# Some Computing History

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EPITA — École Pour l'Informatique et les Techniques Avancées

February 18, 2020

# Some Computing History

# A Short Computer History Chronology

# 3000BC – 1900

# A Short Computer History Chronology

3000 BC Dust abacus is invented, probably in Babylonia [HCS Virtual computer history museum, 2003].

500 BC Bead and wire abacus originates in Egypt.

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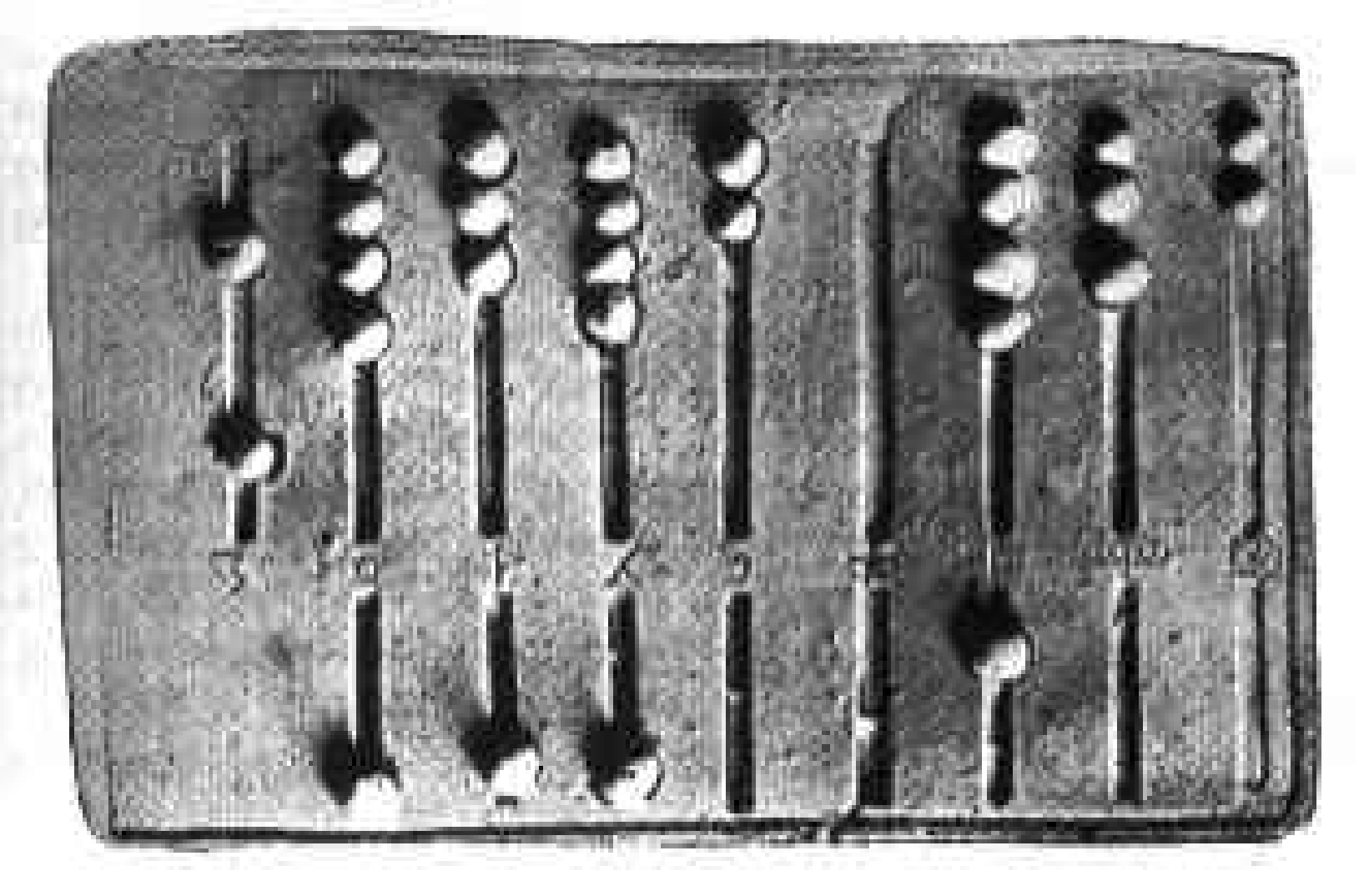
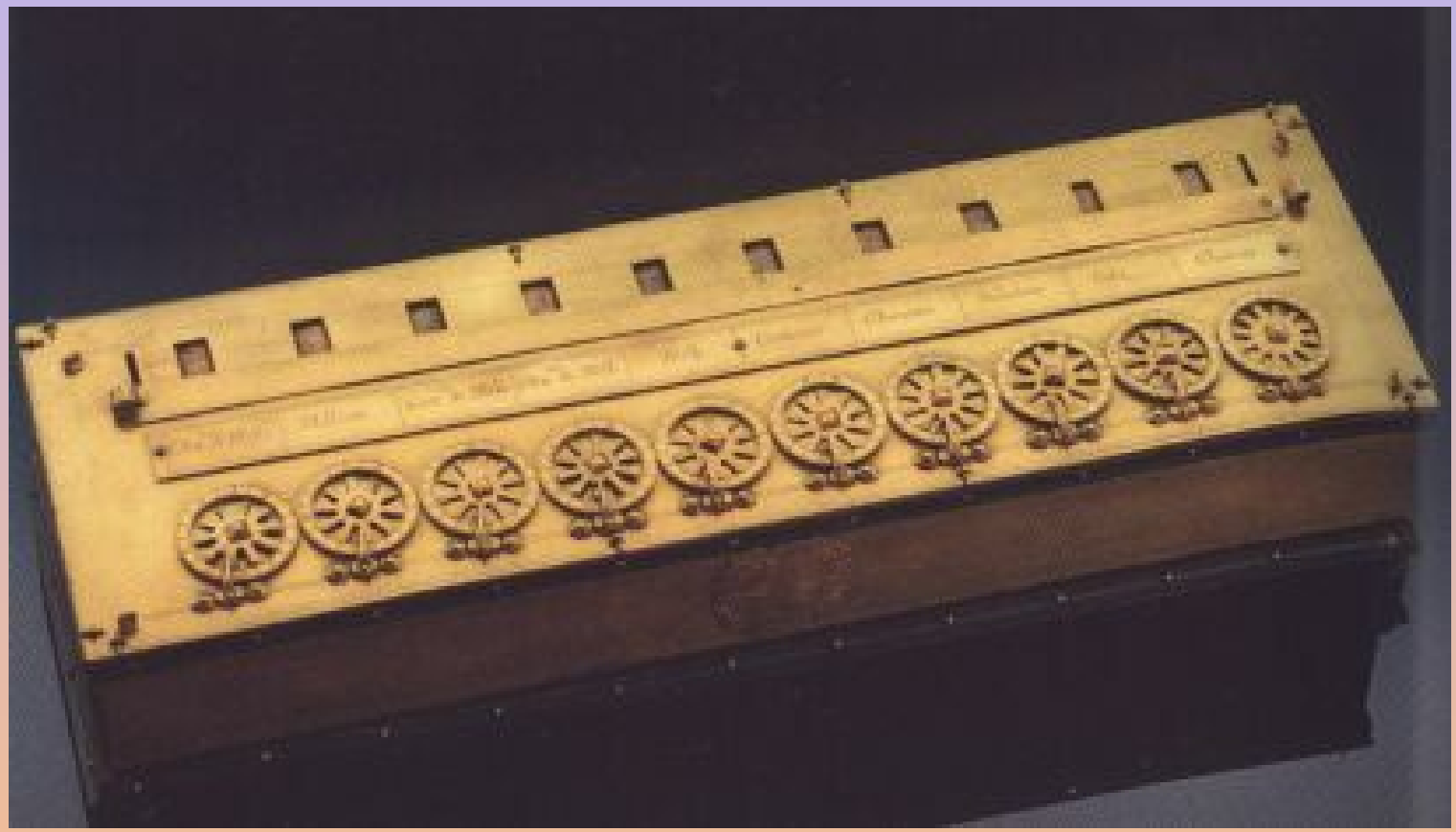


A roman Abacus [Stephenson, 2003]

# A Short Computer History Chronology

1642 First numerical calculating machine in Paris.

# A Short Computer History Chronology



La Pascaline

# A Short Computer History Chronology

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1780 American Benjamin Franklin discovers electricity [Doctors, 2004, Lienhard, 2004].

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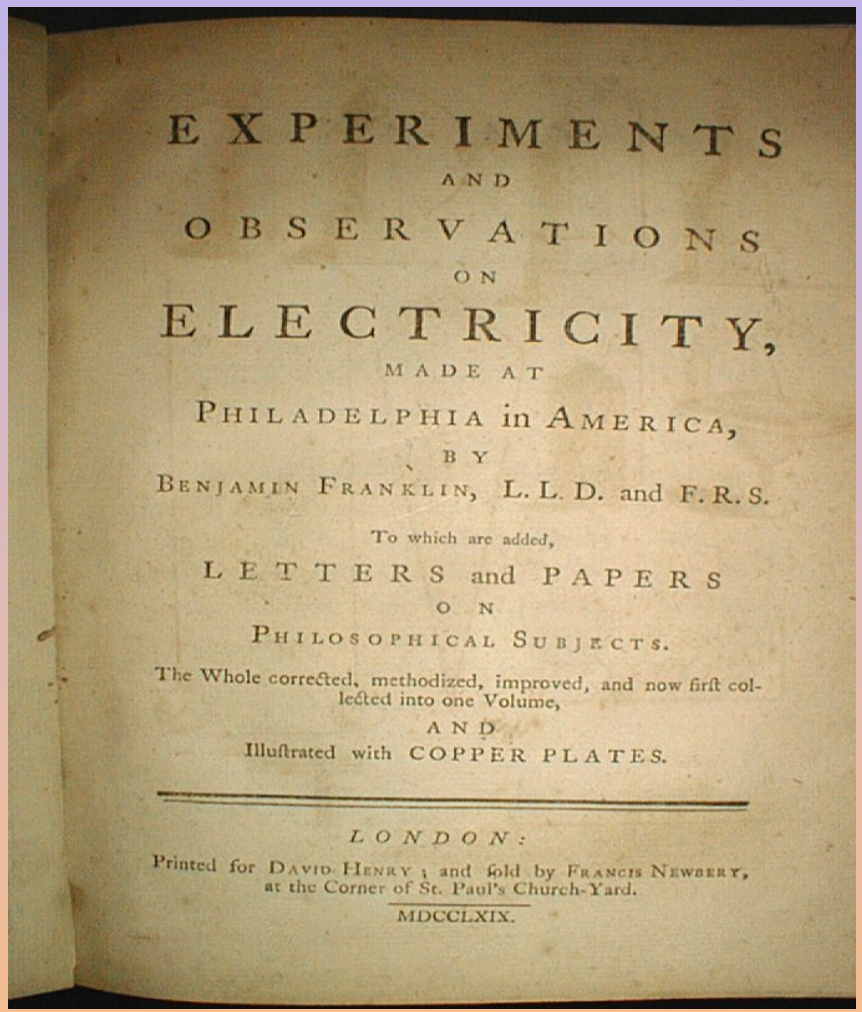


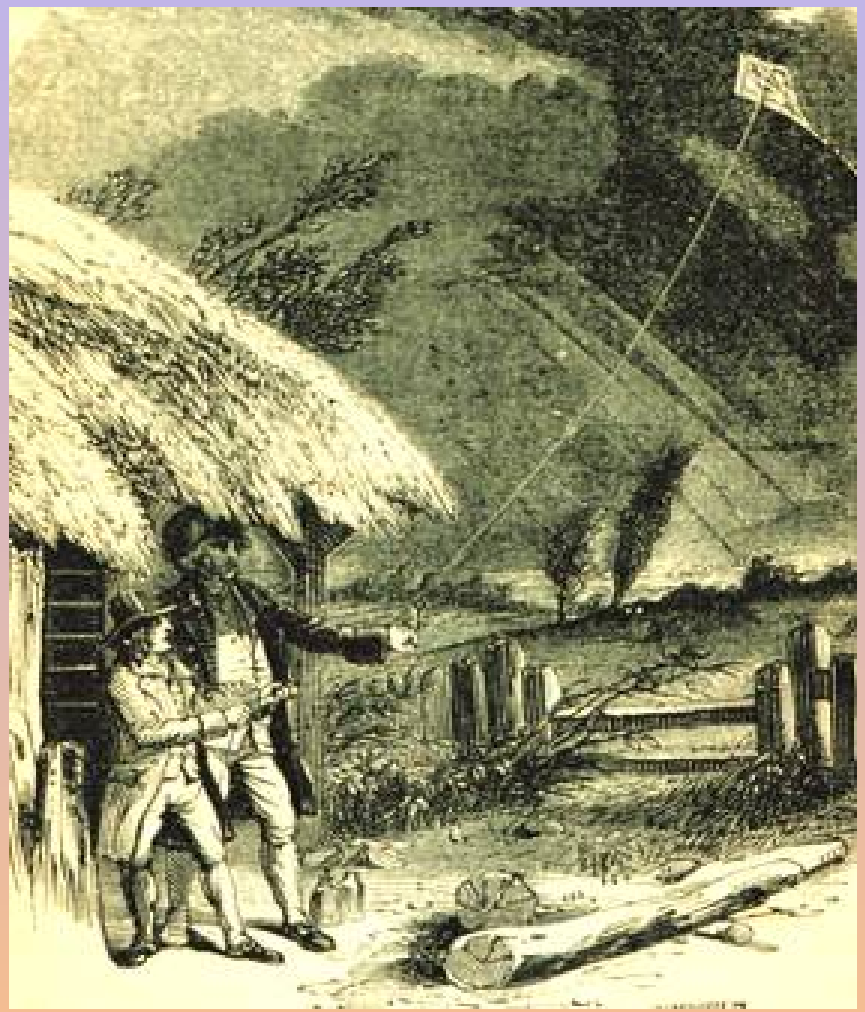
EXPERIMENTS
AND
OBSERVATIONS
ON
ELECTRICITY,
MADE AT
PHILADELPHIA in AMERICA,
BY
BENJAMIN FRANKLIN, L. L. D. and F. R. S.

To which are added,
LETTERS and PAPERS
ON
PHILOSOPHICAL SUBJECTS.

The Whole corrected, methodized, improved, and now first collected into one Volume,
AND
Illustrated with COPPER PLATES.

LONDON:
Printed for DAVID HENRY; and sold by FRANCIS NEWBERY, at the Corner of St. Paul's Church-Yard.
MDCCLXIX.

Franklin's book



Franklin asking for troubles

# A Short Computer History Chronology

1801 Jacquard invents fully automated looms, driven by punch cards.

# A Short Computer History Chronology

Jacquard's loom [WJacquardloom]

Punched cards [WJacquardloom]

# A Short Computer History Chronology

1833 Babbage designs a machine driven by punched-cards.
The first general purpose computer.

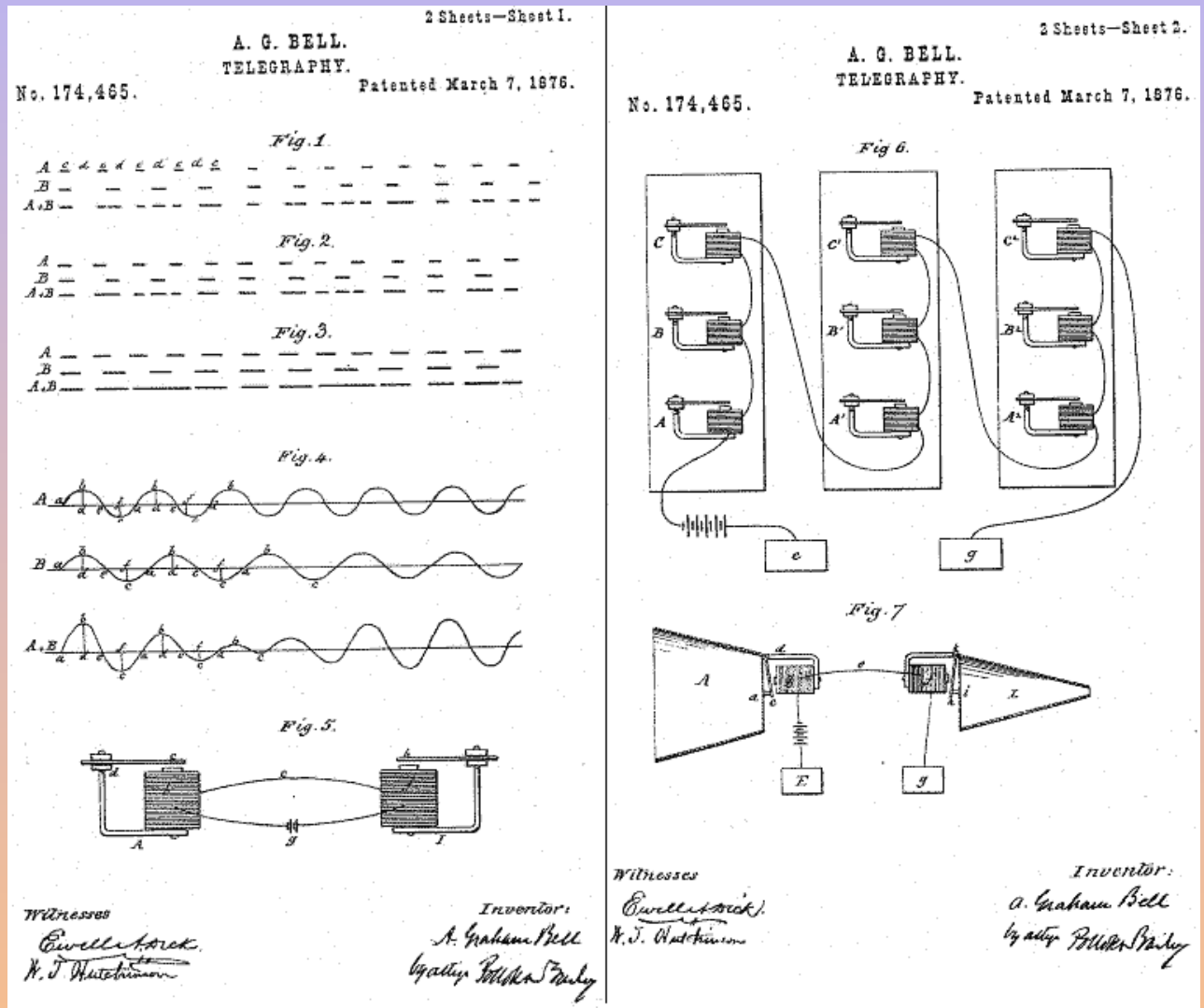
# A Short Computer History Chronology

Babbage's machine finally constructed

# A Short Computer History Chronology

1876 Telephone is patented by Alexander Graham Bell, a few hours before Elisha Gray.

# A Short Computer History Chronology



2 Sheets—Sheet 1.

A. G. BELL.

TELEGRAPHY.

No. 174,465. Patented March 7, 1876.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses

Inventor:

A. Graham Bell

2 Sheets—Sheet 2.

A. G. BELL.

TELEGRAPHY.

No. 174,465. Patented March 7, 1876.

Fig 6.

Fig. 7

Witnesses

Inventor:

A. Graham Bell

United States Patent No. 174,465: Bell's telephone

# A Short Computer History Chronology

1911 Computer-Tabulating-Recording Company is formed

# A Short Computer History Chronology


Computer-Tabulating-Recording

# A Short Computer History Chronology

1924 Computing-Tabulating-Recording Company changes its name to International Business Machines (IBM).

# A Short Computer History Chronology


International Business Machines

# A Short Computer History Chronology

1927 First public demonstration of television.

1936 First calculator, the Z1
Built in Germany by Konrad Zuse [Bordeleau, 2003].

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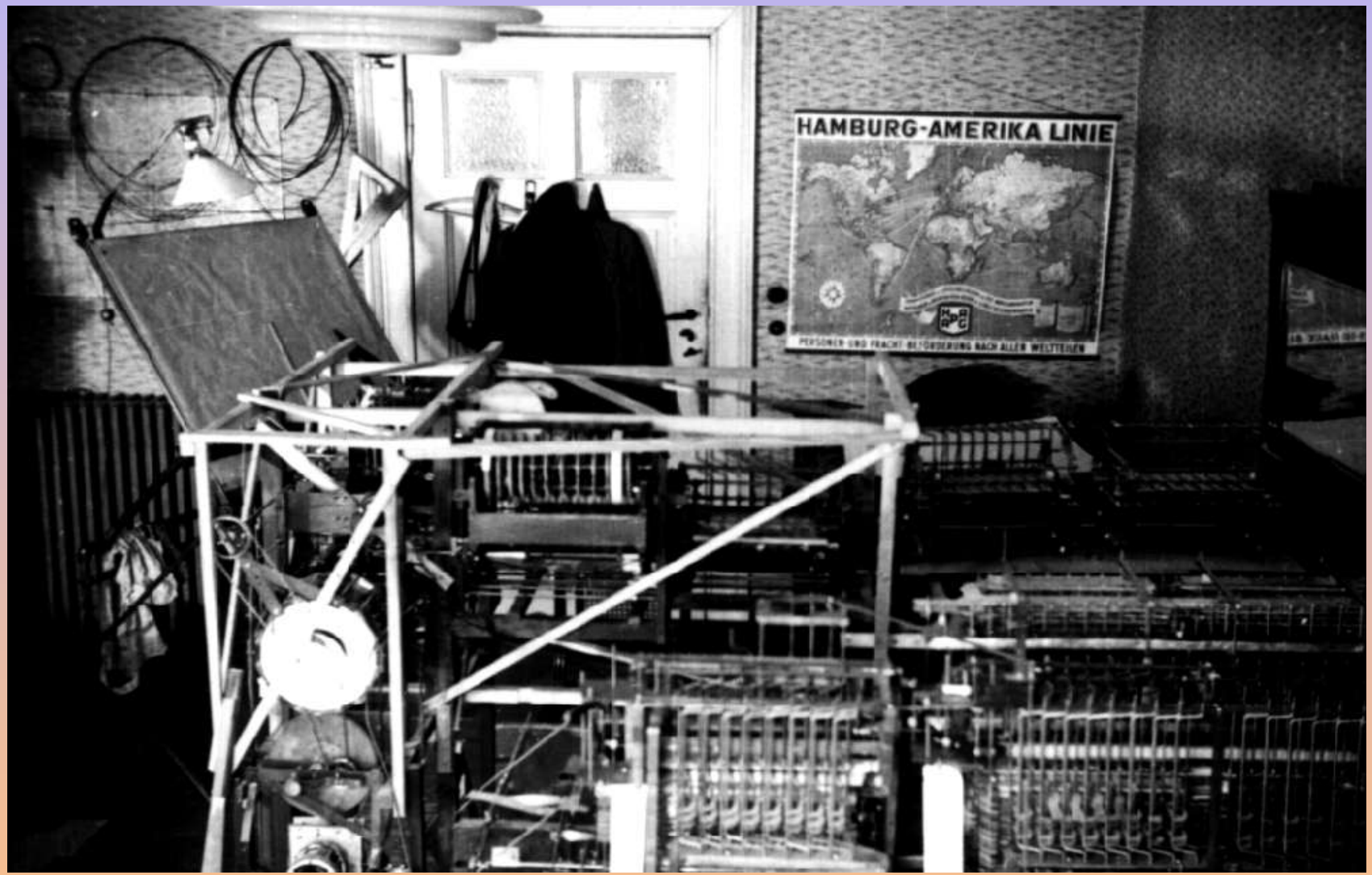
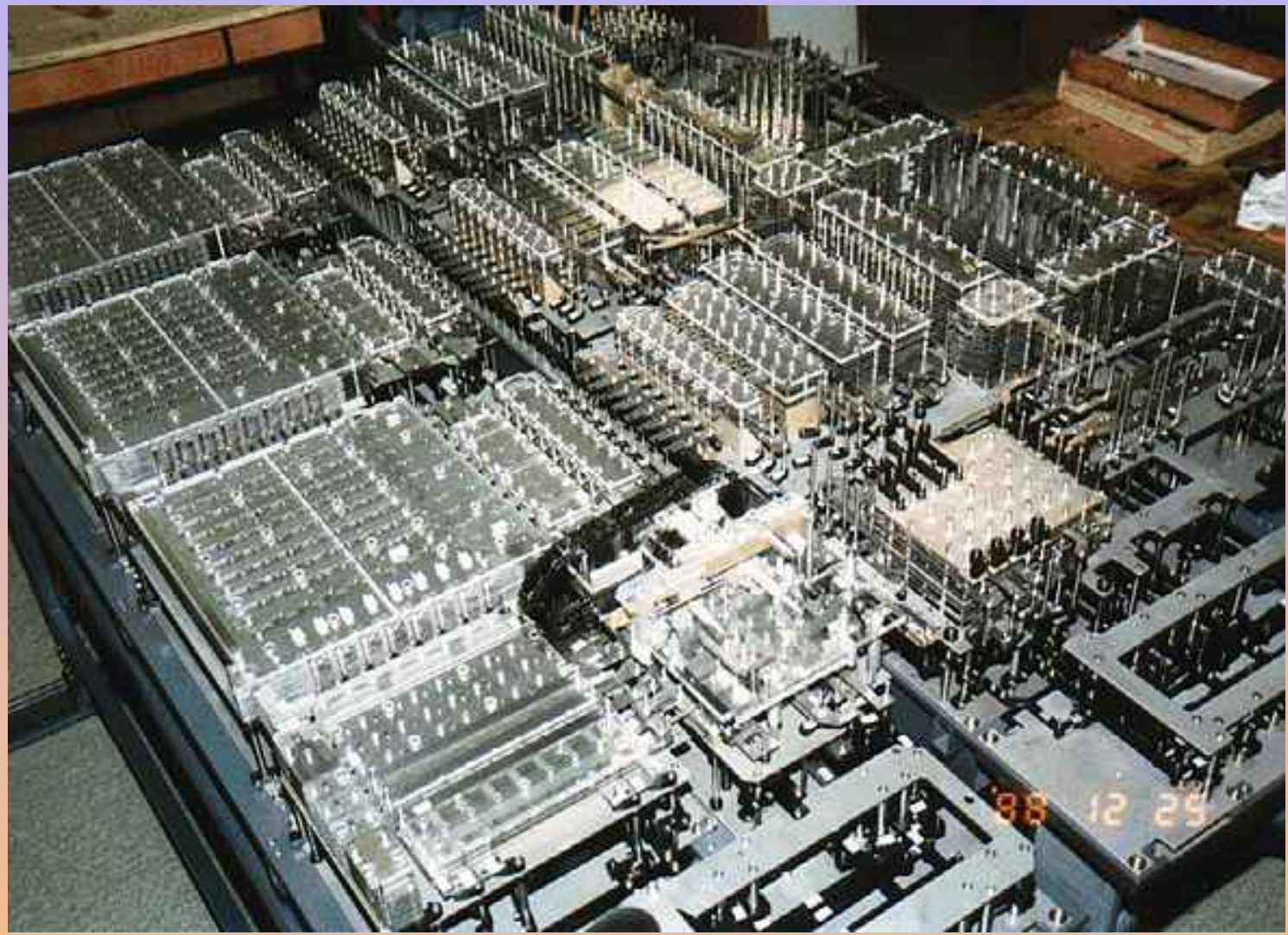



Z1 in the apartment of Konrad Zuse's parents in 1936 [Zuse, 2004]

# A Short Computer History Chronology



The Z1 reconstructed by K. Zuse

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1939 First Radio Shack catalog is published.

1939 Design of the ABC (Atanasoff-Berry Computer).
Ruled the first automatic digital computer in 1973.
Not programmable, not Turing complete.

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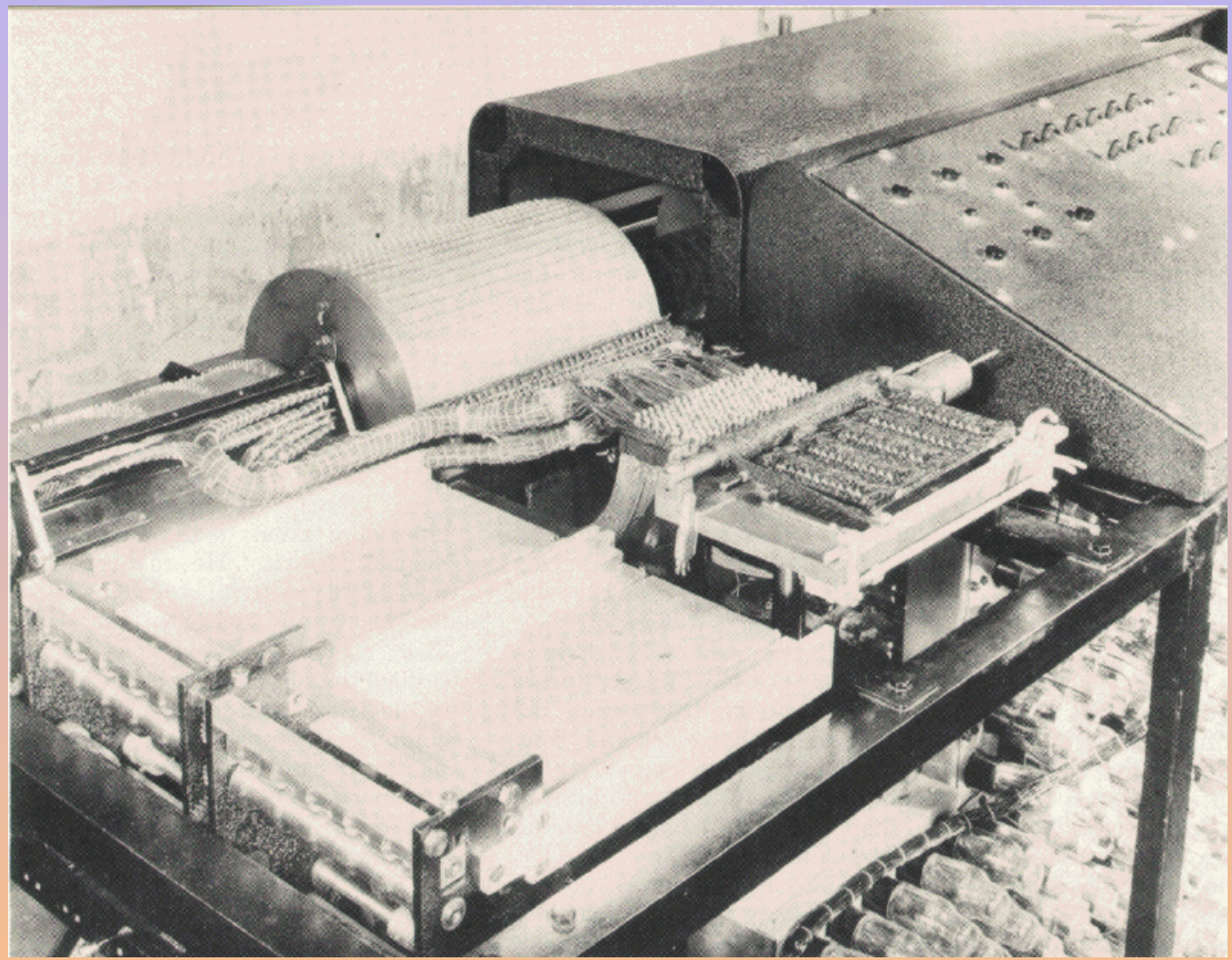

The Atanasoff-Berry Computer

# A Short Computer History Chronology

1940 Complex Number Calculator, which may be the first digital computer (Bell Labs).

1940 First color TV broadcast.

1941 Zuse's Z3
The first reliable, freely programmable, working computer based on a binary floating-point number and switching system.
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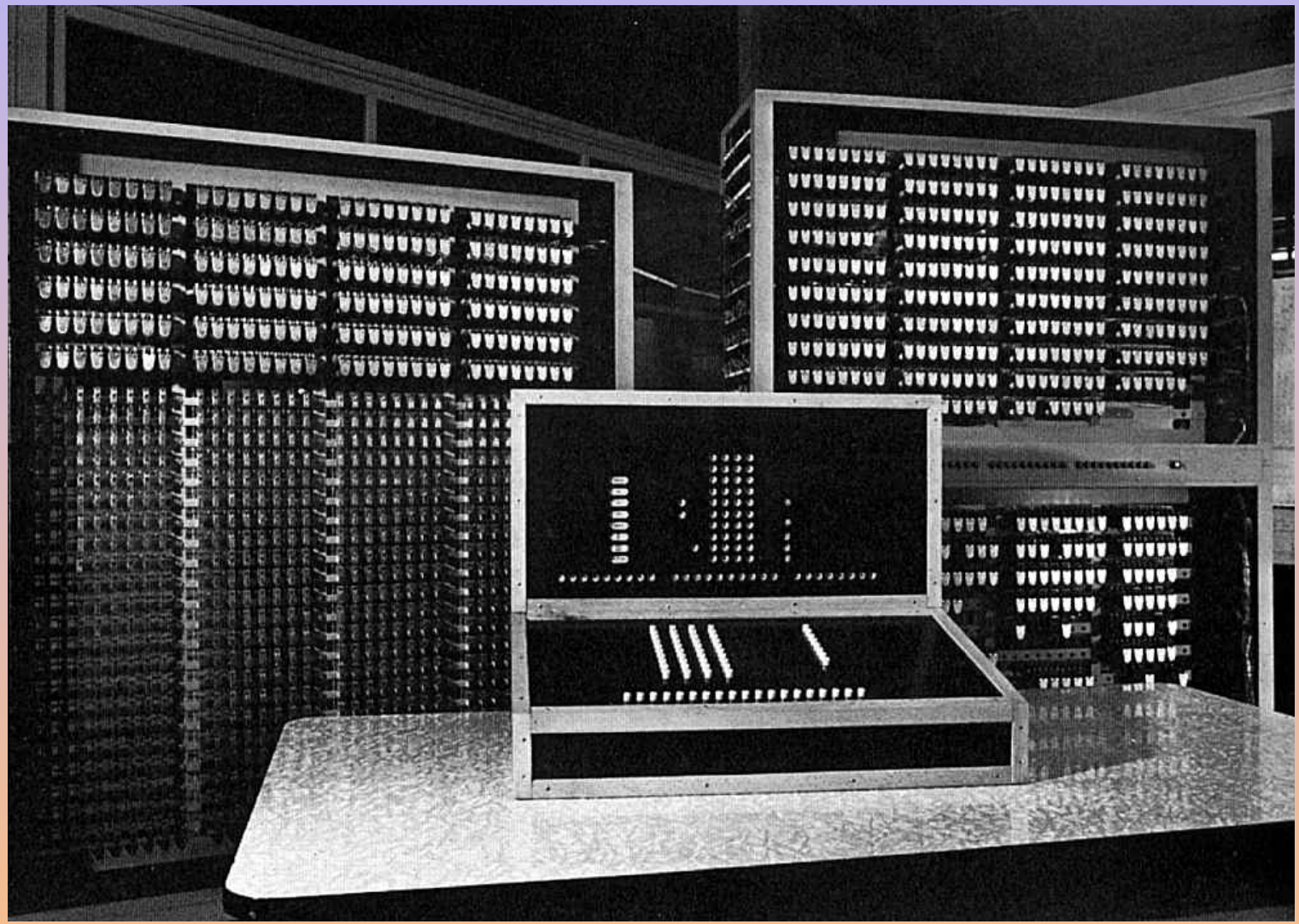

The Z3 rebuilt in 1961 by Zuse

# A Short Computer History Chronology

1944 Harvard Mark I (IBM Automatic Sequence Controlled Calculator (ASCC)) is completed at Harvard and IBM. A relay-based computer.

# A Short Computer History Chronology

The IBM ASCC

# A Short Computer History Chronology

1945, Sep 9th Grace Hopper finds the first computer bug on a Harvard Mark II [The History of Computing Foundation, 2000]. Actually it was not her who found it [WSoftwarebug].

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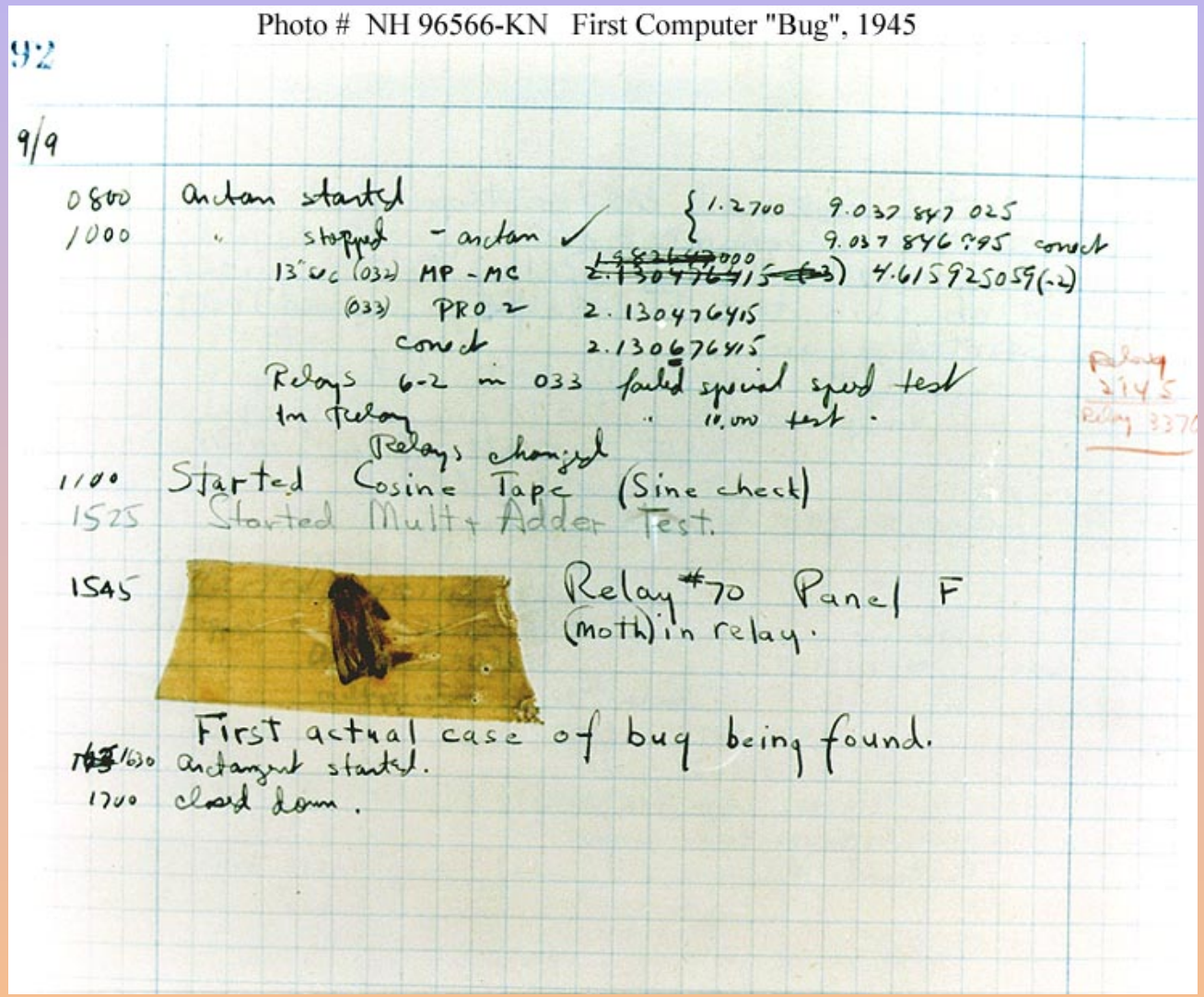


The first bug, logged

# A Short Computer History Chronology

1946-02-14 First electronic calculator: ENIAC
(Electronic Numerical Integrator and Computer)
University of Pennsylvania.

1946 Design of the Universal Automatic Computer (Univac).

1948 IBM builds a computer with 12,000 tubes.

1948 Transistor is invented.

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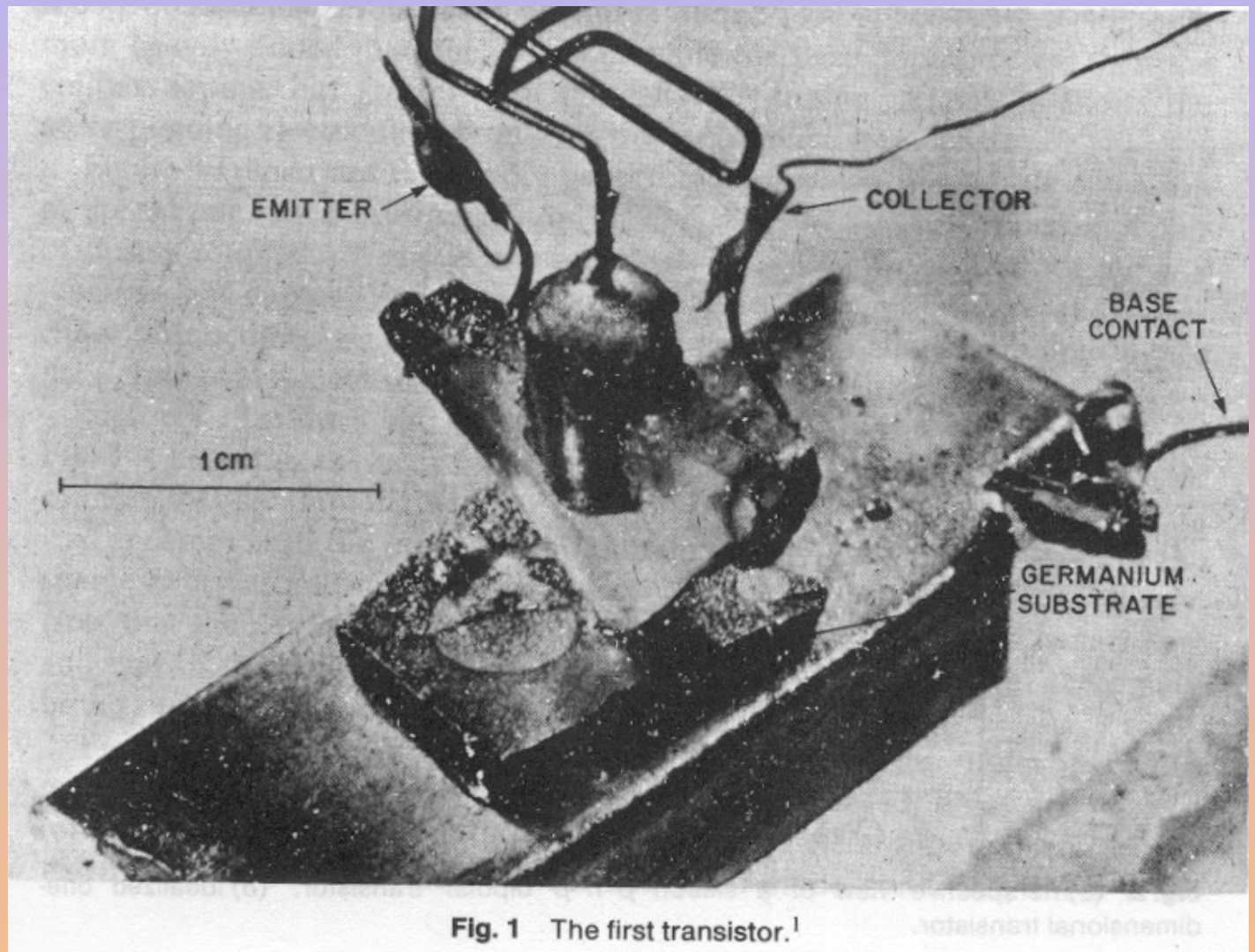


**Fig. 1** The first transistor.[1]

First transitor

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1949 EDVAC (Electronic Discrete Variable Automatic Computer) supports the first tests of magnetic disks.

1949-03 Binac (Binary Automatic Computer)
First computer to operate in real time.

1949 MIT builds the first chess playing machine.

1951-06-14 UNIVAC I, first commercially available computer. Features a magnetic tape unit as a buffer memory.

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UNIVAC I

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1952 RCA develops Bizmac with iron-core memory and a magnetic drum supporting the first database.

1953 First high-speed printer is developed (by Remington-Rand for Univac).

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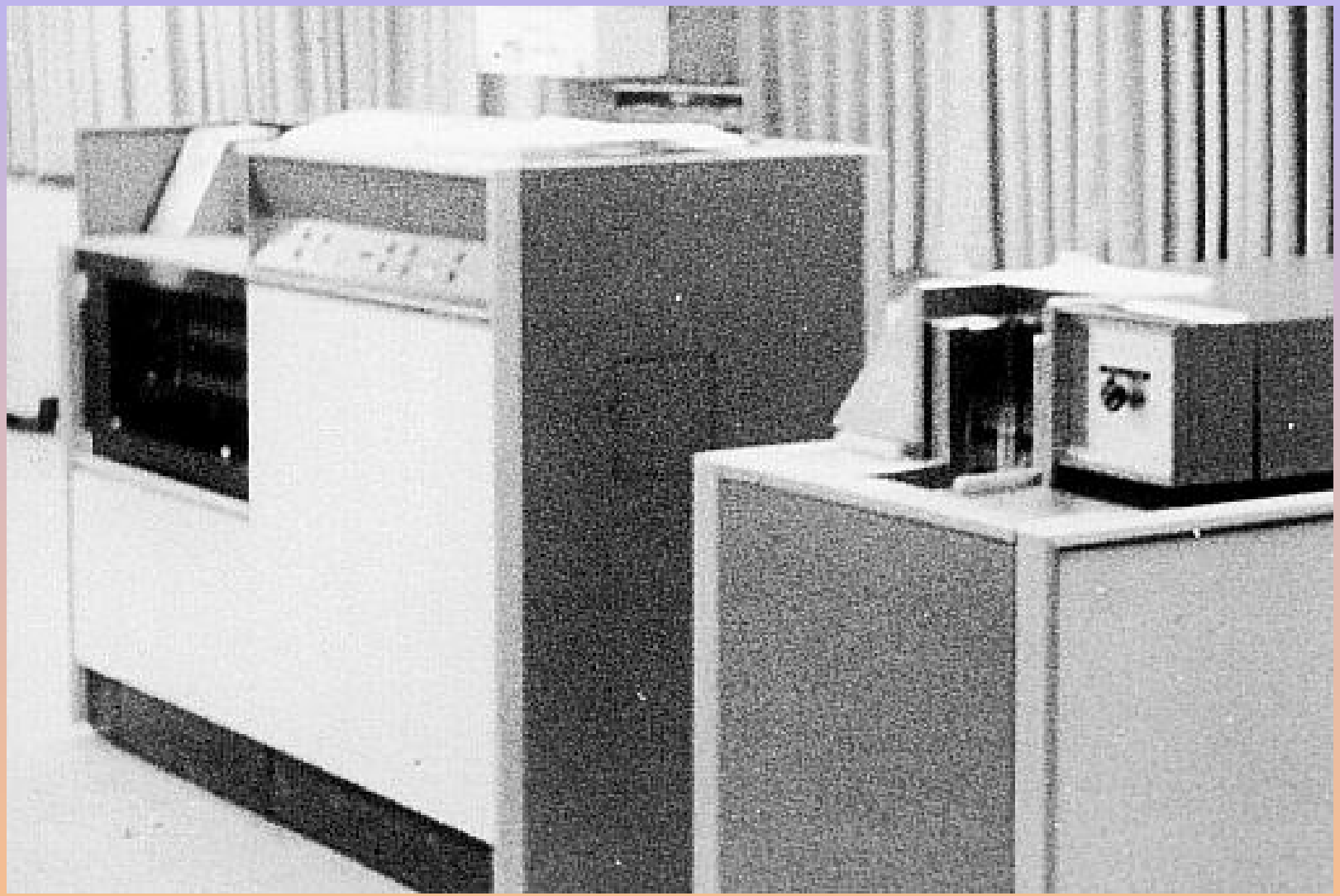

Printer for the UNIVAC 1107 in the 60's[Walker, 2007] Music

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1953-04-07 IBM introduces the 701.
Its first electronic stored-program computer.
It is a vacuum tube, or first generation, computer.

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IBM 701

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1954 FORTRAN is created.

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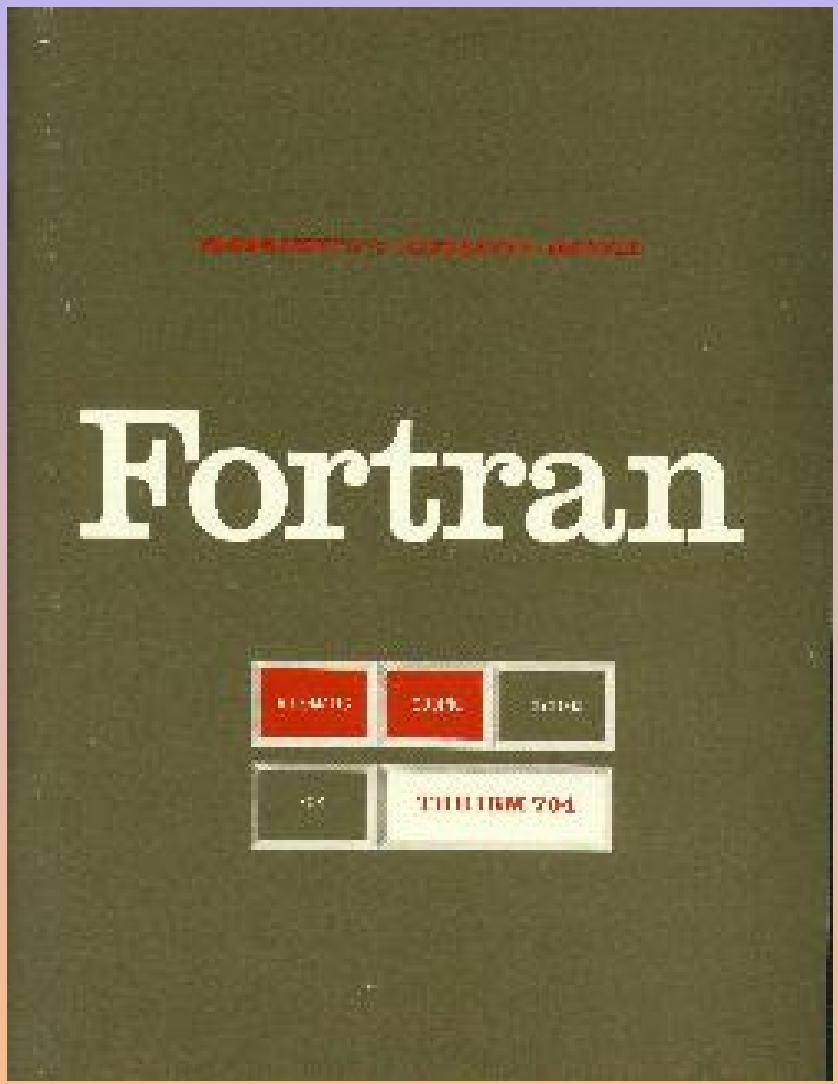
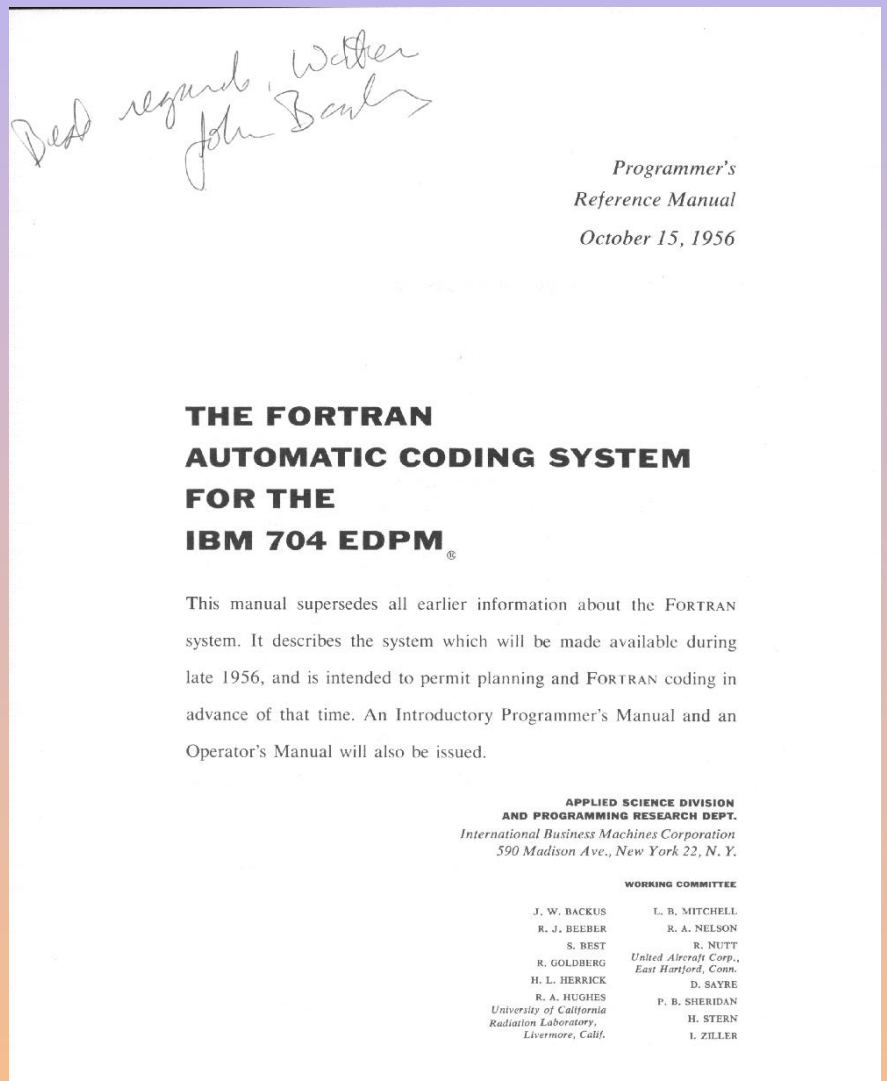



FORTRAN doc...



Best regards
Walter
John Backus

*Programmer's*
*Reference Manual*
*October 15, 1956*

**THE FORTRAN**
**AUTOMATIC CODING SYSTEM**
**FOR THE**
**IBM 704 EDPM**®

This manual supersedes all earlier information about the FORTRAN system. It describes the system which will be made available during late 1956, and is intended to permit planning and FORTRAN coding in advance of that time. An Introductory Programmer's Manual and an Operator's Manual will also be issued.

**APPLIED SCIENCE DIVISION**
**AND PROGRAMMING RESEARCH DEPT.**
*International Business Machines Corporation*
*590 Madison Ave., New York 22, N. Y.*

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...autograph by J. Backus

# A Short Computer History Chronology

| C ← FOR COMMENT / STATEMENT NUMBER (1–5) | CONTINUATION (6) | FORTRAN STATEMENT (7–72) | IDENTIFICATION (73–80) |
|---|---|---|---|
| C | | PROGRAM FOR FINDING THE LARGEST VALUE | |
| C | X | ATTAINED BY A SET OF NUMBERS | |
| | | DIMENSION A(999) | |
| | | FREQUENCY 30(2,1,10), 5(100) | |
| | | READ 1, N,-(A(I), I = 1,N) | |
| 1 | | FORMAT (I3/(12F6.2)) | |
| | | BIGA = A(1) | |
| 5 | | DO 20 I = 2,N | |
| 30 | | IF (BIGA-A(I)) 10,20,20 | |
| 10 | | BIGA = A(I) | |
| 20 | | CONTINUE | |
| | | PRINT 2, N, BIGA | |
| 2 | | FORMAT (22H1THE LARGEST OF THESE I3, 12H NUMBERS IS F7.2) | |
| | | STOP 77777 | |
| | | | |

A FORTRAN sample

# A Short Computer History Chronology

1954 The first operating system, used on IBM 704.

1954-11 Scientists from RAND Corporation have created this model to illustrate how a "home computer" could look in the year 2004.
However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems.
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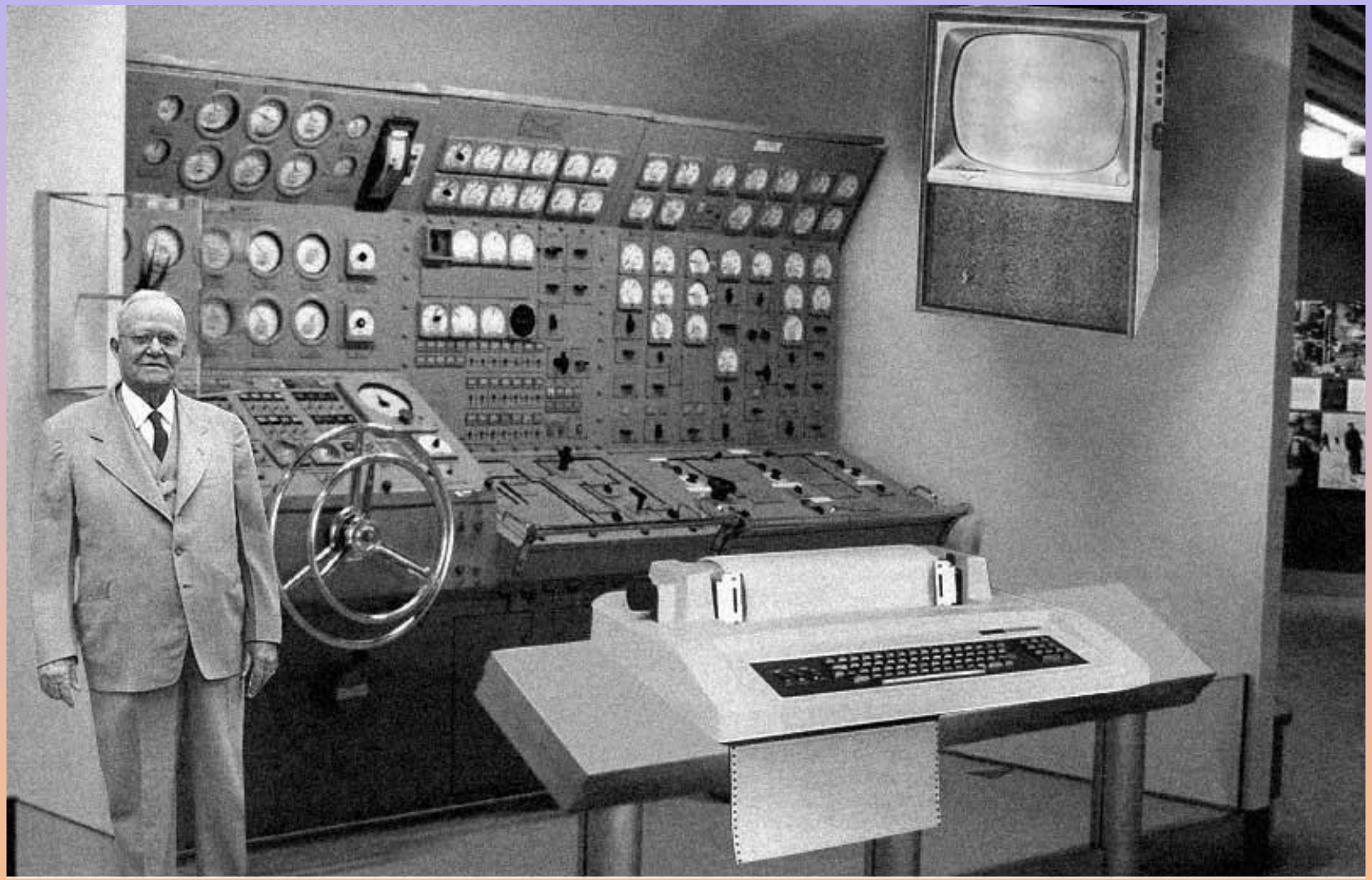

1954 prevision of computers in 2004. Note the joystick.

# A Short Computer History Chronology

Submarine maneuvering room [Snopes.com, 2004].

# A Short Computer History Chronology

1955 First computer user group: SHARE (IBM 701) [Salus et al., 2008].

1955 IBM asks Jacques Perret, a French philologist, for a French translation of the term "computer". He proposes the word "*ordinateur*".

1957 Movie "Desk Set", with Katharine Hepburn. [WDeskSet].

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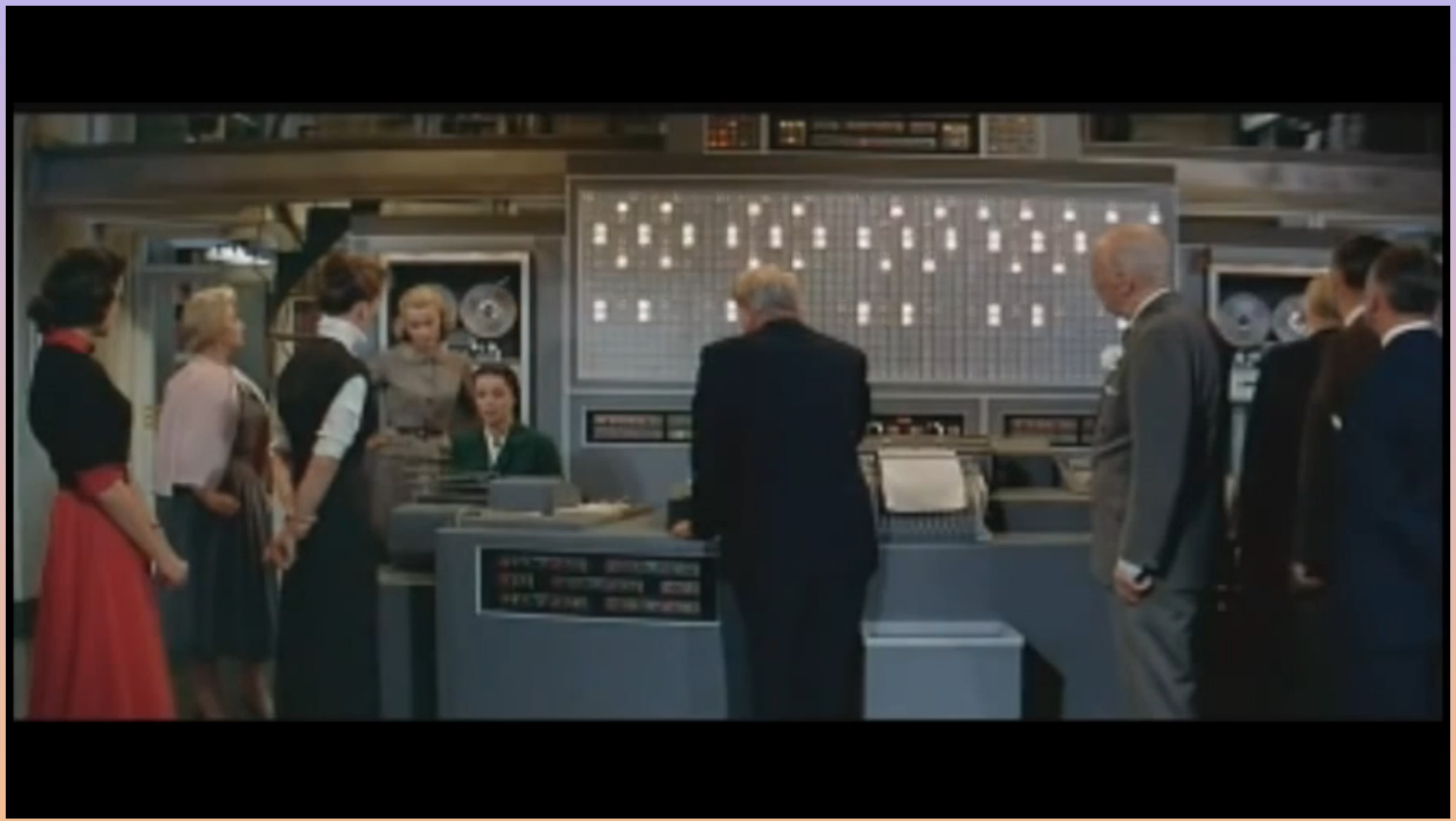
Desk Set before

# A Short Computer History Chronology



Desk Set with EMERAC

# A Short Computer History Chronology

1957 The Traitorous Eight leave the Shockley Semiconductor Laboratory to form Fairchild Semiconductor.

# A Short Computer History Chronology

The Traitorous Eight at Fairchild Semiconductor in 1959: Gordon Moore, Sheldon Roberts, Eugene Kleiner, Robert Noyce, Victor Grinich, Julius Blank, Jean Hoerni, and Jay Last.

# A Short Computer History Chronology

1958 The first fully transistorized supercomputer, the CDC 1604.

1958 Texas Instruments makes the first integrated circuit.

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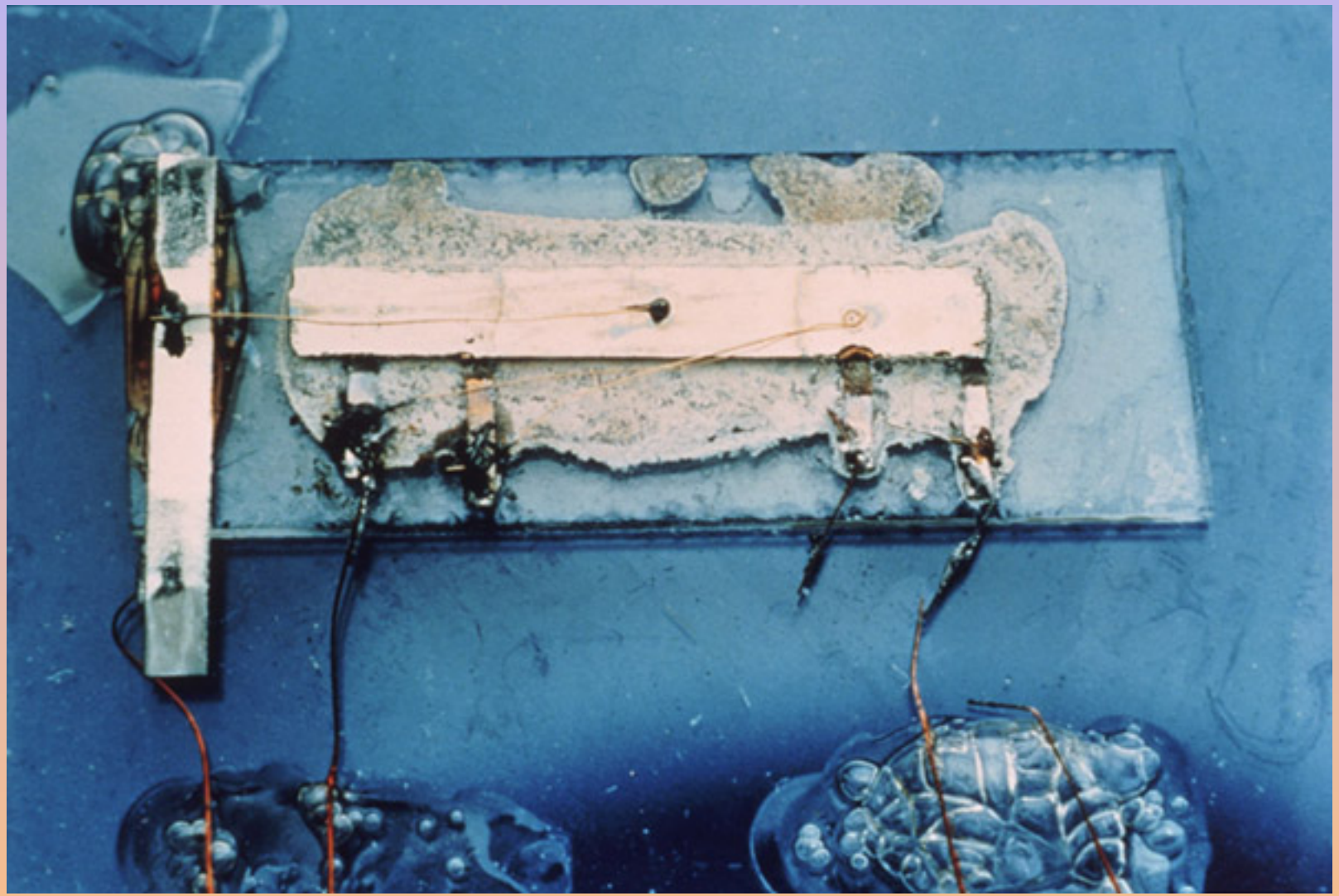

Jack Kilby's first integrated circuit

# A Short Computer History Chronology

1959 COBOL is defined.

1959 IBM introduces the 1401. Over 10,000 units will be delivered during its lifetime.

1959 Texas Instruments files a patent for the first integrated circuit.

1960 First computer driven telephone switch.

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Operator driven switchboard
[WBGLinks, 2006]

Computer driven switchboard
[WBGLinks, 2006]

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1960 Removable disks first appear.

1960 The first minicomputer, the PDP-1 (Programmed Data Processor).

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# A Short Computer History Chronology

PDP-1

# A Short Computer History Chronology

1962 The first video game: Space war. Play the original game [Silverman et al., 1996]

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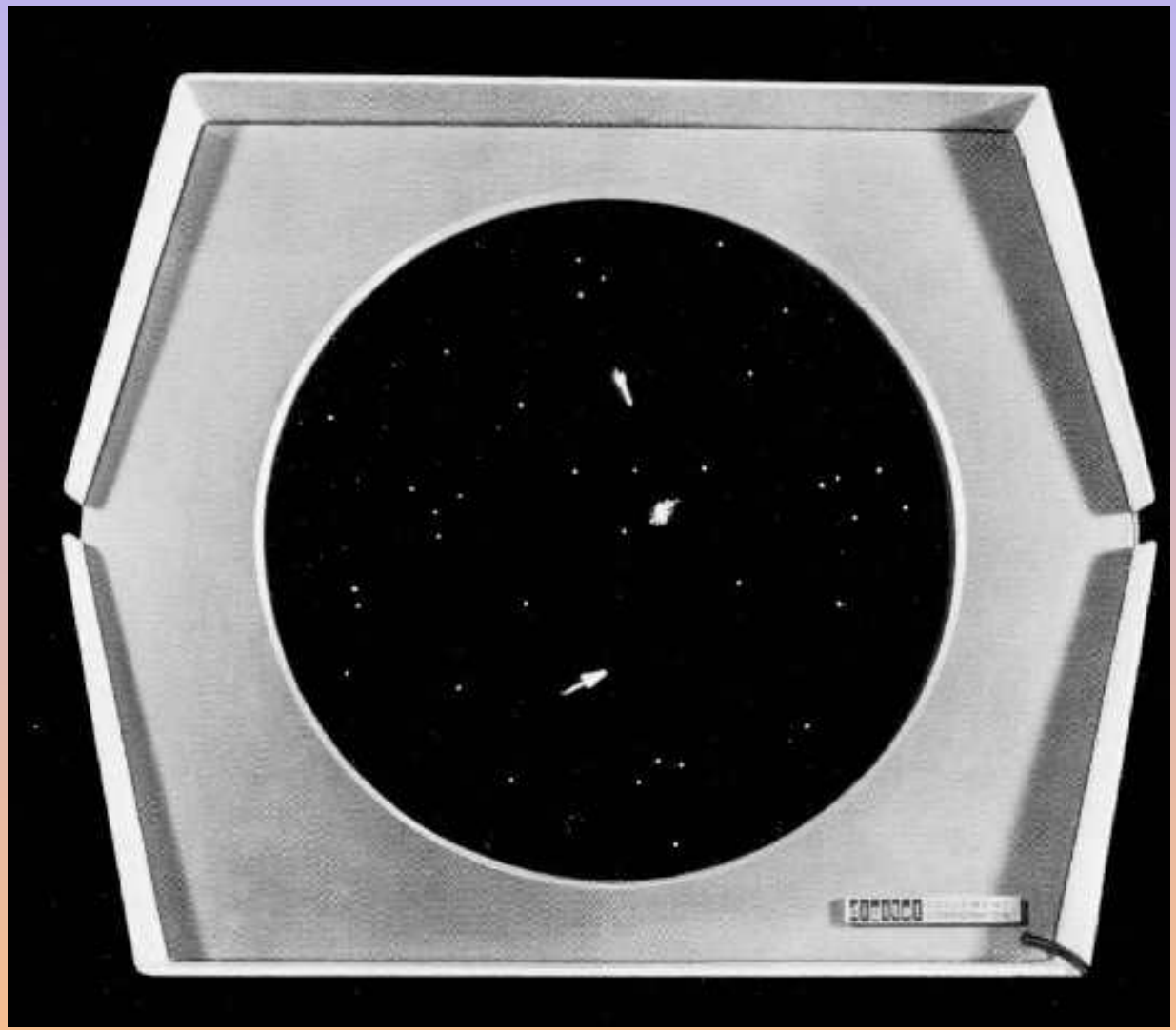

Spacewar! screenshot

# A Short Computer History Chronology

Steve Russell in 2002 [Markoff, 2002]

# A Short Computer History Chronology

1963 Tandy acquires Radio Shack (9 stores).

1964 MIT students play music on a PDP-1 [Smith, 2006]

1964 Control Data Corporation introduces the CDC 6000, the most powerful computer for several years.

1964 BASIC (Beginners All-purpose Symbolic Instruction Code) is created.

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1964 “A computer fed information by engineers at Los Angeles took only 1.2 second this week (sic) to come up with what was described as Miss Formula, the girl with everything. Her dimensions: height, 5 feet, 6 inches; weight, 115-118 pounds and measurements, 36-24-36.” [Lileks, 2005]

# A Short Computer History Chronology

Miss Formula [Lileks, 2005]

# A Short Computer History Chronology


The Control Data Cyber 70 Bosom-Goggler, which automatically stares at the secretary's breasts, freeing up the busy executive so he can stare at her legs. [Lileks, 2005]

# A Short Computer History Chronology

1965 Control Data Institute provides computer-related education.

1965 Douglas Engelbart creates the first mouse [The History of Computing Foundation, 2000].

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# A Short Computer History Chronology

The First Mouse

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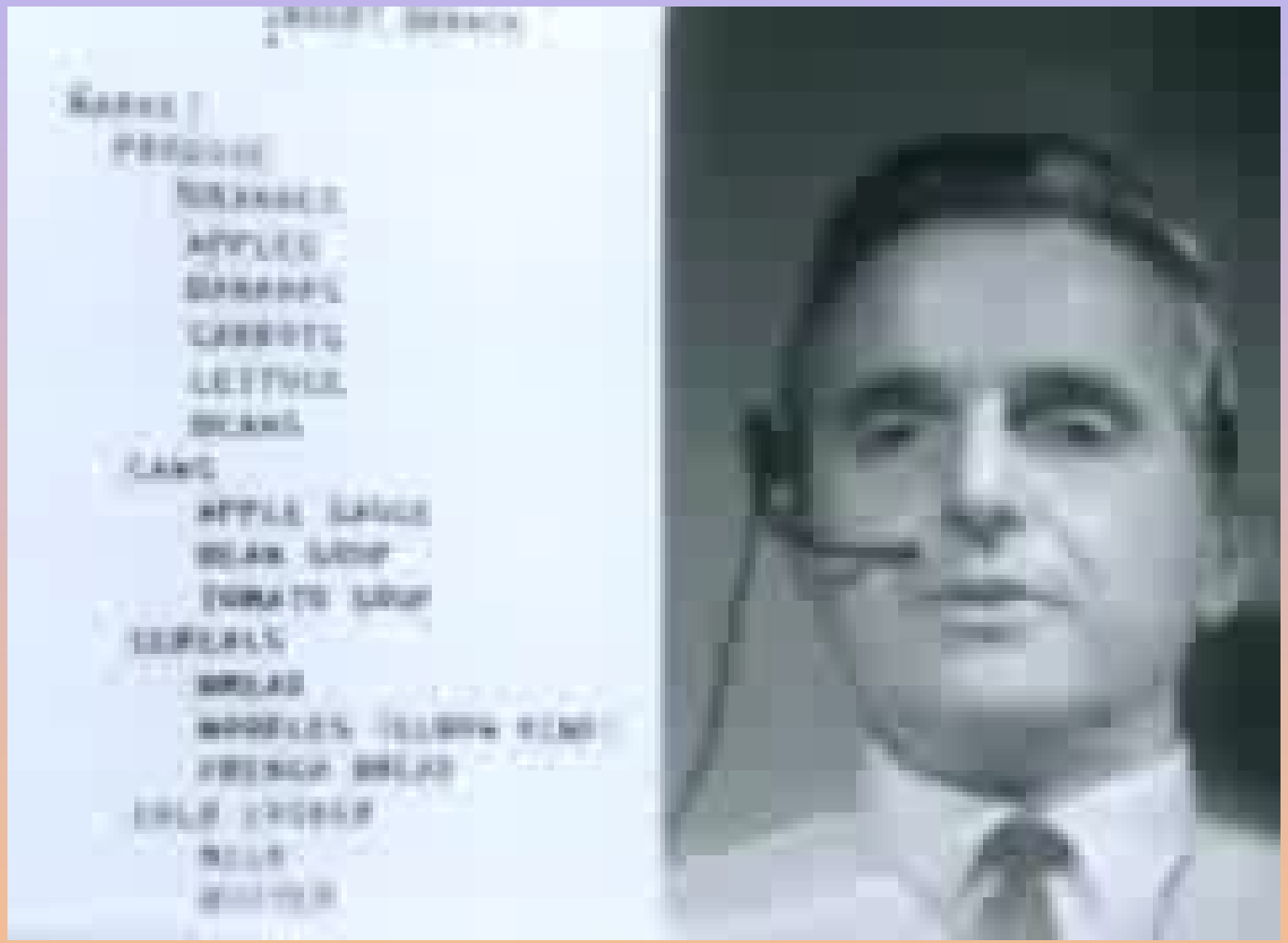

Demonstration of NLS and the mouse (1968) [Rogers, 2005]

# A Short Computer History Chronology

According to Herb Sutter [Sutter, 2009] this *Mother of All Demos* demonstrated prototypes for the 16 following technologies:

- The personal computer for dedicated individual use all day long.
- The mouse.
- Internetworks.
- Network service discovery.
- Live collaboration and desktop/app sharing.
- Hierarchical structure within a file system and within a document.
- Cut/copy/paste, with drag-and-drop.
- Paper metaphor for word processing.
- Advanced pattern search and macro search.
- Keyword search and multiple weighted keyword search.
- Catalog-based information retrieval.
- Flexible interactive formatting and line drawing.
- Hyperlinks within a document and across documents.
- Tagging graphics, and parts of graphics, as hyperlinks.
- Shared workgroup document collaboration with annotations etc.
- Live shared workgroup collaboration with live audio/video teleconference in a window.

# A Short Computer History Chronology

1965 IBM ships the first System 360, its first integrated circuit-based, or third generation computer.

# A Short Computer History Chronology

IBM 360/67

# A Short Computer History Chronology


IBM 360 in black and white

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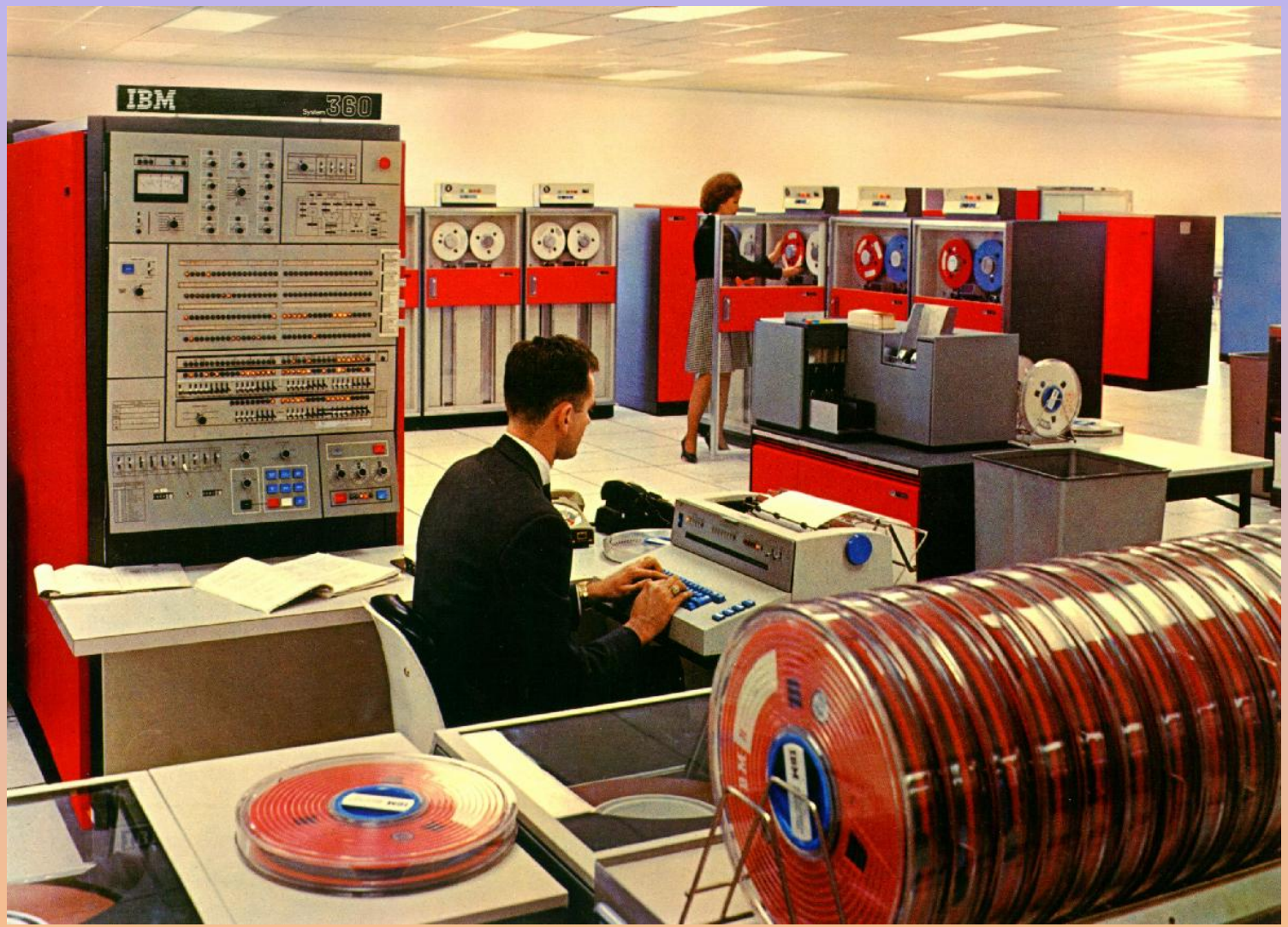


IBM 360 in colors

# A Short Computer History Chronology

1965-12-05 First computer science Ph.D. is granted to Richard L. Wexelblat at the University of Pennsylvania.

1966 Texas Instruments offers the first solid-state hand-held calculator.

1968-07-18 Integrated Electronics (Intel) Corp. is founded by Gordon E. Moore (chemist and physicist) and Robert Noyce (physicist and co-inventor of the integrated circuit).

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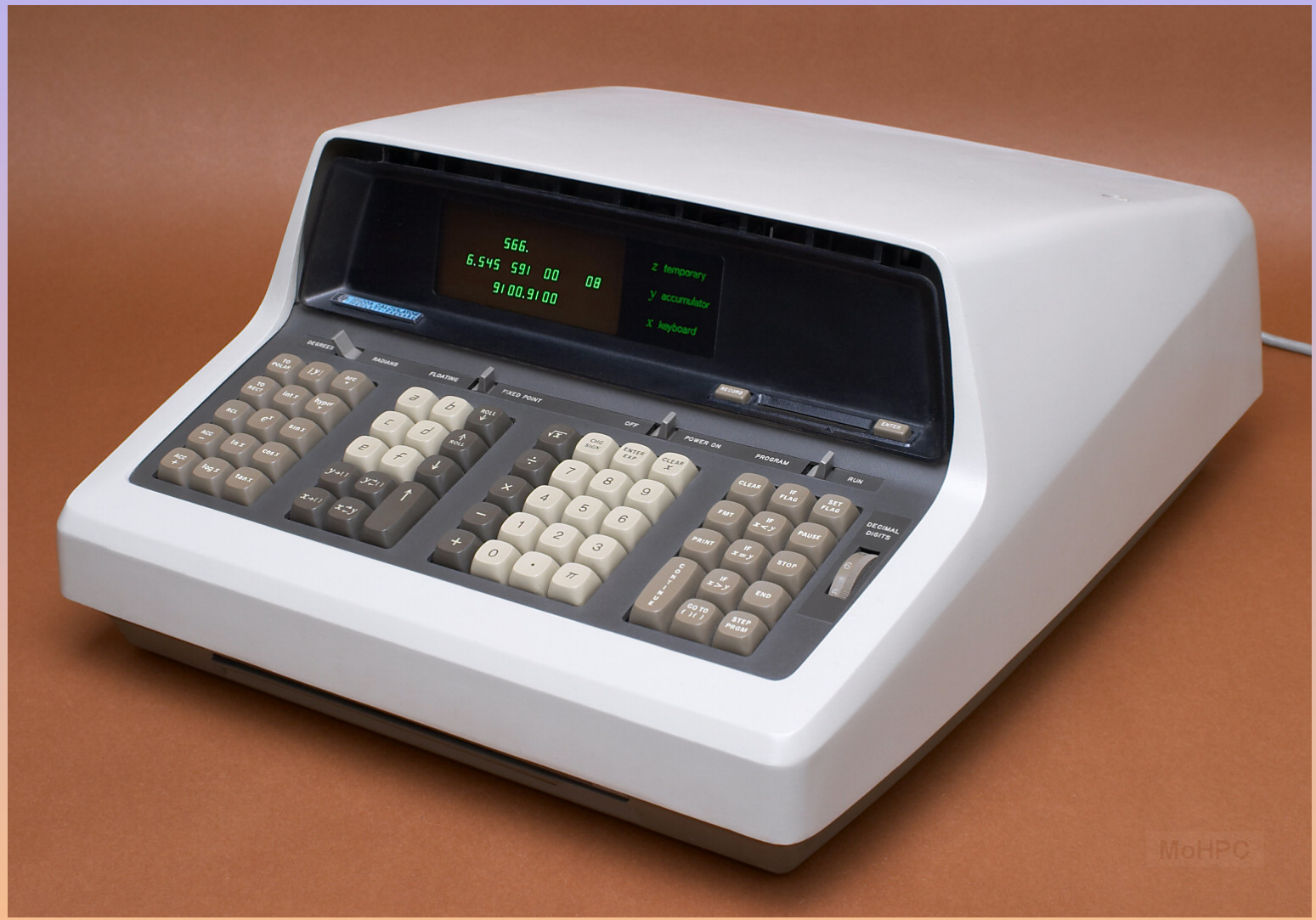


HP 9100a [Hicks, 2003]

# A Short Computer History Chronology

1969 AMD is founded.

1969 IBM introduces a minicomputer line, System/3.

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1969 Bell Labs drop out of the MULTICS project (Multiplexed Information and Computing Service).
Ken Thompson implements UNICS on a PDP/7 (4K of 18 bit words) in one month

UNICS, a joke made by Brian Kernighan (or Peter Neumann [Salus et al., 2008, Chap. 2]) standing for the UNIplexed Information and Computing Service, since the PDP-7 version could support only one user—Ken. After too many bad puns about EUNUCHS being a castrated MULTICS, the name was changed to UNIX [Tanenbaum, 2004].

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# A Short Computer History Chronology

PDP/7 [WBGLinks, 2006]

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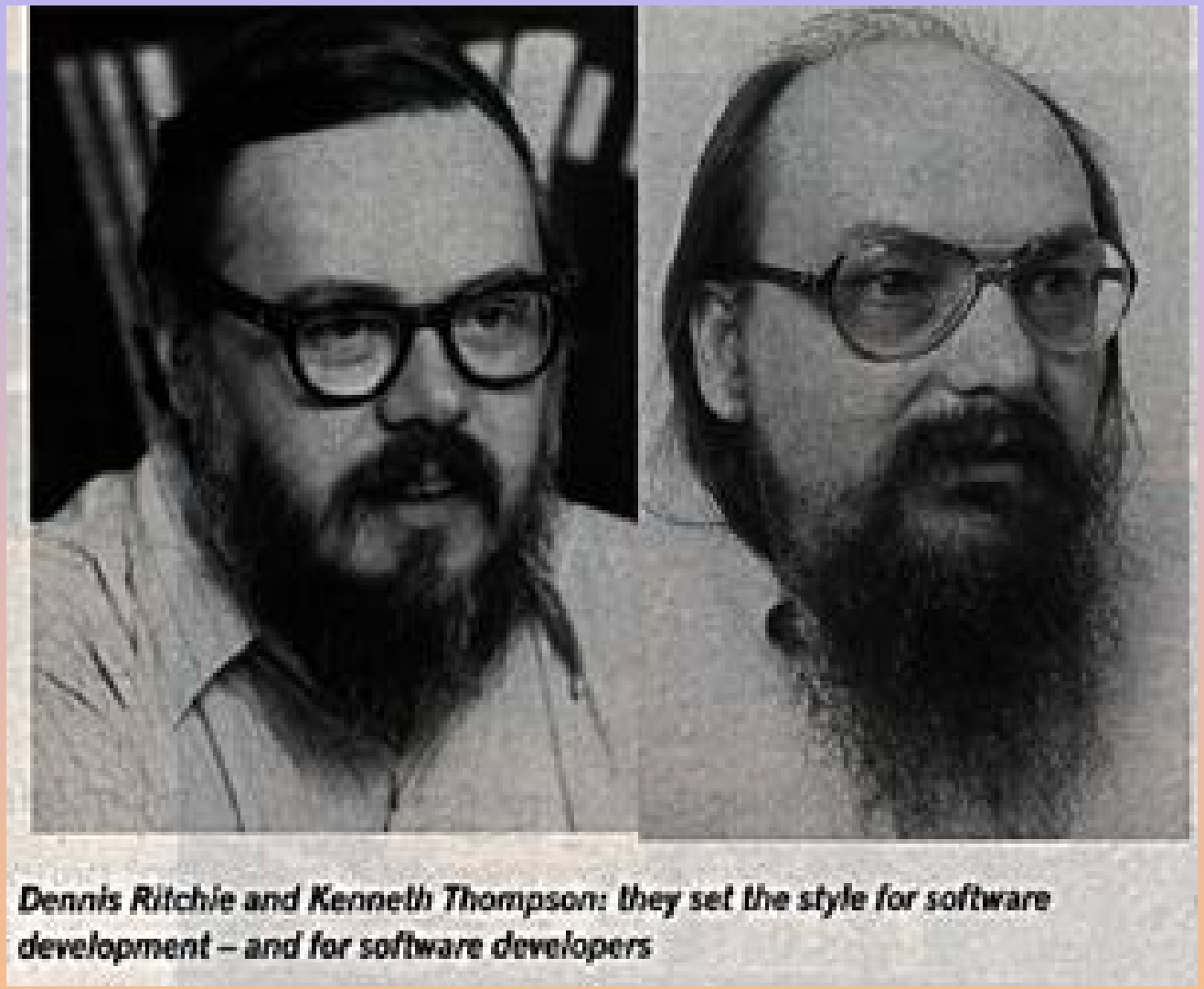

*Dennis Ritchie and Kenneth Thompson: they set the style for software development – and for software developers*

Denis MacAlistair Ritchie & Kenneth Lane Thompson

# A Short Computer History Chronology

Ken Thompson & Denis Ritchie in front of a PDP/11

# A Short Computer History Chronology

1970 IBM ships its first System 370, a fourth generation, computer.

# A Short Computer History Chronology


IBM 370 [Lileks, 2005]

# A Short Computer History Chronology

1971 IBM introduces the 370/135 and 370/195 mainframe computers.

1971 IBM introduces floppy disks.

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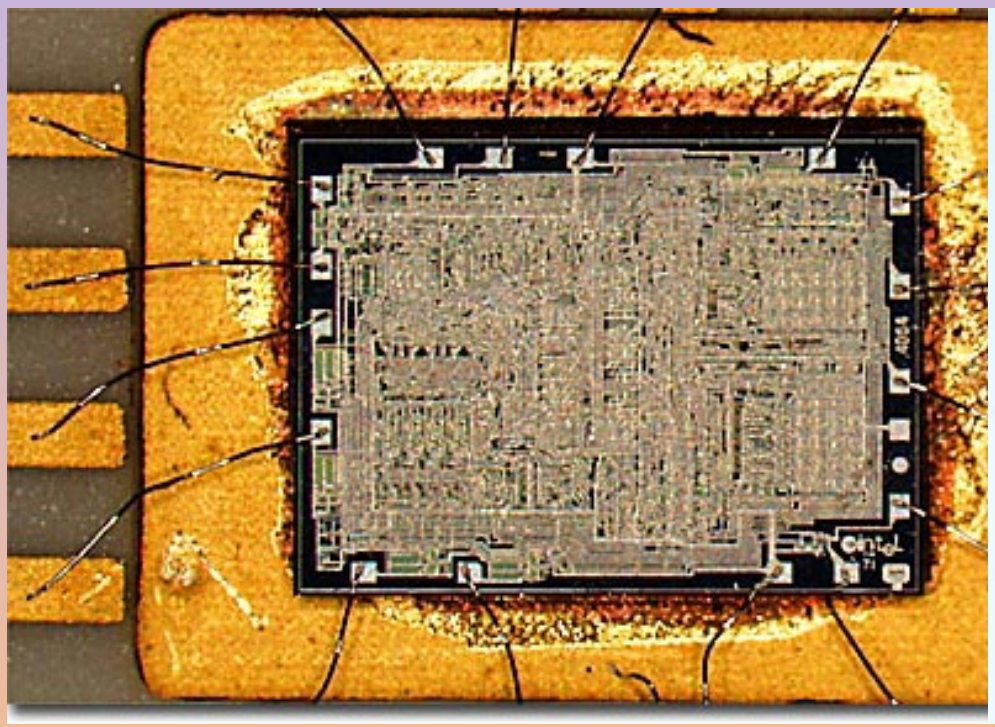
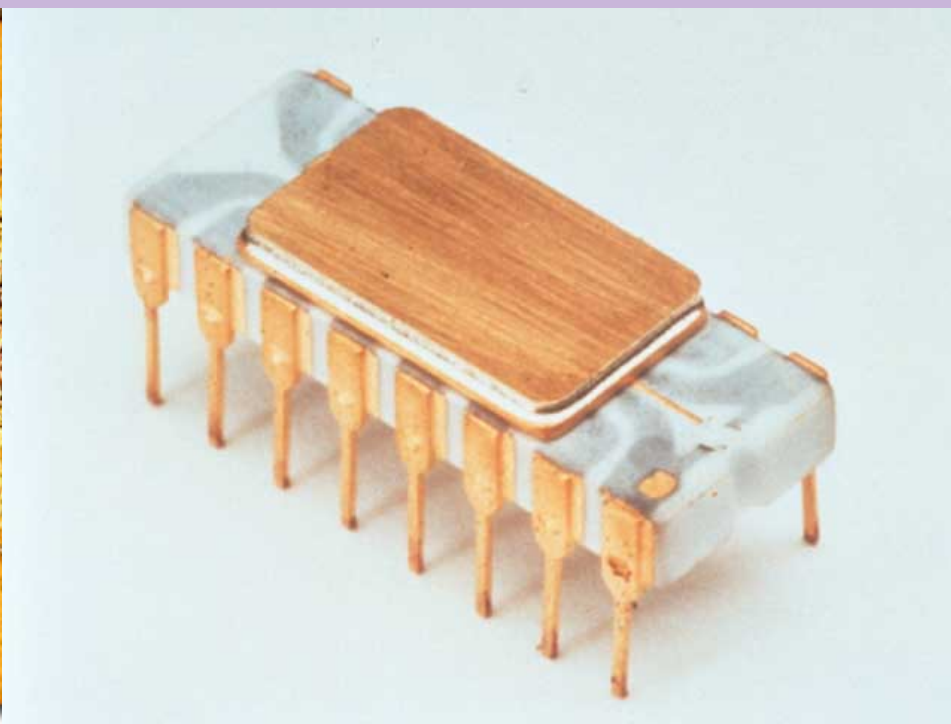


Intel, inside

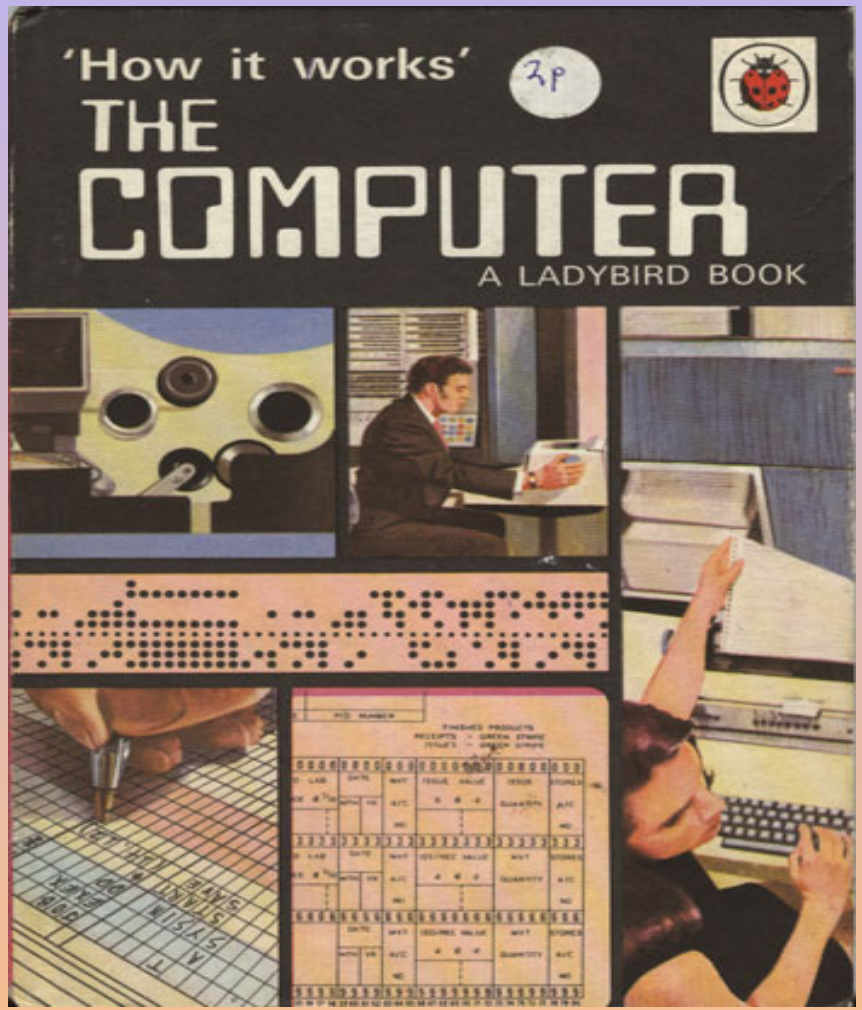


Intel, outside

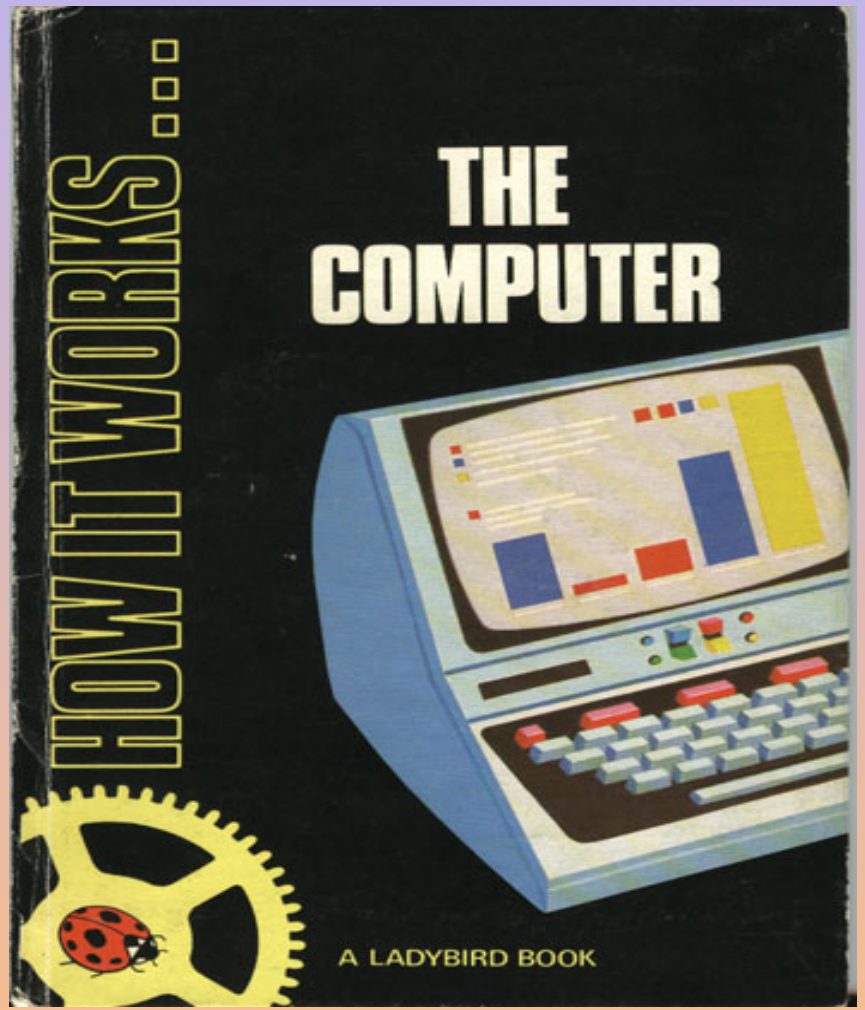
# A Short Computer History Chronology

1971 “How It Works...The Computer” is published [Guy, 1971].

# A Short Computer History Chronology




1st edition, 1971




2nd edition, 1979

# A Short Computer History Chronology

1971 The first personal computer, the Kenbak I. No processor! Only TTL. 256b RAM. $750. About 40 units. [Klein, 2004].

# A Short Computer History Chronology


Kenbak I

# A Short Computer History Chronology

1972 Nolan Bushnell of Atari introduces Pong, the first major coin-operated electronic video game.

1972 First electronic pocket calculator is developed by Texas Instruments.

1973 Ethernet is invented at Xerox PARC by Robert Metcalfe (not only for computer, but for printers too).

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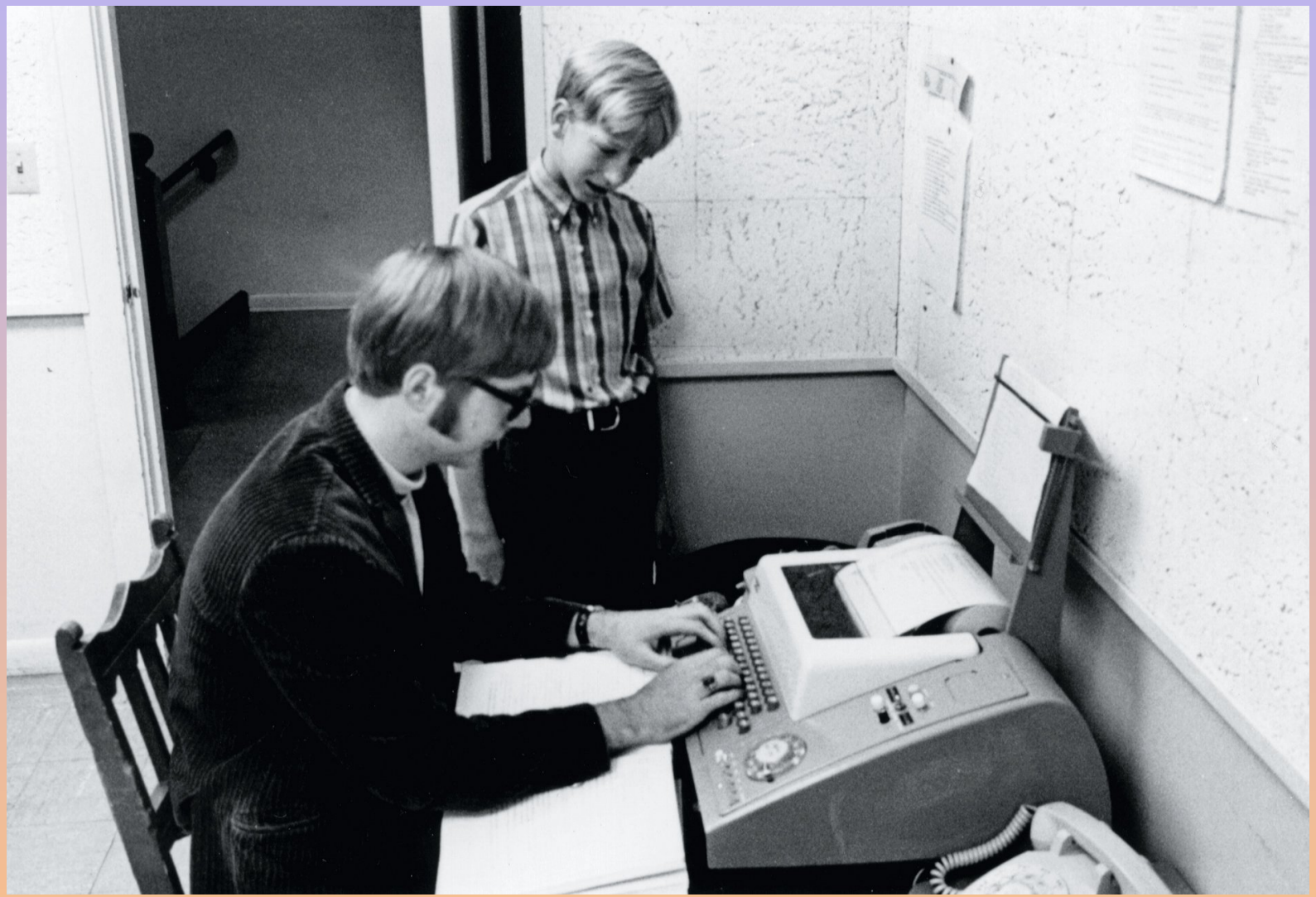
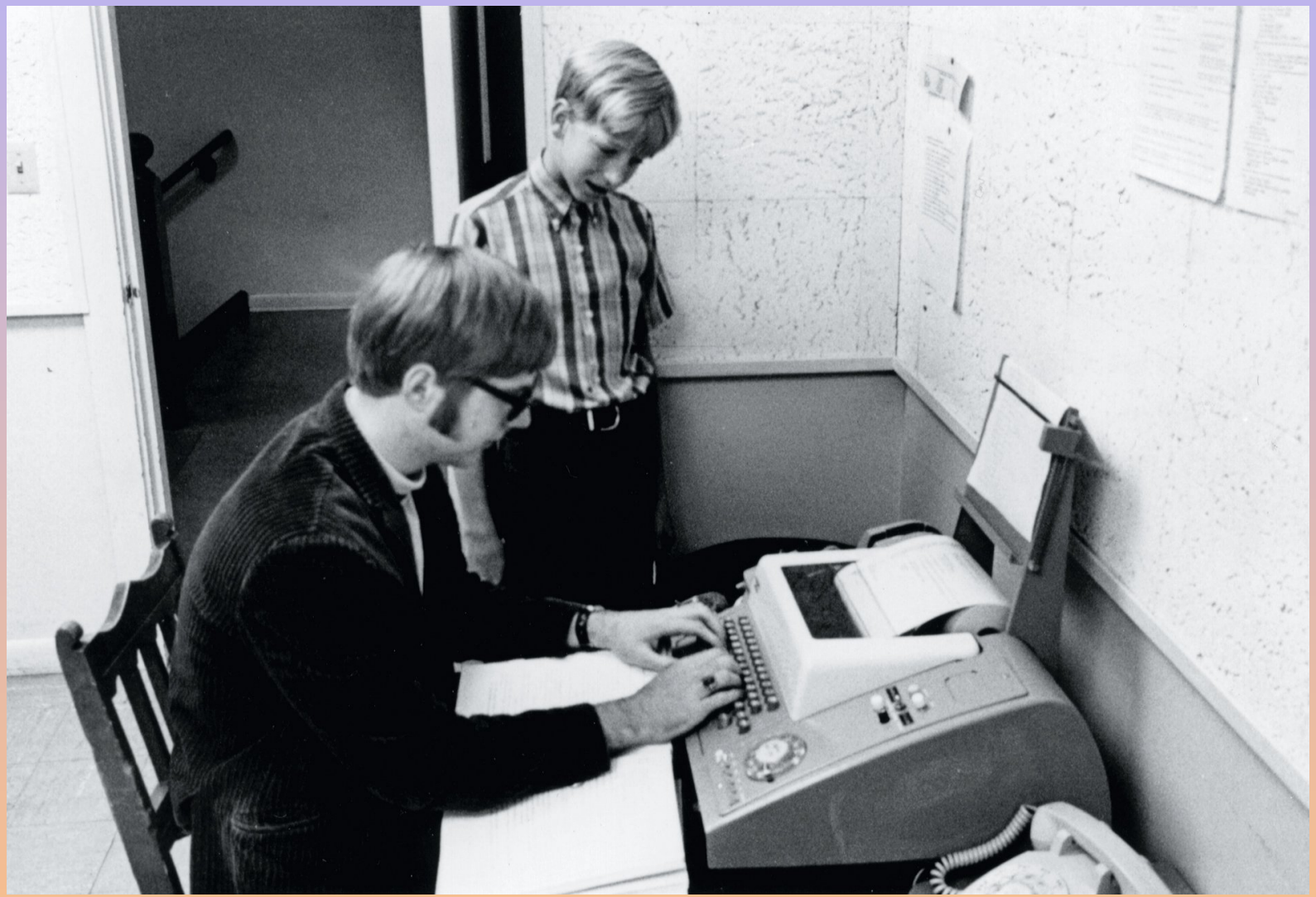


Who's that?

# A Short Computer History Chronology



Who's that? Paul Allen, Bill Gates

# A Short Computer History Chronology

1975 MITS introduces the Altair personal computer
Named after a Star Trek episode, A Voyage to Altair.
The kit costs $397. Designed by Ed Roberts and Bill Yates.

1975 Micro Soft is founded after William H. Gates III and Paul Allen sell BASIC to MITS for the Altair PC.

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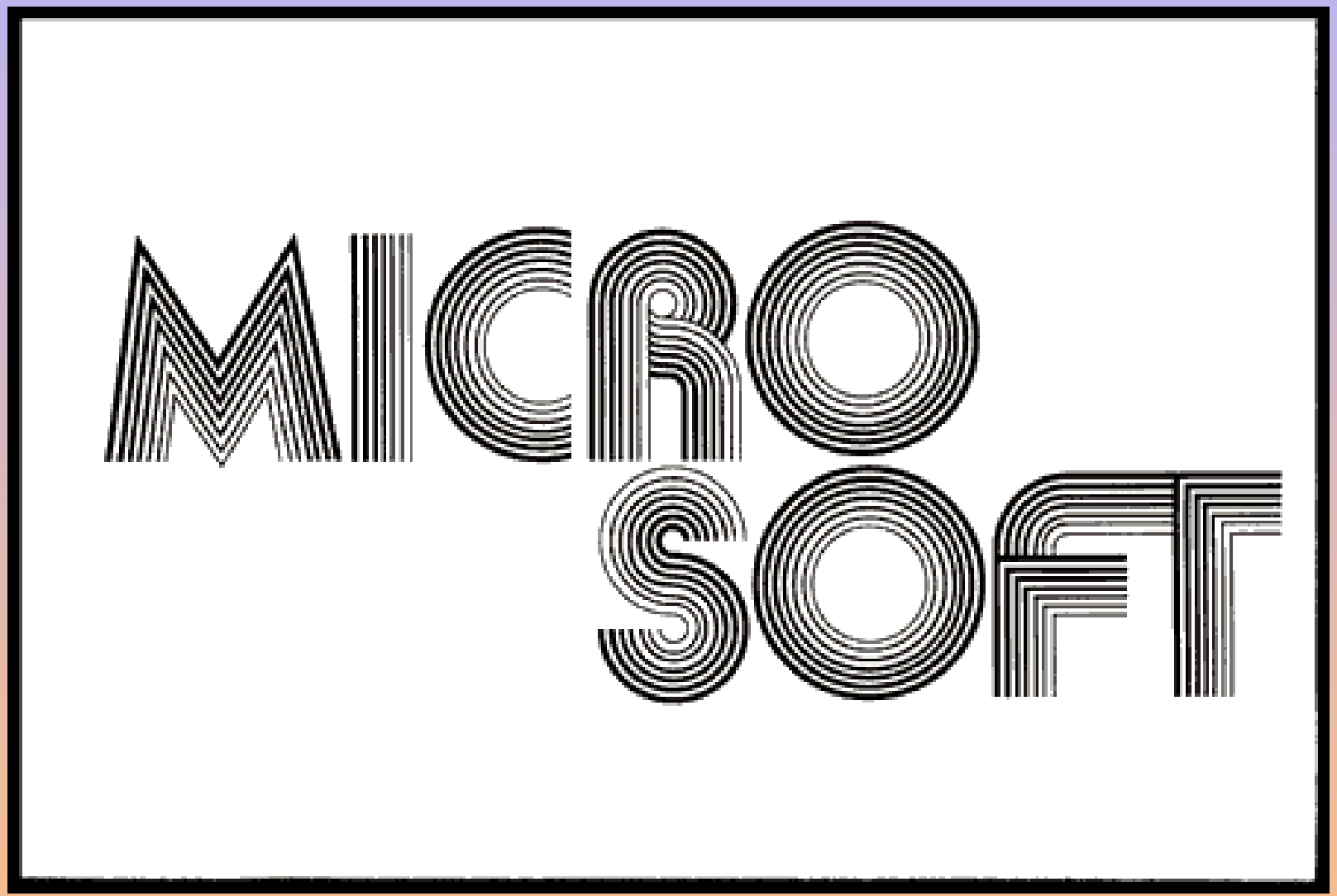
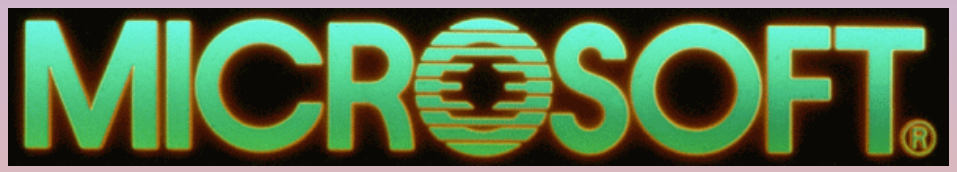



Micro Soft logo

# A Short Computer History Chronology




Microsoft logo in the mid 80s

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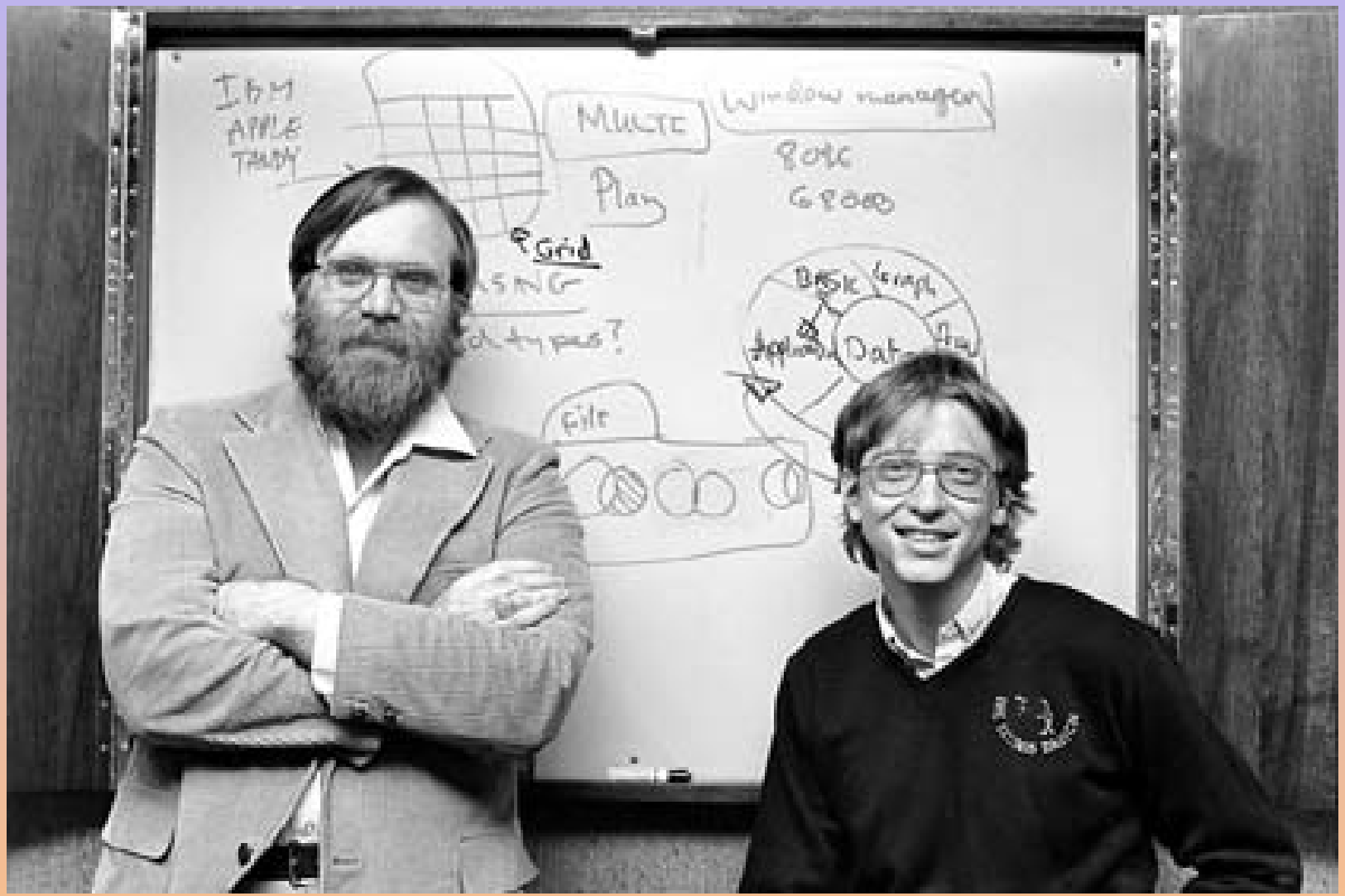


Paul Allen, Bill Gates

# A Short Computer History Chronology

Paul Allen, Altair Peecee, Bill Gates

# A Short Computer History Chronology


Paul Allen, Bill Gates

# A Short Computer History Chronology

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1975 IBM sells its first personnal computer, the PC 5100. 16K to 64K of memory, BASIC and APL, tape drive for program storage: $8,975 to $19,975.

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IBM PC 5100

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1976-04-01 Apple I is commercialized at $666.66 [Sanford, 2006].

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# A Short Computer History Chronology


Apple I

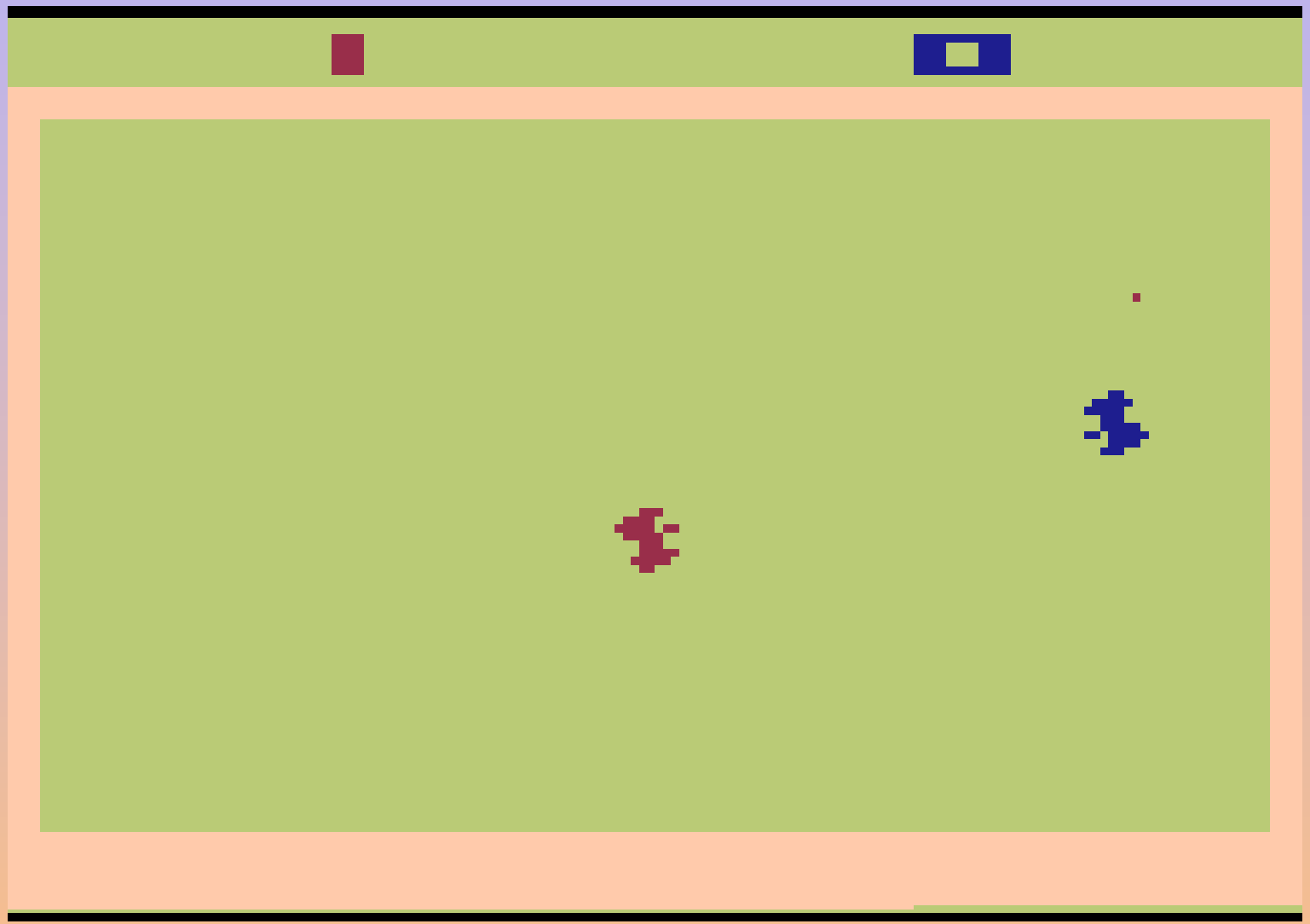
# A Short Computer History Chronology

1977-10 The Atari VCS 2600 is introduced on the US market [WAtari2600].

# A Short Computer History Chronology

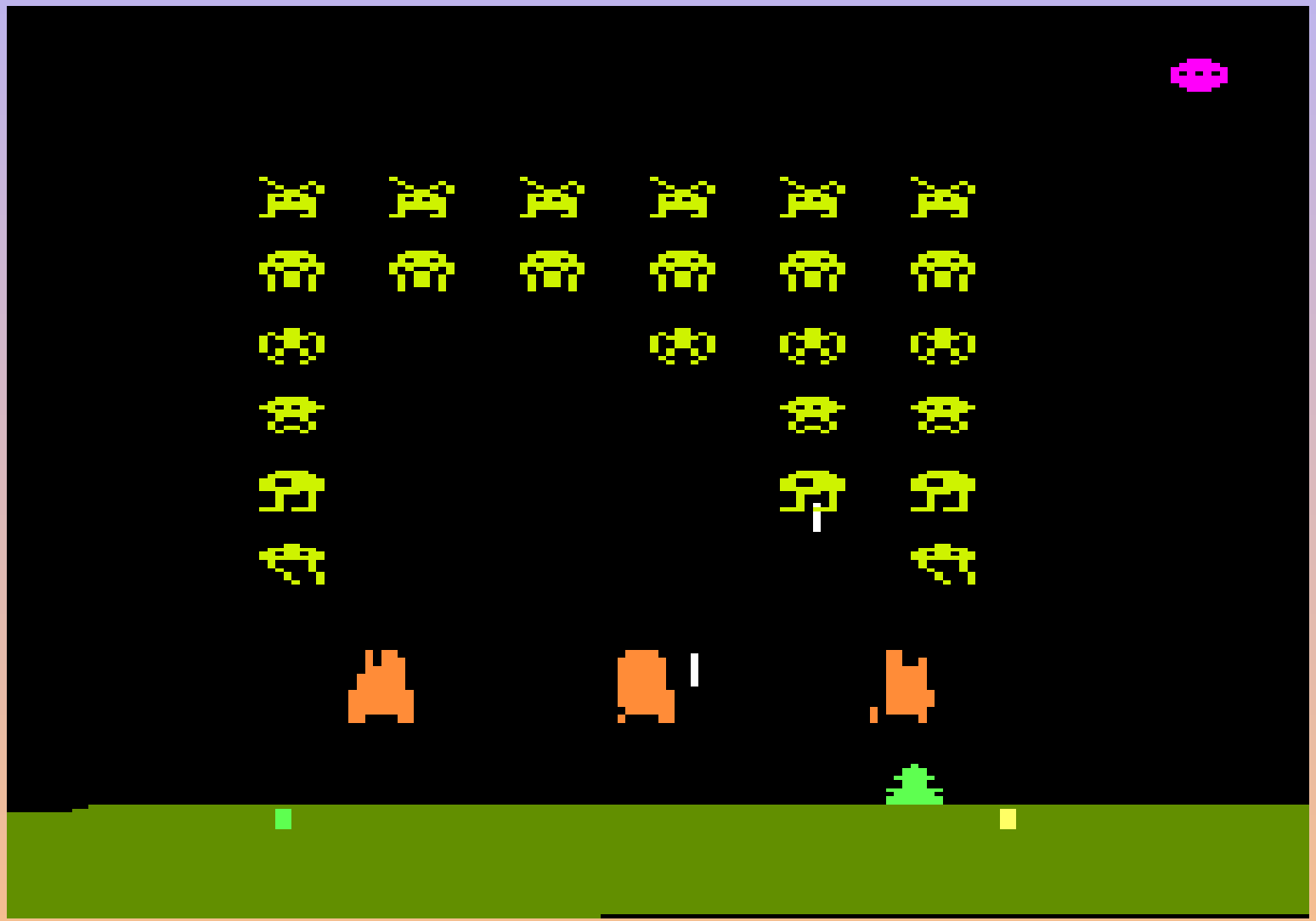

Atari VCS 2600

# A Short Computer History Chronology



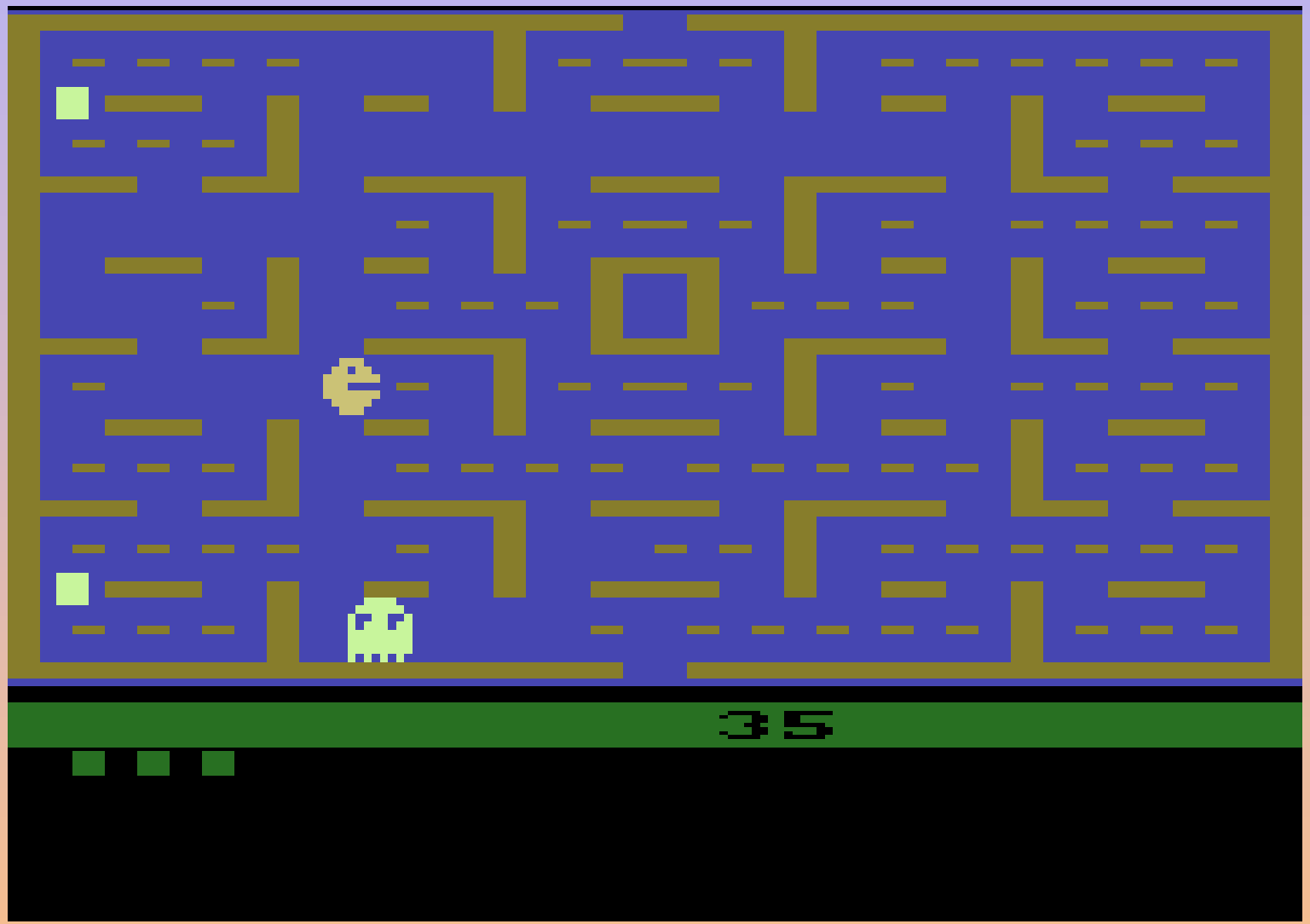
Combat (1977)

# A Short Computer History Chronology



Space Invaders (1980)

# A Short Computer History Chronology

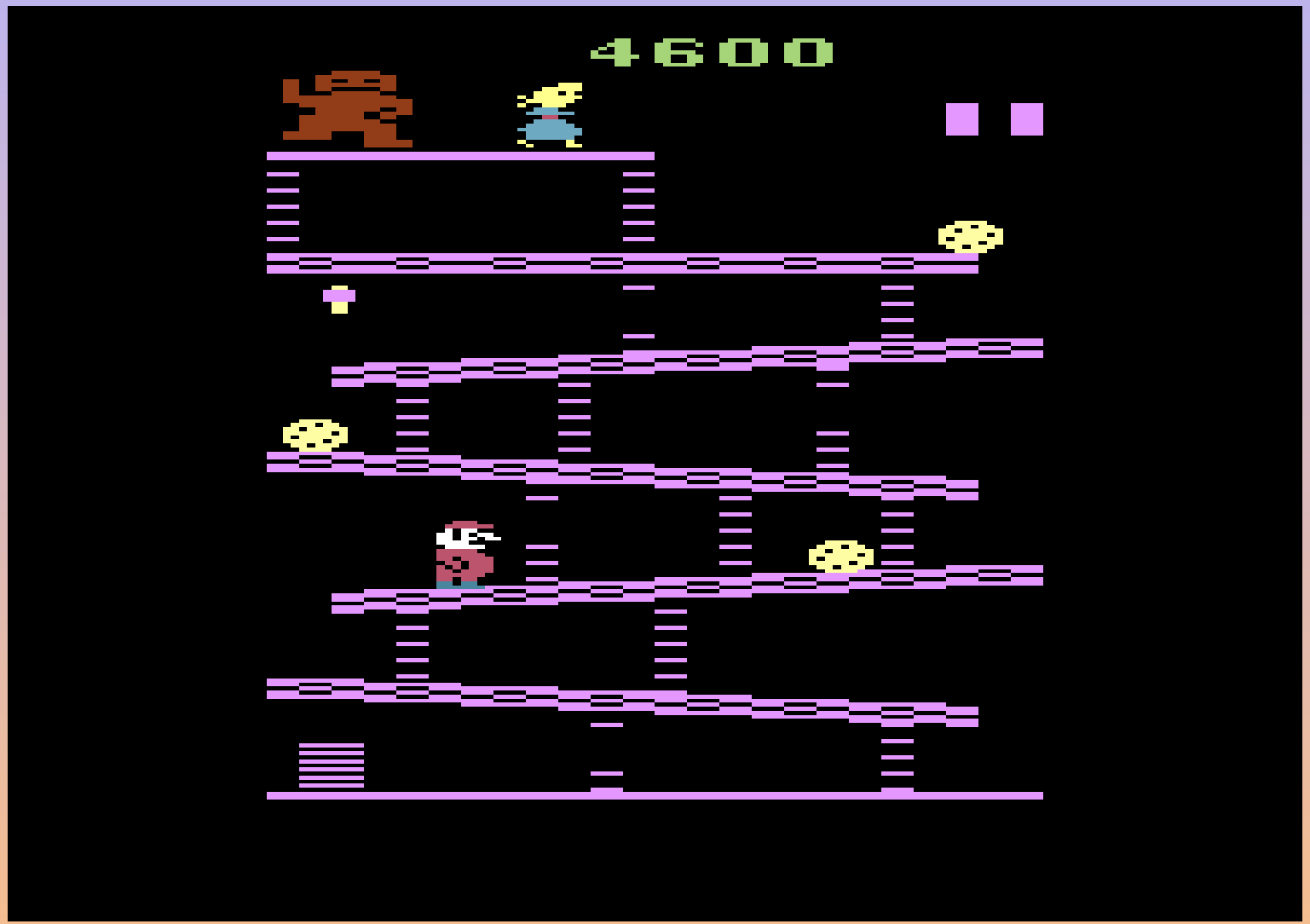



Pacman (1982)

# A Short Computer History Chronology


Atlantis (1982)

# A Short Computer History Chronology




Donkey Kong (1982)

# A Short Computer History Chronology


ET (1982)

# A Short Computer History Chronology


Pitfall (1982)

# A Short Computer History Chronology


Pole Position (1983)

# A Short Computer History Chronology


Video games are a huge success

# A Short Computer History Chronology

1977-12-13 Bill Gates arrested for traffic infraction.

# A Short Computer History Chronology


Bill Gates Mugshot

# A Short Computer History Chronology

1977-04 Apple Computer introduces the Apple ][ personal computer.

# A Short Computer History Chronology


Apple ][

# A Short Computer History Chronology

Jed's Other Poem [Smith, 2007]

# A Short Computer History Chronology

1977 Apple, Commodore, and Tandy begin selling personal computers.

1978-06-11 Texas Instruments introduces the Speak-and-Spell educational toy [webmaster@99er.org, 2004].

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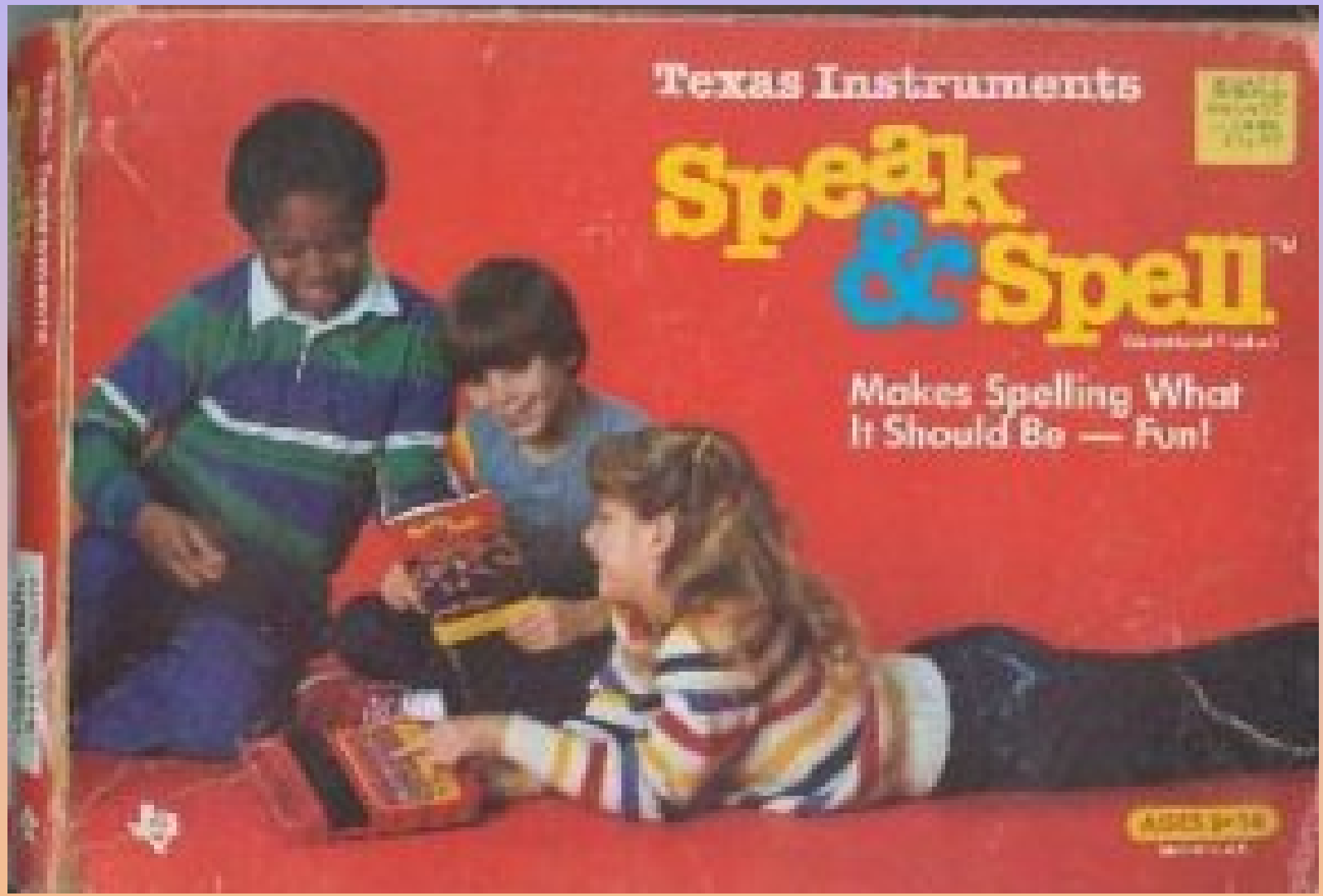


Speak & Spell Box

# A Short Computer History Chronology


La dictée magique

# A Short Computer History Chronology


Speak & Spell Ad

# A Short Computer History Chronology

Microsoft Staff, 1978 Dec 7th

# A Short Computer History Chronology

1978 Total computers in use in the U.S. exceed a half million units.

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The first spreadsheet program.

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HP-41 C [Hicks, 2003]

# A Short Computer History Chronology

1980 Sinclair's ZX80 is sold £99.95.

# A Short Computer History Chronology


Sinclair ZX 80 [Wzx80]

# A Short Computer History Chronology

UK 10 – elektor june 1980 advertisement

# Britain's first complete computer kit.

**A complete personal computer for a third of the price of a bare board.**

**Also available ready assembled for £99.95**

**The Sinclair ZX80.**

Until now, building your own computer could easily cost around £300 – and still leave you with only a bare board for your trouble.

The Sinclair ZX80 changes all that. For just £79.95 you get *everything* you need to build a personal computer at home... PCB, with IC sockets for all ICs; case; leads for direct connection to your own cassette recorder and television; everything!

And yet the ZX80 really is a complete, powerful, full-facility computer, matching or surpassing other personal computers on the market at several times the price. The ZX80 is programmed in BASIC, and you could use it to do quite literally anything from playing chess to running a power station.

The ZX80 is pleasantly straightforward to assemble, using a fine-tipped soldering iron. Once assembled, it immediately proves what a good job you've done. Connect it to your TV set... link it to an appropriate power source*... and you're ready to go.

**Your ZX80 kit contains...**

- Printed circuit board, with IC sockets for all ICs.
- Complete components set, including all ICs – all manufactured by selected world-leading suppliers.
- New rugged Sinclair keyboard, touch-sensitive, wipe-clean.
- Ready-moulded case.
- Leads and plugs for connection to any portable cassette recorder (to store programs) and domestic TV (to act as VDU).
- FREE course in BASIC programming and user manual.

**Optional extras**

- Mains adaptor of 600 mA at 9 V DC nominal unregulated (available separately – see coupon).
- Additional memory expansion board plugs in to take up to 1K bytes extra RAM chips. (Chips also available – see coupon.)

*Use a 600 mA at 9 V DC nominal unregulated mains adaptor. Available from Sinclair if desired (see coupon

**Two unique and valuable components of the Sinclair ZX80.**

The Sinclair ZX80 is not just another personal computer. Quite apart from its exceptionally low price, the ZX80 has two uniquely advanced components: the Sinclair BASIC interpreter, and the Sinclair teach-yourself BASIC manual.

**The unique Sinclair BASIC interpreter...** offers remarkable programming advantages:

- **Unique 'one-touch' key word entry: the ZX80 eliminates a great deal of tiresome typing. Key words (RUN, PRINT, LIST, etc.) have their own single-key entry.**
- Unique syntax check. Only lines with correct syntax are accepted into programs. A cursor identifies errors immediately. This prevents entry of long and complicated programs with faults only discovered when you run them.
- Excellent string-handling capability – takes up to 26 string variables of any length. All strings can undergo all relational tests (e.g. comparison). The ZX80 also has string input-to request a line of text when necessary. Strings do *not* need to be dimensioned.
- Up to 26 single dimension arrays.
- FOR/NEXT loops nested up 26.
- Integer names of any length.
- BASIC language also handles full Boolean arithmetic, conditional expressions, etc.
- Exceptionally powerful edit facilities, allows modification of existing program lines.
- Randomise function, useful for games and secret codes, as well as more serious applications.
- Timer under program control.
- PEEK and POKE enable entry of machine code instructions, USR causes jump to a user's machine language sub-routine.
- High-resolution graphics with 22 standard graphic symbols.
- All characters printable in reverse under program control.

**...and the Sinclair teach-yourself BASIC manual.**

If the features of the Sinclair interpreter listed alongside mean little to you – don't worry. They're all explained in the specially-written 96-page book *free* with every kit! The book makes learning easy, exciting and enjoyable, and represents a complete course in BASIC programming – from first principles to complex programs. (Available separately – purchase price refunded if you buy a ZX80 later.)



advertisement elektor june 1980 – UK 11



**£79.95**
Including VAT.
Including post and packing.
Including all leads and components




**Fewer chips, compact design, volume production – more power per pound!**

The ZX80 owes its remarkable low price to its remarkable design: the whole system is packed onto fewer, newer, more powerful and advanced LSI chips. A single SUPER ROM, for instance, contains the BASIC interpreter, the character set, operating system, and monitor. And the ZX80's 1K byte RAM is roughly equivalent to 4K bytes in a conventional computer, because the ZX80's brilliant design packs the RAM so much more tightly. (Key words, for instance, occupy just a single byte.)

To all that, add volume production – and you've that rare thing: a price breakthrough that really *is* a breakthrough.

**The Sinclair ZX80. Kit: £79.95. Assembled: £99.95. Complete!**

The ZX80 kit costs a mere £79.95. Can't wait to have a ZX80 up and running? No problem! It's also available, ready assembled, for only £99.95.

Whether you choose the kit or the ready-made, you can be sure of world-famous Sinclair technology – and years of satisfying use. (Science of Cambridge Ltd is one of the Sinclair companies owned and run by Clive Sinclair.)

To order, complete the coupon, and post to Science of Cambridge for delivery within 28 days. Return as received within 14 days for full money refund if not completely satisfied.

sinclair ZX80
Science of Cambridge Ltd
6 Kings Parade, Cambridge, Cambs., CB2 1SN.
Tel: 0223 311488.

**Order Form**

**To: Science of Cambridge Ltd, 6 Kings Parade, Cambridge, Cambs., CB2 1SN.**
Remember: all prices shown *include* VAT, postage and packing. No hidden extras.

Please send me:

| Quantity | Item | Item price £ | Total £ |
|---|---|---|---|
| | Sinclair ZX80 Personal Computer kit(s). Price includes ZX80 BASIC manual, excludes mains adaptor. | 79.95 | |
| | Ready-assembled Sinclair ZX80 Personal Computer(s). Price includes ZX80 BASIC manual, excludes mains adaptor. | 99.95 | |
| | Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated). | 8.95 | |
| | Memory Expansion Board(s) (takes up to 3K bytes). | 12.00 | |
| | RAM Memory chips – standard 1K bytes capacity | 16.00 | |
| | Sinclair ZX80 Manual(s) (manual free with every ZX80 kit or ready-made computer). | 5.00 | |
| | | TOTAL | £ |

*NB. Your Sinclair ZX80 may qualify as a business expense.*

I enclose a cheque/postal order payable to Science of Cambridge Ltd for £
Please print
Name: Mr/Mrs/Miss
Address

E6/80

Sinclair ZX 80 [Owen, 2003]

# A Short Computer History Chronology

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Sinclair ZX 81 with a 16Kb extension [Wzx81]

# A Short Computer History Chronology

1981 Commodore introduces the VIC-20 home computer, first computer to sell over one million units. 4Kb RAM.

# A Short Computer History Chronology

Commodore VIC-20

# A Short Computer History Chronology

1981-08-12 IBM “enters” the personal computer market with its model PC 5150.

# A Short Computer History Chronology

IBM PC 5150

# A Short Computer History Chronology

1981 Osborne 1, the first commercially successful portable computer.

# A Short Computer History Chronology

Osborne 1 [Thelen, 2003]

# A Short Computer History Chronology

1981 In September, MicroSoft starts the development of the Interface Manager (to become Windows) [City, ].

1983-01-03 The computer is “Machine of the Year”.

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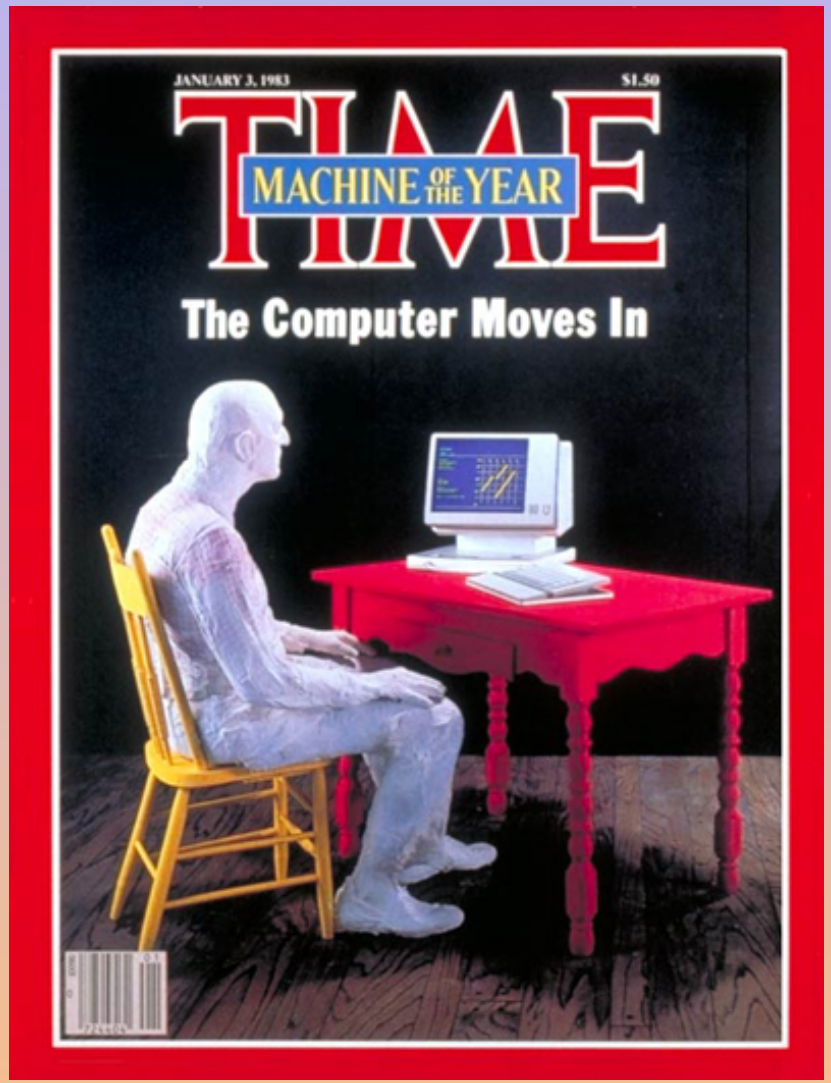
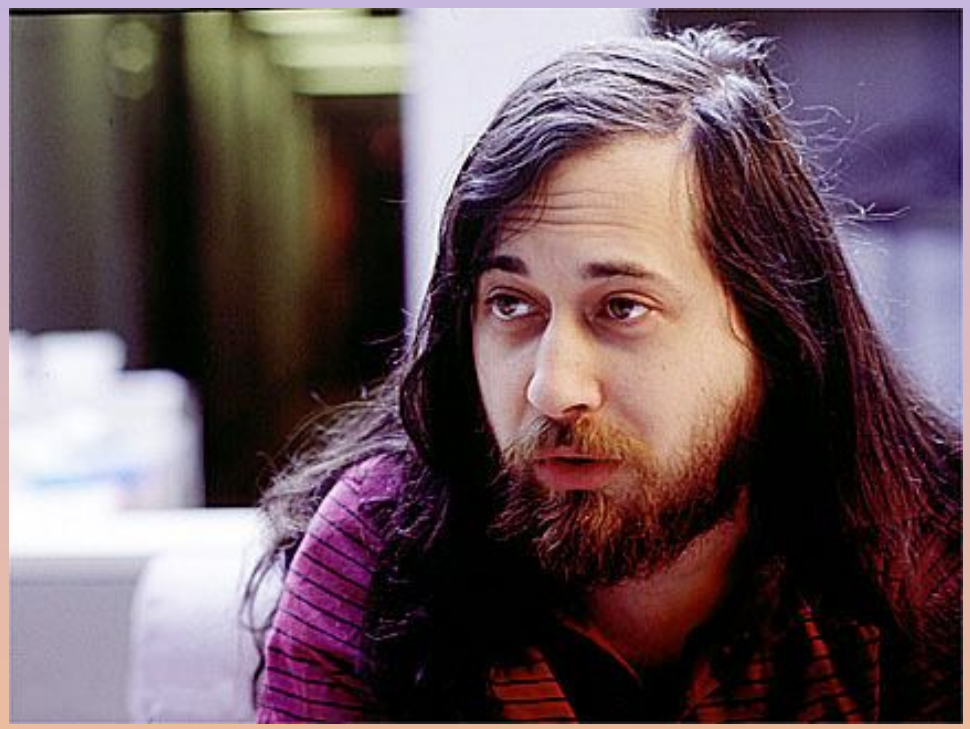



The Time Magazine Cover [Time Magazine, 1983]

# A Short Computer History Chronology

1983-09-27 Richard Stallman makes the first public announcement about the GNU project.

# A Short Computer History Chronology



Richard M. Stallman
[White Hat, Gray Hat, Black Hat, 2006]...

... taming a butterfly

# A Short Computer History Chronology


First CellPhone(1983)

# A Short Computer History Chronology

... Many events...

1984 Macintosh.

# A Short Computer History Chronology

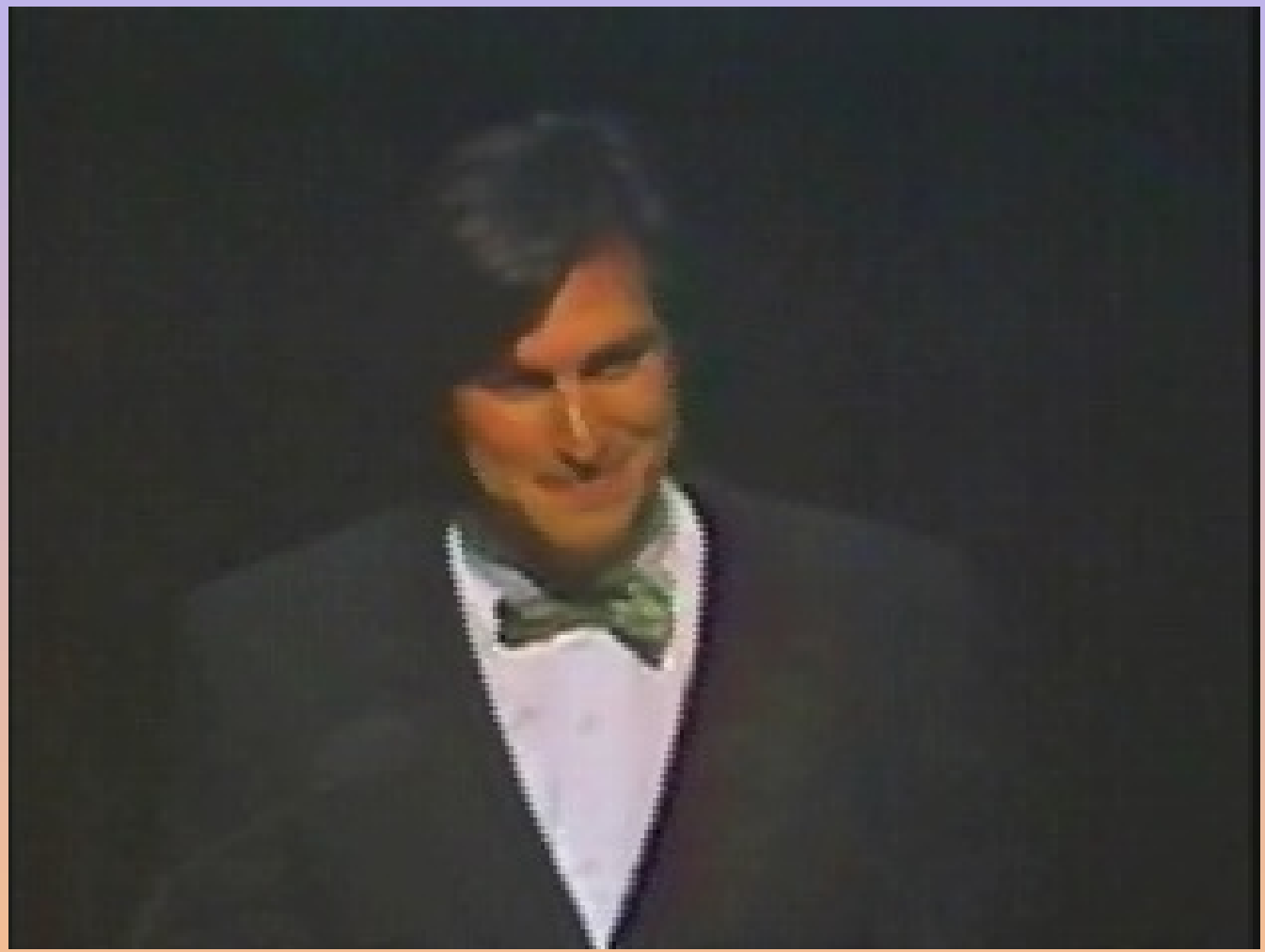
... Many events...

1984 Macintosh.

# A Short Computer History Chronology

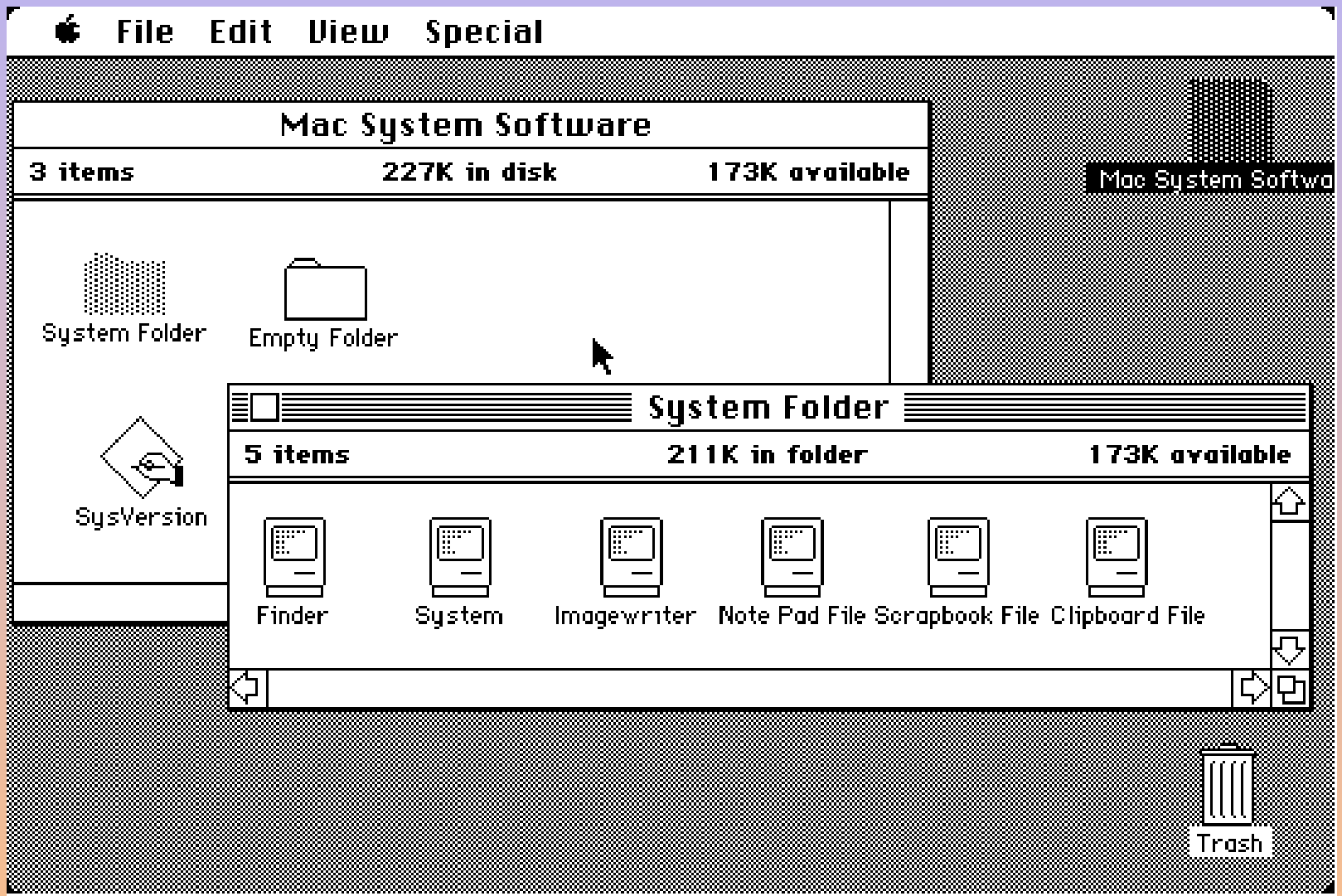
Macintosh Ad

# A Short Computer History Chronology



Introducing Macintosh

# A Short Computer History Chronology

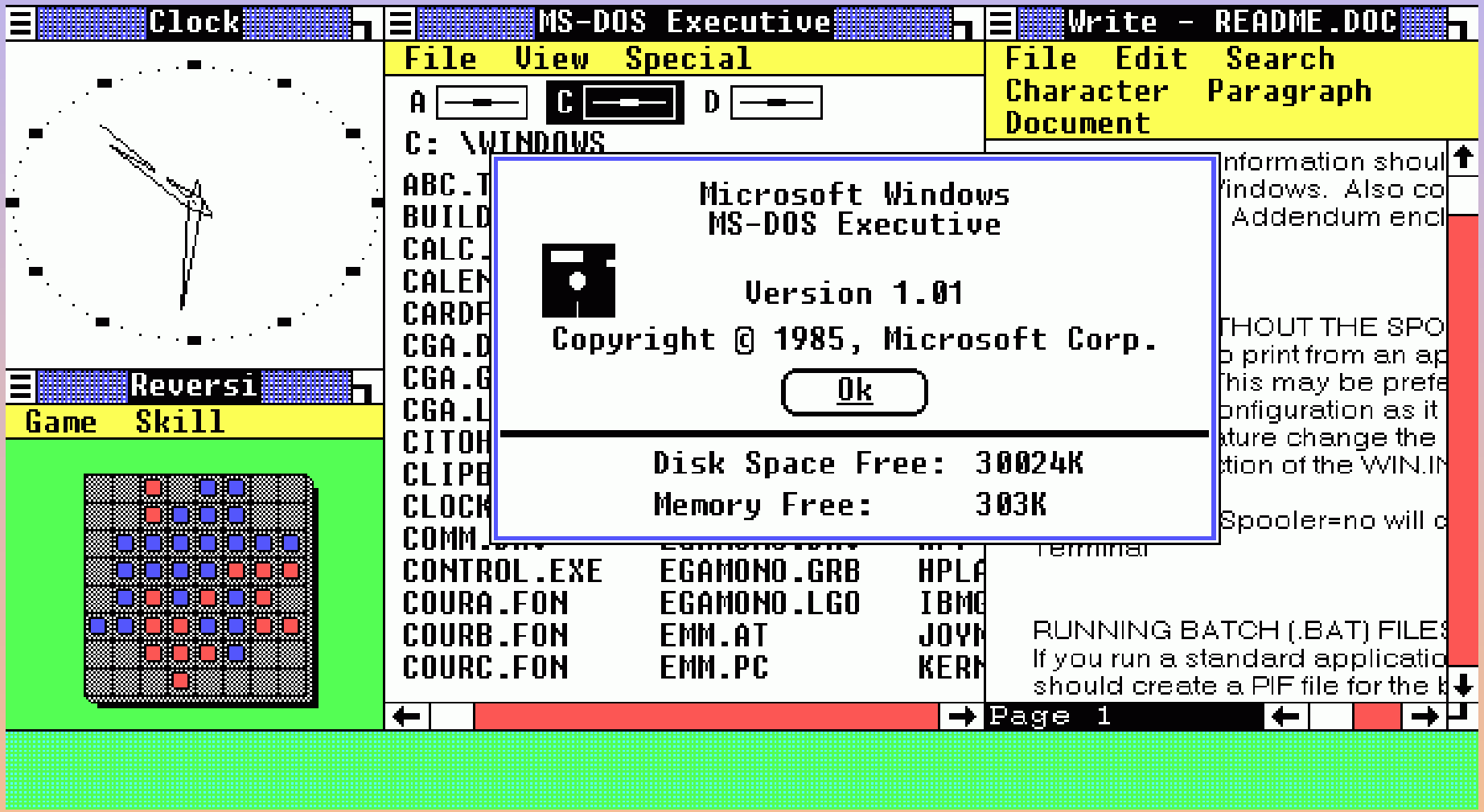



Macintosh System 1

# A Short Computer History Chronology

1985-11-20 Windows 1.0

# A Short Computer History Chronology




Windows 1.01

# A Short Computer History Chronology


Bill Gates in 1985

# A Short Computer History Chronology

Bill Gates in 1985

# A Short Computer History Chronology


Bill Gates in 1985

# A Short Computer History Chronology


Motorola Advisor Pagger (1990)

# A Short Computer History Chronology


PDA: Apple Newton (1993)

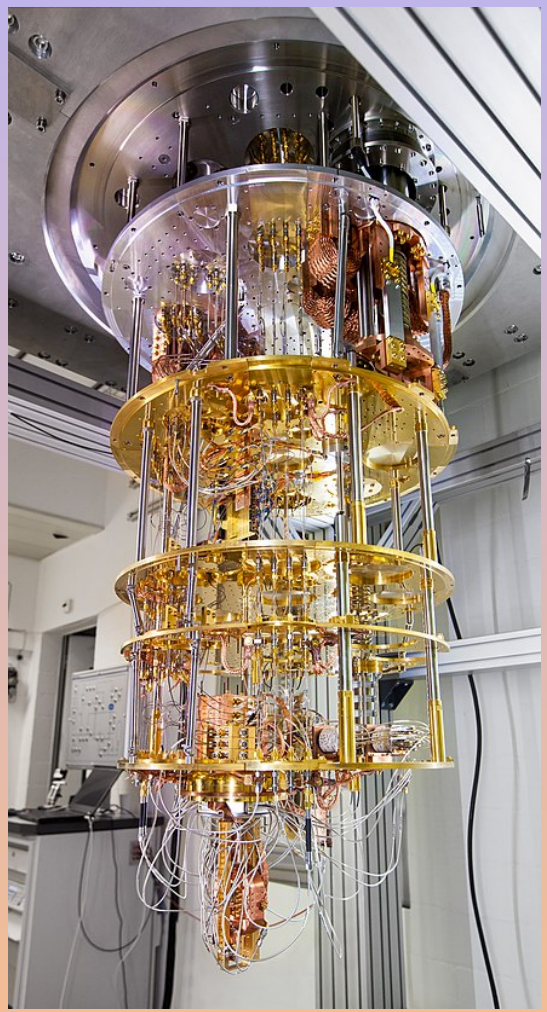
# A Short Computer History Chronology

2011-01-14 Watson beats the humans at Jeopardy!

# A Short Computer History Chronology


Watson at Jeopardy!

# A Short Computer History Chronology



Quantum Computer

# Changing Minds — 16 bits

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Read the instructions on your plasma screen

store your program an disc

And now you move with the cursor up and down
left and right.
Printing directly from the keyboard

change line fourty in your program

Insert a sheet of paper and let the system run.

Face the fact you're left in the dark
with the fantastic 8 megabyte computer.
Start by checking all the connections

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# Changing Minds — 16 bits

and now turn on the power.
While holding the bold key
activating the ram expansion port

Insert your final program
and then yau press 'return'.

Changing; changing; changing minds

If you have detected an error
enter the following command

Poke eighthundredandfiftyeight
one and two
three and four.

Pressing the backspace indicator
touch one of the red function keys

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Select the background colour
the white
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the green
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Count these pieces of information
don't be afraid
my friend

Learn to use this computer
don't try to lose control

If you don't follow these instructions
a five pound explosive charge
Will detonate in your face

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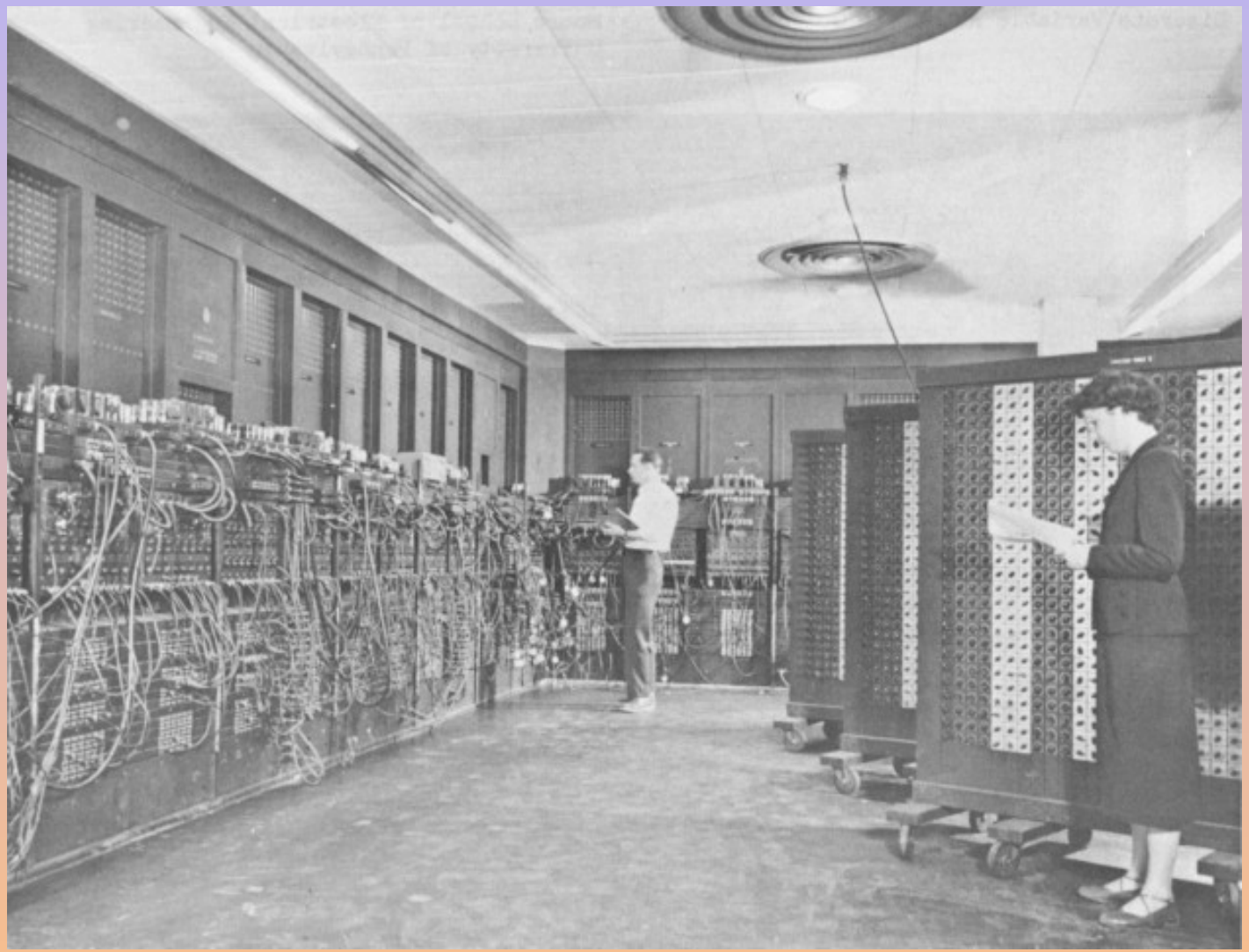
# Some Early Machines

# ENIAC

# Some Early Machines



ENIAC

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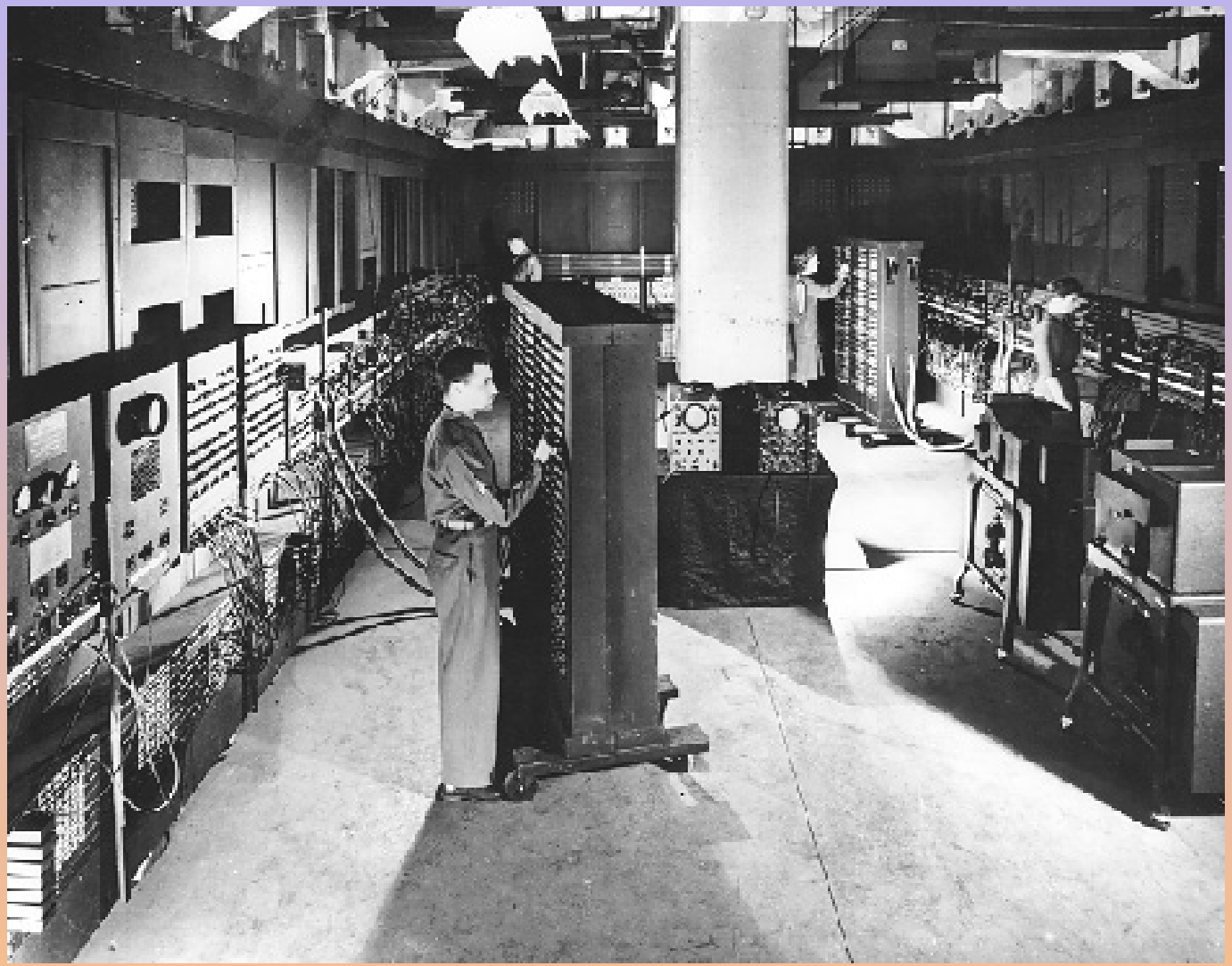

ENIAC

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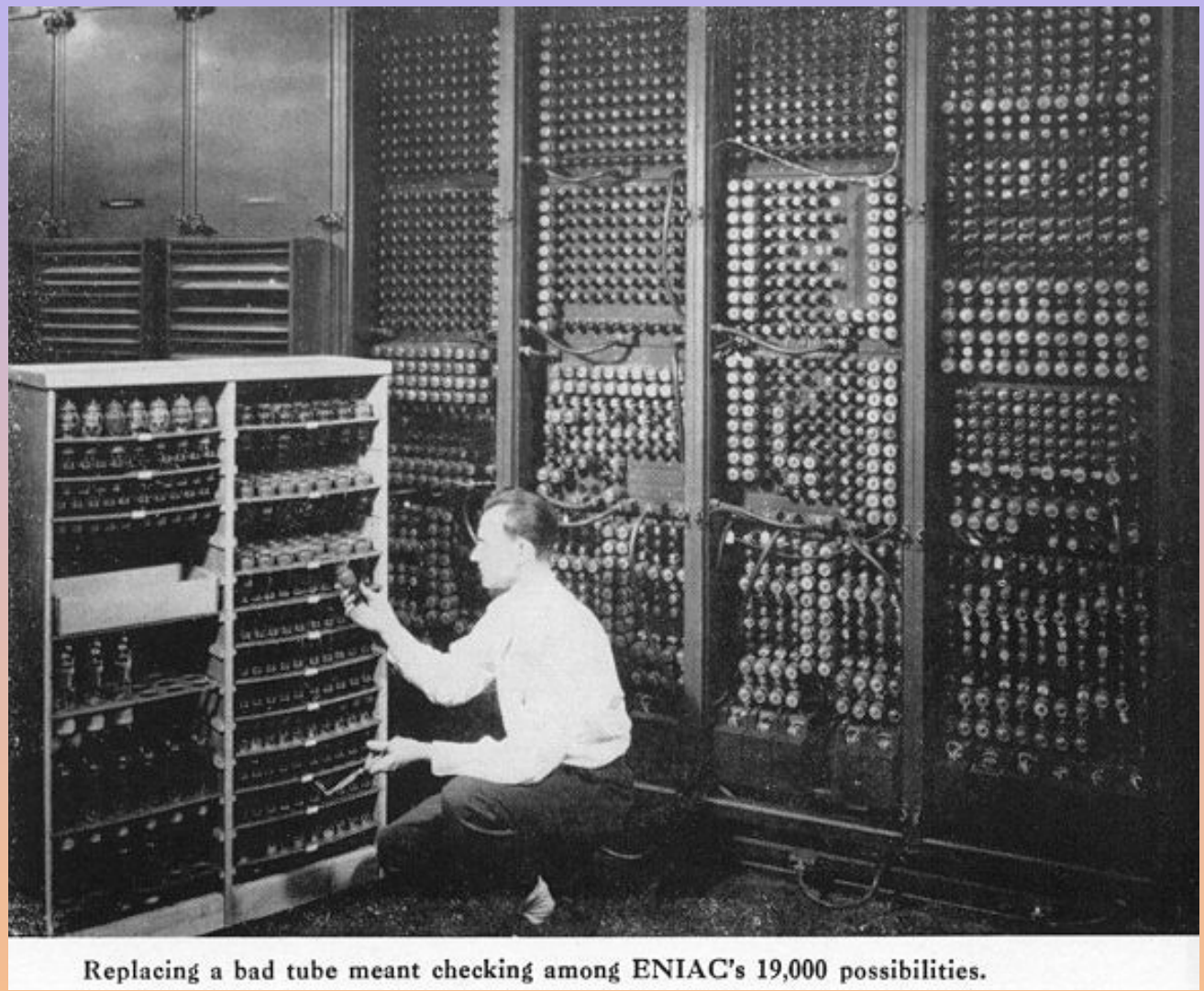
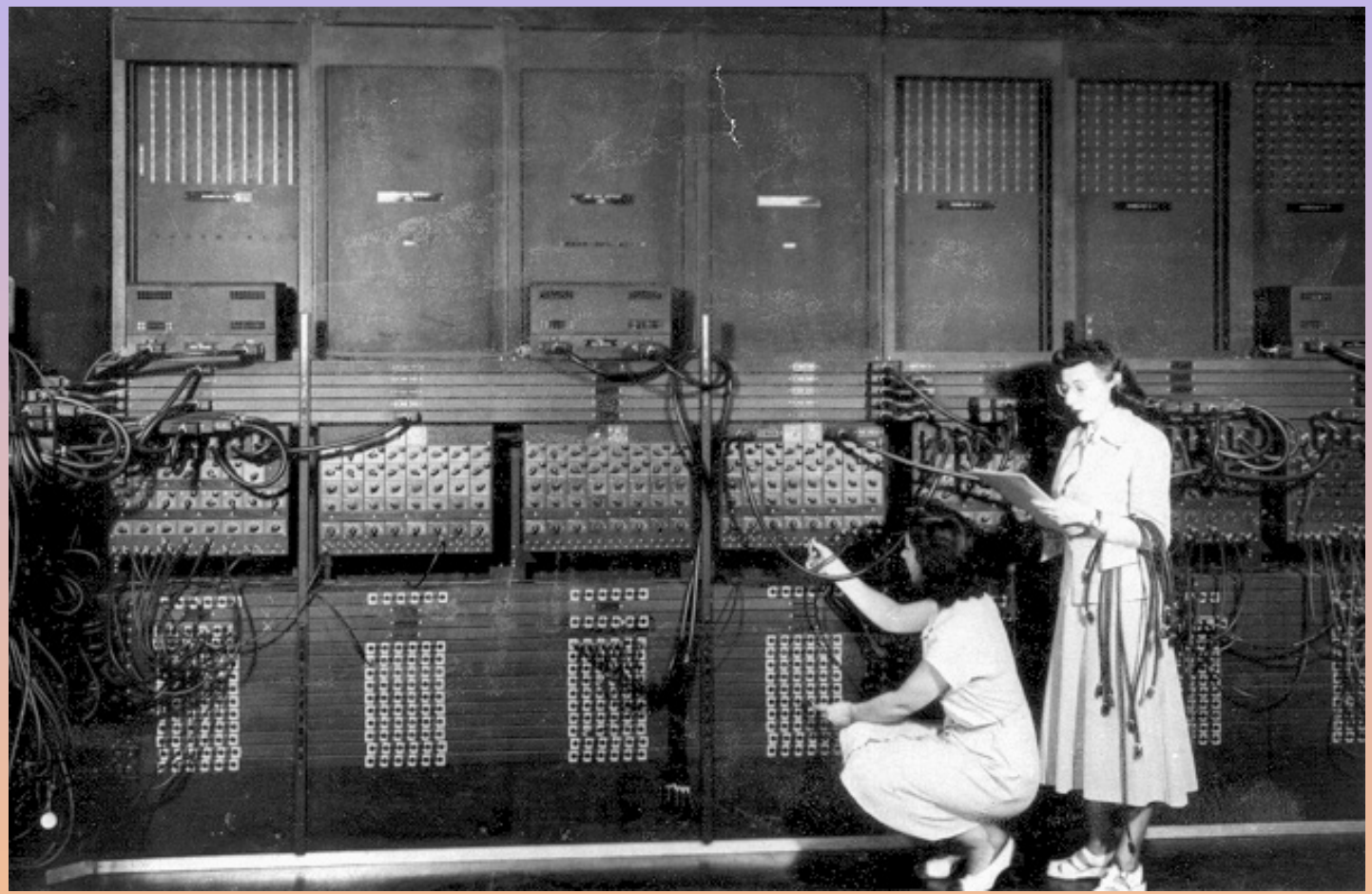


Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

ENIAC

# Some Early Machines



ENIAC

# ENIAC Figures

- 17,468 vacuum tubes
- 7,200 crystal diodes
- 1,500 relays
- 70,000 resistors
- 10,000 capacitors
- around 5 million hand-soldered joints

- 27 tons
- roughly 2.4 m by 0.9 m by 30 m
- took up 167 m2
- consumed 150 kW of power ($60/d)
- $500,000

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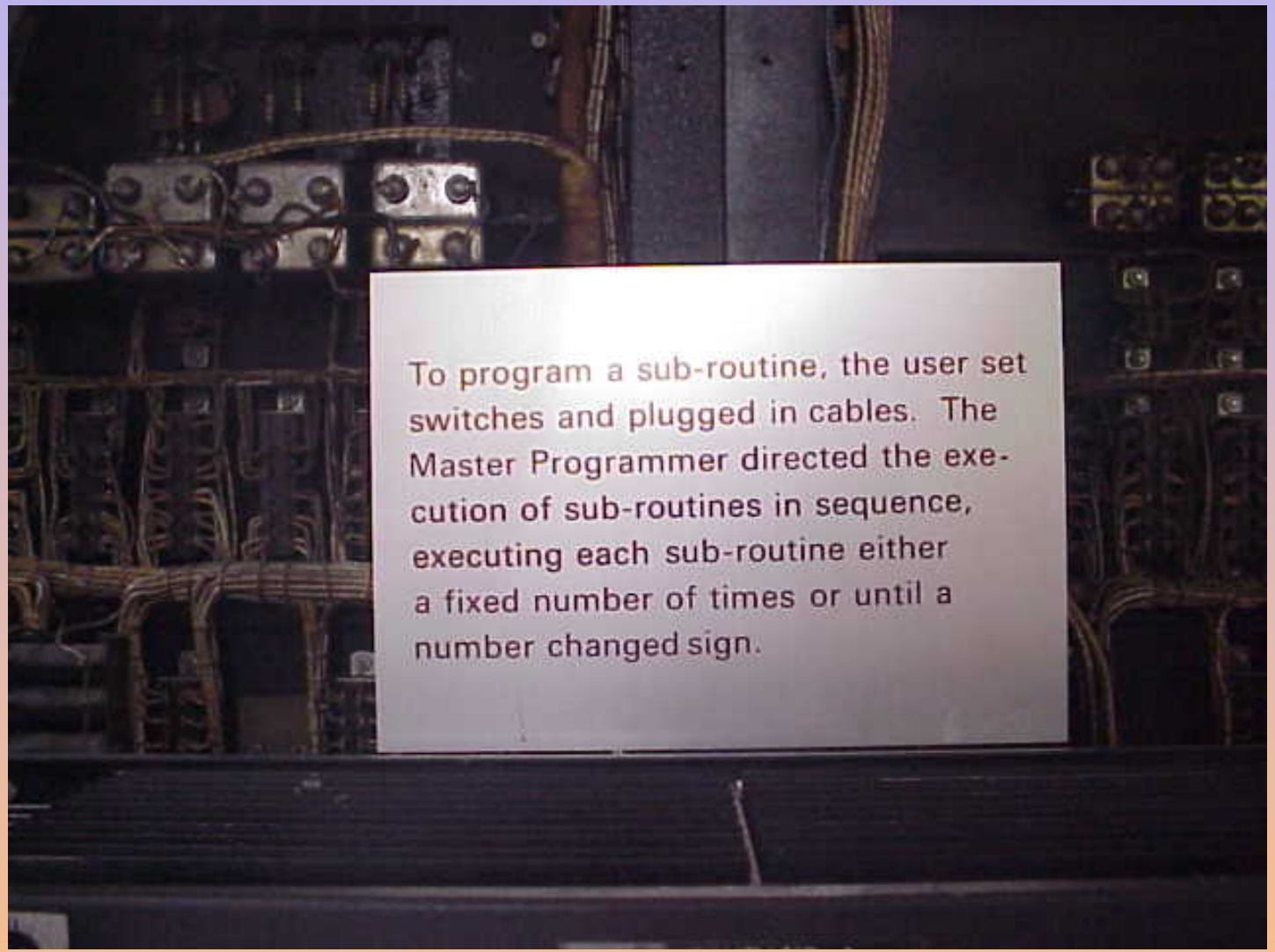
As of 2004, a chip of silicon measuring 0.5 mm square holds the same capacity as the ENIAC

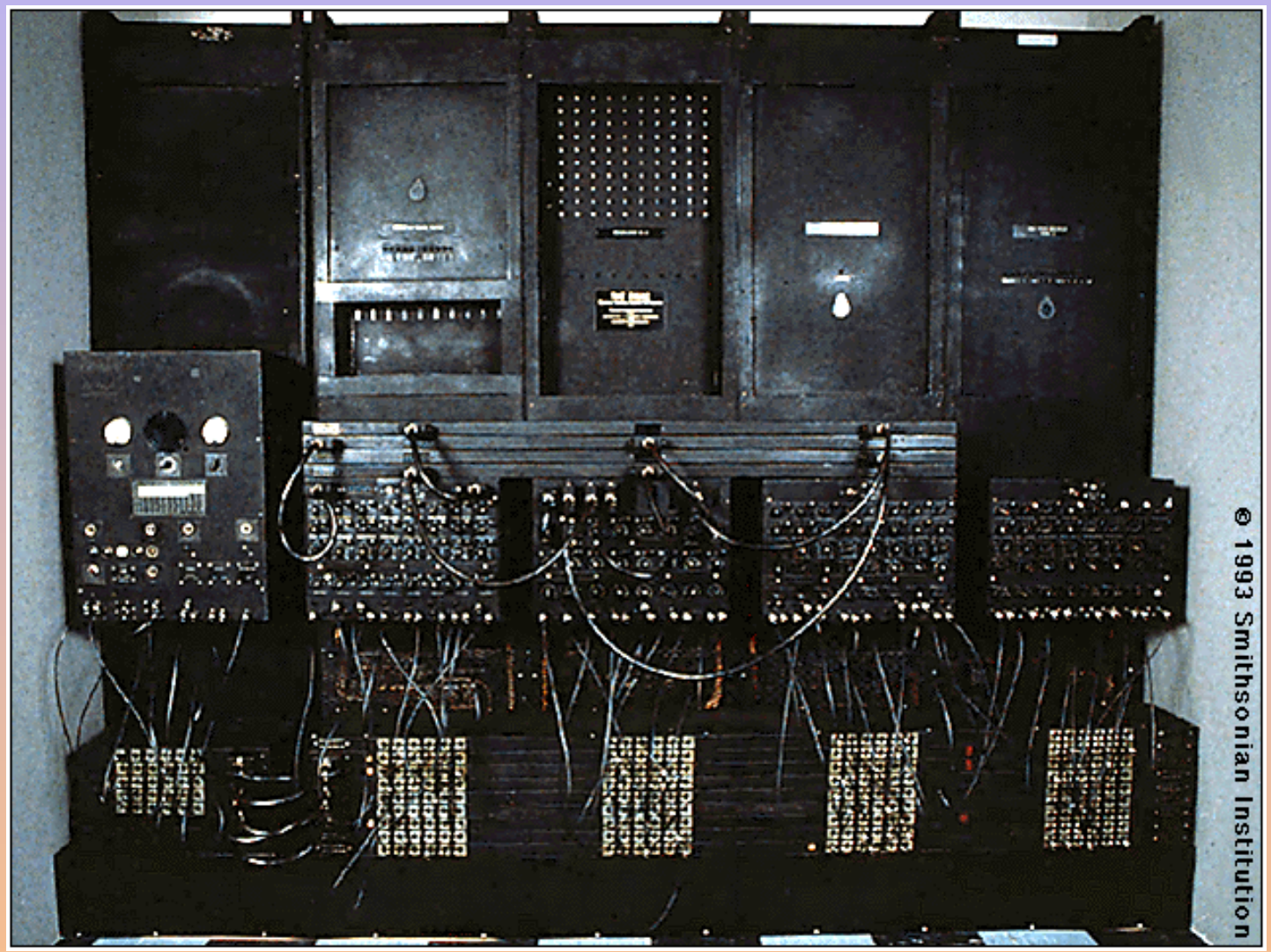
# ENIAC: A Product

# Some Early Machines



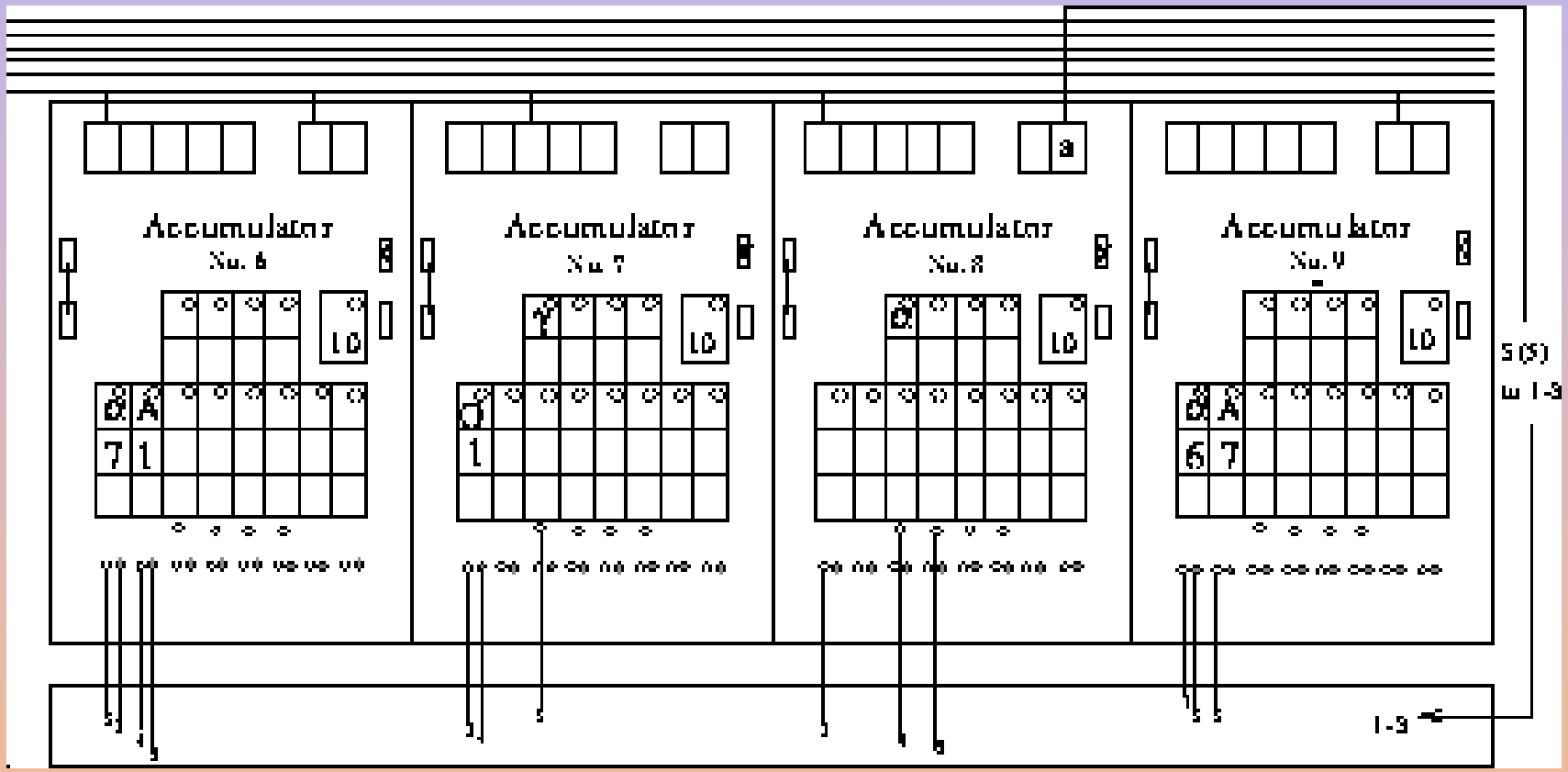

ENIAC Programming

# Some Early Machines




ENIAC Programming [National Museum of American History, 2003a]

# Some Early Machines




ENIAC Programming

# ENIAC Program

1. Leave the existing programming on Accumulators 6 and 9 intact.
2. Set Accumulator 8 to clear by removing all cables from it.
3. Set Accumulator 7 to take care of the dummy program.
   1. Attach Program Line 1-3 to program input terminal 5i.
   2. Attach Program Line 1-4 to program output terminal 5o.
   3. Set the Operation Switch for Program Control 5 to O.
   4. Set the Repeat Switch for Program Control 5 to 1.
4. Set Accumulator 6 to transmit.
   1. Change connection of program output input terminal 6i from Program Line 1-3 to Program Line 1-4.
   2. Connect Program Line 1-5 to program output terminal 6o.
   3. Connect digit output terminal A to a Digit Line. Set the Operation Switch for Program Control 6 to A.
   4. Set the Repeat Switch for Program Control 6 to 1.
1. Set Accumulator 8 to receive input.
   1. Connect Program Line 1-4 to program input terminal 1i.
   2. Connect digit input terminal $\alpha$ to the Digit Line.
   3. Set the Operation Switch for Program Control 1 to $\alpha$.
2. Set Accumulator 8 to branch.
   1. Connect Program Line 1-5 to program input terminal 2i.
   2. Set the Operation Switch for Program Control 2 to S.
   3. Now use the special cable to connect decade 5 from digit output terminal S to Program Line 1-3.
3. Clear the Eniac.
4. Start the Eniac.

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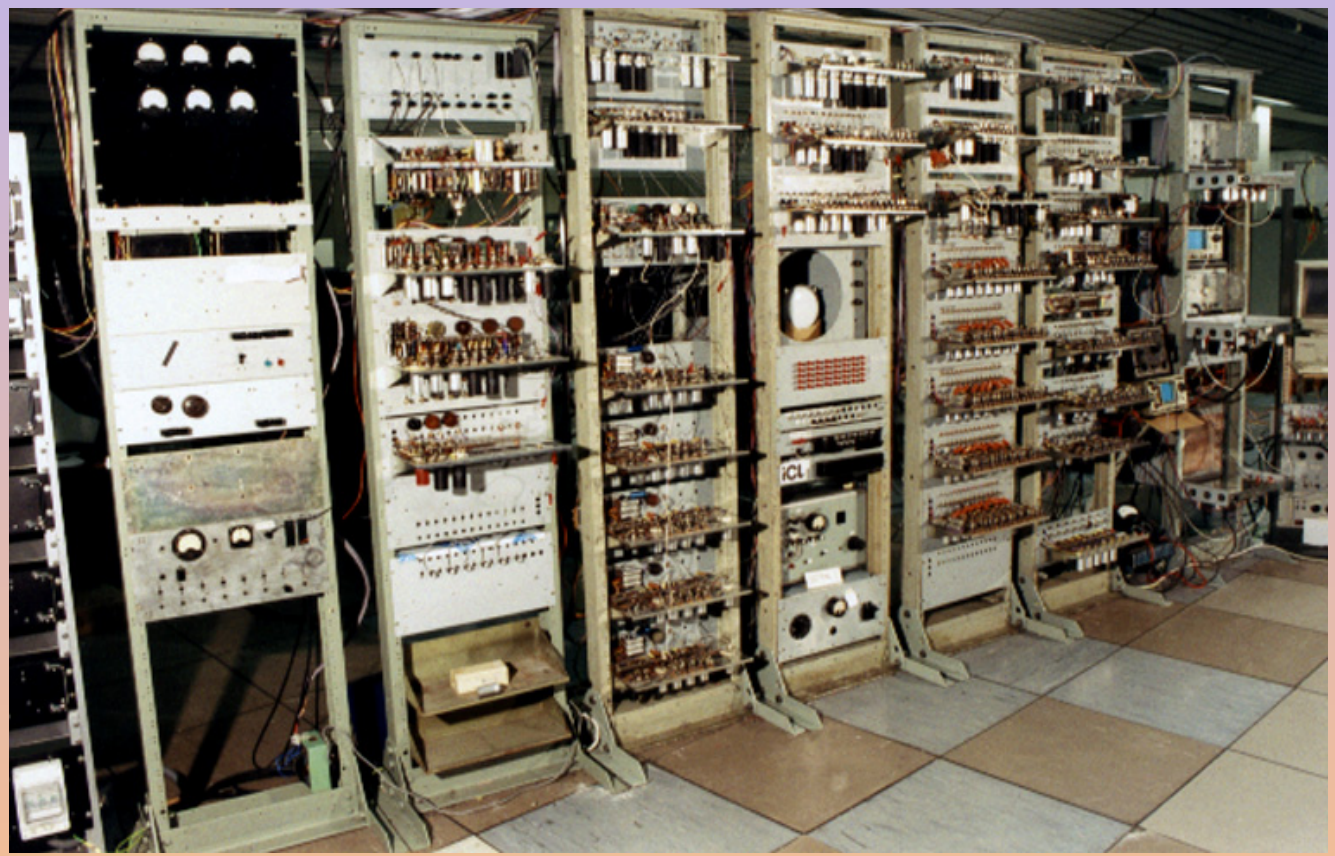
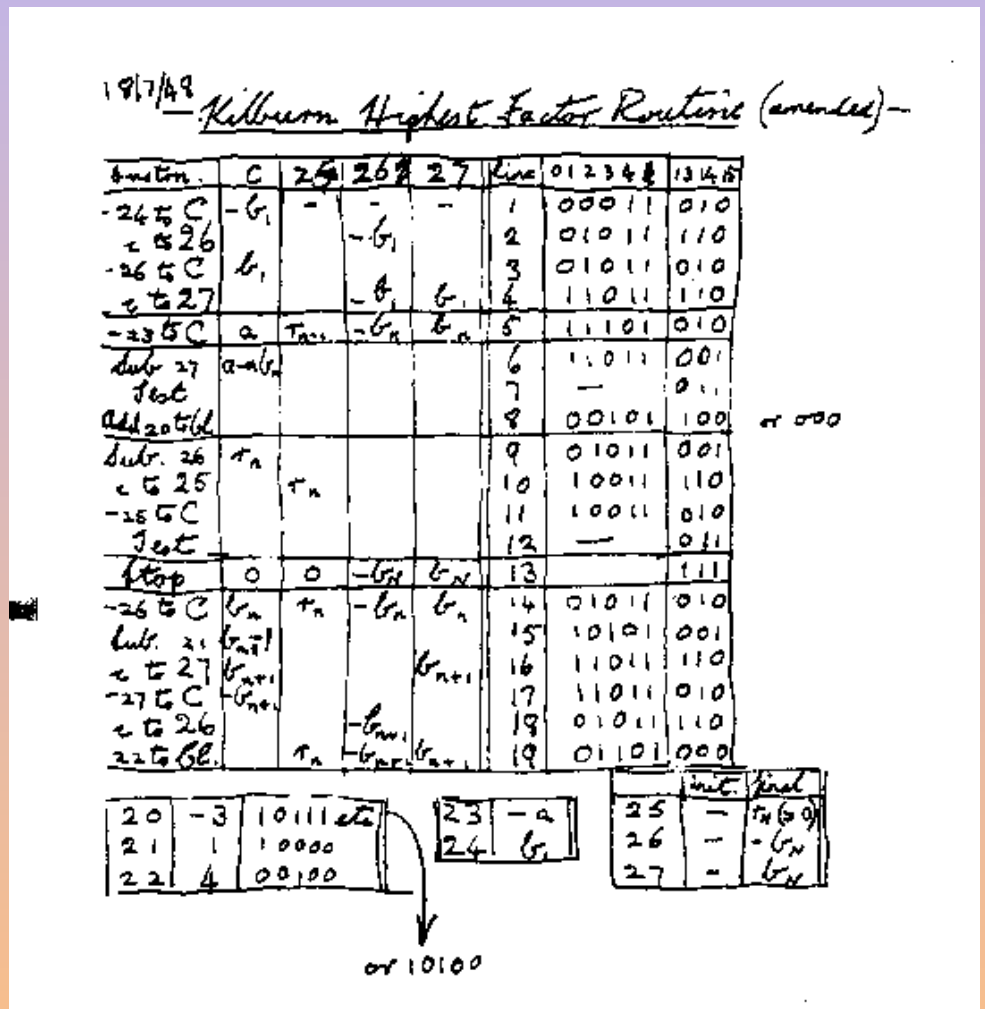
# The Baby

# The Manchester Small Scale Experimental Machine: The Baby [Computer50, 2002]



The world's first stored-program electronic digital computer.

# The First Baby Program: 21st June 1948 [Computer50, 2002]



# The Baby Characteristics [Computer50, 2002]

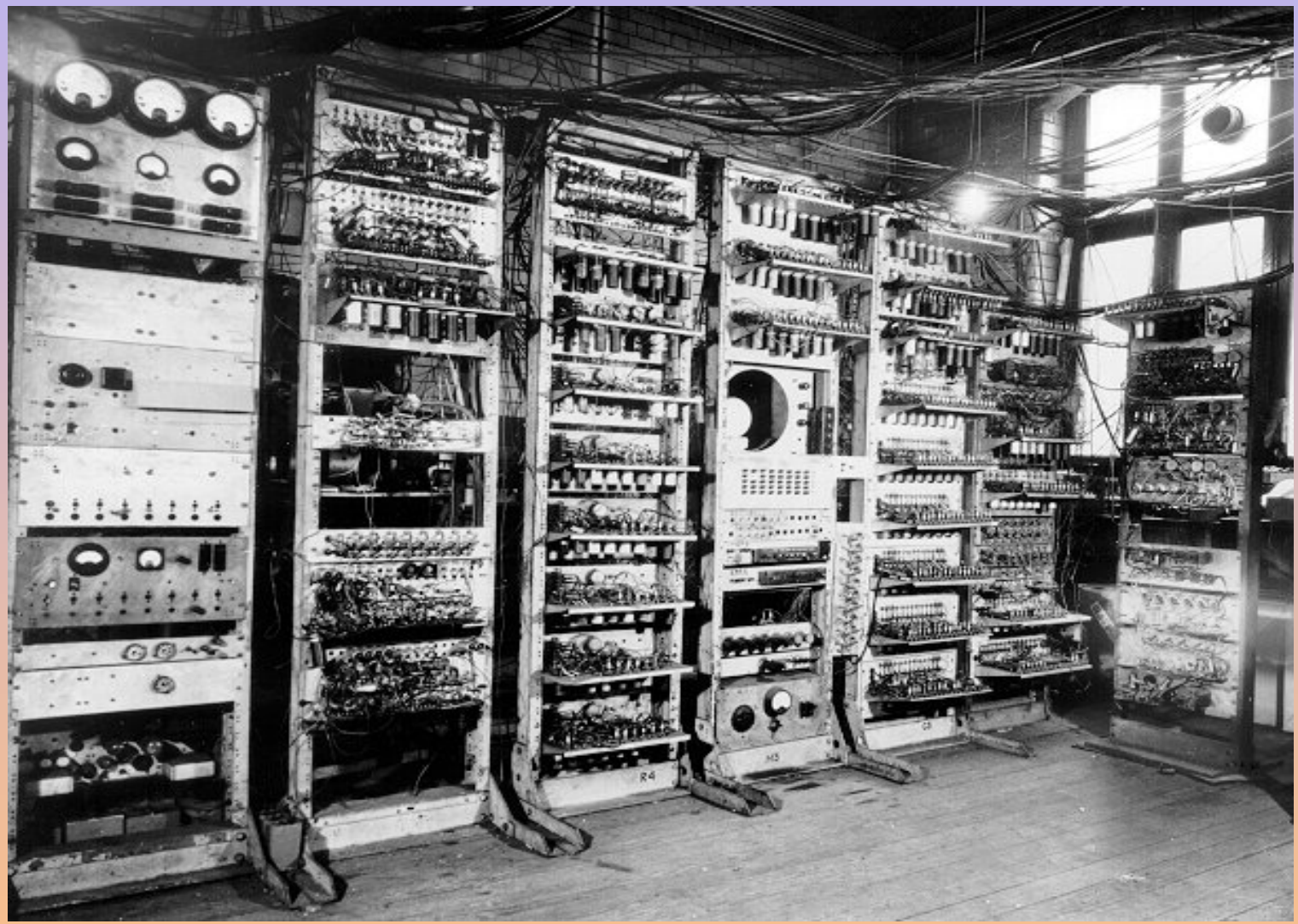
- 32-bit word length
- Serial binary arithmetic using 2's complement integers
- A single address format order code
- A random access main store of 32 words, extendable up to 8192 words
- A computing speed of around 1.2 milliseconds per instruction
- Program and data in the same "RAM".

# The Baby Instructions [Computer50, 2002]

The instruction format was : 3-bit function field (bits 13 to 15) – 13-bit store address (0 to 12) – 16 bits unused
There were 7 instructions:

- `A := - S` ("S": the contents of the word with address S)
- `A := A - S`
- `S := A`
- `If A < 0, PC := PC + 1` (if A negative, skip the next instruction)
- `PC := S`
- `PC := PC + S`
- `Halt the program`

# Manchester Mark I



# Ferranti Pegasus

# Some Early Machines


Ferranti Pegasus

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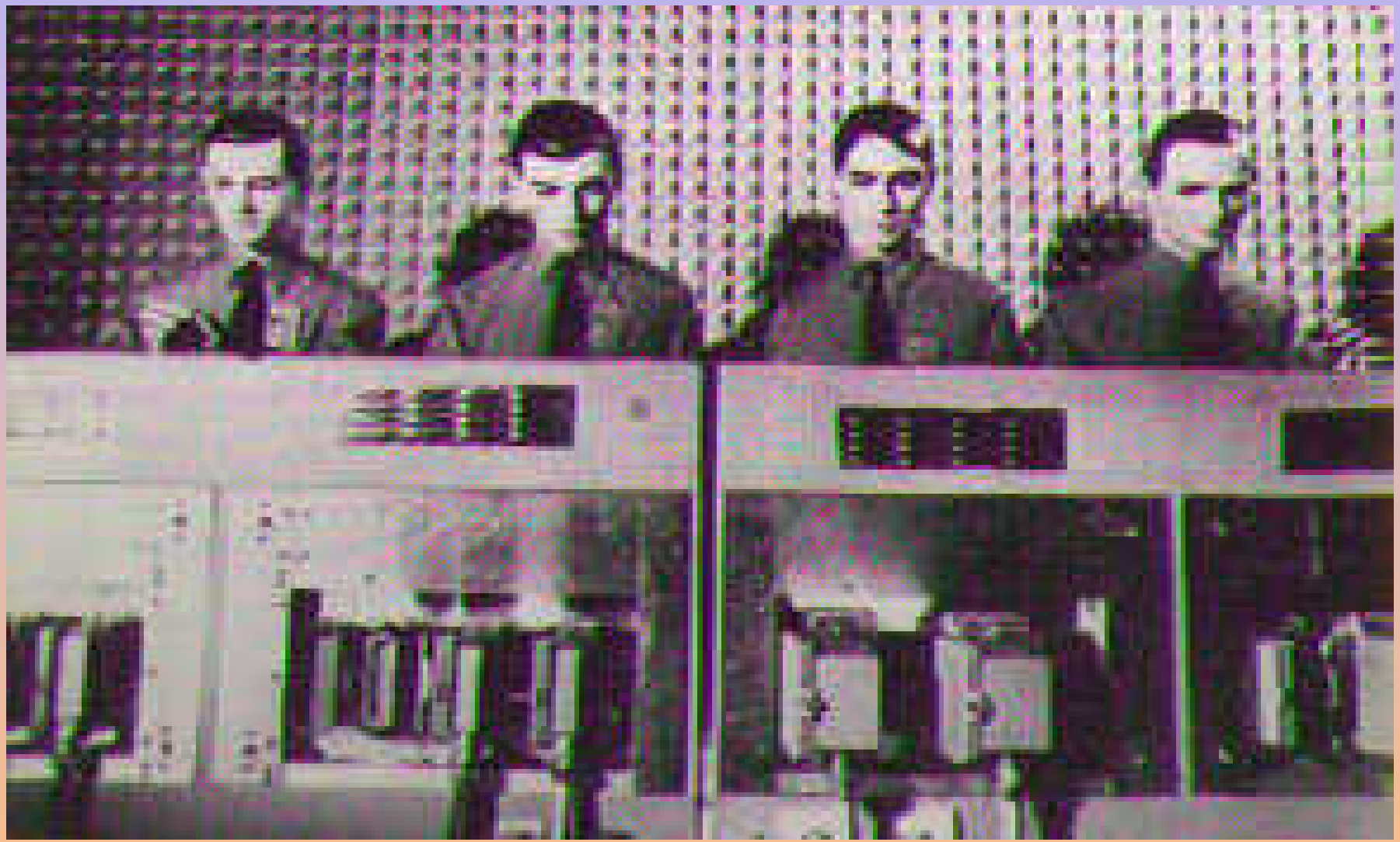
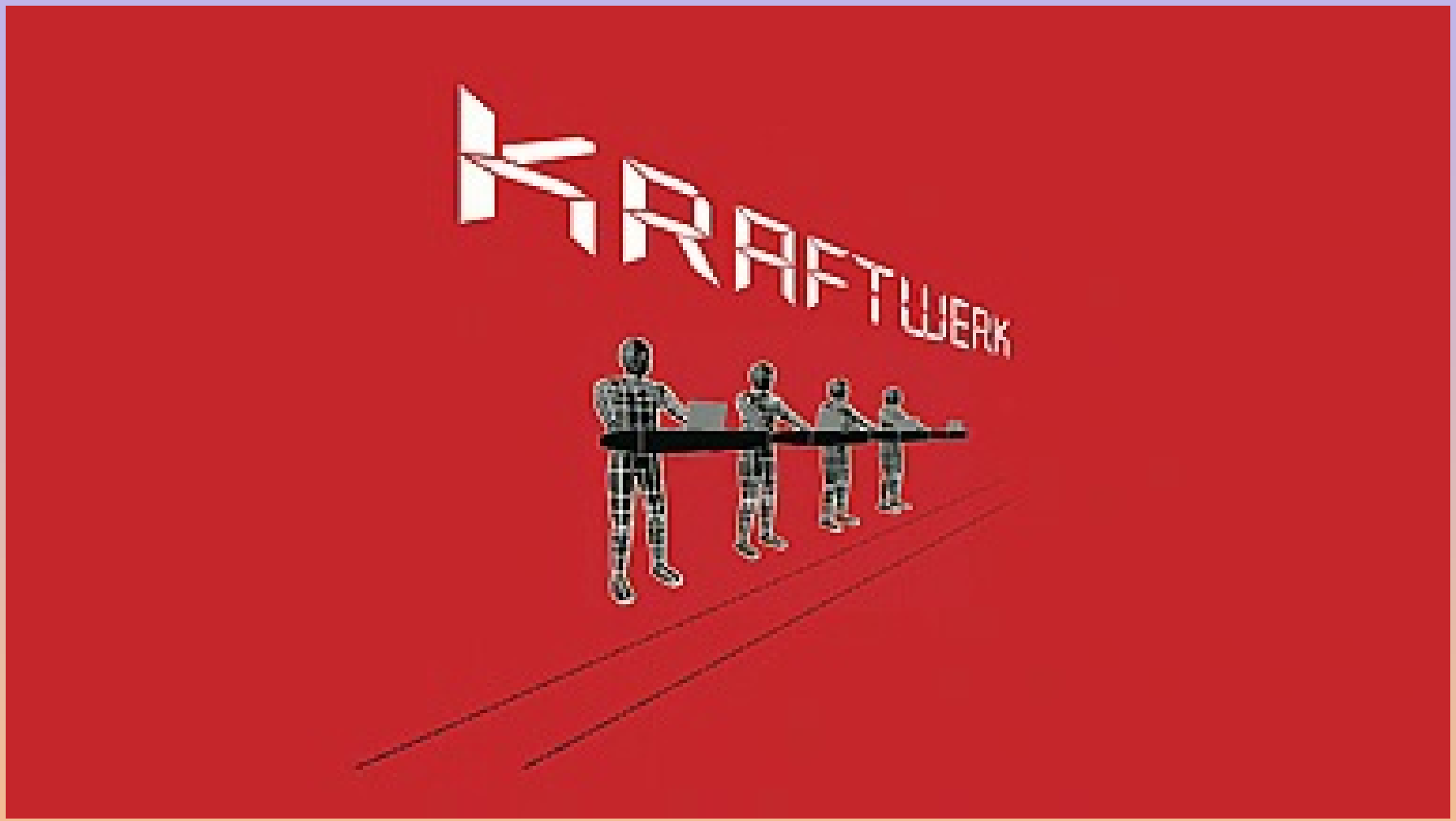


Kraftwerk

# Some Early Machines

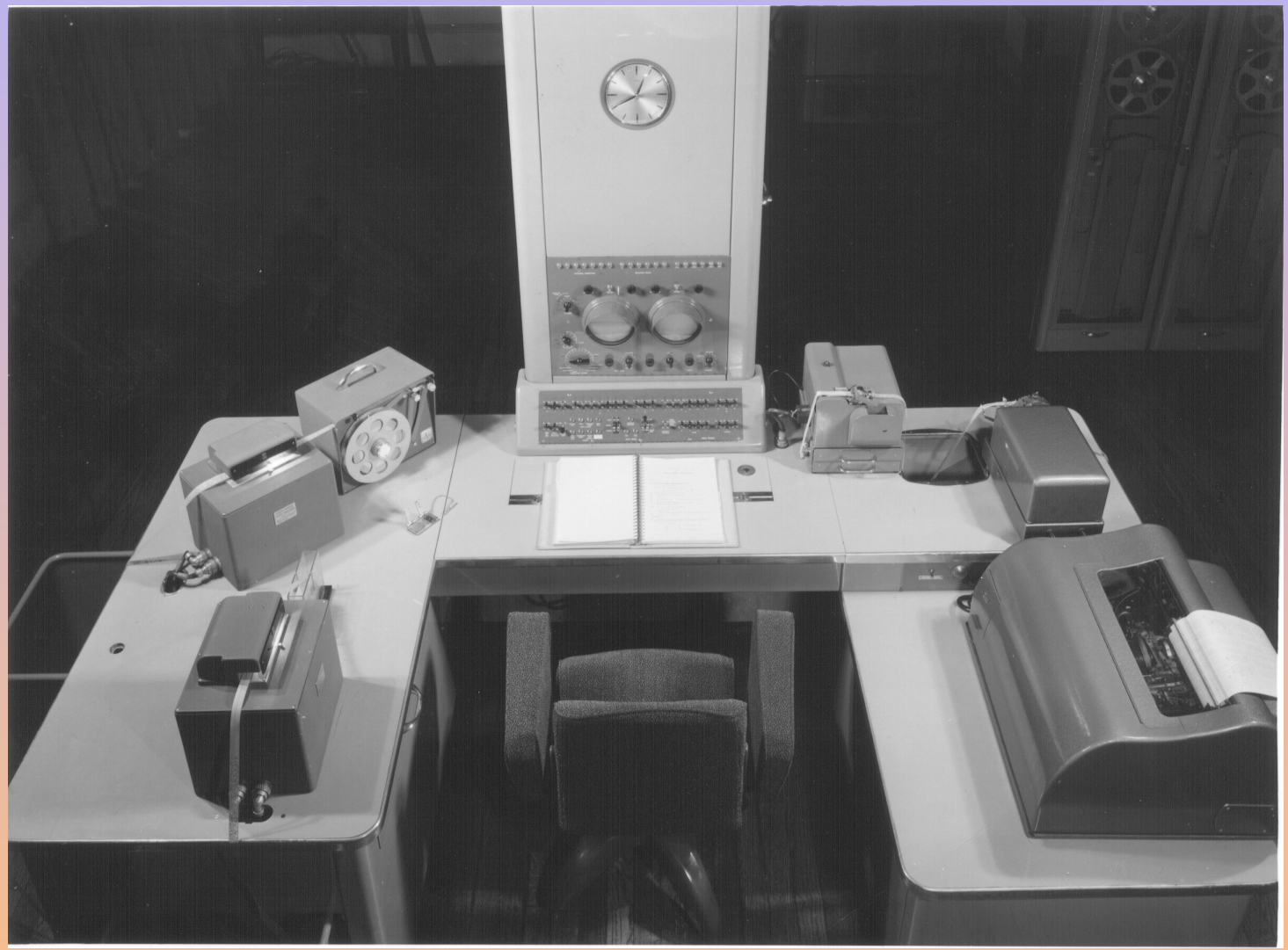
The Robots — Kraftwerk, 1978

# Some Early Machines




Minimum Maximum — Kraftwerk

# Some Early Machines



Ferranti Pegasus

# Some Early Machines

Ferranti Pegasus Assembly Chain

# Code Machine

```
1.3  521
3.0  1125
```

Instruction “21” Take the number at address 1.3, multiply it by that in accumulator 5, store the result in accumulators 6 & 7.

Instruction “12” Transfer the content of accumulator 1 to address 3.0 “as modified by the number in accumulator 5”.

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# Autocode

```
v10=TAPEB*
n1=v10
n0=n1
v0=0.0
1)v0=v0+v(10+n0)
n0=n0-1
->1,n0f0
v1=v0/n1
n2=0
2)v2=v(10+n1)
->3n1=n1-1
->2,n1f0
PRINTv1,1025
PRINTn2,2025
(->0)
```

Integer variables (n0, n1...), floating (v1, v2...).

Interpreted language.

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