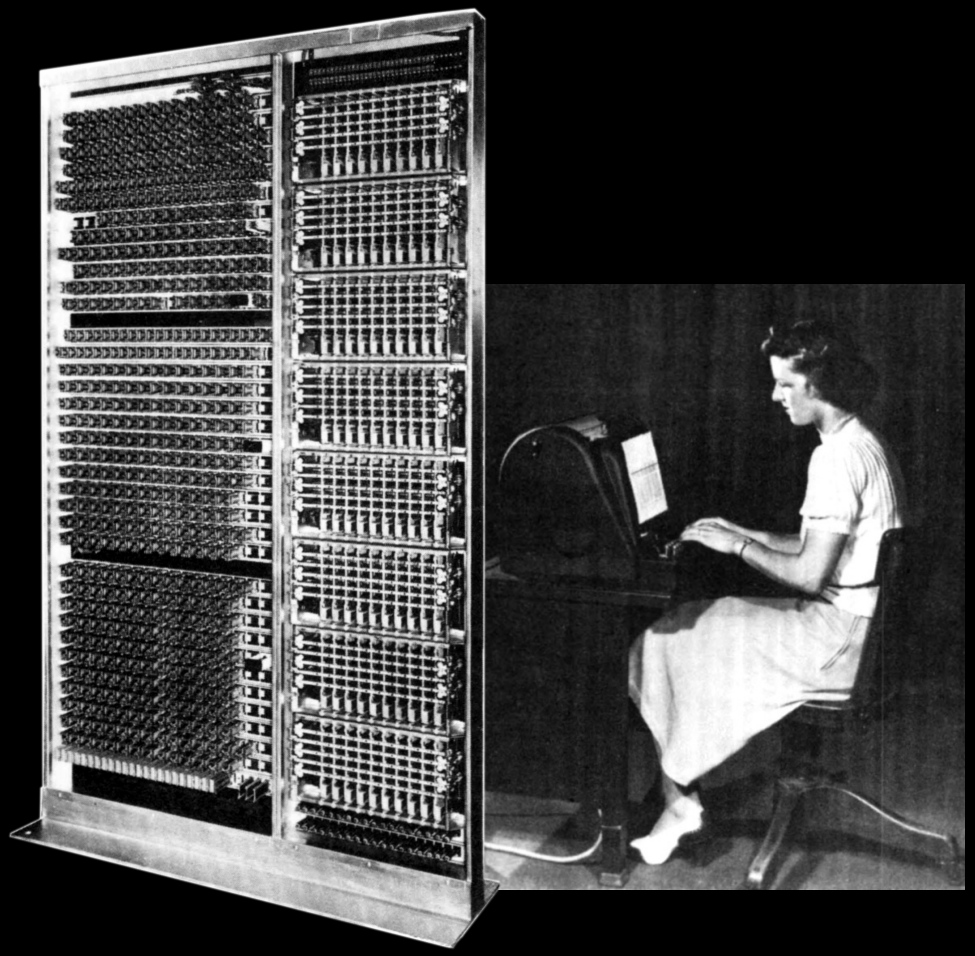
Clifford E. Berry
1918, 1963



1940, il CNC ai Bell Labs

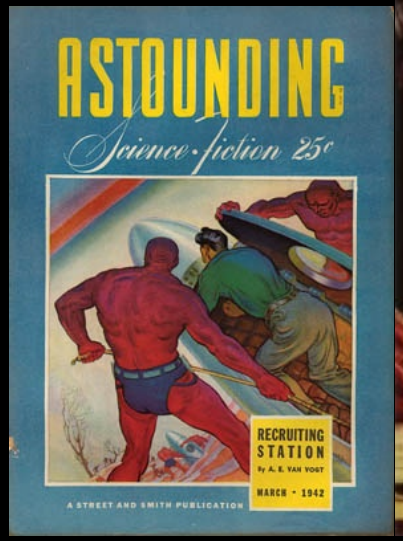
George Robert Stibitz
1904, 1995

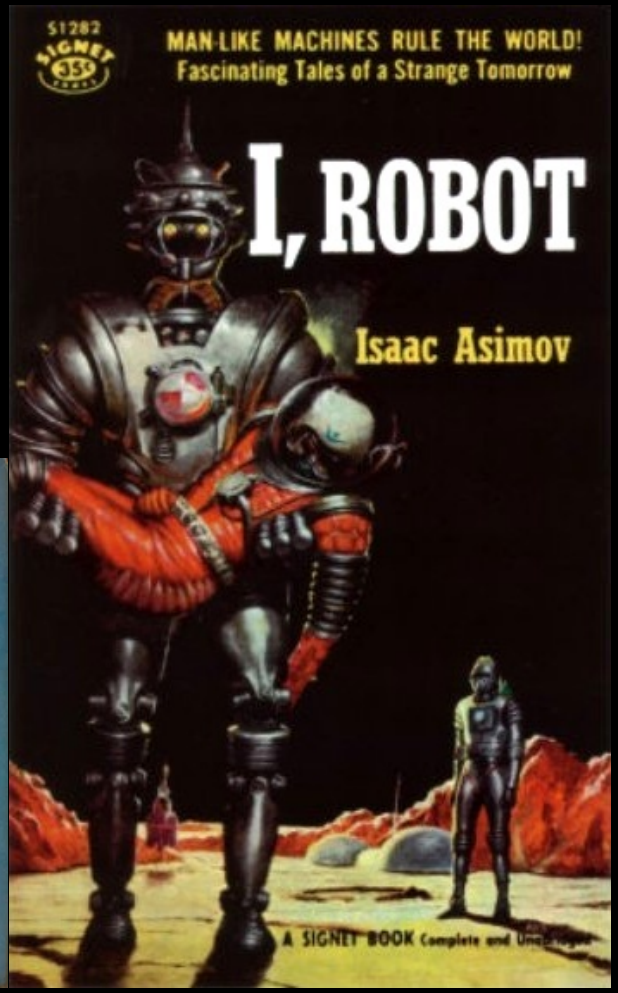




1942, “Runaround”

Isaac Asimov
1920, 1992





1942, Kriegsmarine Enigma ...

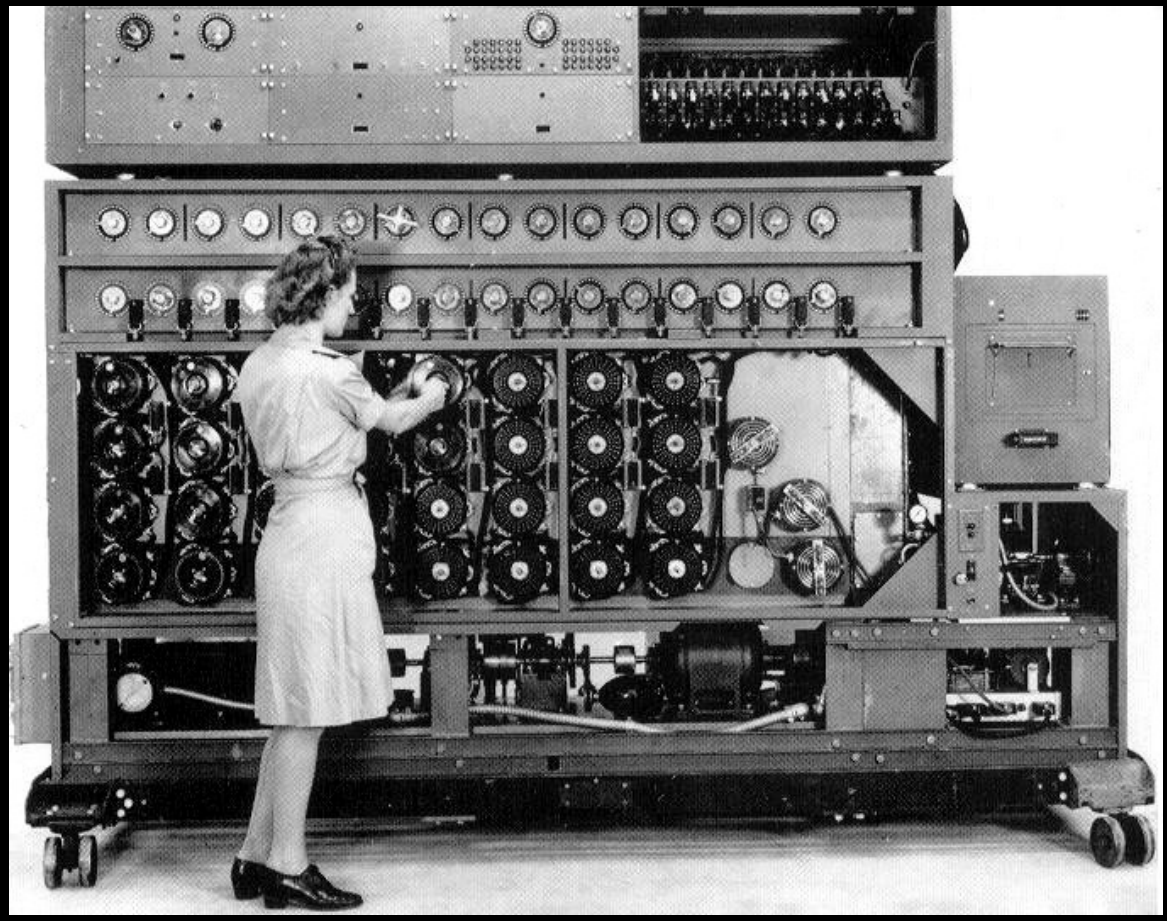
Arthur Scherbius
1878, 1929

… vs Bombe

Marian Adam Rejewski
1905, 1980

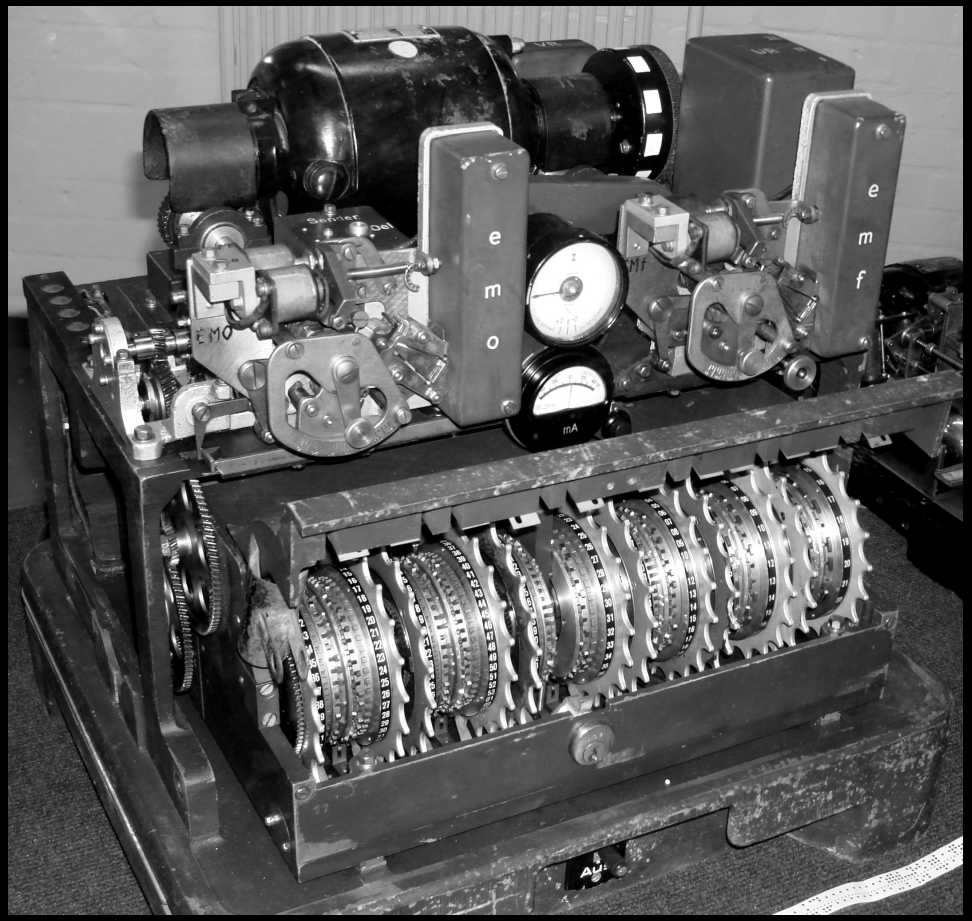
Alan M. Turing
1912, 1954

W. Gordon Welchman
1906, 1985



1943, Lorenz SZ42 ...

Gilbert S. Vernam
1890, 1960

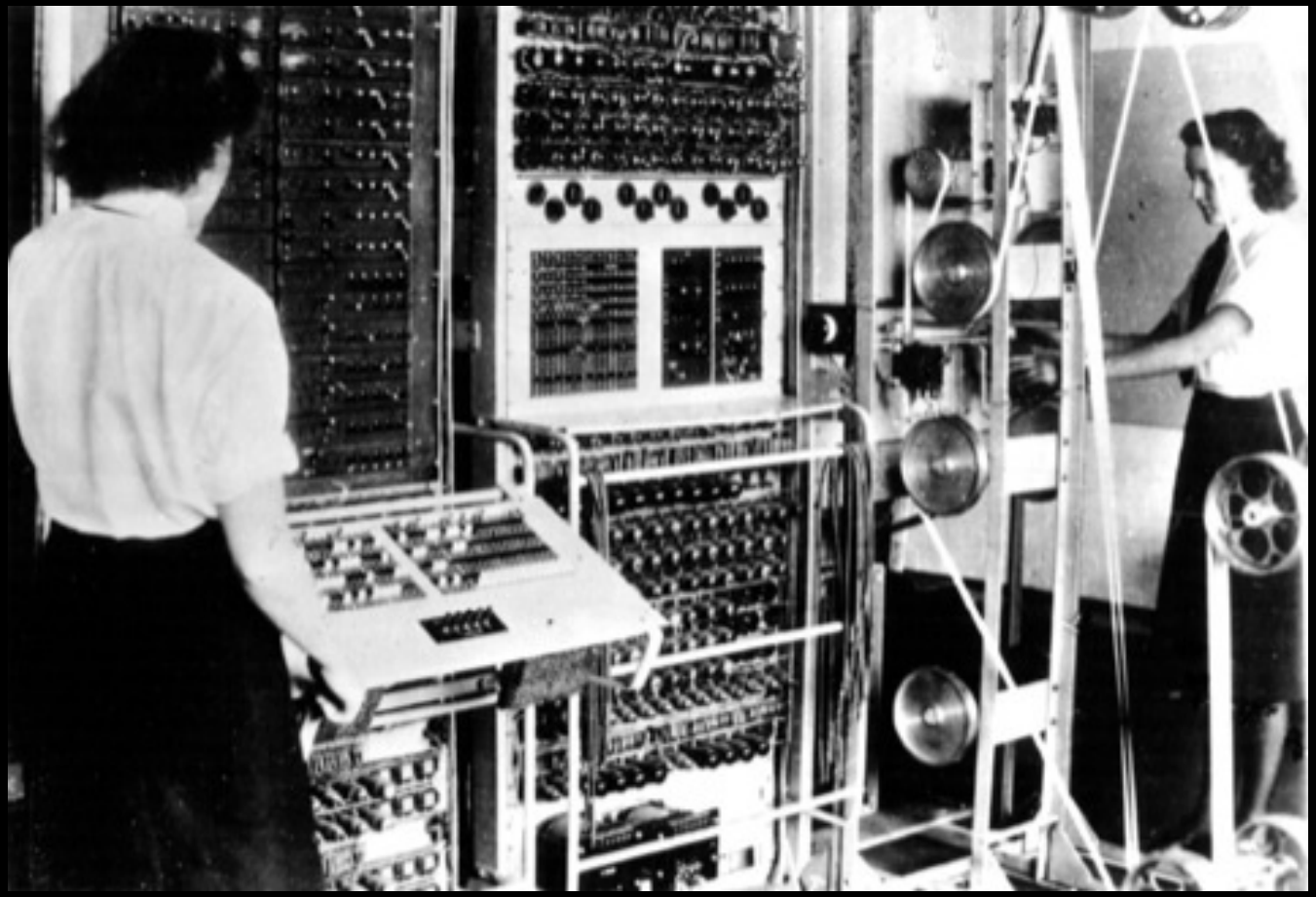


… vs Colossus

Maxwell “Max” Newman
1897, 1984

Thomas H. Flowers
1905, 1998

Alan M. Turing
1912, 1954



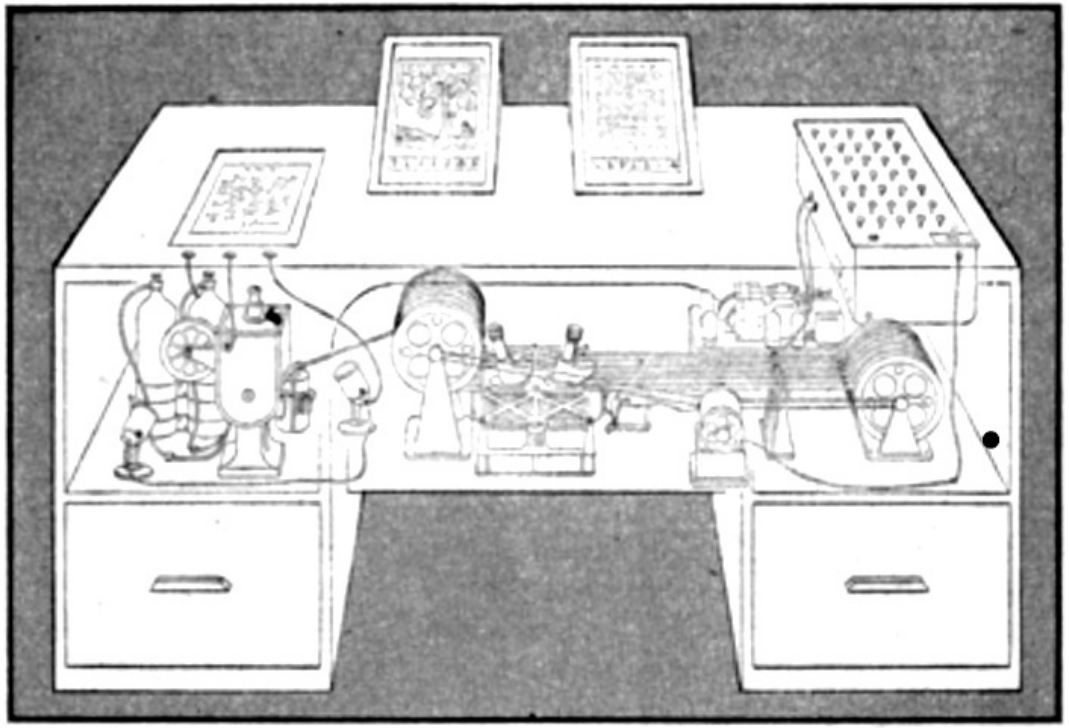
1943, MkII/K14 Gyro Gunsight

1944, Harvard MkI / IBM ASCC

Howard H. Aiken
1900, 1973

1945, Memex

Vannevar Bush
1890, 1974



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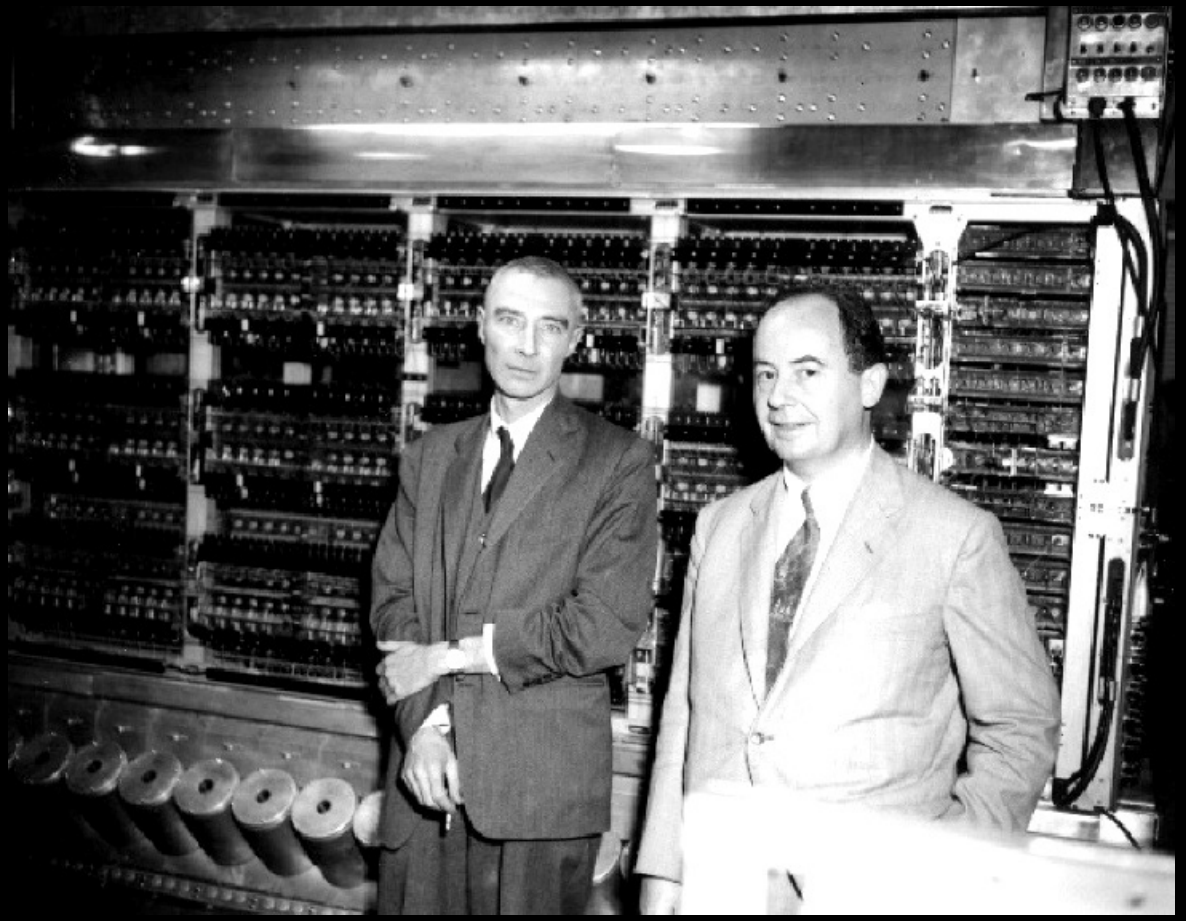
1945, EDVAC First Draft

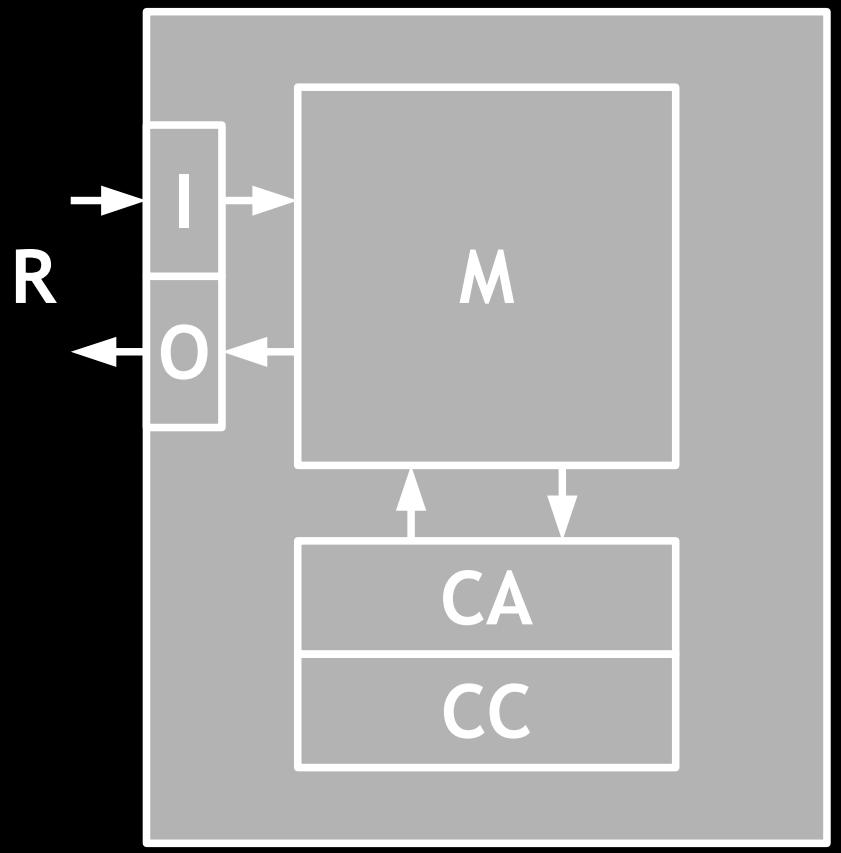
John von Neumann
1903, 1957

Julius R. Oppenheimer
1904, 1967



1945, architettura EDVAC

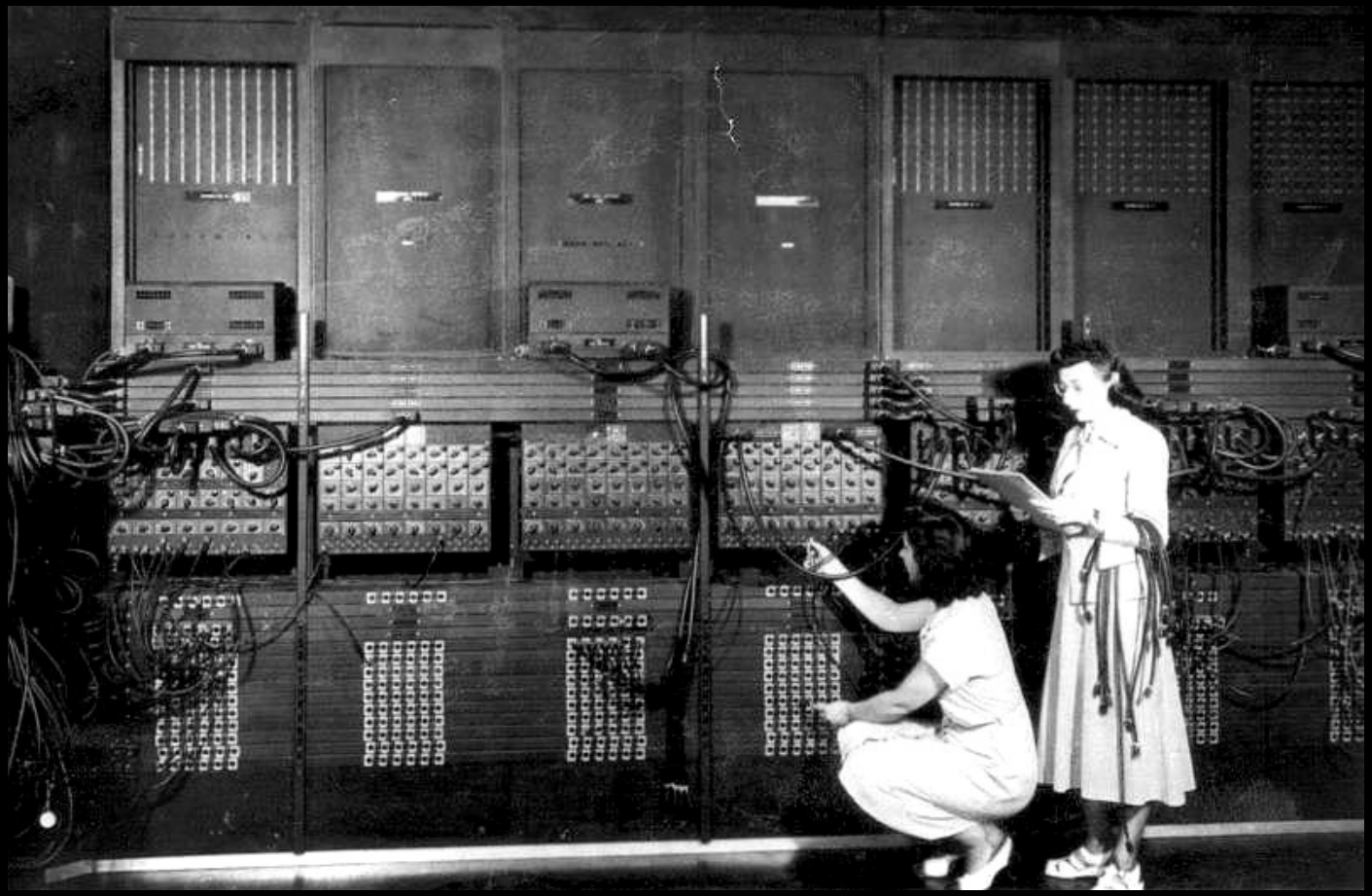
- 5 parti + un supporto
  - CA, central arithmetic
  - CC, central control
  - M, memory
  - I, input, da R in M
  - O, output, da M su R
  - R, recording media



1946, ENIAC

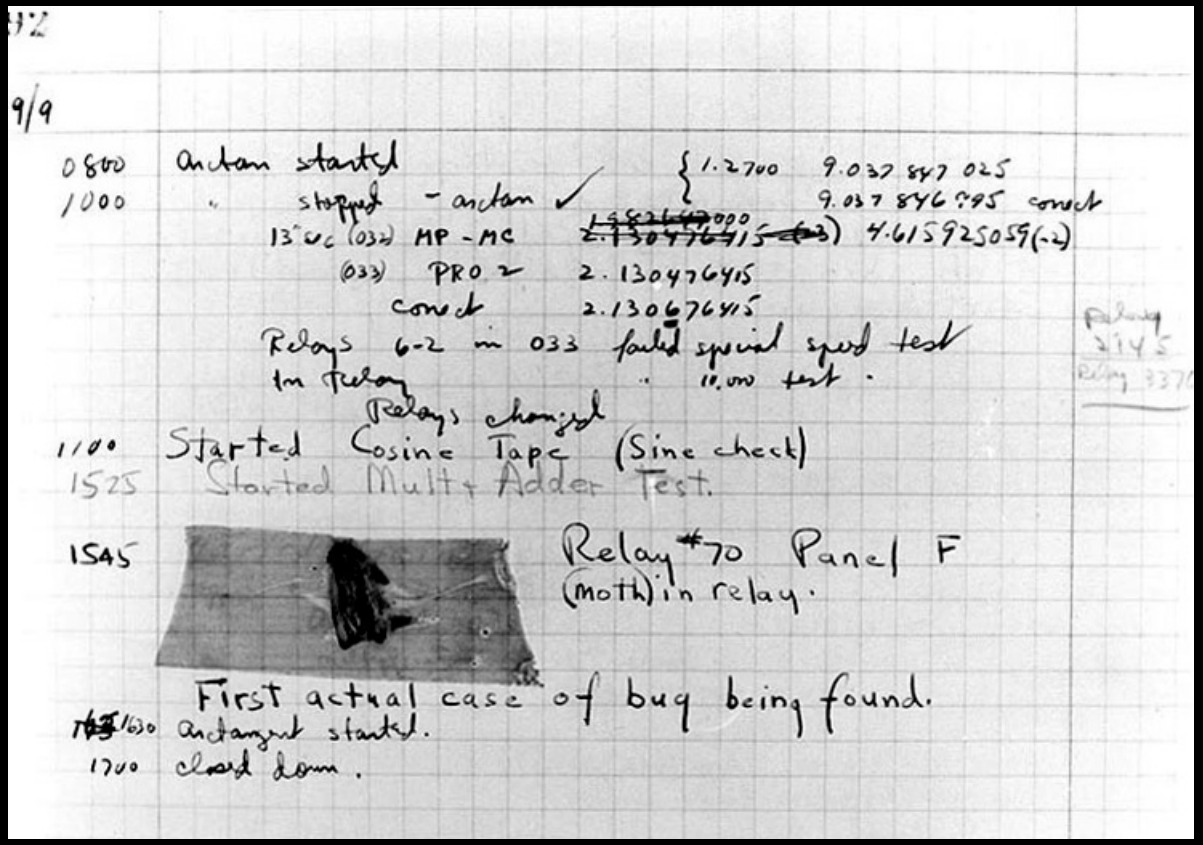
John W. Mauchly
1907, 1980

J. Presper Eckert
1919, 1995



1947, il baco dell'Harvard MkII

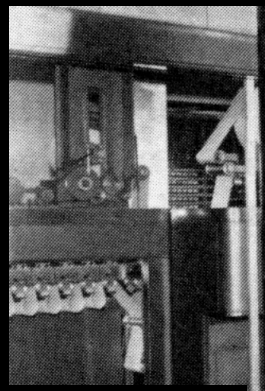
Grace Murray Hopper
1906, 1992

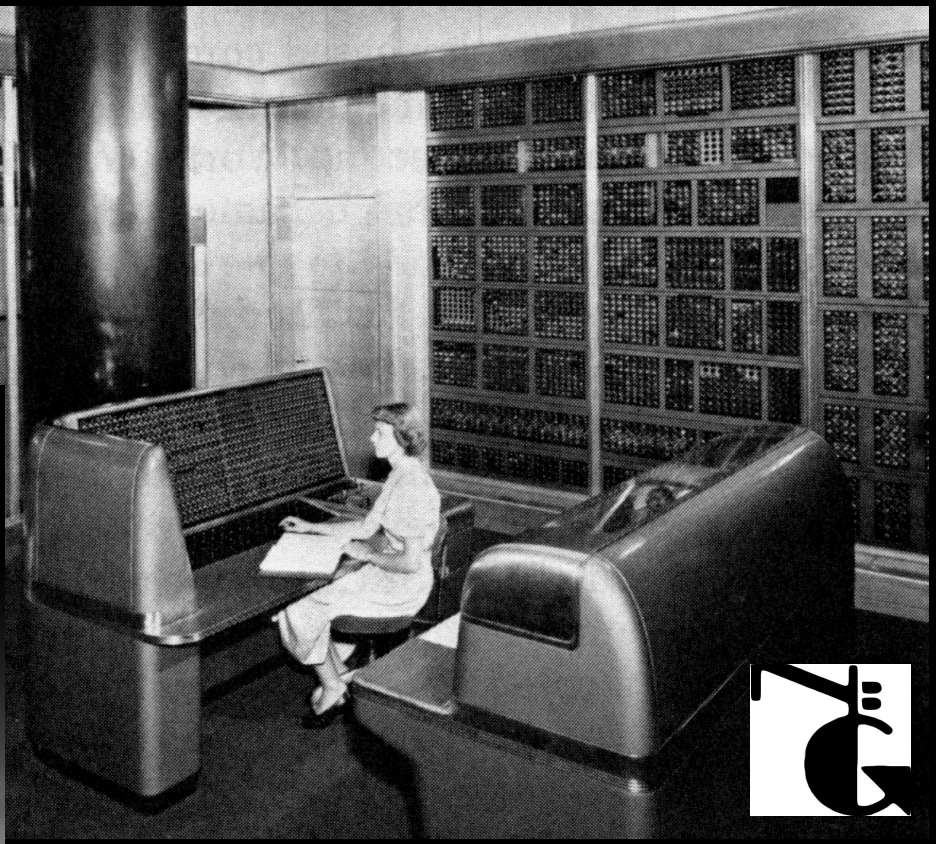


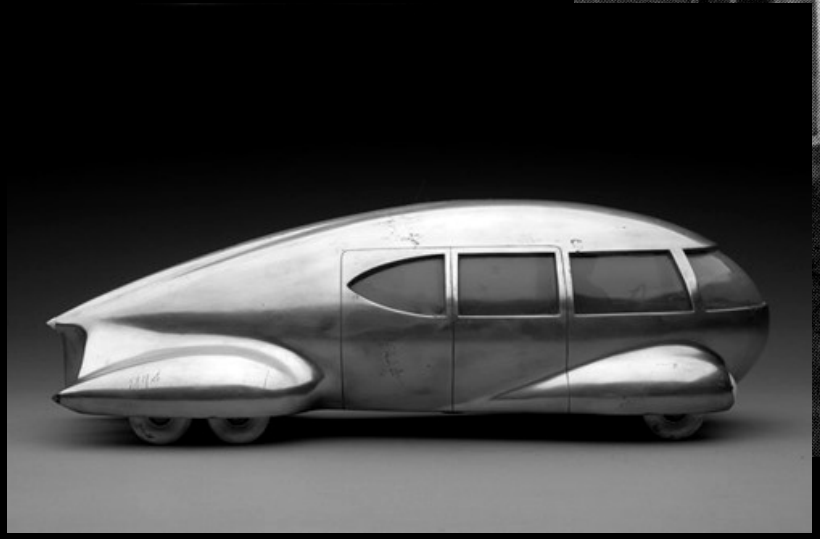
1948, IBM SECC e Bel Geddes

Wallace John Eckert
1902, 1971

Norman Bel Geddes
1893, 1958





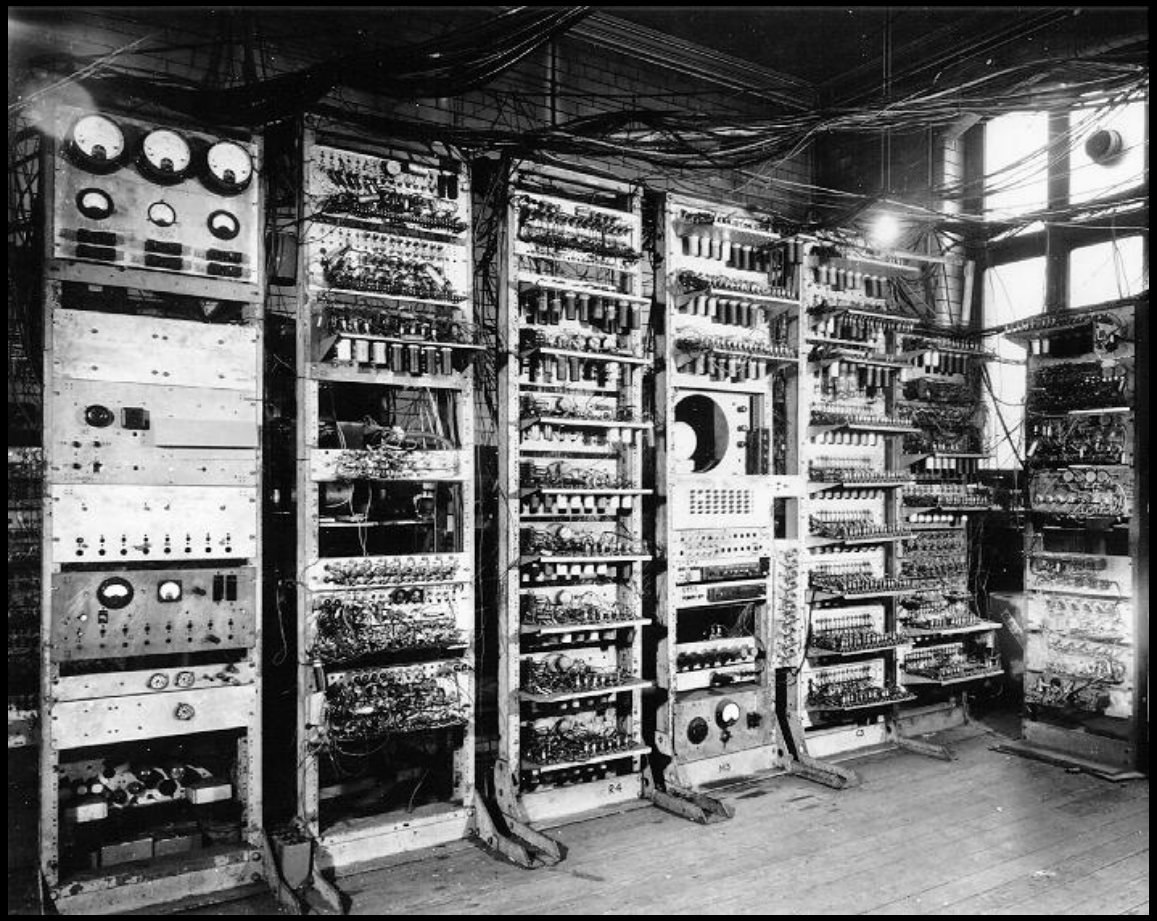


1948, Baby Machine, hw ...

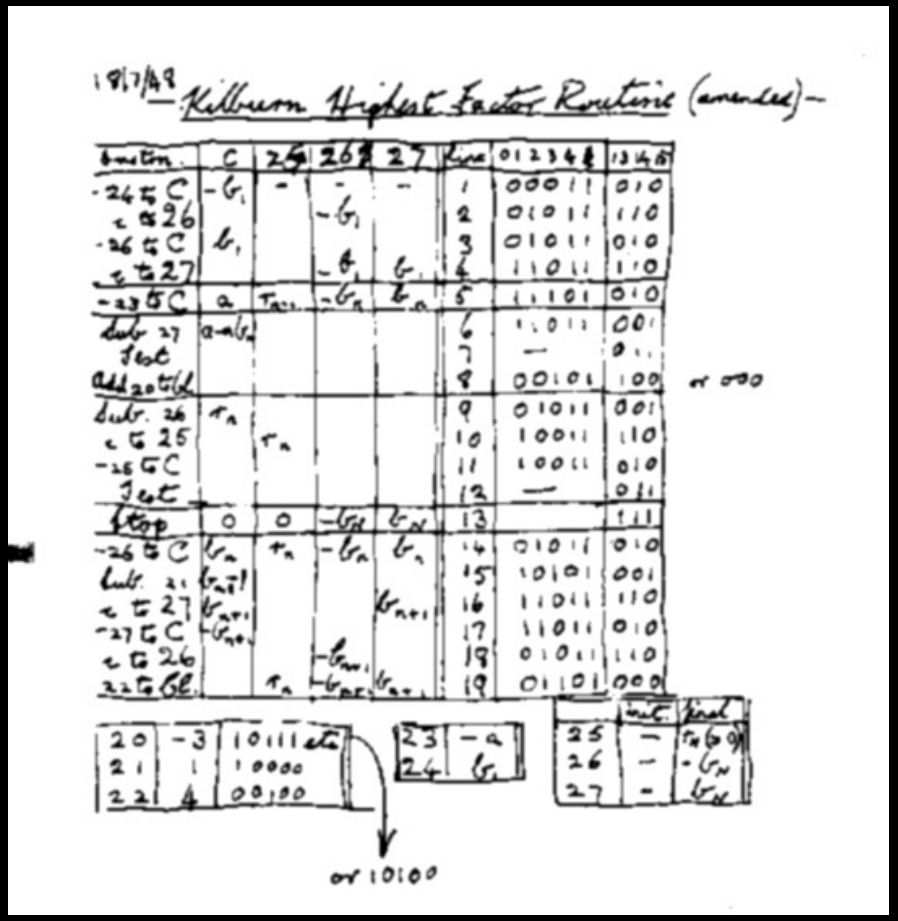
Maxwell “Max” Newman
1897, 1984

Frederic C. Williams
1911, 1977

Tom Kilburn
1921, 2001



... e software


18/7/49 Kilburn Highest Factor Routine (amended)
Function
C
25
26
27
Line
0 1 2 3 4
1 3 4
-24 to C
c to 26
-26 to C
c to 27
Subr 27
Test
Add 20 to 26
Subr. 26
c to 25
-25 to C
Test
Stop
-26 to C
Subr. 21
c to 27
-27 to C
c to 26
22 to 26
20 -3 10111 etc
21 1 10000
22 4 00100
23 -a
24
25 —
26 —
27 —
init.
final
or 10100
or 000

1948, Herzstark Curta

Curt Herzstark
1902, 1988

1948, il transistor

John Bardeen
1908, 1991

William B. Shockley
1910, 1989

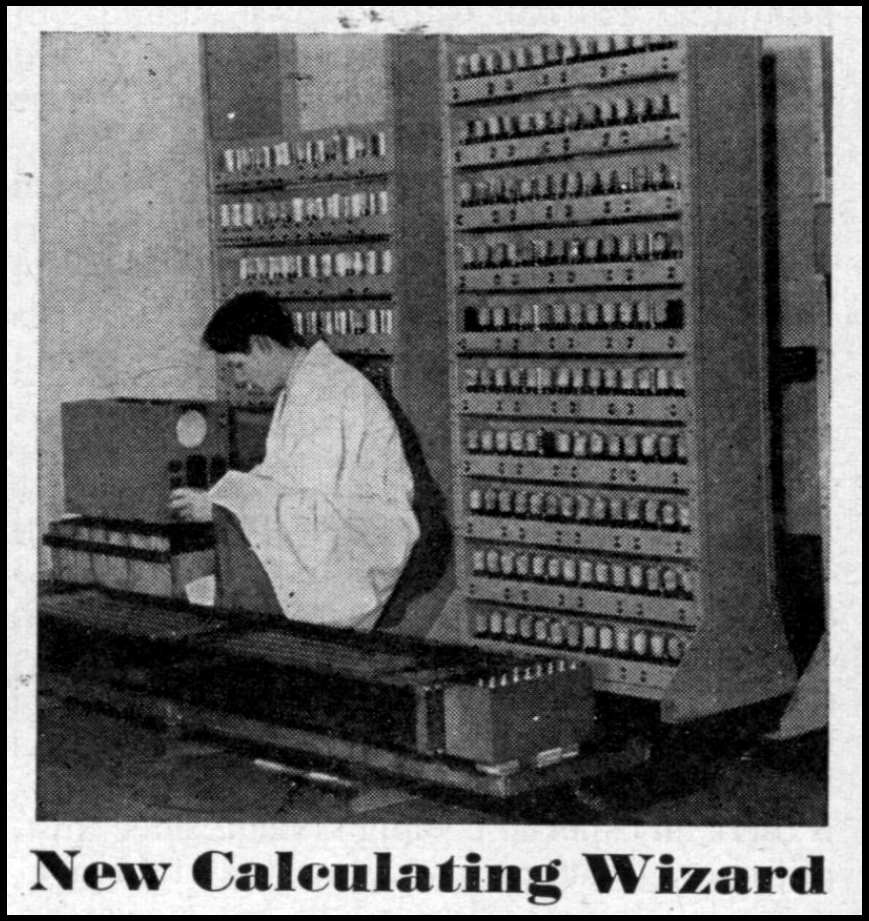
Walter H. Brattain
1902, 1987

1949, EDSAC a Cambridge

Maurice V. Wilkes
1913, 2010

David J. Wheeler
1927, 2004

Stanley Gill
1926, 1975



Want to Buy a Brain?

Now you can, for a measly $200,000.

Its vacuum tubes will make up your mind

for you far faster than your gray matter can.

By Martin Mann

PS photos by Hubert Luckett

YOU can buy a machine now to do some of your thinking for you. It will give a definite answer to any question that can be expressed mathematically.

Ask one of these machines how thick the cables for a new bridge should be, and it will tell you.

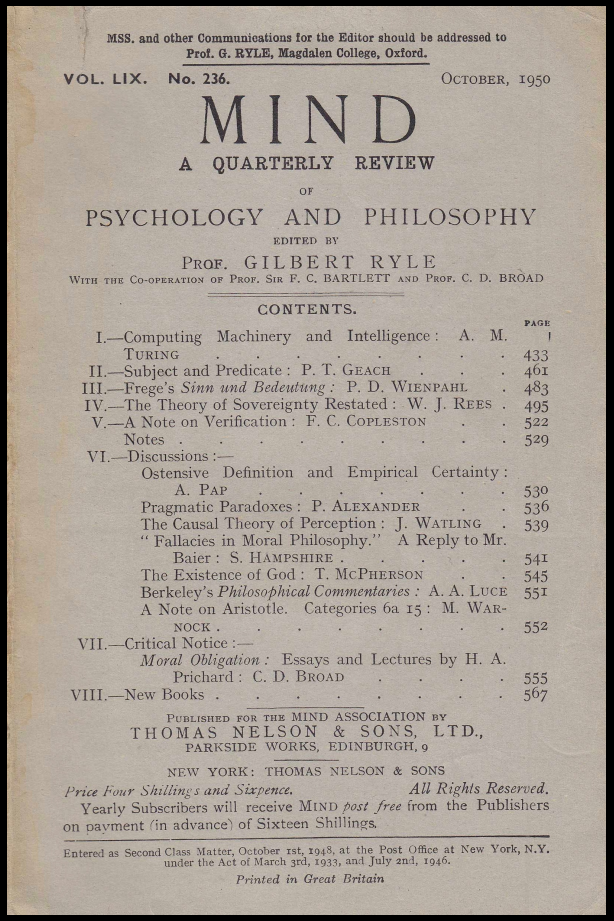
Ask how fast a new automobile can go before its crankshaft starts to vibrate to pieces, and it will give the exact speed.

You can order one of these electronic brains from a number of organizations. They are being made by the Eckert-Mauchly Computer Corp., Raytheon Mfg. Co., Harvard, M.I.T., the University of Pennsylvania, and jointly by RCA and the Institute of Advanced Study.

One of the most versatile of the new machines will be the Univac® (for UNIVersal Automatic Computer), now under construction by Eckert-Mauchly. It will be much smaller than older computers, but will still take as much room as almost 70 people standing together. It will have 1,500 vacuum tubes and 12 seven-inch reels of magnetic tape. It will be able to multiply 10-digit numbers 30,000 times a minute, and solve hundreds of equations containing hundreds of unknown numbers all at one

1950, test di Turing

Alan M. Turing
1912, 1954



MSS. and other Communications for the Editor should be addressed to
Prof. G. RYLE, Magdalen College, Oxford.

VOL. LIX. No. 236. OCTOBER, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

EDITED BY

PROF. GILBERT RYLE

WITH THE CO-OPERATION OF PROF. SIR F. C. BARTLETT AND PROF. C. D. BROAD

CONTENTS.

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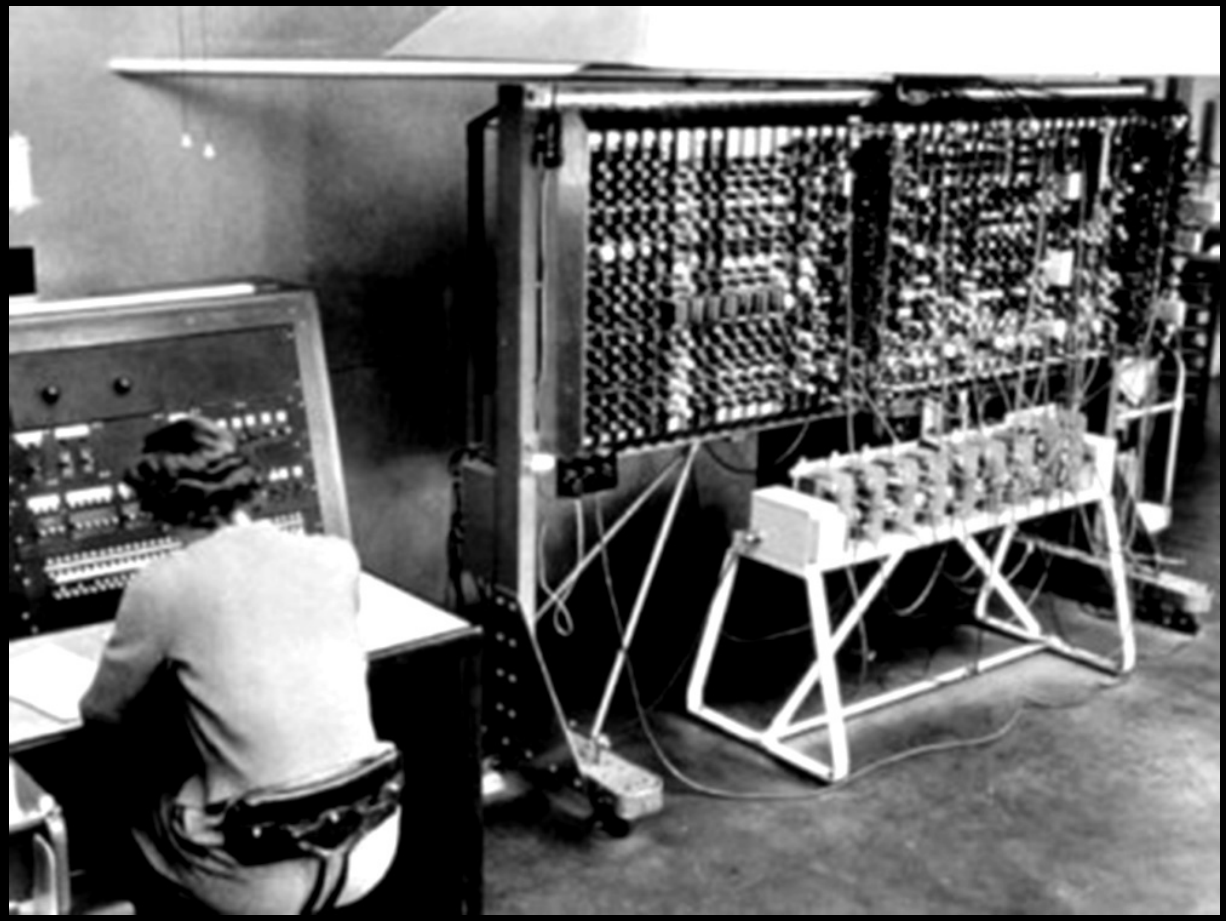
Printed in Great Britain

1950, Pilot ACE

Alan M. Turing
1912, 1954

James H. Wilkinson
1919, 1986



1950, Marchant

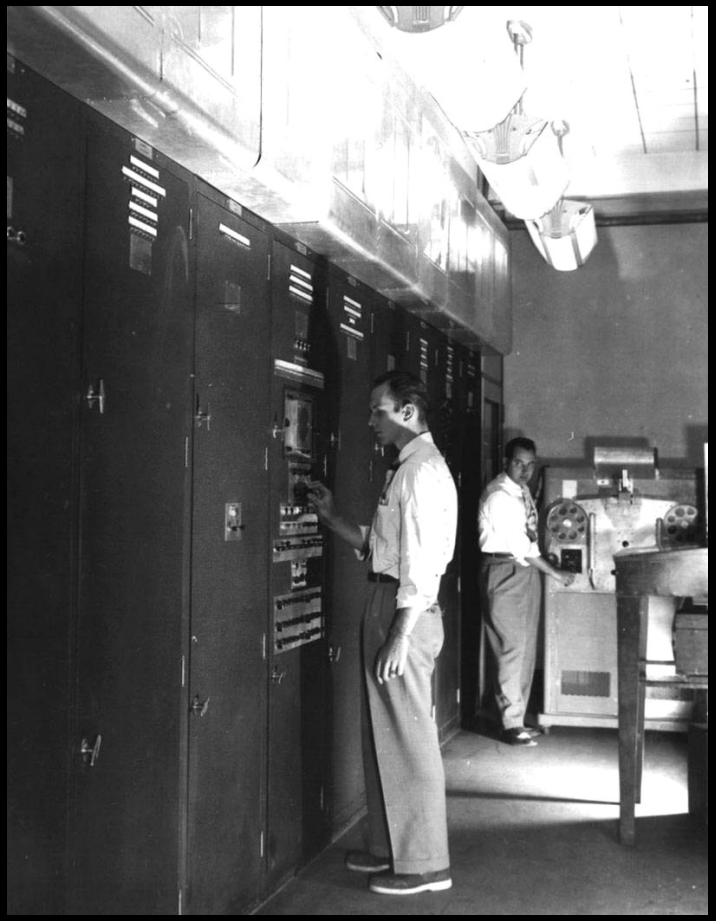
F.lli Marchant, 1911

Carl Friden
1891, 1945

1951, EDVAC

John W. Mauchly
1907, 1980

J. Presper Eckert
1919, 1995



1951, UNIVAC

1946	Eckert-Mauchly Computer Corporation
1950	Remington Rand
1955	Sperry Rand
1975	Sperry Corporation
1986	Unisys, con Burroughs

1951, A0 il primo compilatore

Grace Murray Hopper
1906, 1992

1952, IBM 701


150 Extra Engineers
An IBM Electronic Calculator speeds through thousands of intricate computations so quickly that on many complex problems it's like having 150 EXTRA Engineers.
No longer must valuable engineering personnel . . . now in critical shortage . . . spend priceless creative time at routine repetitive figuring.
Thousands of IBM Electronic Business Machines . . . vital to our nation's defense . . . are at work for science, industry, and the armed forces, in laboratories, factories, and offices, helping to meet urgent demands for greater production.
IBM
INTERNATIONAL BUSINESS MACHINES

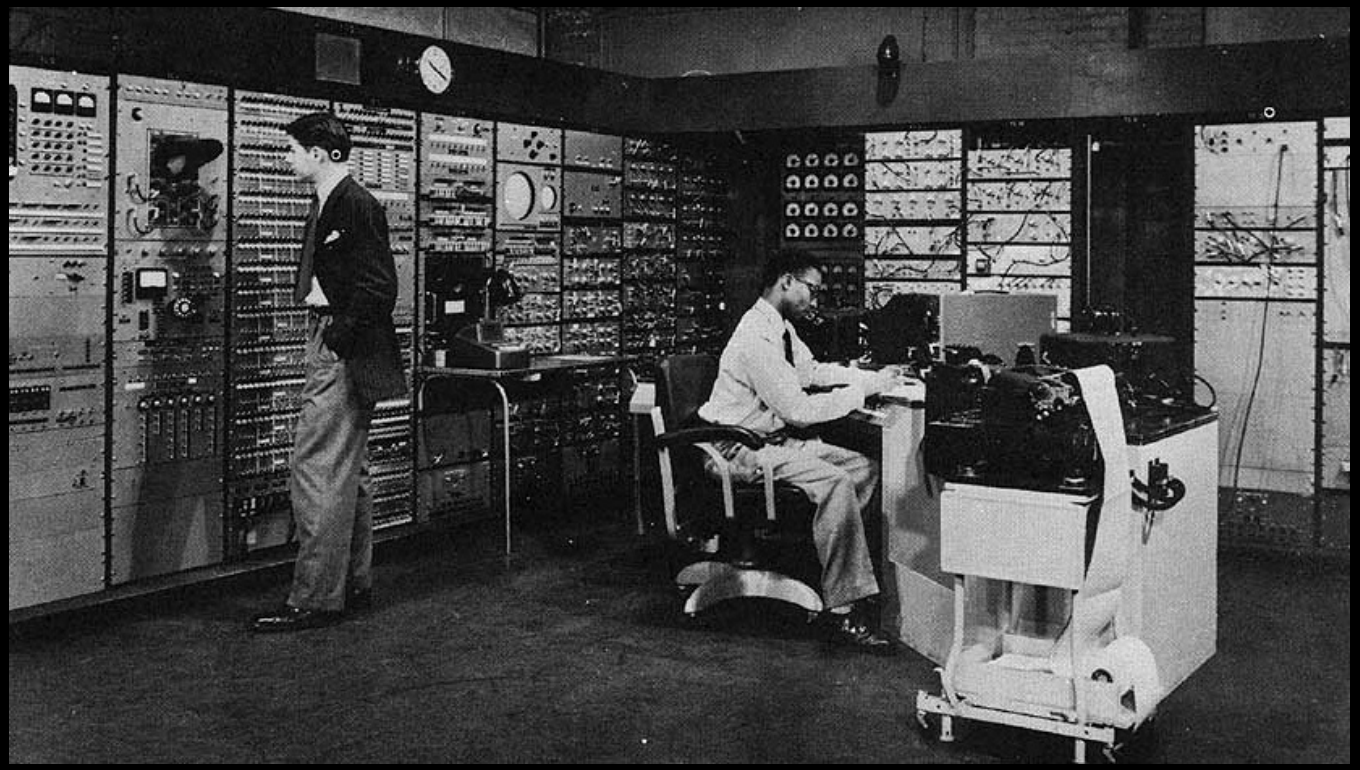
1952, Eisenhower-Stevenson

Walter Leland Cronkite
1916, 2009

1953, Whirlwind I al MIT

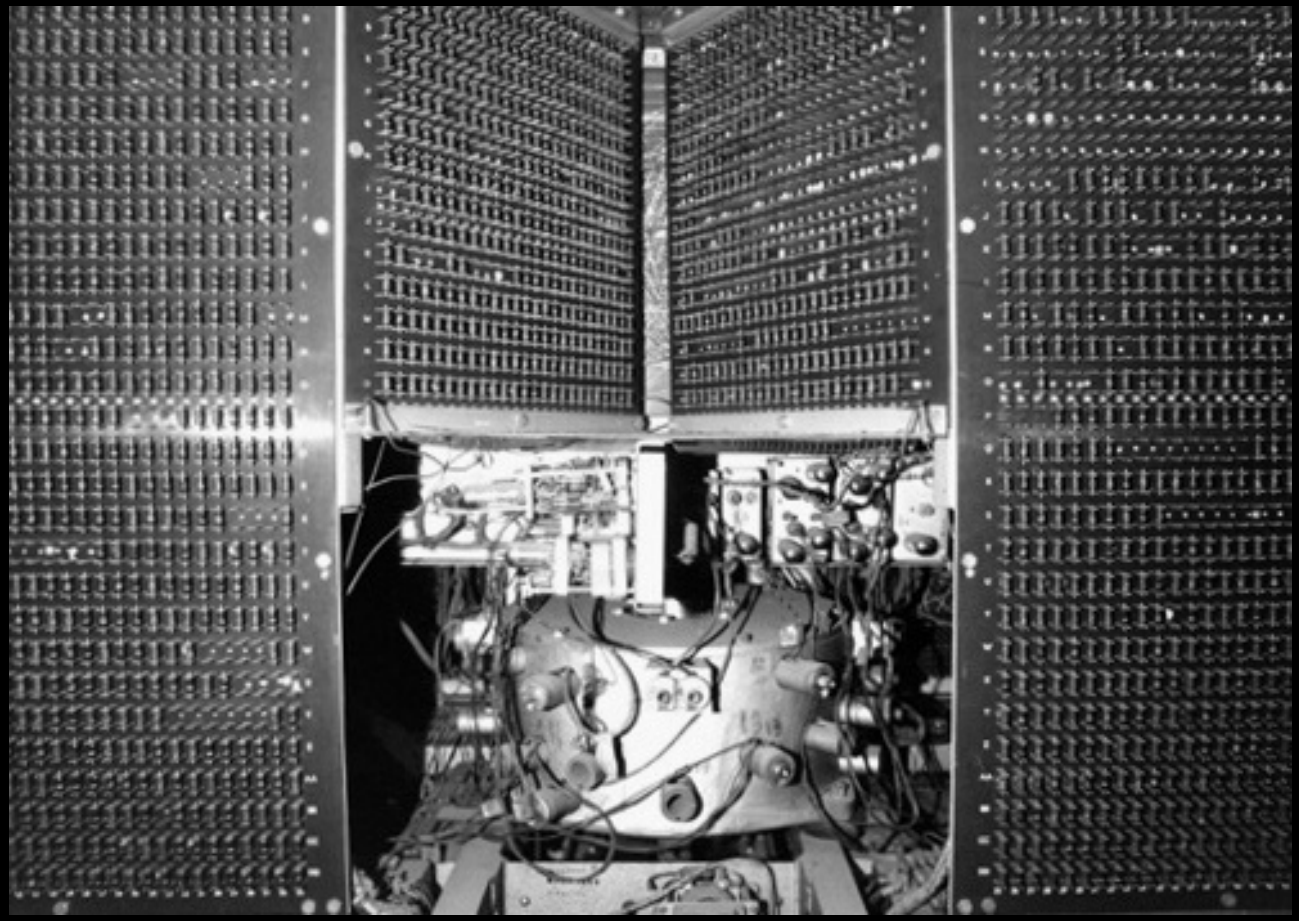
Jay Wright Forrester

Robert Rivers Everett



1954, CRC102 a Milano

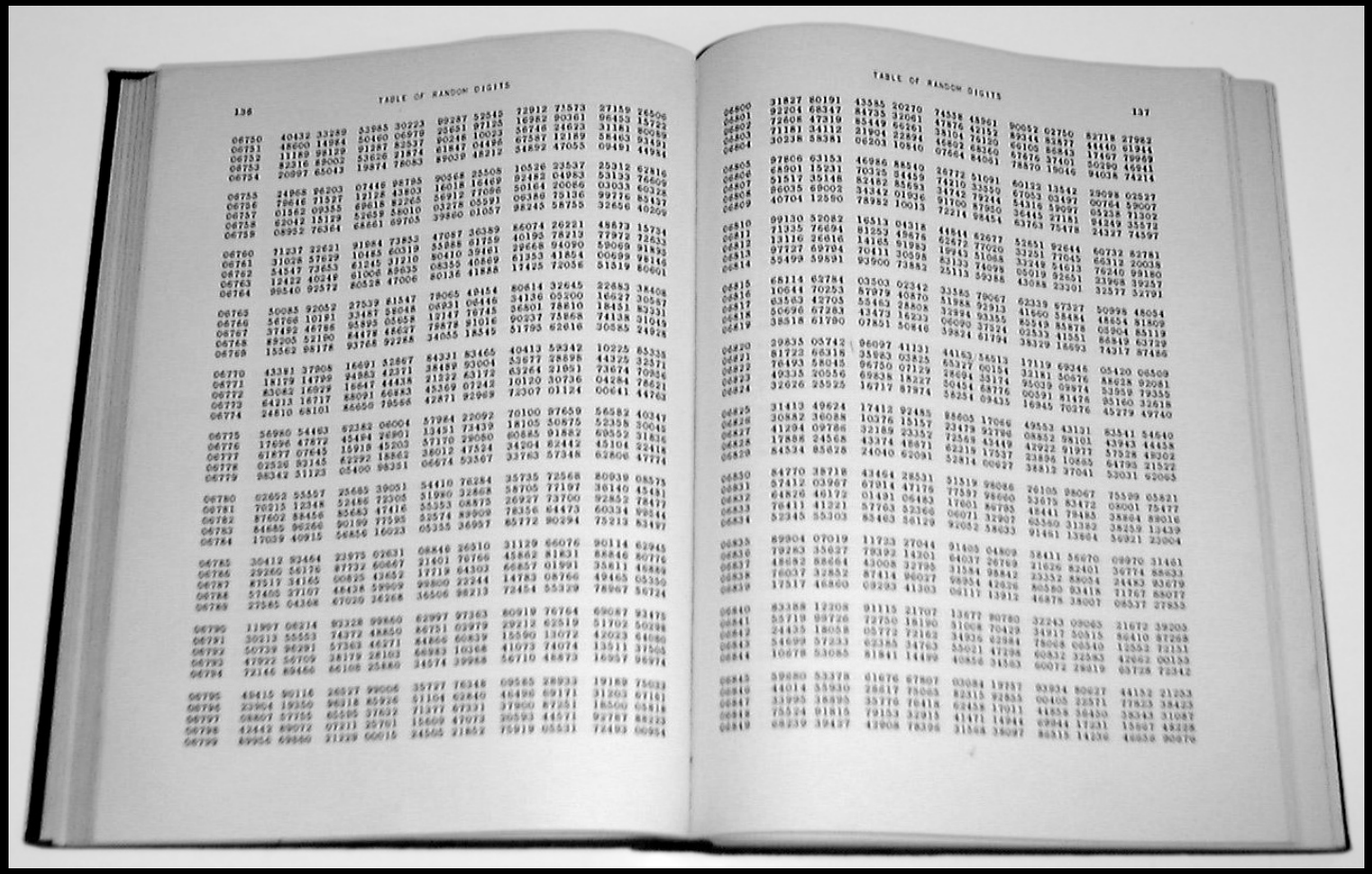
Luigi Dadda,
1923, 2012



1955, Ferranti MK1 a Roma

Mauro Picone
1885, 1977

1955, A Million Random Digits



1956, Olivetti Divisumma

Natale Capellaro
1902, 1977

Marcello Nizzoli (des)
1887, 1969

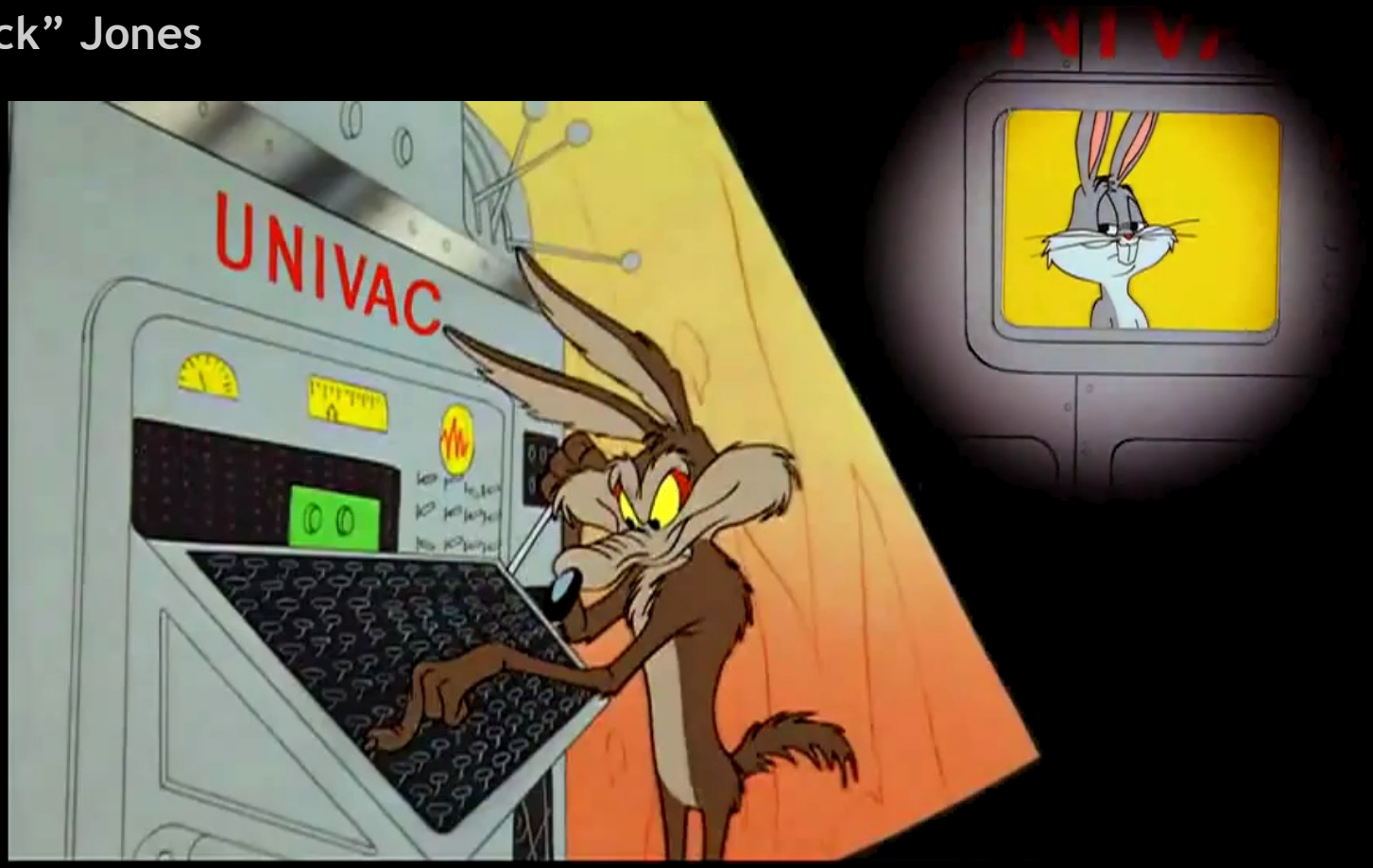
1956, Dartmouth: nasce l'AI

Marvin Lee Minsky

John McCarthy
1927, 2011

1956, To Hare is Human

Charles M. “Chuck” Jones
1912, 2002



1957, Macchina Ridotta a Pisa

Alfonso Caracciolo di Forino
1925, 1996

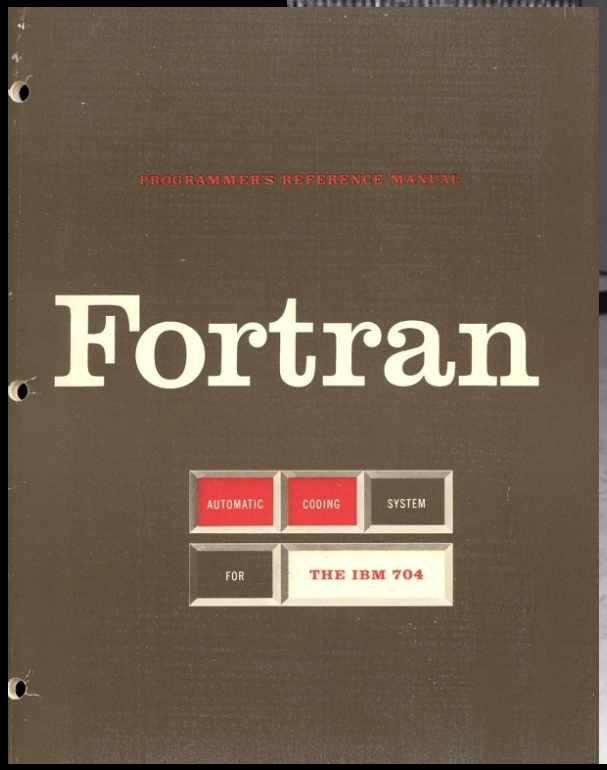
Elio Fabri

Giuseppe Cecchini

Sergio Sibani

1957, IBM 704: il Fortran

John Warner Backus
1924, 2007



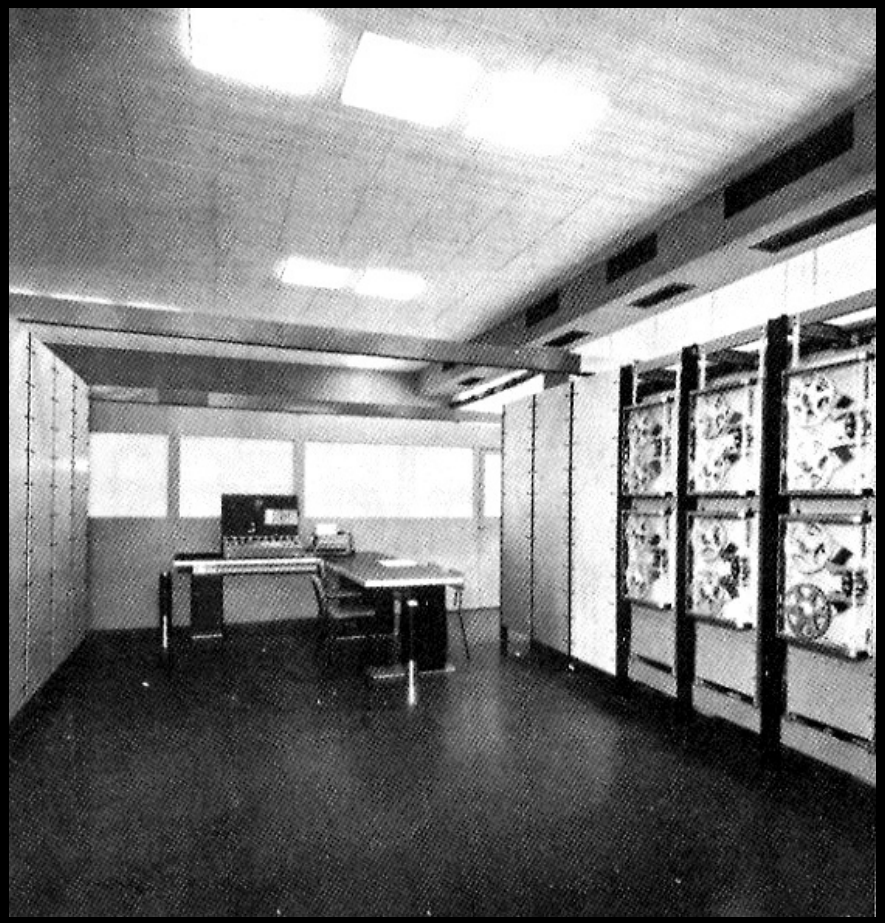
Phoebe Ephron
1914, 1971

Henry Ephron
1911, 1992

Walter Lang
1896, 1972

1958, ELEA 9001 a Ivrea

Mario Tchou
1924, 1961



1958, AN/FSQ-7

1958, transistor industriali

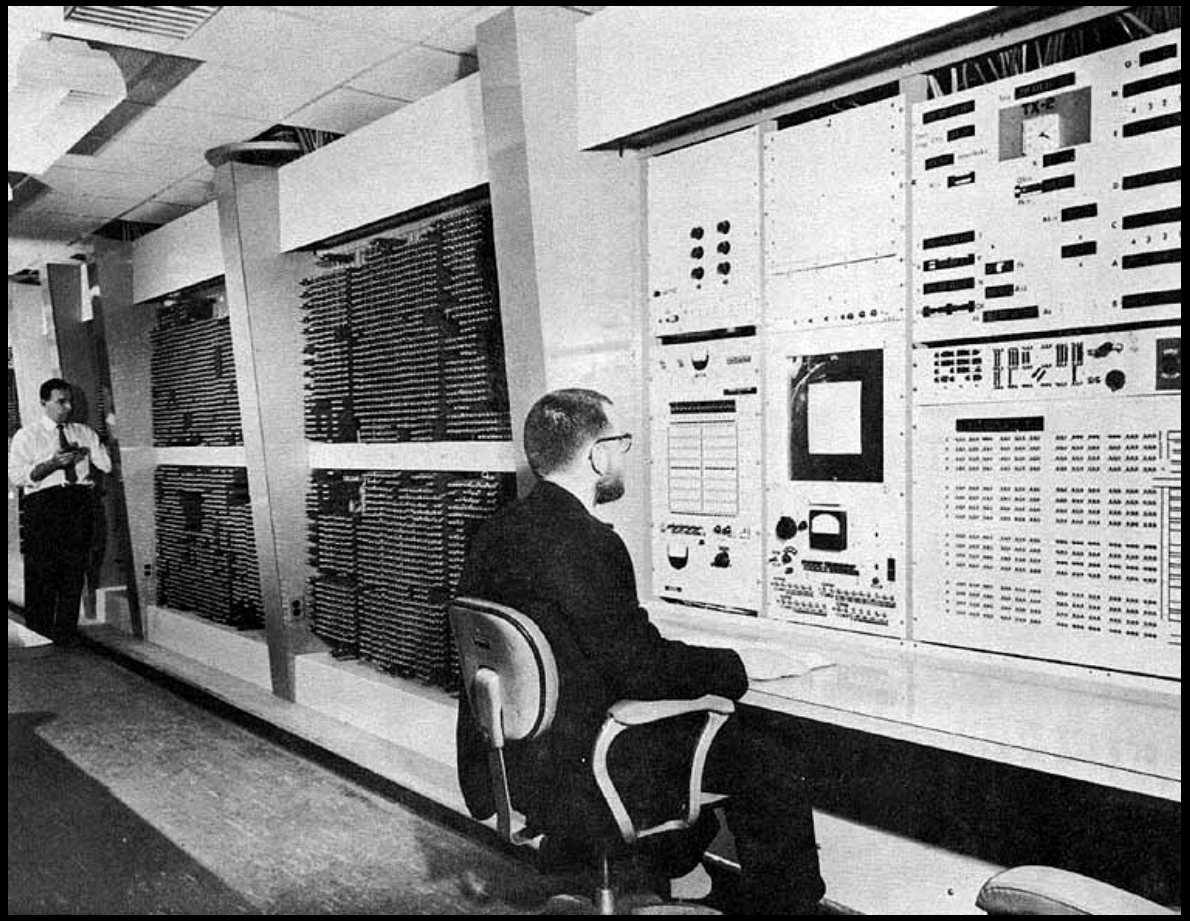
Gordon Kidd Teal
1907, 2003

William B. Shockley
1910, 1989

The Traitoruos Eight

Sherman Mills Fairchild
1896, 1971

1958, Lincoln TX-2 al MIT



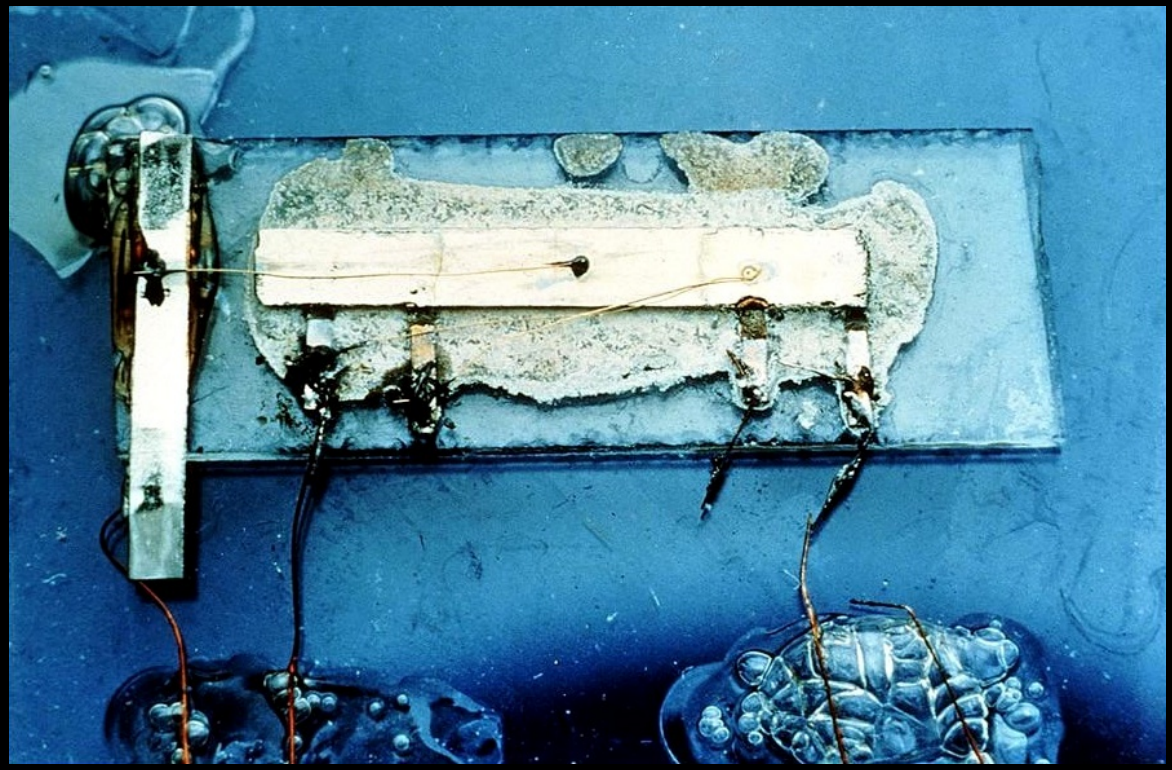
1958, il circuito integrato

Geoffrey W.A. Dummer (TI),
1909, 2002

Jack St. Clair Kilby
1923, 2005

Jean Amédée Hoerni
1924, 1997

Robert Norton Noyce
1927, 1990



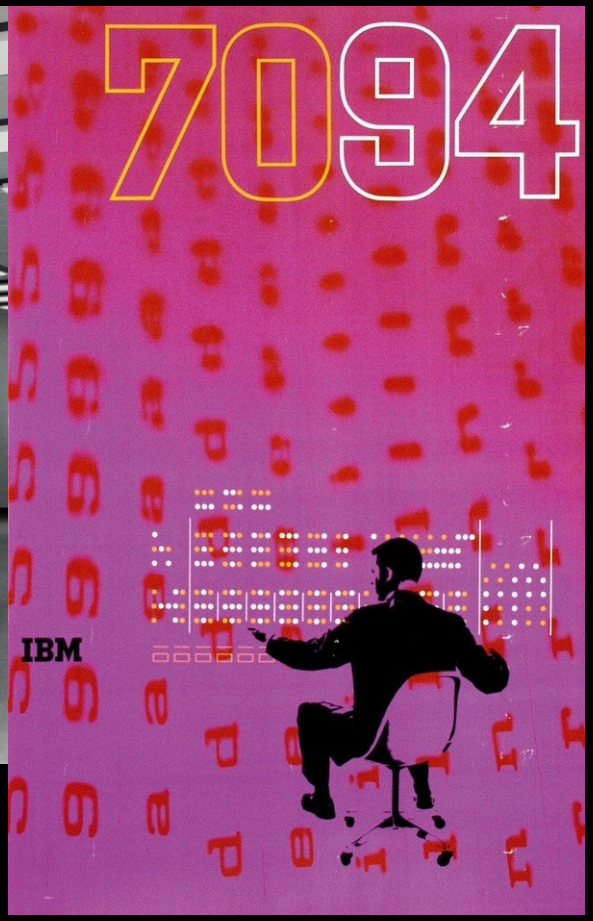
1959, ELEA 9002

Mario Tchou
1924, 1961

Ettore Sottsass (des)
1917, 2007

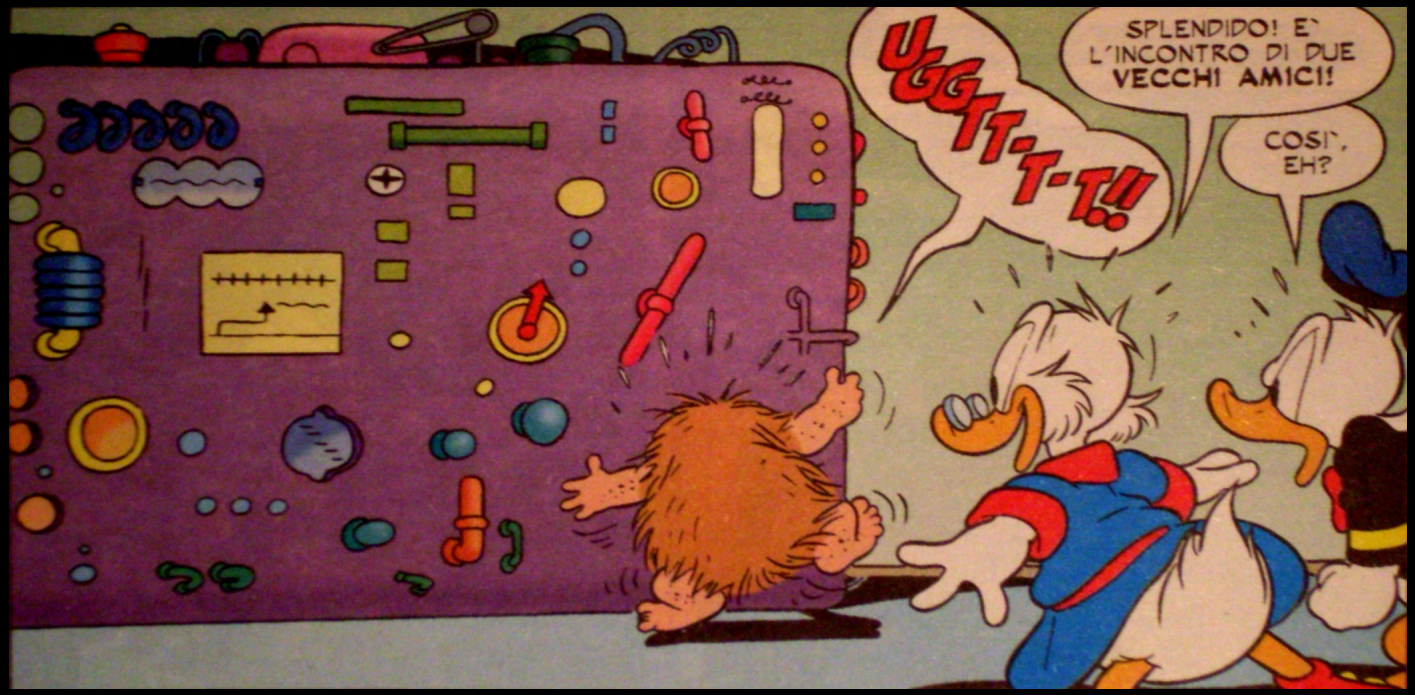
Aldo Ballo (foto)
1928, 1994

1959, IBM 7090



1959, il signor Bunz

Romano Scarpa
1927, 2005



1959, Friden

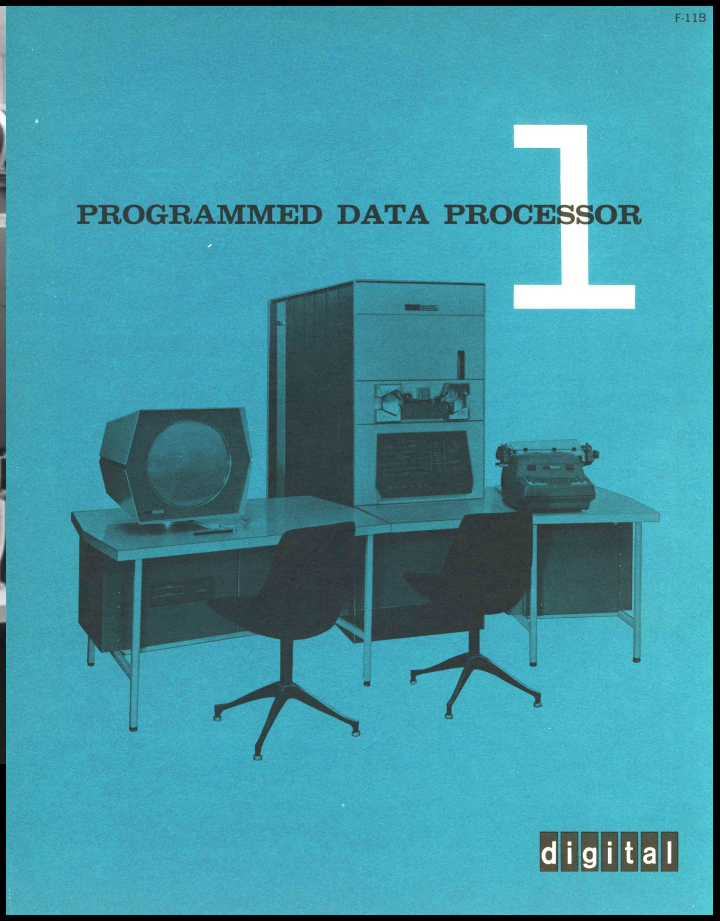
Carl Friden
1891, 1945

1960, Fairchild 2N1613

Jean Amédée Hoerni
1924, 1997

Robert Norton Noyce
1927, 1990

1960, Digital PDP-1

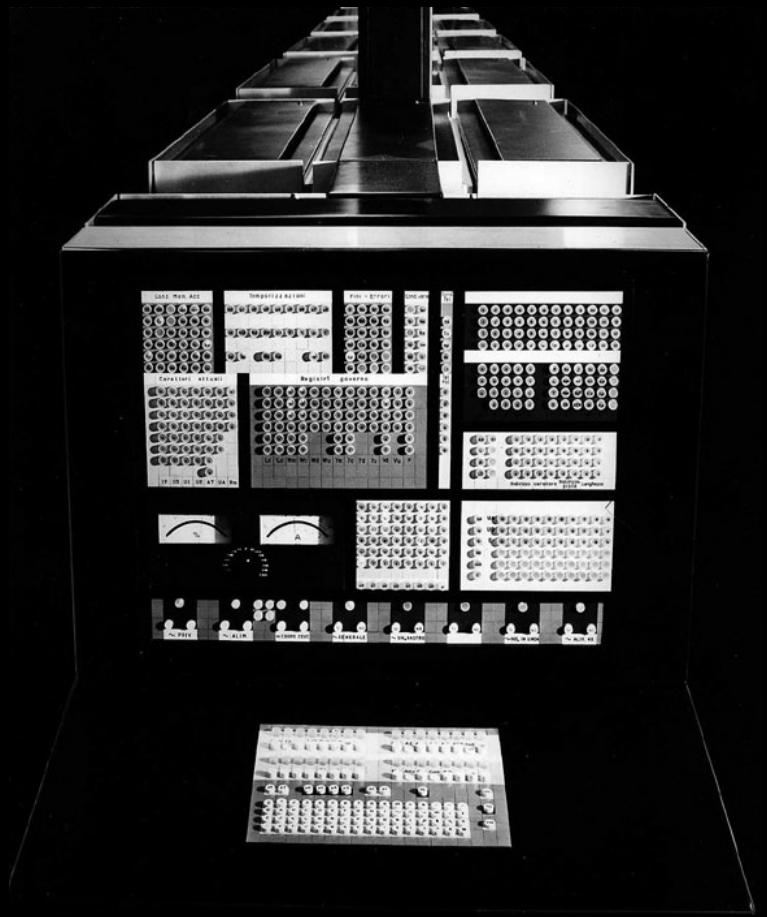


1960, ELEA 9003

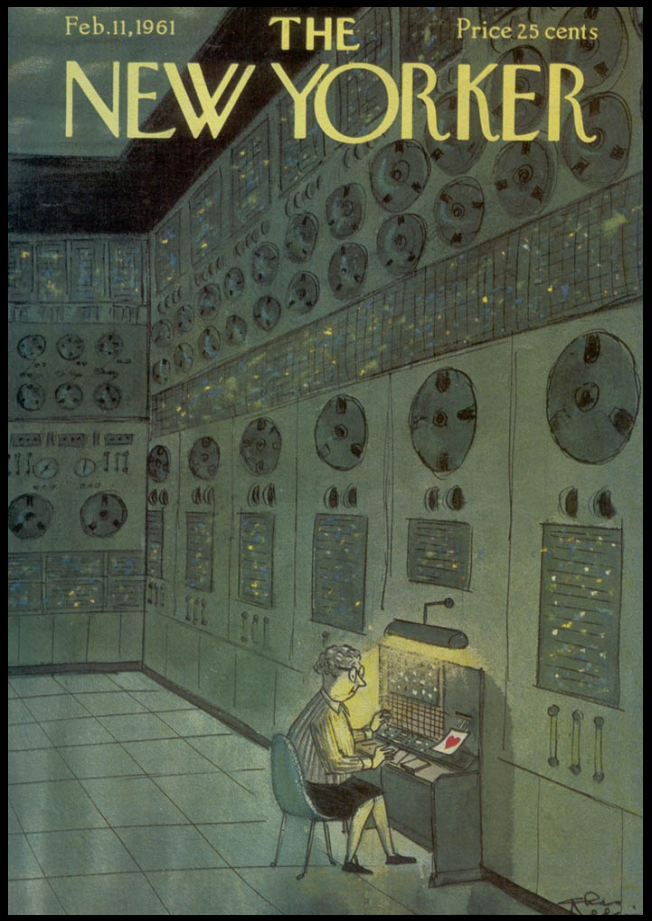
Mario Tchou
1924, 1961

Ettore Sottsass (des)
1917, 2007

Aldo Ballo (foto)
1928, 1994



1961, S. Valentino



1961, il 7090 canta Daisy Bell

John Larry Kelly
1923, 1965

Max Vernon Mathews
1926, 2011

1961, ELEA 6001

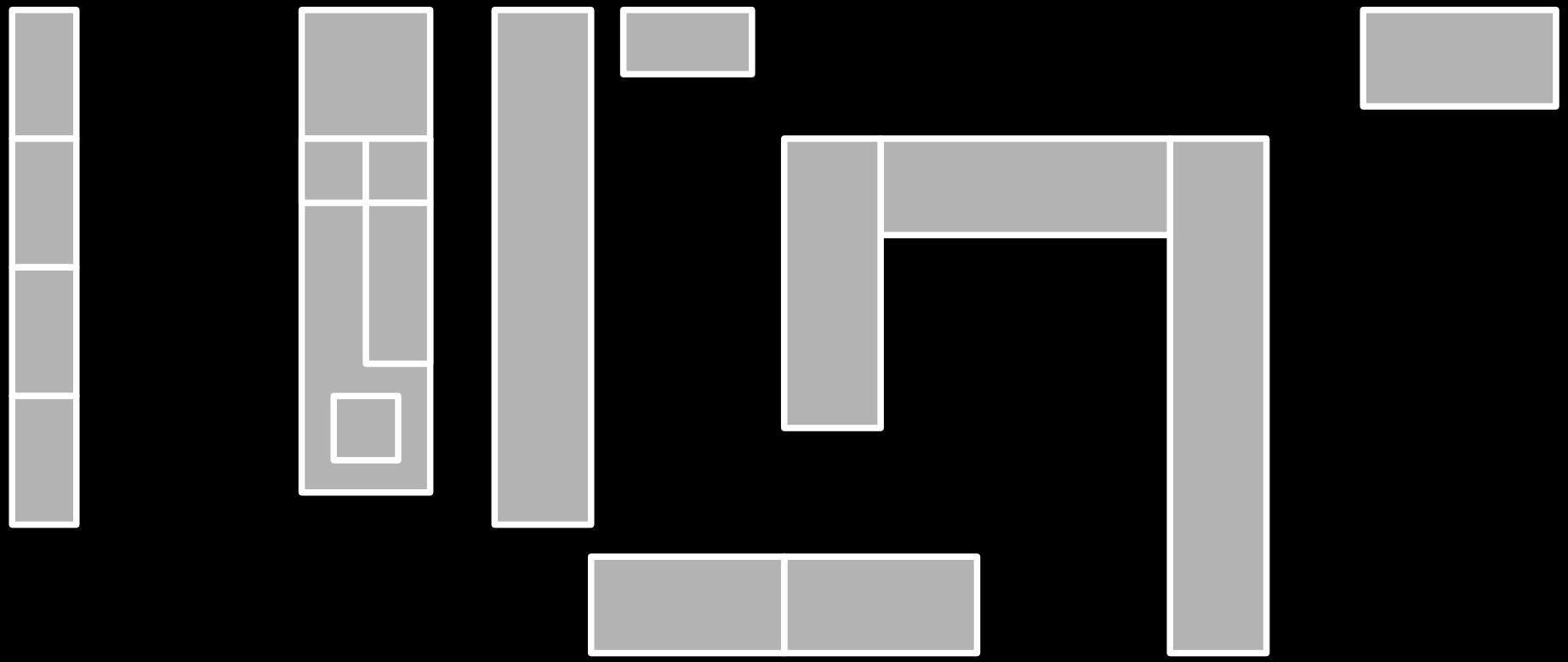
1961, CEP “definitiva” a Pisa

Marcello Conversi
1917, 1988

Alfonso Caracciolo di Forino
1925, 1996

Giovan Battista Gerace
1925, 1987

1961-1969, la CEP in pianta

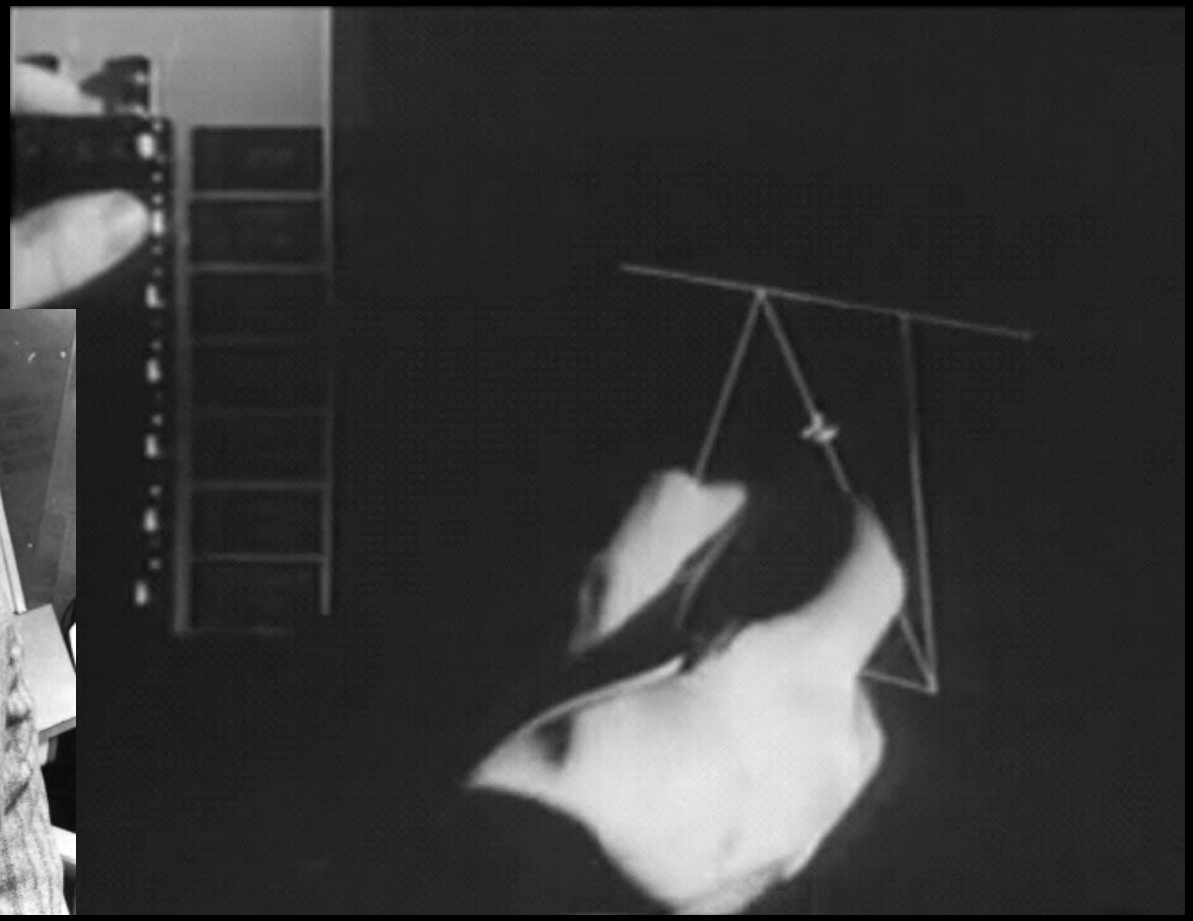



1962, Spacewar!

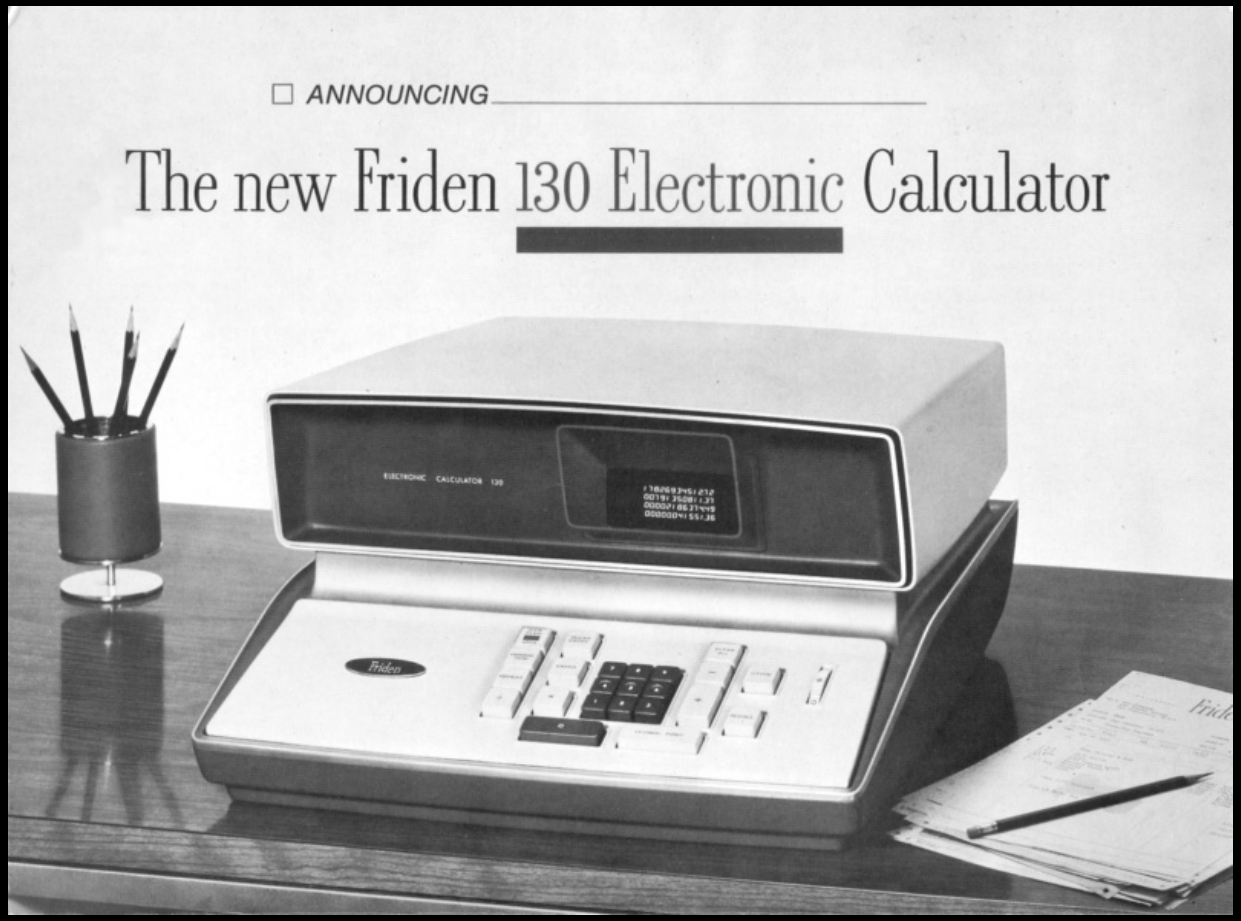
Steve “Slug” Russell

1963, Sketchpad

Ivan Edward Sutherland



1963, Friden 130



1964, Mathatron

how to get a quick tan

Or arctan for that matter. Trignometric functions are solved in a few seconds on Mathatron, the $5,000 digital computer.

Mathatron understands algebra — your language. Just tap in the expression the way you would write it. Use power-of-10 exponents, parentheses, square roots, decimal points. Answers from the tape printer are in decimal, with the point in the right place.

Mathatron is expandable, like the big computers. When you need it you can add memory, prewired programs, remote keyboard, paper tape reader/punch, or page printer. But you may prefer to keep yours small. It's a personal thing.

Over 80% of Mathatron owners have access to a big computer, but they prefer quick answers. Write us for the whole story.

mathatron: Program memory, 24 to 480 steps • Addressable storage, 4 to 88 registers • 9 significant digits, exponent, and sign • Number range $\pm 10^{-42}$ to 10^{+58} • Speed 100 accumulations per second • Optional prewired programs for special applications.

MATHATRONICS

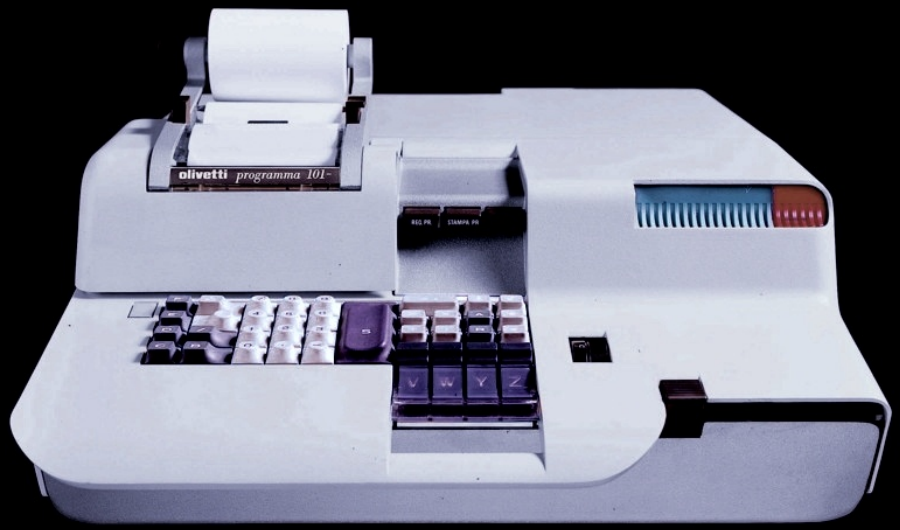
a division of Barry Wright Corporation

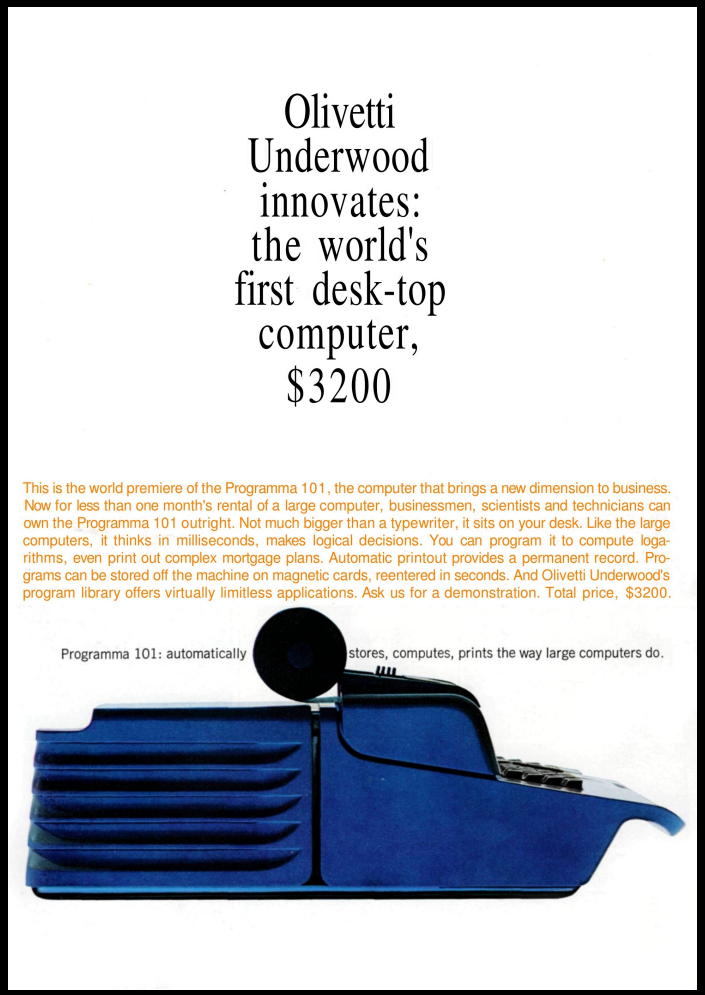
241 Crescent Street, Waltham, Massachusetts 02154, Telephone: 617-893-1630

1965, Programma 101

Pier Giorgio Perotto
1930, 2002

Mario Bellini (des)





1968, HP 9100

Tom Osborne

Powerful Computing Genie: $4900

READY, WILLING AND ABLE.

Ready—to relieve you of waiting to get on the big computer.
Constantly available. At your fingertips whenever you need it.
Ready to abolish tedium from scientific and engineering computation.
Ready to slash through long routines
and come up with answers in milliseconds.
The new Hewlett-Packard 9100A personal computer.

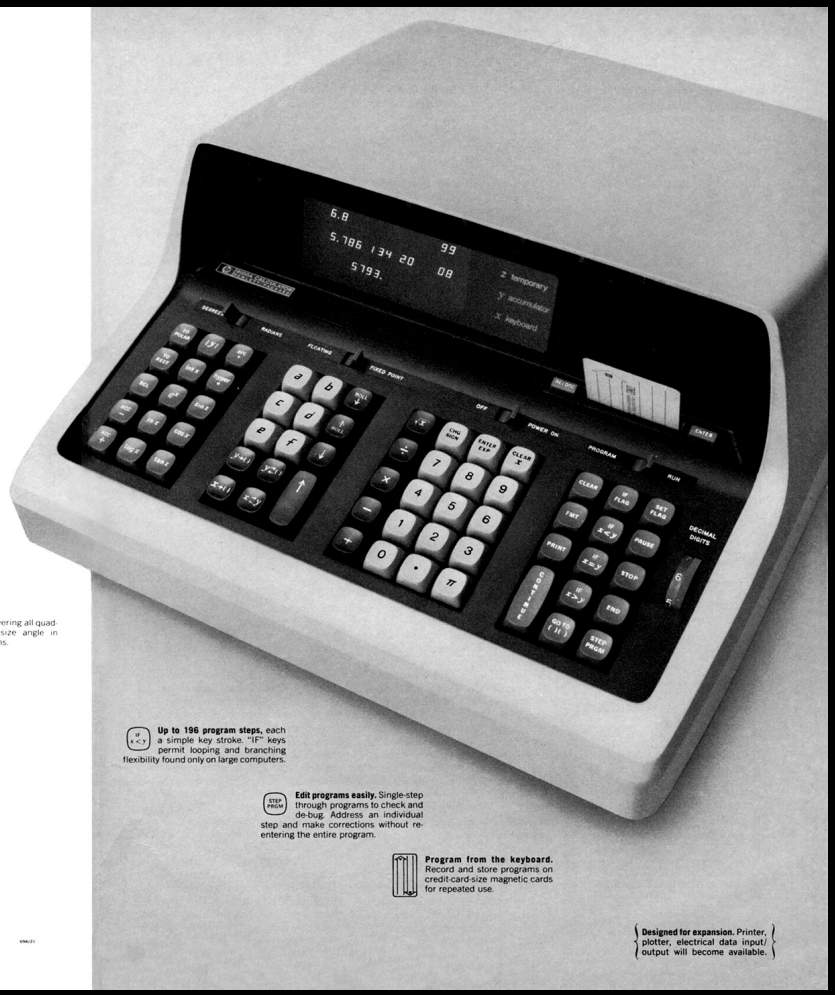
Willing—to perform log and trig functions,
even hyperbolics and coordinate transformations,
at the touch of a key. Willing to work
with extremely large and small numbers simultaneously.
Willing to take your programming commands
in mathematical language.
No computer language or programming specialist required.
Willing to communicate with you on *your* terms.
The new Hewlett-Packard 9100A computing marvel.

Able—to take on the most complex problems:
roots of a fifth-degree polynomial . . .
solutions to three simultaneous equations . . .
Bessel functions . . . Fourier analysis . . . elliptic integrals . . .
real and complex polynomial evaluation . . .
coordinate geometry . . . regression analysis . . .
numerical integration . . . vector analysis . . .
and many, many more!
Able to be your fast, responsive mathematical servant.

Dynamic range 10 ** to 10.** nearly 200 decades. Observation of math operations on 3 displayed registers. Up to 16 more registers for data storage.

Complex and vector arithmetic simplified with coordinate transformation keys, rectangular-to-polar and vice-versa, in milliseconds.

Trig functions covering all quadrants and any size angle in degrees or radians.



Up to 196 program steps, each a simple key stroke. "IF" keys permit looping and branching flexibility found only on large computers.

Edit programs easily. Single-step through programs to check and de-bug. Address an individual step and make corrections without re-entering the entire program.

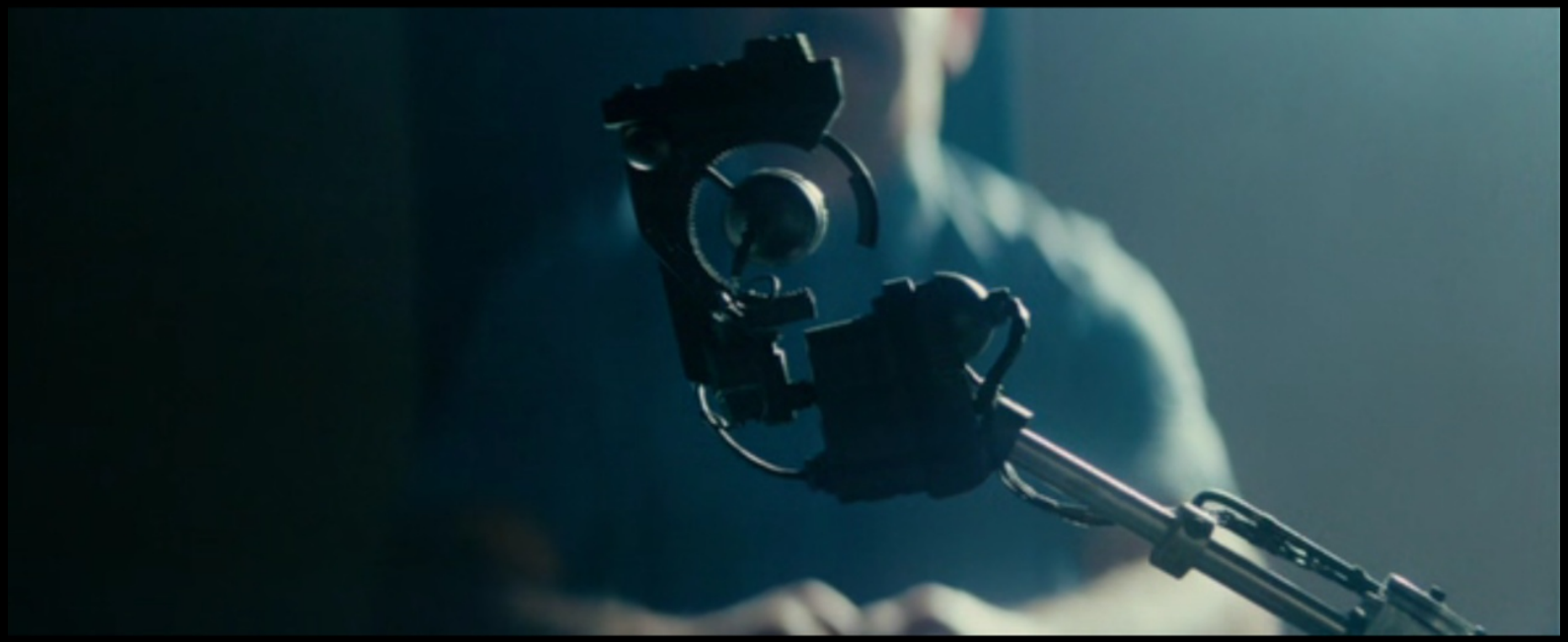
Program from the keyboard. Record and store programs on credit-card-size magnetic cards for repeated use.

Designed for expansion. Printer, plotter, electrical data input/output will become available.

1968, Voig(h)t-Kampff test

Philip Kindred Dick
1928, 1982

Ridley Scott



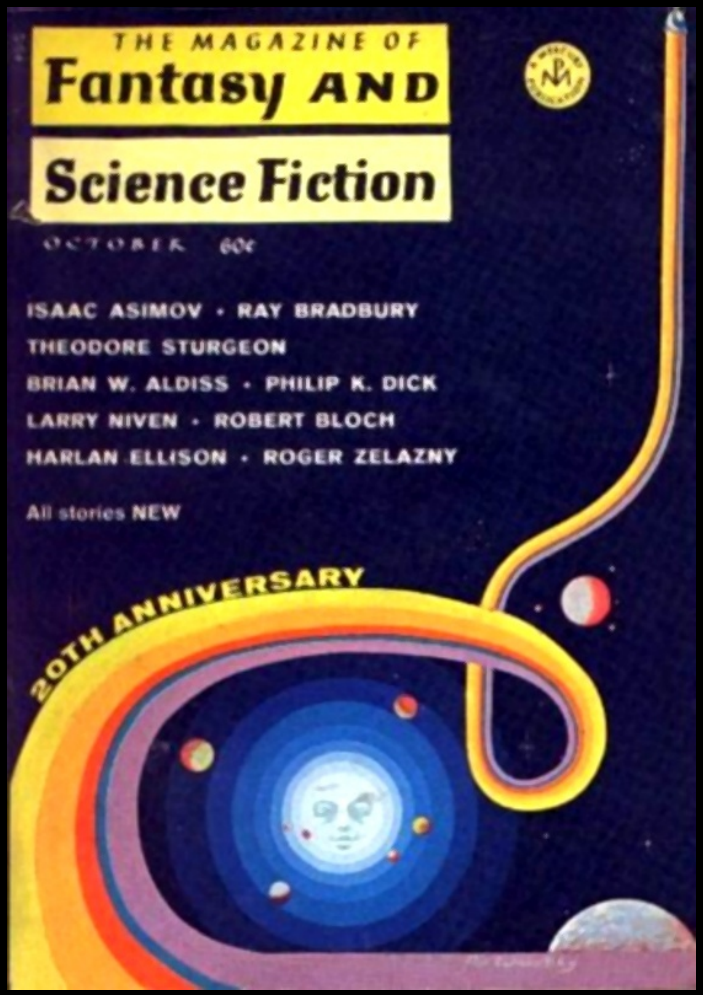
1968, HAL 9000

Arthur Charles Clarke,
1917, 2008

Stanley Kubrick
1928, 1999

1969, Electric Ant

Philip Kindred Dick
1928, 1982



1969, Honeywell 316

If she can only cook as well as Honeywell can compute.

Her souffles are supreme, her meal planning a challenge? She's what the Honeywell people had in mind when they devised our Kitchen Computer. She'll learn to program it with a cross-reference to her favorite recipes by N-M's own Helen Corbitt. Then by simply pushing a few buttons obtain a complete menu organized around the entrée. And if she pales at reckoning her lunch tab, she can program it to balance the family checkbook. **84A** 10,600.00 complete with two week programming course **84B Fed with Corbitt data:** the original Helen Corbitt cookbook with over 1,000 recipes 5.00 (.75) **84C** Her Potluck, 375 of our famed Zodiac restaurant's best kept secret recipes 3.95 (.75) Epicure **84D Her tabard apron,** one-size, ours alone by Garden House in multi-pastel provincial cotton 28.00 (.90) Trophy Room

1969, ARPANET

J.C.R. “Lick” Licklider
1915, 1990

Ivan Edward Sutherland

Robert W. “Bob” Taylor

Univ. Cal. Los Angeles
SDS Sigma, L. Kleinrock

Stanford Research Institute
SDS 940, D.C. Engelbart

Univ. Cal. Santa Barbara
IBM 360/75, G. Culler

University of Utah
DEC PDP10, I.E. Sutherland

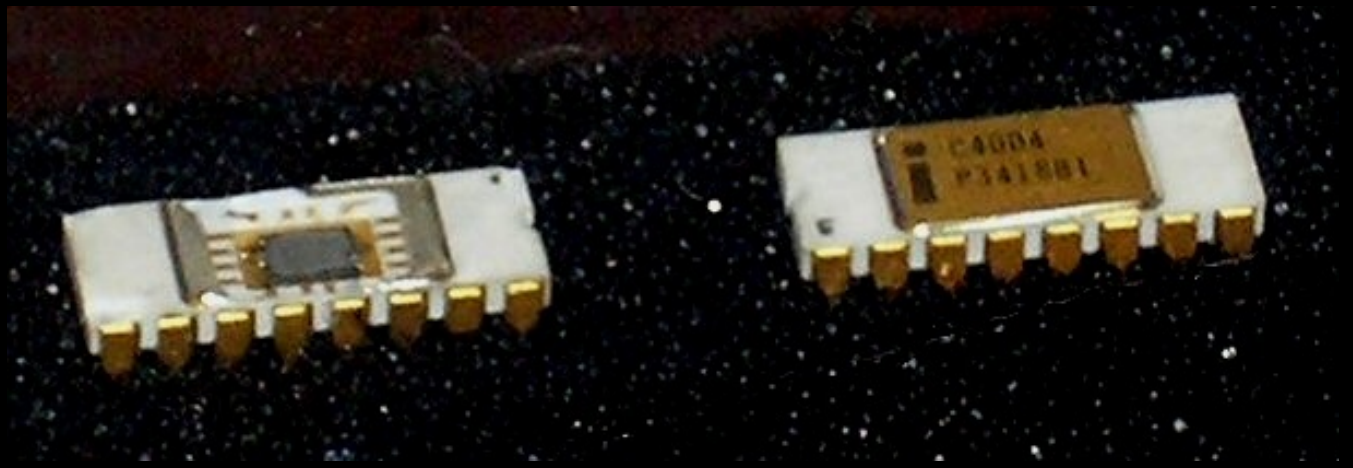
1970, Intel 4004

Federico Faggin

M.E. “Ted” Hoff

Stanley Mazor

Masatoshi Shima
(Busicom)




1971, e-mail

Raymond S. Tomlinson

1973, Xerox Alto

Charles P. “Chuck” Thacker

Butler W. Lampson

Douglas Carl Engelbart

Alan Kay

1975, IBM 5100

IBM announces the new 5100 Portable Computer

A compact problem-solving aid for engineers, statisticians, scientists and financial and business analysts.

Now you can have a computer right on your desk. Exactly where you need it. When you need it.

The new IBM 5100 Portable Computer incorporates the latest in semi-conductor technology. It features a typewriter-like keyboard and numeric key-pad for simplified data entry, a 1024 character display screen, an integrated magnetic tape drive, and 16K characters of memory.

Options available with the 5100 include a bi-directional 80-characters per second printer, a second magnetic tape drive, and additional memory up to a maximum of 64K characters. Also available is a communications feature which allows the 5100 to be used as a terminal.

The IBM 5100 comes with either APL or BASIC language or both.

Over 100 often-used analytical routines in mathematical, statistical and financial calculations are available for such functions as forecasting, modeling, matrix arithmetic, engineering and design calculations, regression and correlation analysis, return on investment and cash flow analysis.

In addition, the 5100 features a self-study training package that makes it easy to learn and easy to use without taking any classes or relying on specially trained experts.

If you'd like to find out more about IBM's new 5100 Portable Computer and arrange for a demonstration right at your desk, call your IBM General Systems Division office or fill out this coupon.

SA

IBM. IBM General Systems Division
P.O. Box 2068, Atlanta, Georgia 30301

☐ I would like more information about IBM's new 5100.
☐ I would like a demonstration of IBM's new 5100.
My major area of interest is:
☐ Engineering/Scientific ☐ Statistical Analysis
☐ Business/Financial Analysis

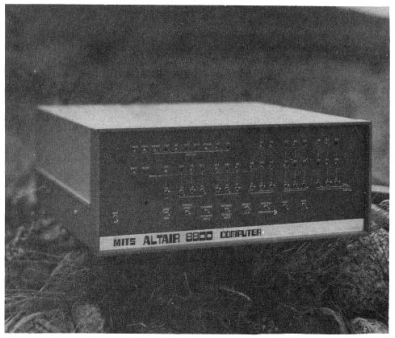
Name_____
Title_____
Company_____
Address_____
City_____ State_____ Zip_____
Phone_____

1975, Altair 8800

Henry “Ed” Roberts
1941, 2010

MITS

A COMPUTER CONCEPT BECOMES AN EXCITING REALITY.



Not too long ago, the thought of an honest, full-blown computer that sells for less than $500 would have been considered a mere pipe dream.

Everyone knows that computers are monstrous, box-shaped machines that sell for 10's and 100's of thousands of dollars.

Pipe dream or not, *MITS*, the quality engineering oriented company that pioneered the calculator market, has made the *Altair 8800* a reality. It is the realization of that day when computers are accessible to almost anyone who wants one.

The heart (and the secret) of the *MITS Altair 8800* is the *Intell 8080* processor chip. Thanks to rapid advances in integrated circuit technology, this one IC chip can now do what once took thousands of electronic components (including 100's of IC's) and miles of wire.

Make no mistake about it. The *MITS Altair 8800* is a lot of brain power. Its parallel, 8-bit processor uses a 16-bit address. It has 78 basic machine instructions with variances up to 200 instructions. That's more than enough to program all the street lights in a major city.

And the *MITS Altair 8800 Computer* is fast. Very fast. It's basic instruction cycle time is 2 microseconds.

Combine this speed and power with the *Altair's* flexibility (it can directly address 256 input and 256 output devices) and you have a computer that's competitive with most mini's on the market today. And sells for a fraction of their cost.

The Altair 8800 has been designed to fullfill a wide variety of computer needs. It is ideal for the hobbyist who wants to get involved with computers. Yet, it has the power and versatility for the most advanced data processing requirements.

It's basic memory of 256 words of static RAM memory can be expanded to 65,000 words of directly addressable memory. Static OR dynamic memory. OR PROM or ROM memory. OR a floppy disc system. All supplied by *MITS*.

Using standard *MITS* interface cards, the *Altair 8800* can be connected to *MITS* peripherals (computer terminals, line printers, audio-cassette interface) to form the core of a sophisticated time-share system.

The *Altair 8800* can be a process controller. It can be an educational device. Or it can be expanded to be an advanced, custom intrusion system. A programmable scientific calculator. Automatic IC tester. Automated automobile test analyzer. Complete accounting system. "Smart" computer terminal. Sound and light system controller.

OR it can be all of these things *at the same time*. It could be the beginning of new business opportunities. The list of applications is literally endless.

MITS wants to service your individual computer needs.

You can buy an assembled *Altair 8800*. Or you can start by building the computer yourself. The *MITS Altair 8800* is the ultimate kit. Its assembly isn't much more difficult than assembling a desktop calculator.

OR you can start with an *Altair 8800* complete data processing system. *Altair Systems* come in 4 basic configurations.

For those users who are not familiar with computers, *MITS* offers free consultation service. Just describe your requirements to our engineering staff and we will specify the additional cards and the system configuration you need to do the job.

The MITS Altair 8800 is backed by complete peripheral and software development programs. There is even a high level language available.

Order your Altair 8800 Computer today. As a special introductory offer, *MITS* is offering the *Altair 8800* at a discount of $100. This offer is good on all orders postmarked prior to March 1, 1975.

PRICES:
Altair 8800 Computer (assembled with complete operation instructions) **$750.00**
Altair 8800 Computer (kit form) **$495.00**
Subtract $100.00 from above prices on all orders postmarked prior to March 1, 1975.

MITS INC.
"Creative Electronics"

Warranty: 90 days on parts and labor for assembled units. 90 days on parts for kits.
Prices, specifications and delivery subject to change without notice.

☐ Enclosed is a Check for $ .....
or ☐ Bank Americard # .....
or ☐ Master Charge # .....
Credit Card Expiration Date ..... ☐ Kit
Include $8.00 for Postage and Handling ☐ Assembled
☐ ALTAIR 8800
☐ Please send complete Altair System Catalogue.
NAME .....
ADDRESS .....
City .....
STATE & ZIP .....
MITS / 6328 Linn, N.E., Albuquerque, New Mexico
87108 505/265-7553

CIRCLE NO. 23 ON READER SERVICE CARD

LEN SHUSTER

NEWSLETTER

Issue number one Fred Moore, editor, 2100 Santa Cruz Ave., Menlo Park, Ca. 94025 March 15, 1975

AMATEUR COMPUTER USERS GROUP
HOMEBREW COMPUTER CLUB . . . you name it.

Are you building your own computer? Terminal? T V Typewriter? I/O device? or some other digital black-magic box?

Or are you buying time on a time-sharing service?

If so, you might like to come to a gathering of people with likeminded interests. Exchange information, swap ideas, talk shop, help work on a project, whatever . . .

This simple announcement brought 32 enthusiastic people together March 5th at Gordon's garage. We arrived from all over the Bay Area---Berkeley to Los Gatos. After a quick round of introductions, the questions, comments, reports, info on supply sources, etc., poured forth in a spontaneous spirit of sharing. Six in the group already had homebrew systems up and running. Some were designing theirs around the 8008 microprocessor chip; several had sent for the Altair 8800 kit. The group contained a good cross section of both hardware experts and software programmers.

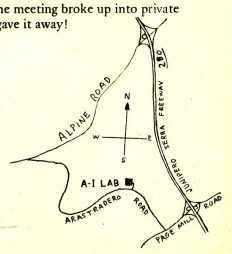
We got into a short dispute over HEX or Octal until someone mentioned that if you are setting the switches by hand it doesn't make any difference. Talked about other standards: re-start locations? input ports? better operating code for the 8080? paper tape or cassettes or paper & pencil listings? Even ASCII should not be assumed the standard: many 5 channel Model 15 TTYs are about and in use by RTTY folks. Home computing is a hobby for the experimenter and explorer of what can be done cheaply. I doubt that standards will ever be completely agreed on because of the trade-offs in design and because what's available for one amateur may not be obtainable for another.

Talked about what we want to do as a club: quantity buying, cooperation on software, need to develop a cross assembler, share experience in hardware design, classes possibly, tips on what's currently available where, etc. Marty passed out M.I.'s Application Manual on the MF8008 and let it be known that he could get anything we want. Steve gave a report on his recent visit to MITS. About 1500 Altairs have been shipped out so far. MITS expects to send out 1100 more this month. No interfaces or peripherals are available until they catch up with the mainframe back orders. Bob passed out the latest PCC and showed the Altair 8800 which had arrived that week (the red LEDs blink and flash nicely). Ken unboxed and demonstrated the impressive Phi-Deck tape transport.

What will people do with a computer in their home? Well, we asked that question and the variety of responses show that the imagination of people has been underestimated. Uses ranged from the private secretary functions: text editing, mass storage, memory, etc., to control of house utilities: heating, alarms, sprinkler system, auto tune-up, cooking, etc., to GAMES: all kinds, TV graphics, x - y plotting, making music, small robots and turtles, and other educational uses, to small business applications and neighborhood memory networks. I expect home computers will be used in unconventional ways---most of which no one has thought of yet.

We decided to start a newsletter and meet again in two weeks. As the meeting broke up into private conversations, Marty held up an 8008 chip, asked who could use it, and gave it away!

NEXT MEETING WEDNESDAY, MARCH 19th, 7 PM at Stanford's Artificial Intellegence Laboratory, Conference room, Arastradero Road in Portola Valley. Look for this road sign: D C Power Lab



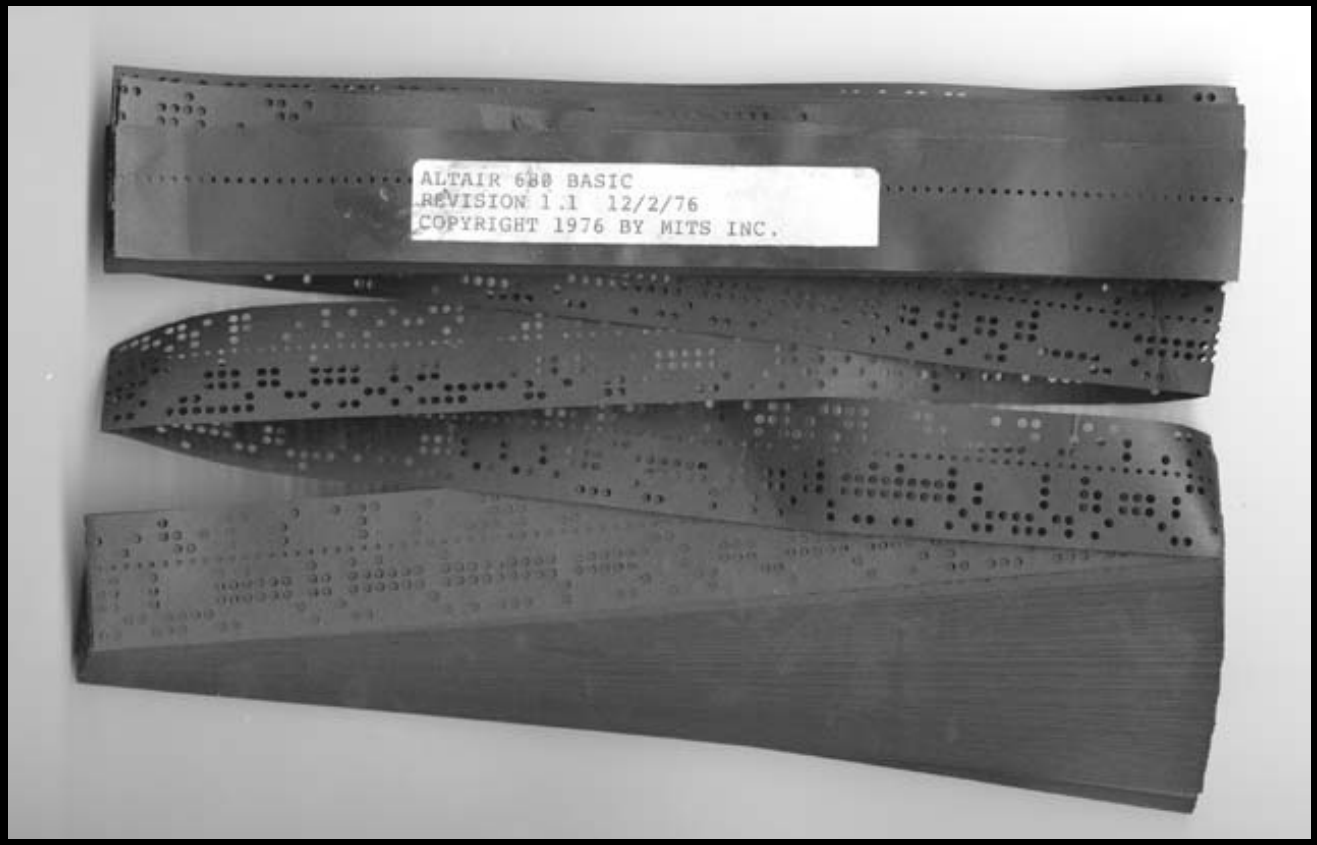
Announcement:

Texas Instruments Learning Center is presenting an early morning home television series, April 15 - 18, on "Introduction to Microprocessors." In the San Jose - Bay Area this program will be on channel 11 at 6:00 AM.

1975, Microsoft

William H. “Bill” Gates

Paul Gardner Allen

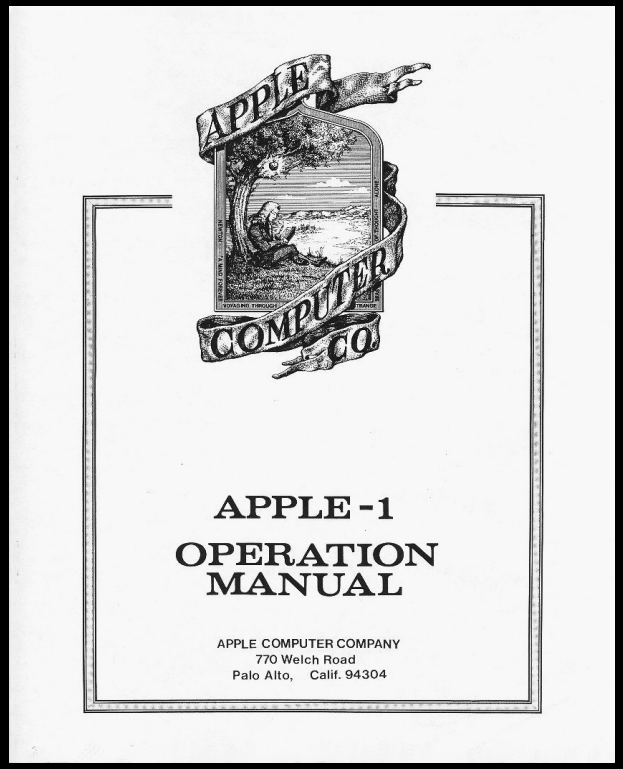


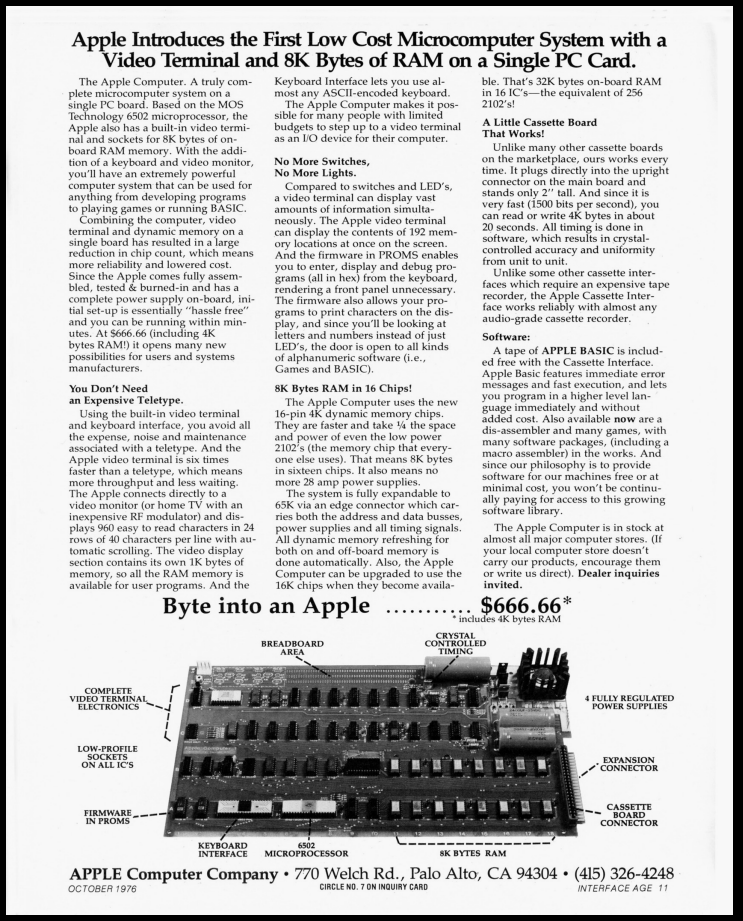
1976, Apple 1

Stephen “Woz” Wozniak

Steven P. Jobs
1955, 2011

Ronald Gerald Wayne





Apple Introduces the First Low Cost Microcomputer System with a Video Terminal and 8K Bytes of RAM on a Single PC Card.

The Apple Computer. A truly complete microcomputer system on a single PC board. Based on the MOS Technology 6502 microprocessor, the Apple also has a built-in video terminal and sockets for 8K bytes of on-board RAM memory. With the addition of a keyboard and video monitor, you'll have an extremely powerful computer system that can be used for anything from developing programs to playing games or running BASIC.

Combining the computer, video terminal and dynamic memory on a single board has resulted in a large reduction in chip count, which means more reliability and lowered cost. Since the Apple comes fully assembled, tested & burned-in and has a complete power supply on-board, initial set-up is essentially "hassle free" and you can be running within minutes. At $666.66 (including 4K bytes RAM!) it opens many new possibilities for users and systems manufacturers.

You Don't Need an Expensive Teletype.

Using the built-in video terminal and keyboard interface, you avoid all the expense, noise and maintenance associated with a teletype. And the Apple video terminal is six times faster than a teletype, which means more throughput and less waiting. The Apple connects directly to a video monitor (or home TV with an inexpensive RF modulator) and displays 960 easy to read characters in 24 rows of 40 characters per line with automatic scrolling. The video display section contains its own 1K bytes of memory, so all the RAM memory is available for user programs. And the Keyboard Interface lets you use almost any ASCII-encoded keyboard.

The Apple Computer makes it possible for many people with limited budgets to step up to a video terminal as an I/O device for their computer.

No More Switches, No More Lights.

Compared to switches and LED's, a video terminal can display vast amounts of information simultaneously. The Apple video terminal can display the contents of 192 memory locations at once on the screen. And the firmware in PROMS enables you to enter, display and debug programs (all in hex) from the keyboard, rendering a front panel unnecessary. The firmware also allows your programs to print characters on the display, and since you'll be looking at letters and numbers instead of just LED's, the door is open to all kinds of alphanumeric software (i.e., Games and BASIC).

8K Bytes RAM in 16 Chips!

The Apple Computer uses the new 16-pin 4K dynamic memory chips. They are faster and take ¼ the space and power of even the low power 2102's (the memory chip that everyone else uses). That means 8K bytes in sixteen chips. It also means no more 28 amp power supplies.

The system is fully expandable to 65K via an edge connector which carries both the address and data busses, power supplies and all timing signals. All dynamic memory refreshing for both on and off-board memory is done automatically. Also, the Apple Computer can be upgraded to use the 16K chips when they become available. That's 32K bytes on-board RAM in 16 IC's—the equivalent of 256 2102's!

A Little Cassette Board That Works!

Unlike many other cassette boards on the marketplace, ours works every time. It plugs directly into the upright connector on the main board and stands only 2" tall. And since it is very fast (1500 bits per second), you can read or write 4K bytes in about 20 seconds. All timing is done in software, which results in crystal-controlled accuracy and uniformity from unit to unit.

Unlike some other cassette interfaces which require an expensive tape recorder, the Apple Cassette Interface works reliably with almost any audio-grade cassette recorder.

Software:

A tape of **APPLE BASIC** is included free with the Cassette Interface. Apple Basic features immediate error messages and fast execution, and lets you program in a higher level language immediately and without added cost. Also available **now** are a dis-assembler and many games, with many software packages, (including a macro assembler) in the works. And since our philosophy is to provide software for our machines free or at minimal cost, you won't be continually paying for access to this growing software library.

The Apple Computer is in stock at almost all major computer stores. (If your local computer store doesn't carry our products, encourage them or write us direct). **Dealer inquiries invited.**

Byte into an Apple $666.66*
*includes 4K bytes RAM

APPLE Computer Company • 770 Welch Rd., Palo Alto, CA 94304 • (415) 326-4248

OCTOBER 1976 CIRCLE NO. 7 ON INQUIRY CARD INTERFACE AGE 11

1977, Apple II

Stephen “Woz” Wozniak

1981, Commodore VIC-20

Jack Tramiel
1928, 2012

Robert “Bob” Russell

Michael S. Tomczyk
(marketing)

Feature	Commodore VIC-20	Atari® 400™	TI® 99/4A	TRS-80® Color Computer
Price*	$299.95	$458.95	$499.00	$399.00
Maximum RAM Memory	32K	16K	16K	32K
Keyboard Style	Full-Size Typewriter Style	Flat Plastic Membrane	Half-Size Typewriter Style	Calculator Style
Number of Keys	66	57	40	53
Programmable Function Keys	4	0	0	0
Graphic Symbols On Keyboard	62	0	0	0
Displayable Characters	512	256	64	256
Microprocessor	6502	6502	TI990	6809
Accessible Machine Language	YES	YES	NO	YES
Upper/Lower Case Characters	YES	YES	NO	NO
Operates with all Peripherals (Disk, Printer and Modem)	YES	NO	YES	YES
Full Screen Editor	YES	YES	NO	NO
Microsoft Basic	Standard	N/A	N/A	$ 99.00
Telephone Modem	$109.95	$399.95	$450.00	$154.95

*Manufacturer’s suggested retail price Jan. 1, 1982. Includes BASIC cartridge required for programming.

1981, IBM PC & MS DOS

Philip Donald Estridge
1937, 1985

Tim Paterson (QDOS)

1982, Sinclair ZX Spectrum

Clive Sinclair

Richard Francis Altwasser

1982, Commodore 64

Jack Tramiel
1928, 2012

Robert “Bob” Russell

SID
Robert “Bob” Yannes

VIC II
Al Charpentier
Charles Winterble

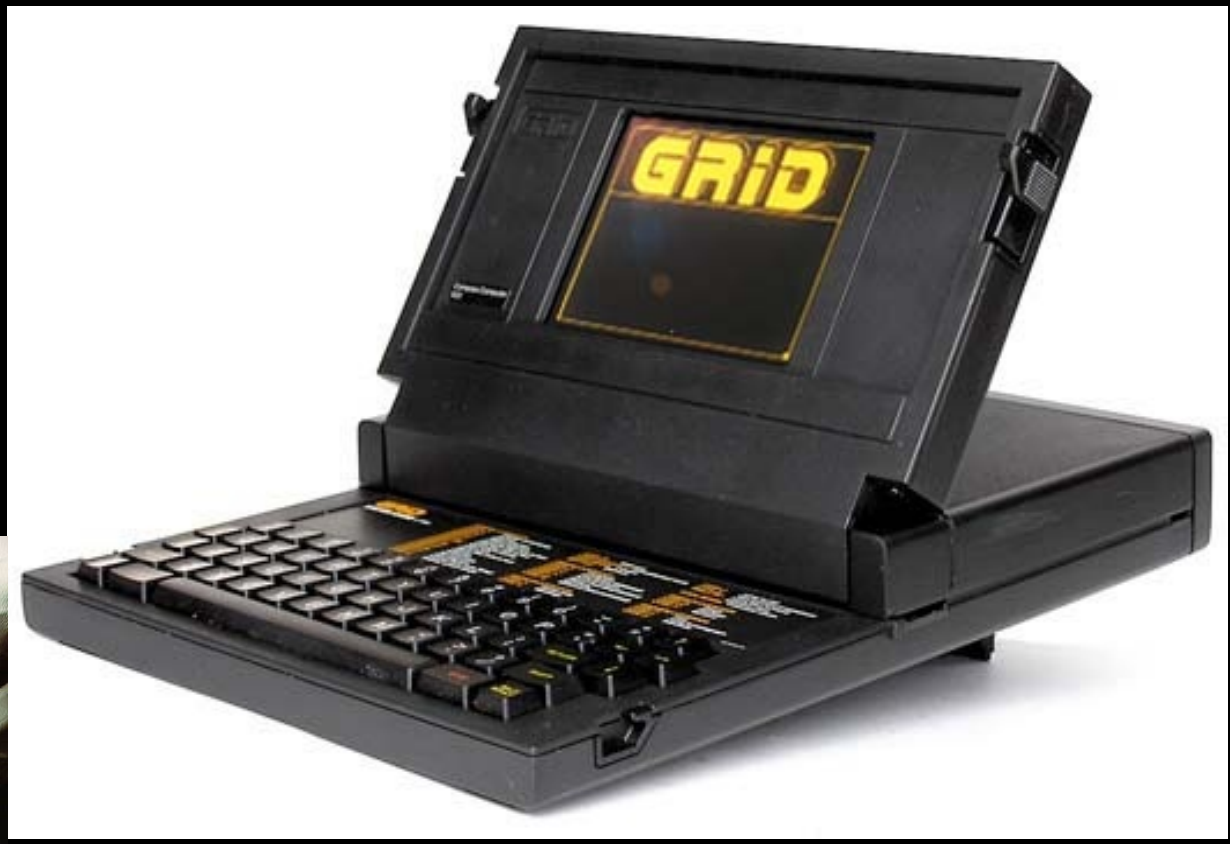
1982, GRiD Compass 1101

John Ellenby (XParc)

Glenn Edens

Dave Paulsen

W.G. “Bill” Moggridge (des)
1943, 2012



1983, Jan. 1: TCP/IP flag day

Vinton G. “Vint” Cerf

Robert E. “Bob” Kahn

1983, Compaq Portable

Rod Canion
Jim Harris
Bill Murto

Ogilvy & Mather

1983, Apple Lisa

John Couch

Jef Raskin (UI)
1943, 2005

Wayne Rosing (Hw)

William M. “Trip” Hawkins
(marketing)

THIS IS NOT THE MOST AMAZING PART OF MOBILE COMPUTING.

The requirements of mobile computing demand nothing less than a complete 16-bit computer with the largest possible display screen, full-sized keyboard, large and expandable memory, removable storage, and a correspondence-quality 8½" x 11" or legal page printer.

But the criteria of necessity was only our starting point in designing the mobile computer's hardware. The end result takes the idea much farther as a solid combination of some of the most highly evolved microcomputer technologies ever to appear in the same package.

THIS 9 POUND COMPUTER IS NO LIGHTWEIGHT.

The decision to incorporate the power of a full 16-bit processor over the 8-bit approach wasn't a tough decision. From the outset, we saw that for the Gavilan mobile computer to offer the highest degree of software capability and flexibility, it would have to use a 16-bit processor. Eight bits just can't run the software and interface required. Additionally, most of the software innovations of the '80s will be in 16-bit packages.

The LCD screen is a bit-mapped 80 character per line display with plenty of room to zoom in and out for viewing entire documents and scroll through letters, tables and spreadsheets easily. Horizontal and vertical scroll is standard. We also equipped the Gavilan with an adapter for a 24 line x 80 character video monitor.

The keyboard is a full-sized typewriter layout with an integrated 10-key numeric pad—the best ergonomic arrangement possible for serious word processing and number entry.

THE PRINTER FOR THE COMPLETE PORTABLE OFFICE.

Putting your work on paper in the field means having a good lightweight printer. So the mobile computer comes with a true technological advancement: a 5 pound printer that produces correspondence-quality 8½" x 11" and legal (or continuous) documents at the rate of 50 characters per second. Its self-contained battery pack will print up to 60,000 characters between charges. It attaches compactly and securely onto the back of the portable main unit and was designed as an integrated part of the computer for regular daily use, rather than as a dangling cable-attached accessory. With printer attached, the entire computer weighs only 14 pounds.

A 3½" FILE CABINET HOLDS IT ALL.

The Gavilan mobile computer is made possible in part by two of the newest miniaturizations in memory devices: the 3½" floppy disk drive and plug-in memory expansion capsules. Both memory components are contained within the portable main unit of the computer behind the display screen, adding no additional volume to the computer.

The 3½" microfloppy disk drive provides 360,000 characters of formatted memory. Adding a second disk provides an additional 360,000 characters of formatted storage. That's more than 100 pages of text per disk.

The plug-in memory capsules contain both expansion memory capability and software programs. The standard 80 Kbytes of system memory can be expanded by additional capsules. Further, external memory options can boost it to 336 Kbytes.

For field communications between computers, the Gavilan incorporates an integrated modem offering direct connection, auto-dialing and auto-answering.

An RS-232 port allows direct link data transfer at 9600 baud rate.

WHAT COULD BE EASIER THAN A KEYBOARD? A TOUCH PAD.

But the one piece of hardware that orchestrates all of the rest—the fully integrated solid state mouse—is the single most significant advancement in easy-to-use computer hardware available today.

It's a touch-sensitive panel located below the display screen at the top of the keyboard. The touch panel, as it's called, is the means by which the user directs practically all of the computer's selection capabilities. With it, we've eliminated keyboard operation for all but number entry and word typing. The rest of the operation is "menu driven," meaning that selection menus containing commands for the computer are displayed on the screen, and you run the computer by simply using the touch panel to select the capabilities you want from the menus.

All of this, including 8-hour continuous-use rechargeable batteries, weighs in at 14 pounds. The portable main unit itself—including display, keyboard, central processing unit, memory plug-in capsules and batteries—is only 9 pounds.

But, the hardware, as state-of-the-art as it is, is not the most amazing part of mobile computing.

CAPSULEWARE AND MEMORY EXPANSION CAPSULES

CORRESPONDENCE-QUALITY 50 CHARACTER PER SECOND PRINTER WITH SELF-CONTAINED BATTERY PACK WEIGHS FIVE POUNDS

3½" FLOPPY DISK DRIVE, 360 KBYTES FORMATTED

FULL-SIZE TYPEWRITER KEYBOARD

10-KEY NUMERIC PAD

TOUCH PANEL WITH COMMAND FUNCTIONS ALLOWS PRESSURE-SENSITIVE POINTER CONTROL OF ON-SCREEN MENUS, DOCUMENTS, NUMBERS AND TEXT

80 CHARACTER PER LINE LCD SCREEN WITH ABILITY TO DRIVE A 24 LINE X 80 CHARACTER VIDEO MONITOR

1984, Commodore Amiga

Jay Glenn Miner
1932, 1994

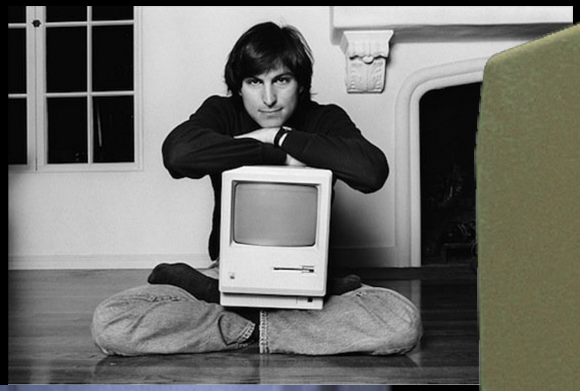
1984, Apple Macintosh

Jef Raskin
1943, 2005

Bill Atkinson

Burrell Carver Smith

Ridley Scott (spot)



1985, Free Software

Richard Matthew Stallman

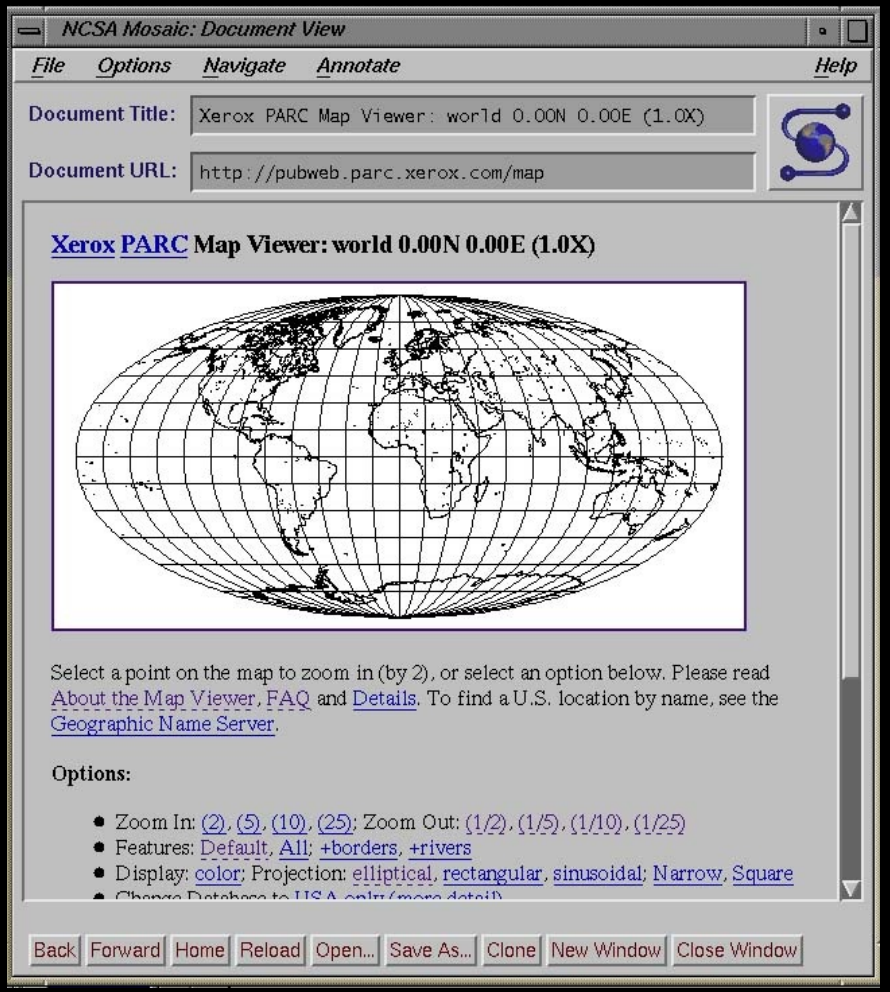
1993, NCSA Mosaic

Timothy J. “Tim” Berners-Lee

Robert Cailliau

Marc Lowell Andreessen

Eric J. Bina

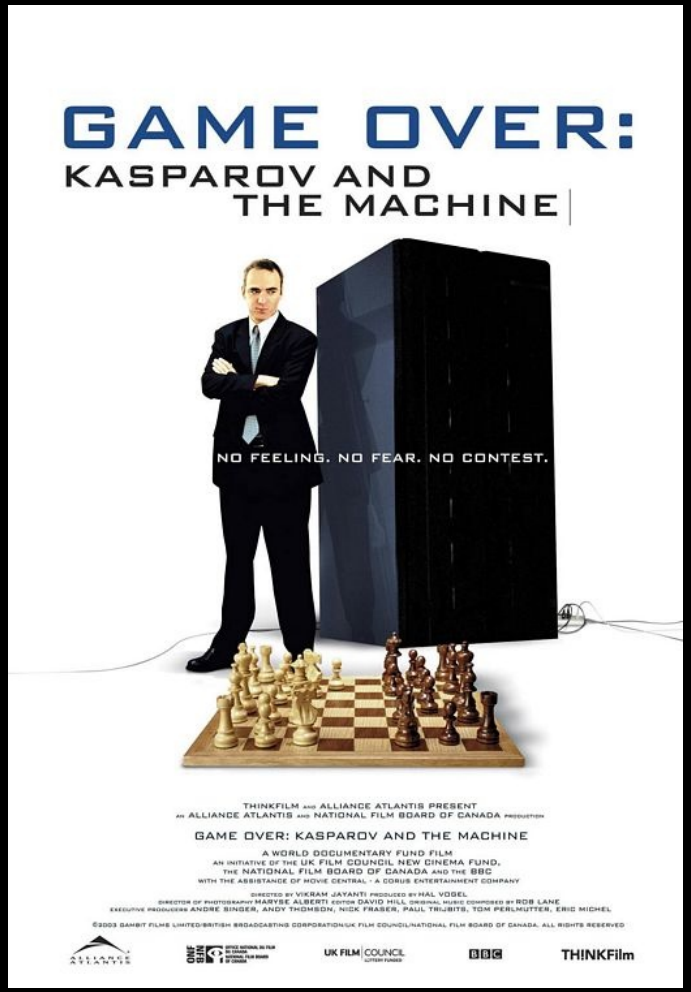


1997, scacco matto

Garry Kimovich Kasparov

Feng-hsiung Hsu

Joel Benjamin



2002: 1 miliardo di PC venduti

2007: 2 miliardi di PC venduti

primo a superare un milione
di unità vendute

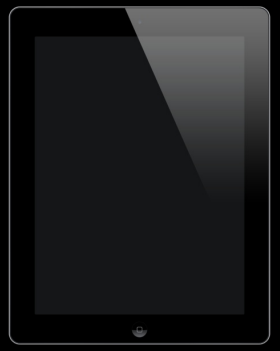
PC più venduto di sempre
17 milioni

... e hardware

2000, 154M

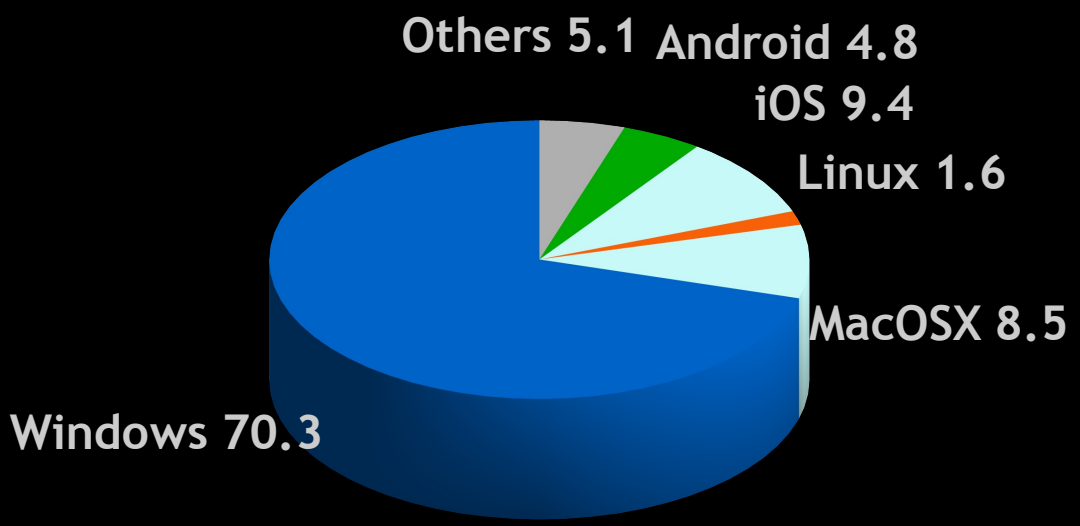
2006, 97M

2007, 108M



2010, 100M

Software...


Others 5.1
Android 4.8
iOS 9.4
Linux 1.6
MacOSX 8.5
Windows 70.3


Others 8.6
Opera 4.3
Safari 15.1
Chrome 30.6
Firefox 19.1
IExplorer 22

1981, 450M

CALL OF DUTY

2003, 100M

1996, 219M

ASSASSIN'S CREED

2007, 38M