

Short History of Computing

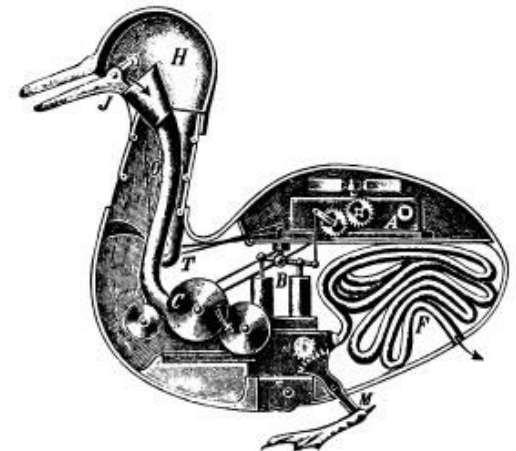
Er. Shiva K. Shrestha (HoD)

BCT, Khwopa College of Engineering

1709-
1782

Jacques de Vaucanson 1709-1782

- Gifted French Artist & Inventor
- Son of a **Glove-maker**, aspired to be a **Clock-maker**
- 1727-1743 – Created a series of mechanical automations that simulated life.
- Best remembered is the “Digesting Duck”, which had over 400 parts.
- Also worked to automate **Looms**, creating the first automated loom in 1745.



1805

1805 - Jacquard Loom

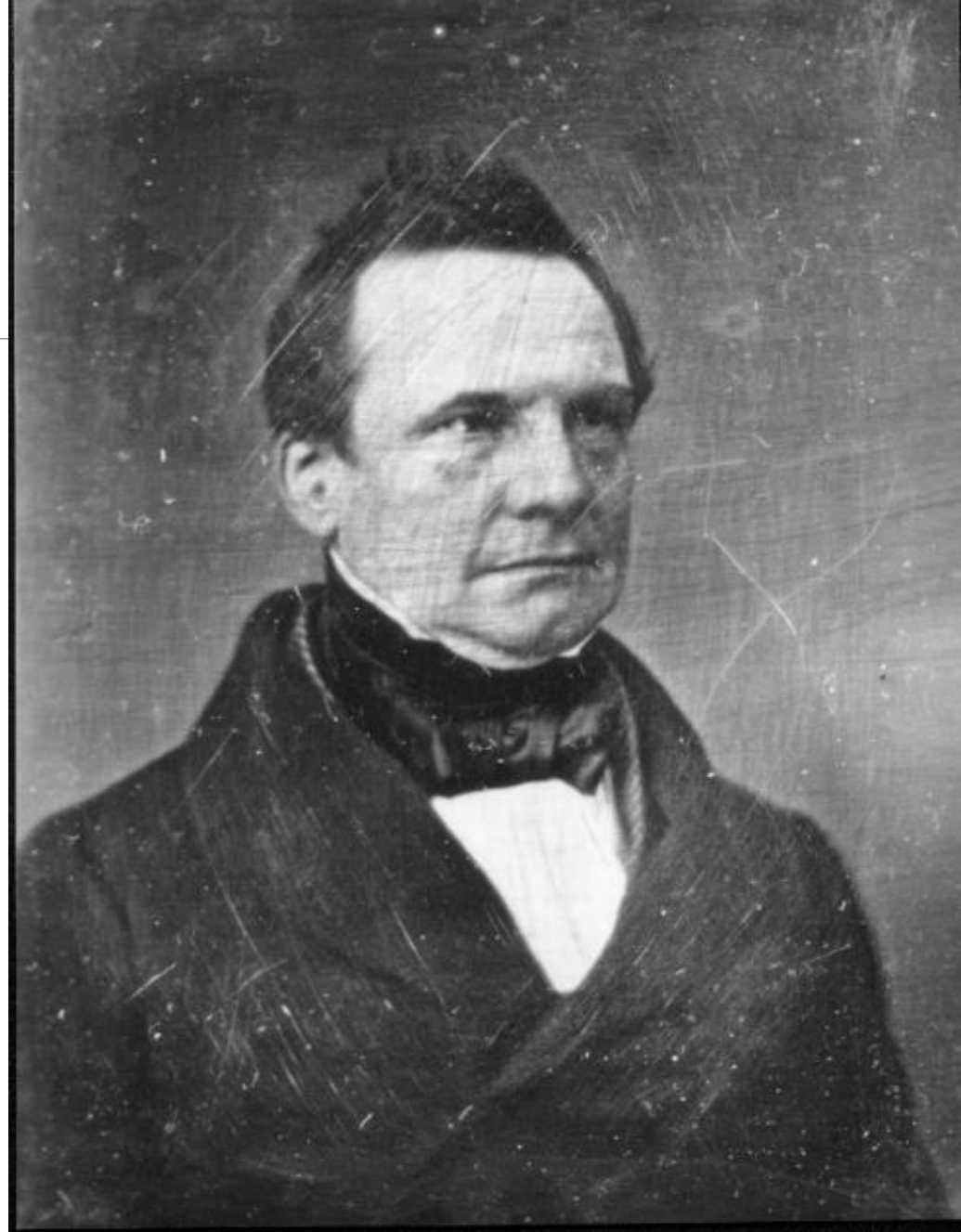
- **First** fully automated and programmable Loom
- Used punch cards to “program” the **pattern to be woven into cloth**



1791-
1871

Charles Babbage 1791-1871

- Father of Computer
- English mathematician, engineer, philosopher and inventor.
- Originated the concept of the programmable computer, and designed one.
- Could also be a Jerk.



1822

1822 – Difference Engine

Numerical tables were constructed by hand using large numbers of human “computers” (one who computes).

Annoyed by the many human errors this produced, Charles Babbage designed a “difference engine” that could calculate values of polynomial functions.

It was never completed, although much work was done and money spent.

Book Recommendation:

The Difference Engine: Charles Babbage and the Quest to Build the First Computer
by Doron Swade



1837 – Analytical Engine

- Charles Babbage first described a **general purpose analytical engine** in 1837, but worked on the design until his death in 1871. It was never built.
- As designed, it would have been programmed using punch-cards and would have included features such as sequential control, loops, conditionals and branching. If constructed, it would have been the first “computer” as we think of them today.

1815-
1852

Augusta Ada Byron King

- Countess of Lovelace 1815-1852
- The Right Honourable Augusta Ada, Countess of Lovelace
- Created a program for the (theoretical) Babbage analytical engine which would have calculated Bernoulli numbers.
- Widely recognized as the **first programmer**.



1906-
1978

Kurt Gödel 1906-1978

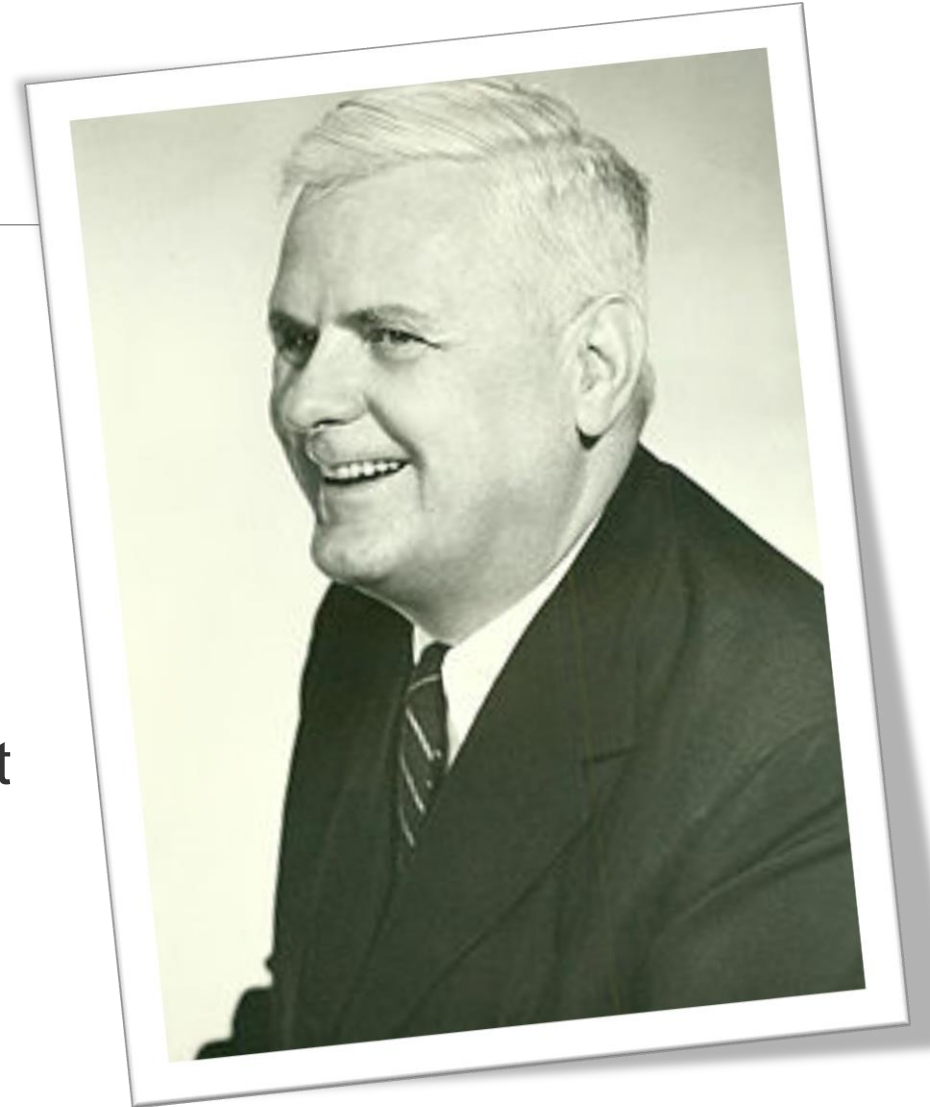
- Famous for his **Incompleteness Theorem**
- This theorem implies that not all mathematical questions are computable (can be solved).



1903-
1995

Alonzo Church 1903-1995

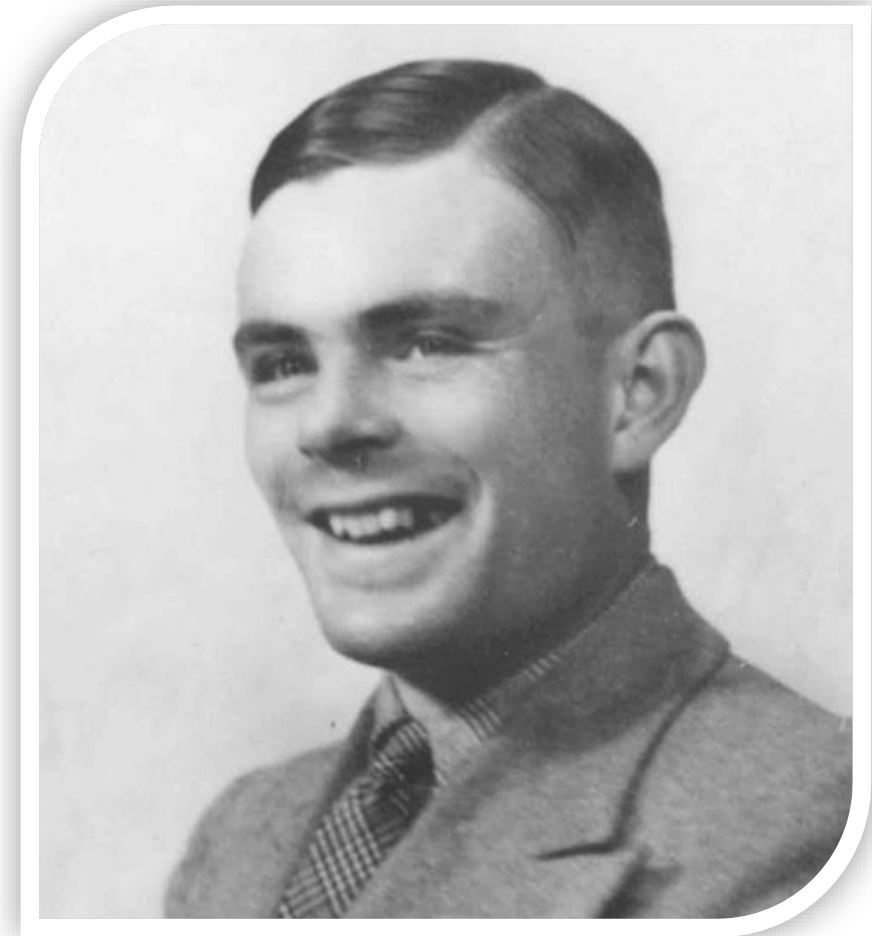
- American mathematician and logician.
- Developed lambda calculus, directly implemented by LISP and other functional programming languages.
- Showed the existence of an undecidable problem.
- **Lambda calculus** was proven to be equivalent to a Turing Machine by Church and Turing working together.



1912-
1954

Alan Turing 1912-1954

- British mathematician and cryptographer.
- Father of **theoretical computer science**.
- Contributions include:
 - **Turing Machine**
 - Turing Test (for AI)
 - First detailed design of a stored program computer (never built)
- The Turing Machine is a simpler version of Kurt Gödel's formal languages.
- Halting problem is undecidable.



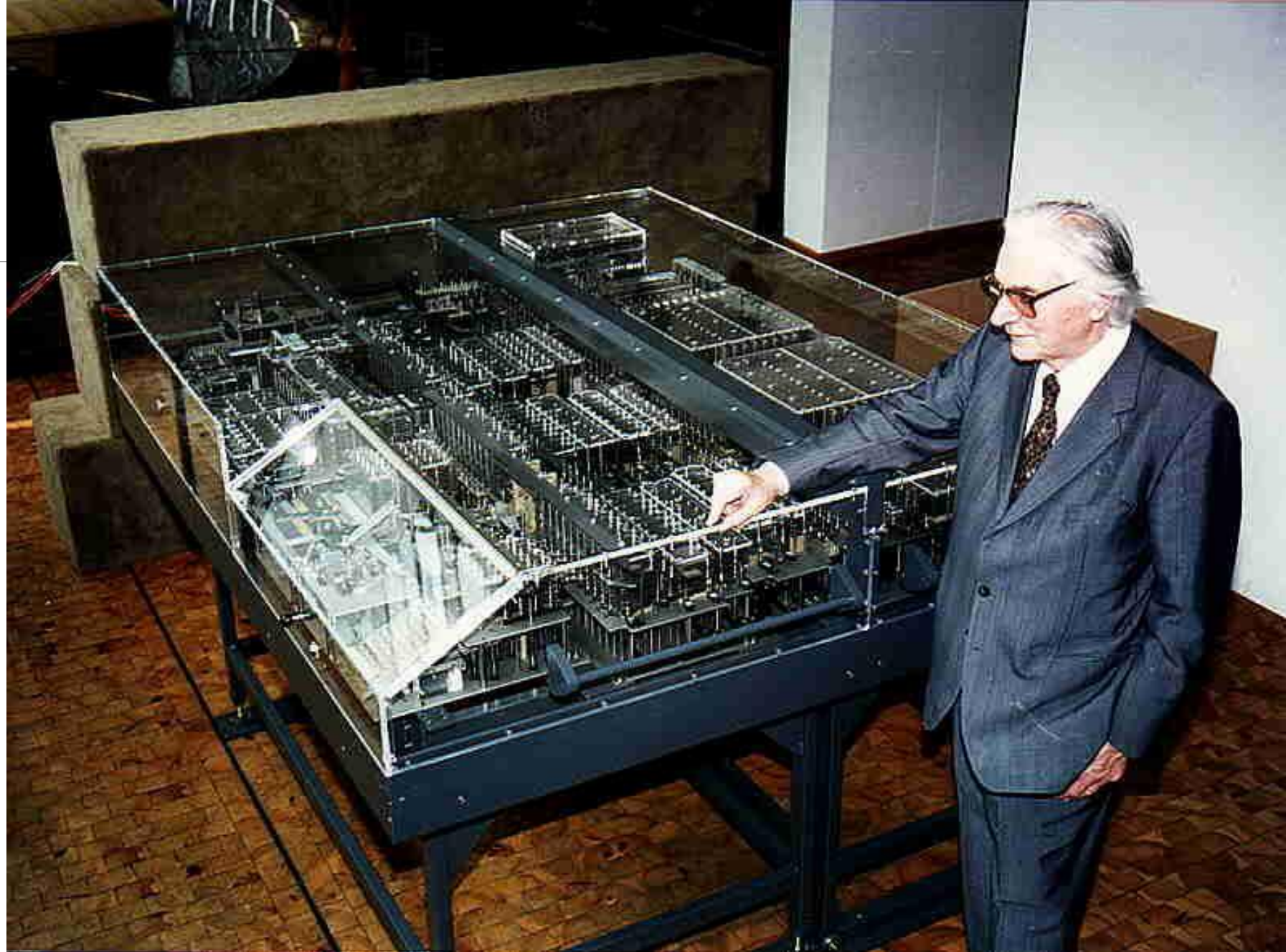
1936

1936

Konrad Zuse

Z1 Computer

First freely programmable computer, electro-mechanical punch tape control.



1944

1944 – Howard Aiken & Grace Hopper

Harvard Mark I Computer

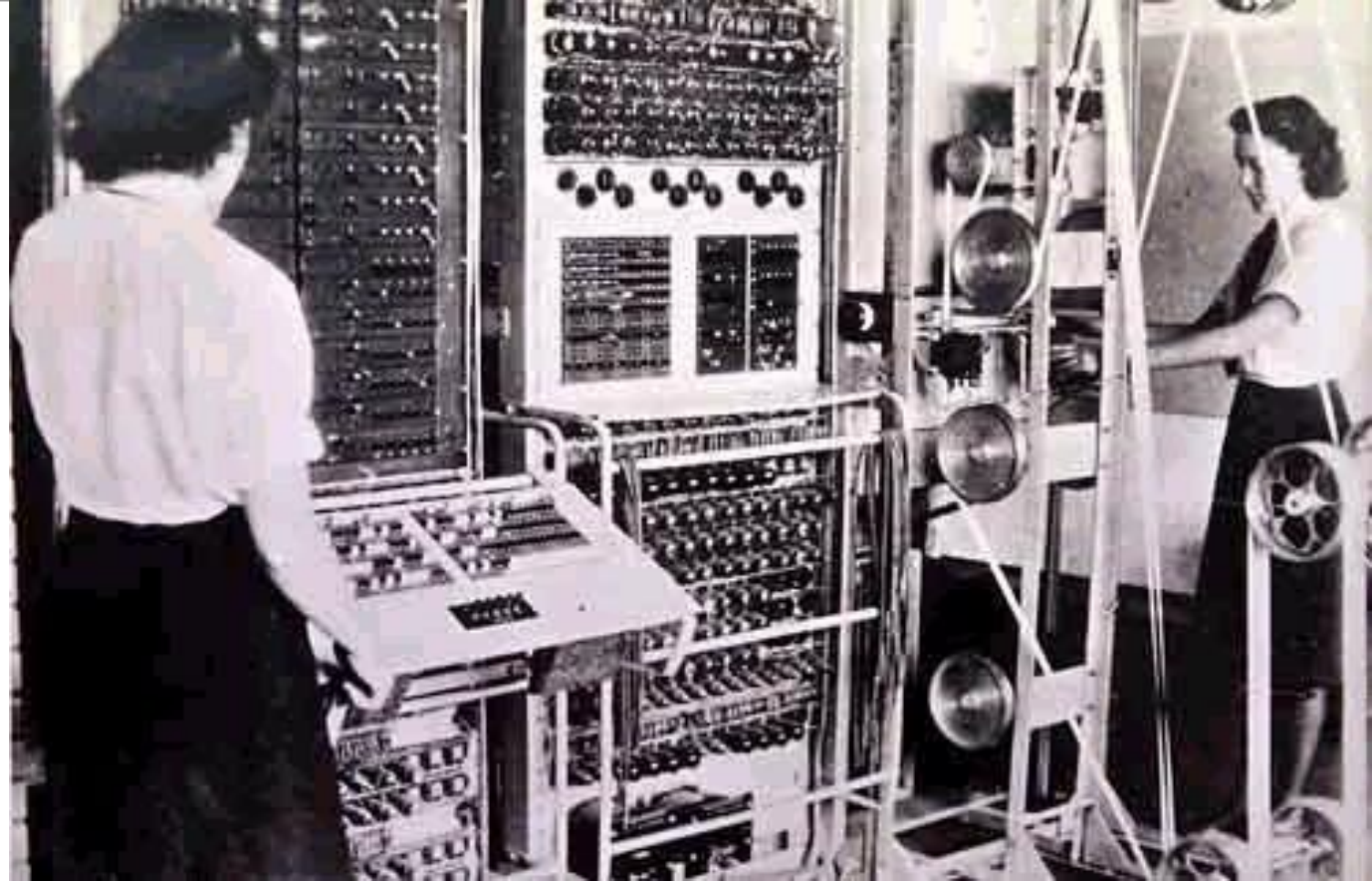


- The IBM Automatic Sequence Controlled Calculator (ASCC) Computer was created by IBM for Harvard University, which called it the **Mark I**.
- First universal calculator.

1943/
1944

1943/1944 – Colossus Mark I & II

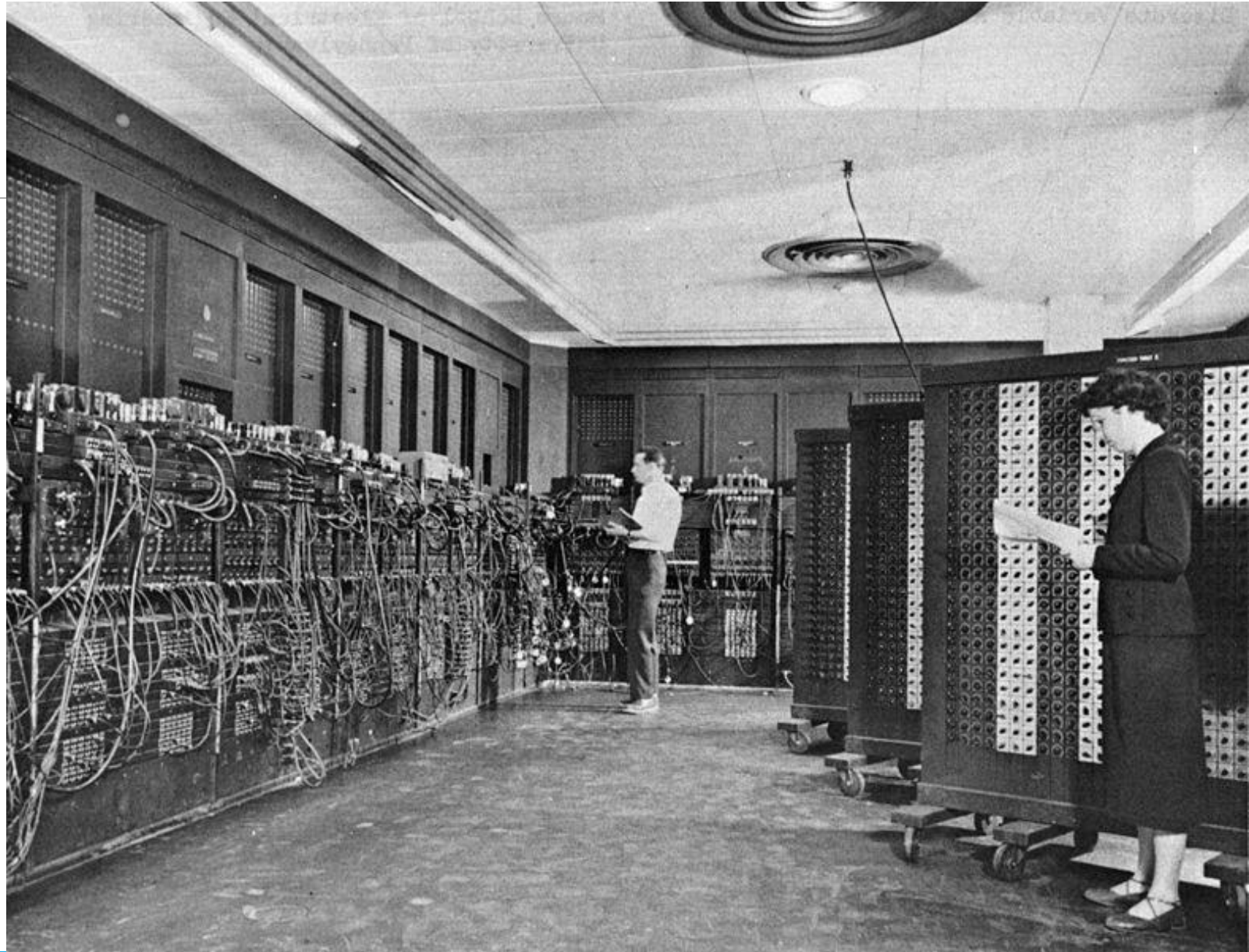
The Colossus Mark I & II are widely acknowledged as the first programmable electric computers, and were used at Bletchley Park to decode German codes encrypted by the Lorenz SZ40/42.



1946

John Eckert &
John W. Mauchly
ENIAC 1 Computer

ENIAC was short for **E**lectronic **N**umerical **I**ntegrator **A**nd **C**omputer. It was the first general purpose (programmable to solve any problem) electric computer. It contained over 17,000 vacuum tubes, weighed 27 tones and drew 150 kW of power to operate.



1947

1947 –The transistor

Invented by William Shockley (seated) John Bardeen & Walter Brattain at Bell Labs.

The transistor replaces bulky vacuum tubes with a smaller, more reliable, and power saving solid state circuit.



1951

1951 – UNIVAC



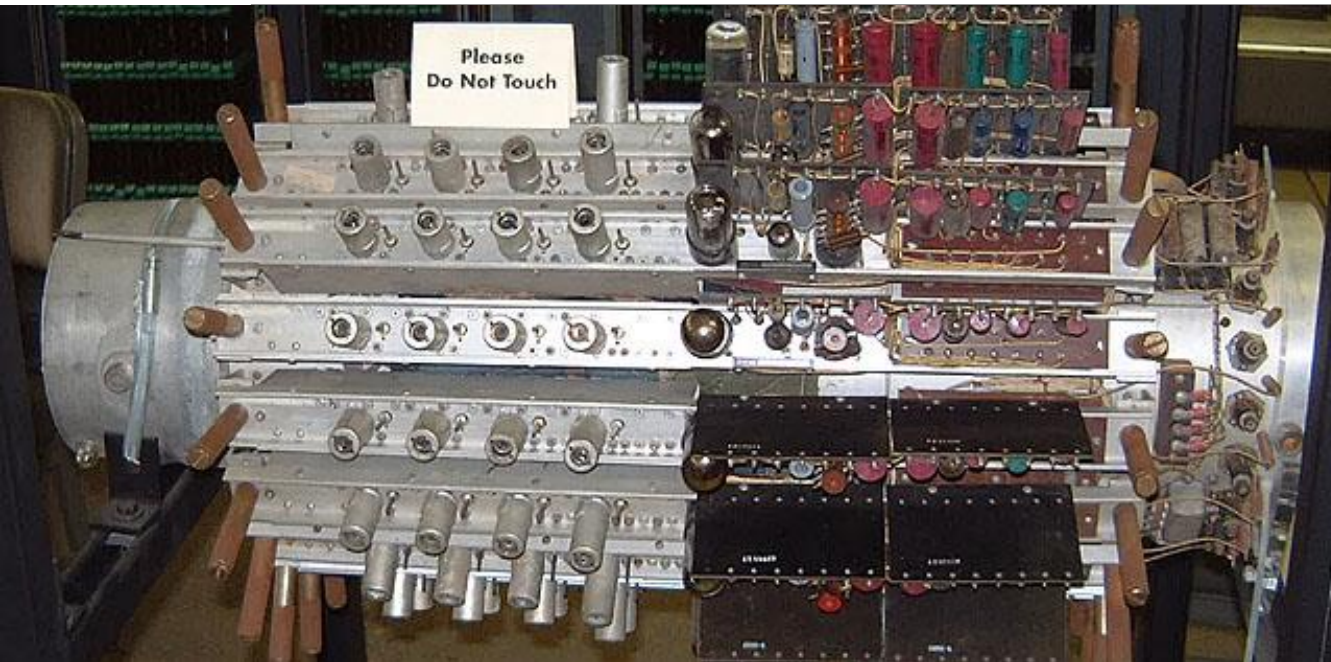
25 feet by 50 feet in size
5,600 tubes,
18,000 crystal diodes
300 relays

Internal storage capacity of 1,008
fifteen bit words was achieved
using 126 mercury delay lines

- First commercial computer
- Between 1951 and 1958, 47 UNIVAC I computers were delivered.

1951

1951 – UNIVAC



UNIVAC mercury delay units containing 18 delay lines, each of which stored 120 bits. Total of 2,160 bits, or 144 fifteen bit words per memory unit.



UNIVAC tape units.



UNIVAC tube board and individual vacuum tube.



1953

1953 – IBM 701 **EDPM** Computer

- IBM enters the market with its first large scale electronic computer.
- It was designed to be incomparable with IBM's existing punch card processing system, so that it would not cut into IBM's existing profit sources.



1906-
1992

Grace Hopper 1906-1992

- Developed the **first compiler** (A-0, later ARITH-MATIC, MATH-MATIC and FLOW-MATIC) while working at the Remington Rand corporation on the UNIVAC I.
- Later returned to the NAVY where she worked on COBOL and was eventually promoted to Rear Admiral.



1906-
1992

Grace Hopper 1906-1992



Grace Hopper
(January 1984)



Rear Admiral Grace Hopper, US Navy, and other programmers at a UNIVAC console - 1957



1906-
1992

Some of Grace Hopper's Awards

- She won the first "man of the year" award from the Data Processing Management Association in 1969.
- She became the first person from the United States and the first woman of any nationality to be made a Distinguished Fellow of the British Computer Society in 1973.
- Upon her retirement she received the Defense Distinguished Service Medal in 1986
- She received the National Medal of Technology in 1991

9/9

0800 Antan started
 1000 " stopped - antan ✓
 1300 (032) MP-MC $\{ 1.2700 \quad 9.037847025$
 (033) PRO 2 $\{ 2.130476415 \quad 9.037846995 \text{ correct}$
 correct $\{ 2.130676415 \quad 4.615925059(-2)$
 Relays 6-2 in 033 failed special speed test
 in relay .. 10,000 test.

Relay
 2145
 Relay 3370

1100 Started Cosine Tape (Sine check)
 1525 Started Multi Adder Test.

1545



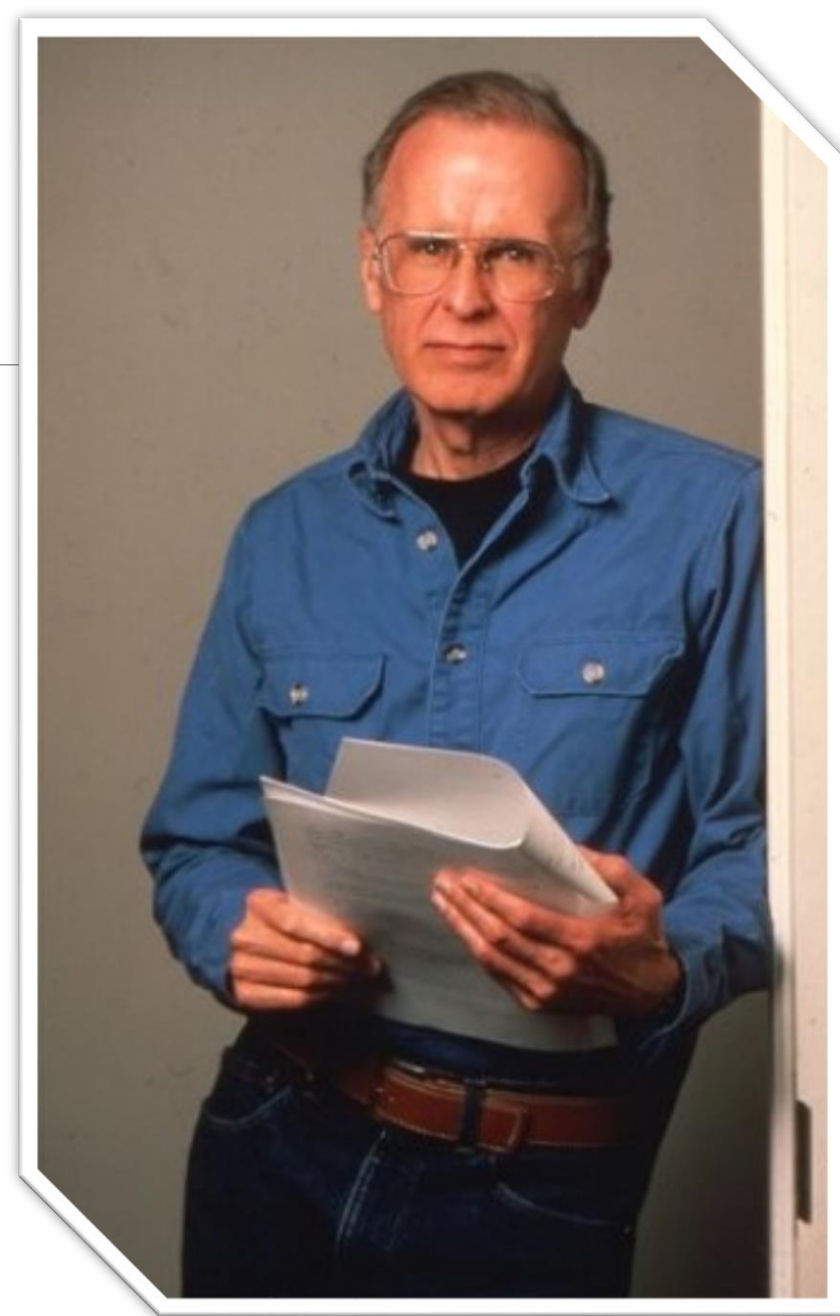
Relay #70 Panel F
 (moth) in relay.

First actual case of bug being found.
 1630 antan started.
 1700 closed down.

1954

1954 – FORTRAN

- John Backus & IBM invent the first successful high level programming language, and compiler, that ran on IBM 701 computers.
- **FOR**mula **TRAN**slation was designed to make calculating the answers to scientific and math problems easier.



1958

1958 – Integrated Circuit

Jack Kilby at Texas Instruments & Robert Noyce at Fairchild semiconductor independently invent the first integrated circuits or “the chip”.

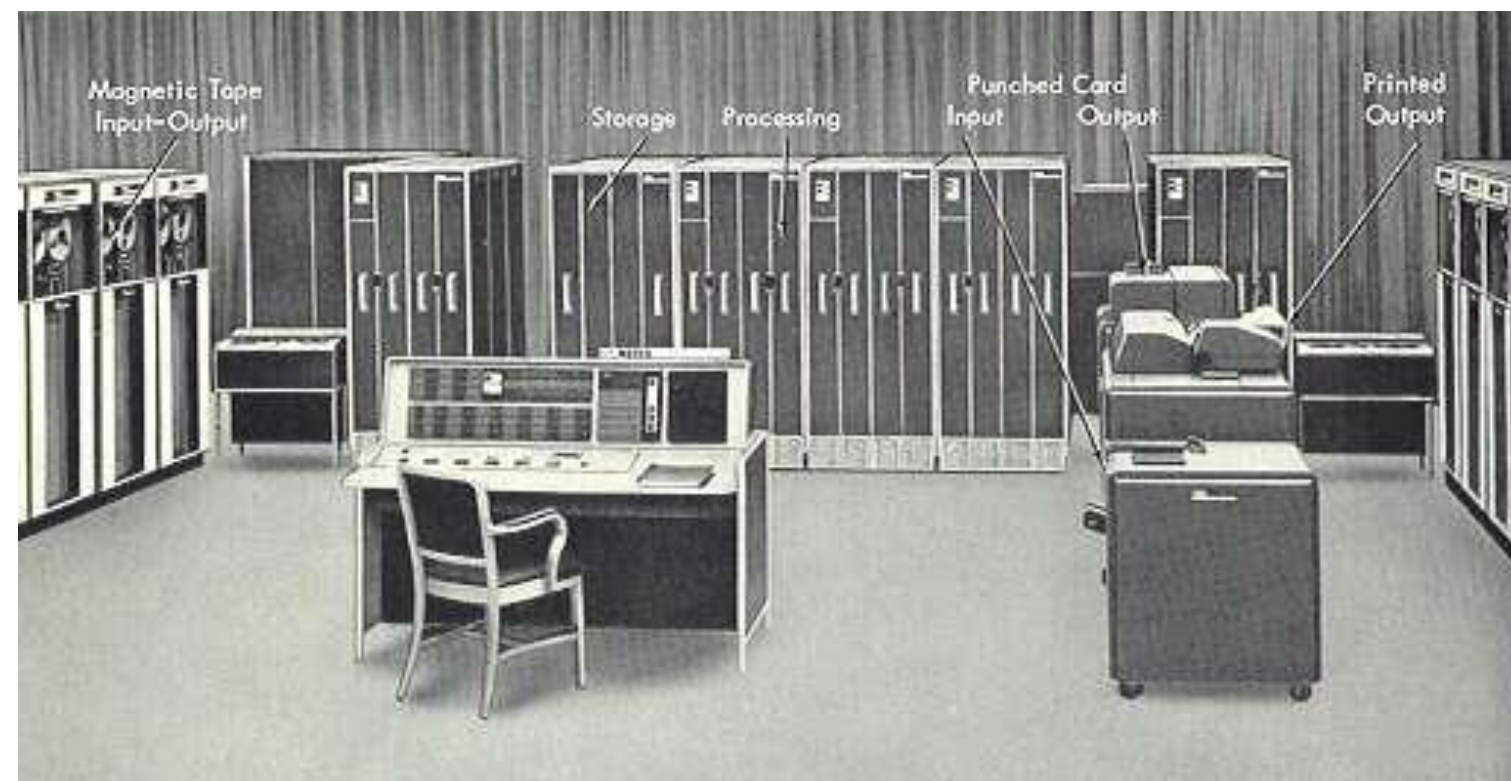
Jack Kilby was awarded the National Medal of Science and was inducted into the National Inventors Hall of Fame, and received the 2000 Nobel Prize in Physics for his work on the integrated circuit.



1960

1960 – First commercial transistorized computers

DEC introduced the PDP-1 and IBM released the 7090 which was the fastest in the world.



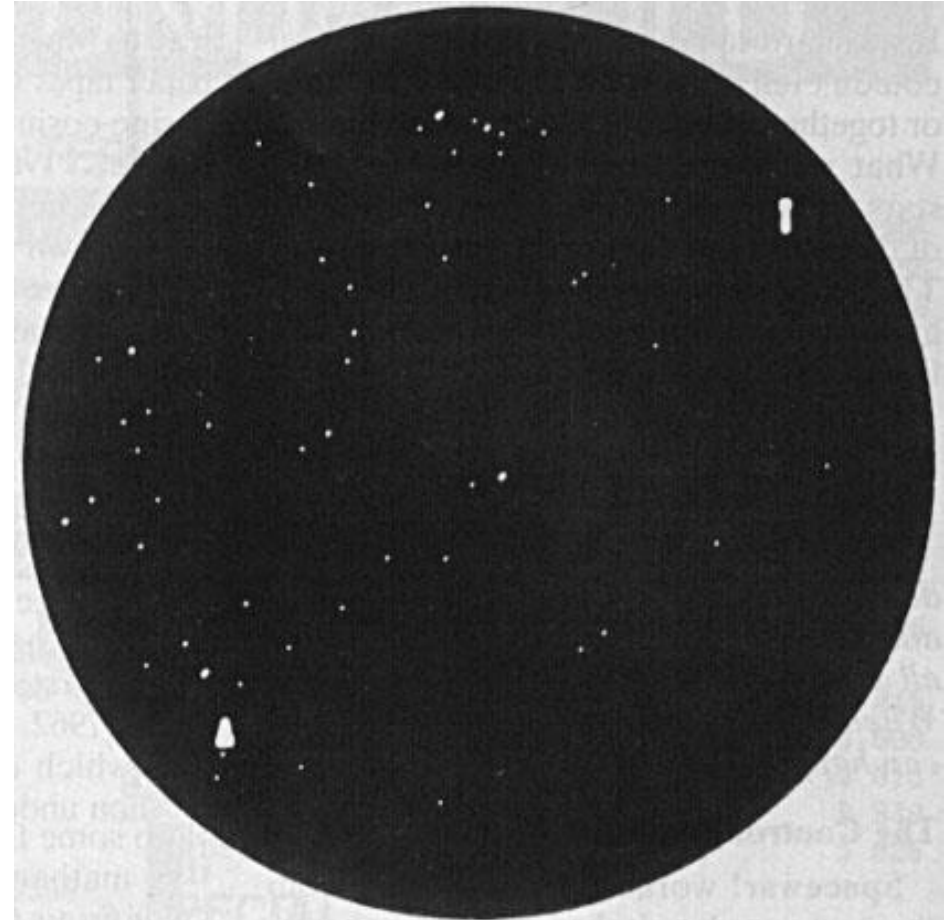
1962

1962 – First computer game & word processor

Steve Russell at MIT invents **Spacewar**, the first computer game running on a DEC PDP-1.

Because the PDP-1 had a typewriter interface, editors like TECO (Text Editor and Corrector) were written for it.

Steve Piner and L. Peter Deutsch produced the first “word processor” called Expensive Typewriter (MIT's PDP-1 cost \$100,000).



1964

The mouse & Window concept

Douglas Engelbart demonstrates the worlds first “mouse”, nicknamed after the “tail”.



SRI (Stanford Research Institute) received a patent on the mouse in 1970, and licensed it to apple for \$40,000.



1969

1969 - ARPANET

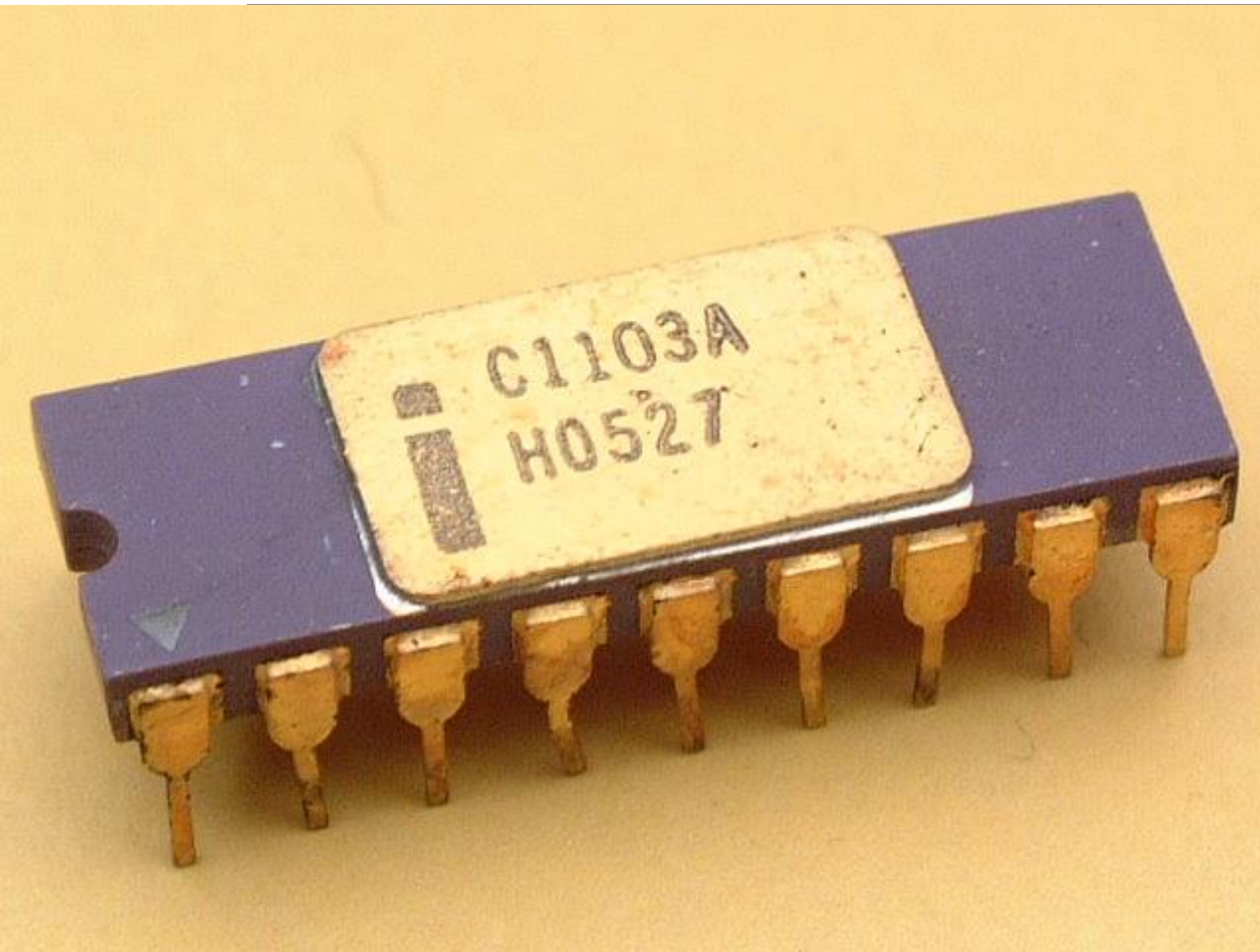
The precursor to the Internet as we know it, funded by ARPA (Advanced Research Projects Agency now DARPA) begins.

The first four nodes were located at:

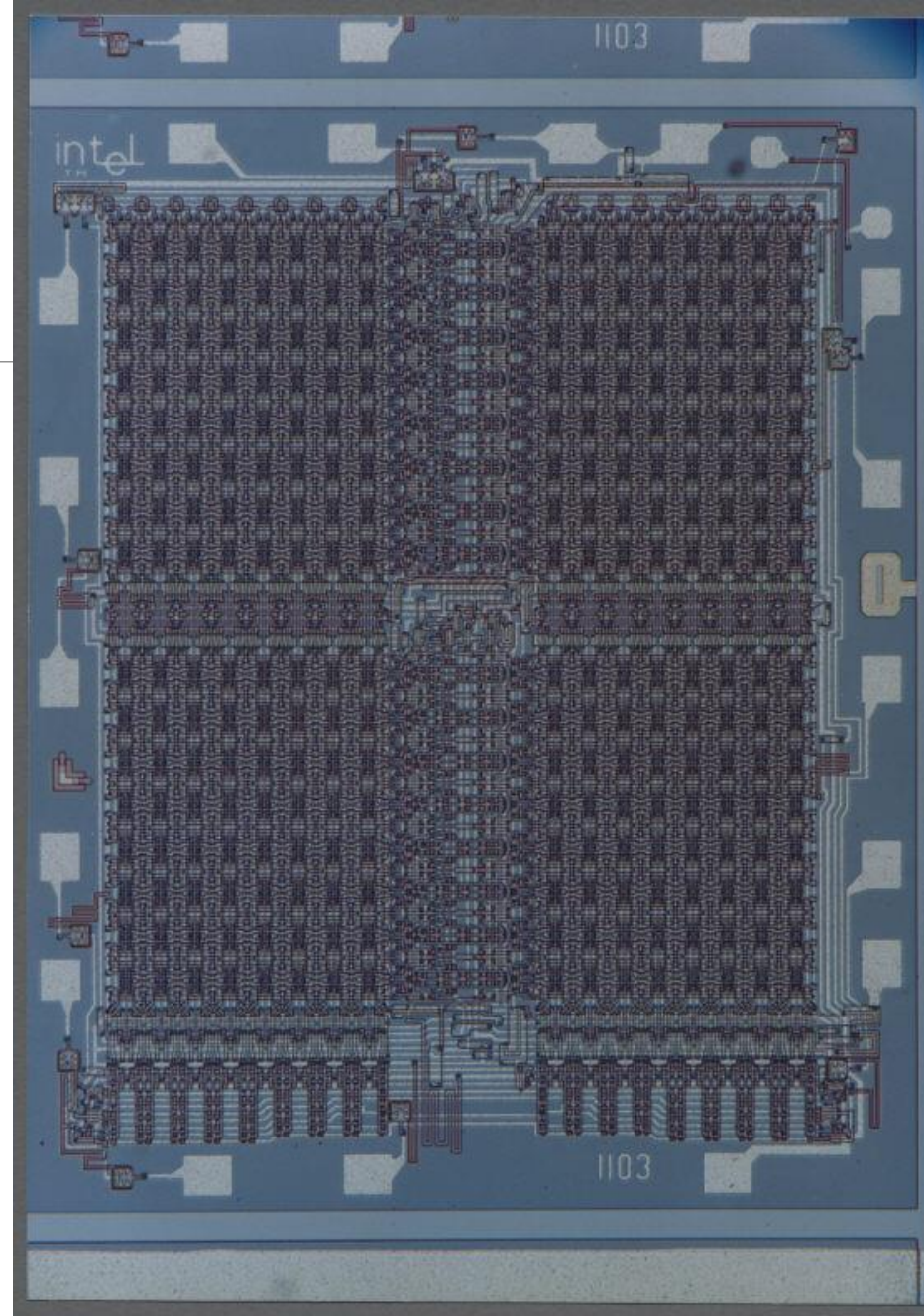
- UCLA
- Stanford Research Institute
- UC Santa Barbara
- University of Utah

1970

1970 – Intel 1103 Dynamic Memory Chip

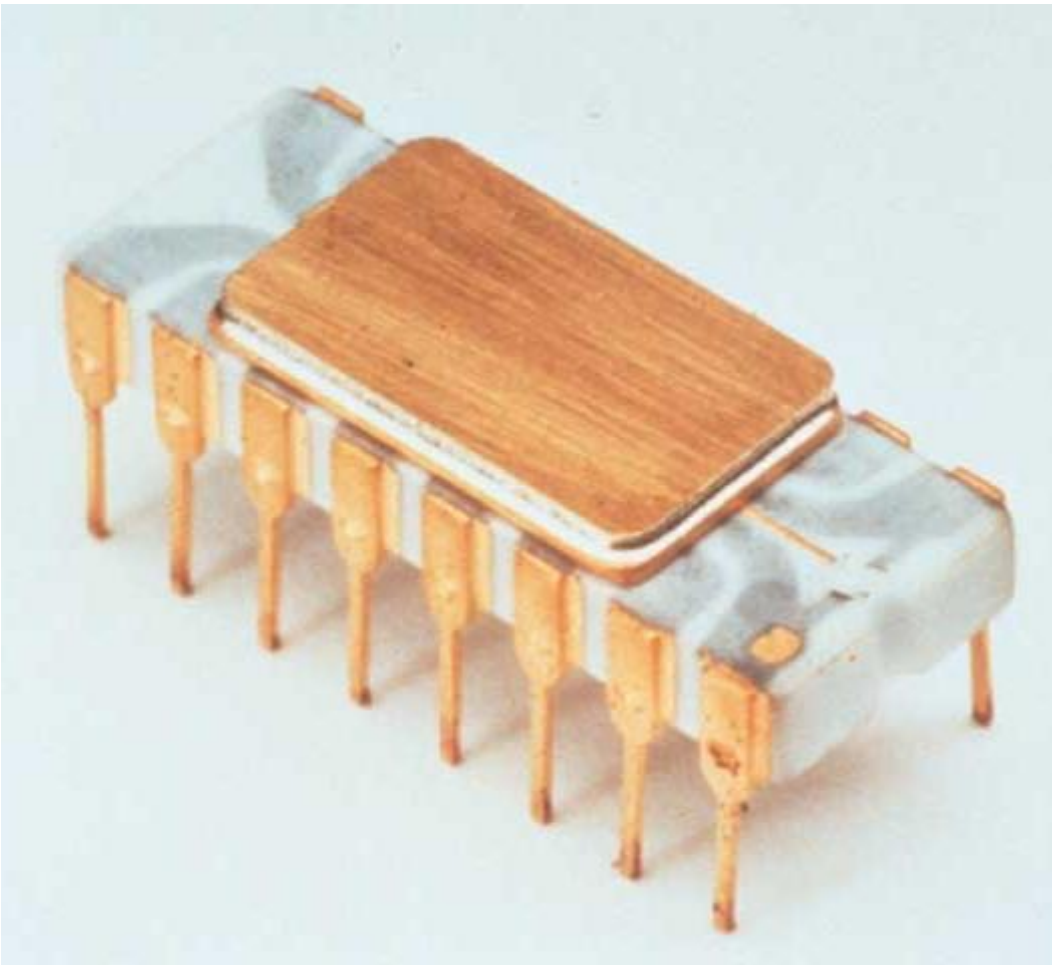


- World's first commercially available dynamic memory chip,
- 1024 bytes
- Or **1KB**

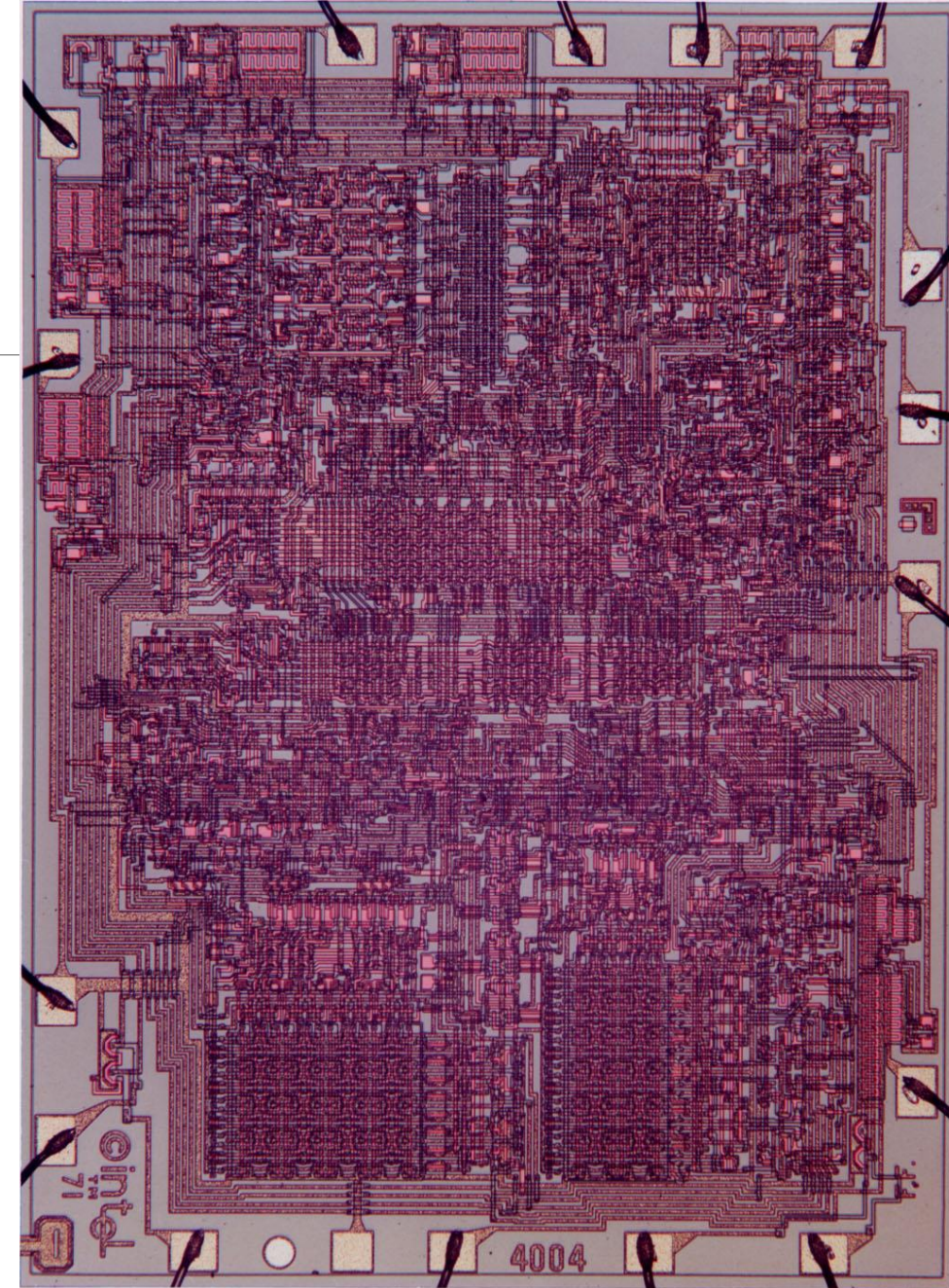


1971

1971 – Intel 4004 Microprocessor



- World's first microprocessor with 2,300 transistors,
- had the same processing power as the 3,000 cubic-foot ENIAC.



1973-
1976

1973-1976 – Ethernet

Robert Metcalfe at Xerox invents Ethernet so that multiple computers can talk to a new laser printer. Originally, Ethernet used a large coaxial cable and ran at 3Mbit/sec.

Ethernet today runs over twisted pair (usually CAT5, or CAT6) and can achieve speeds of 10Megabit/sec to 1Gigabit (1000 Mbit/sec).



1974/
1975

1974/1975 Personal Computers

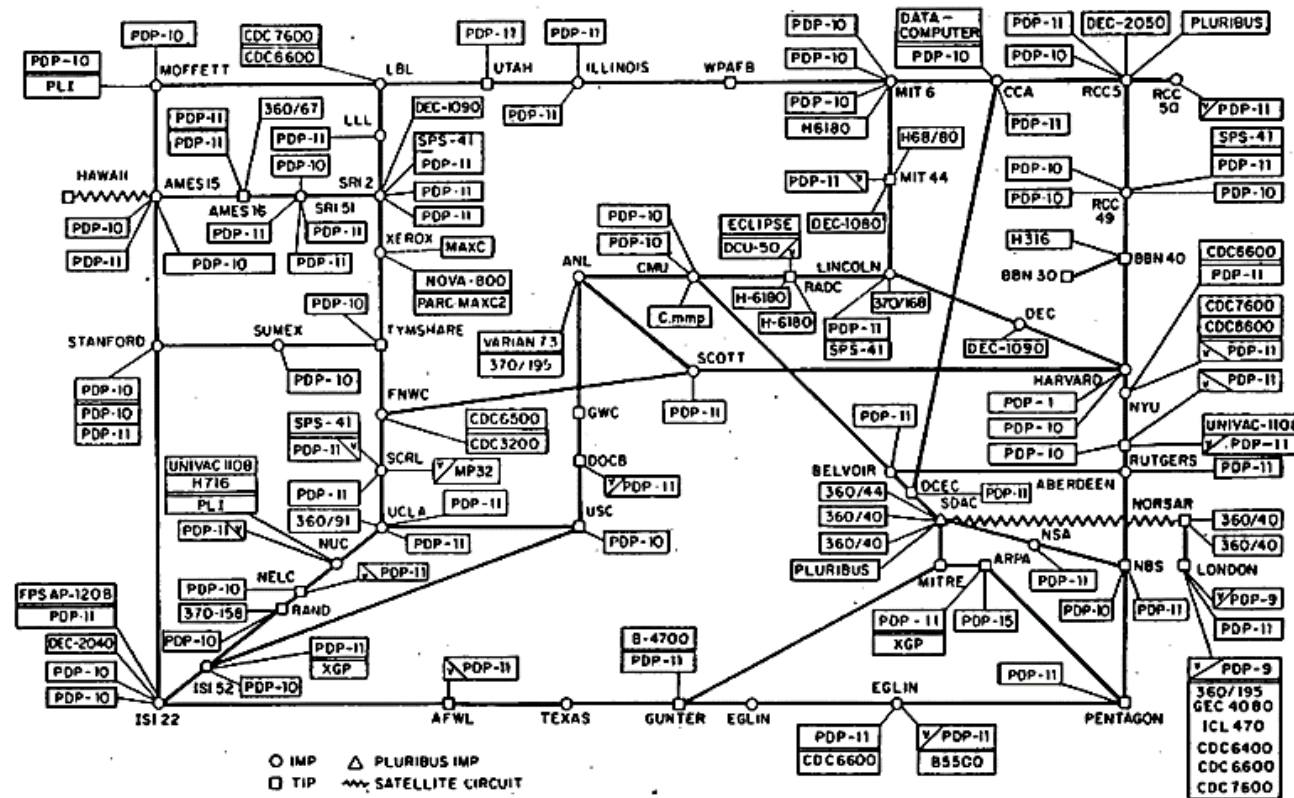
Scelbi Mark-8 Altair and IBM 5100 computers are first marketed to individuals (as opposed to corporations). They are followed by the Apple I,II, TRS-80, and Commodore Pet computers by 1977.



1977

1977 – Growth of the ARPAnet

ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE HOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES

1978/
1979

1978/1979 – First individual productivity software

C11 (L) TOTAL C1 25

A	B	C	D
ITEM	NO.	UNIT	COST
MUCK RAKE	43	12.95	556.85
BUZZ CUT	15	6.75	101.25
TOE TONER	250	49.95	12487.50
EYE SNUFF	2	4.95	9.90
SUBTOTAL			13155.50
9.75% TAX			1282.66
TOTAL			14438.16

VisiCalc Spreadsheet software and **WordStar** word processor are the “killer applications” for personal computers, especially for small business owners.

```
A:NEWDOC FC=1 FL=1 COL 01          INSERT ON
<<<  MAIN MENU  >>>
--Cursor Movement--  !-Delete-!  !-Miscellaneous-!  !-Other Menus-
^S char left ^D char right !^G char ! ^I Tab  ^B Reform ! (from Main only)
^A word left ^F word right !DEL chr lf! ^V INSERT ON/OFF !^J Help ^K Block
^E line up ^X line down !^T word rt! ^L Find/Replce again! ^Q Quick ^P Print
--Scrolling--        !^Y line !RETURN End paragraph! ^O Onscreen
^W up line  ^Z down line !          ! ^N Insert a RETURN !
^R up screen ^C down screen!        ! ^U Stop a command !

THIS IS A DOCUMENT BEING WRITTEN ON THE WORDSTAR WORD PROCESSOR ON A KAYPRO
COMPUTER WHICH RUNS UNDER THE CP/M OPERATING SYSTEM.

WORDSTAR WAS A VERY ANKWARD WORD PROCESSOR BY TODAY'S STANDARDS, BUT IN
ITS HEYDAY, IT OFFERED ELECTRONIC WORD PROCESSING TO HUNDREDS OF THOUSANDS
OF PEOPLE WHO WOULD OTHERWISE HAVE NOT BEEN ABLE TO AFFORD IT.

LIKE THE OSBORNE COMPUTER, THE KAYPRO WAS CONSIDERED A "PORTABLE" MACHINE,
ALL 30 POUNDS OF IT. LUGGING ONE OF THESE BEAUTIES AROUND WAS A TASK, AND
SINCE THEY RAN ON AC POWER AND NOT BATTERIES, THEY WERE NOT USABLE EXCEPT
IN A BUILDING OR WHEREVER A POWER SOURCE WAS PRESENT.

LOOKING AT THIS MONOCHROME 8" SCREEN MAY SEEM LUDICROUS BY COMPARISON TO
TODAY'S LAPTOPS, BUT PEOPLE MARVELED AT THIS MACHINE IN THE EARLY 1980s.
```

1981

1981 – IBM PC

The IBM PC is introduced running the Microsoft Disk Operating System (MS-DOS) along with CP/M-86. The IBM PC's open architecture made it the de-facto standard platform, and it was eventually replaced by inexpensive clones.

CPU: Intel 8088 @ 4.77 MHz

RAM: 16 kB ~ 640 kB

Price: \$5,000 - \$20,000



1984

1984 – Apple Macintosh

Apple introduces the first successful consumer computer with a WIMP user interface (Windows Icons Mouse & Pointer), modelled after the unsuccessful Xerox Alto computer.

Motorola 68000 @8Mhz

128KB Ram

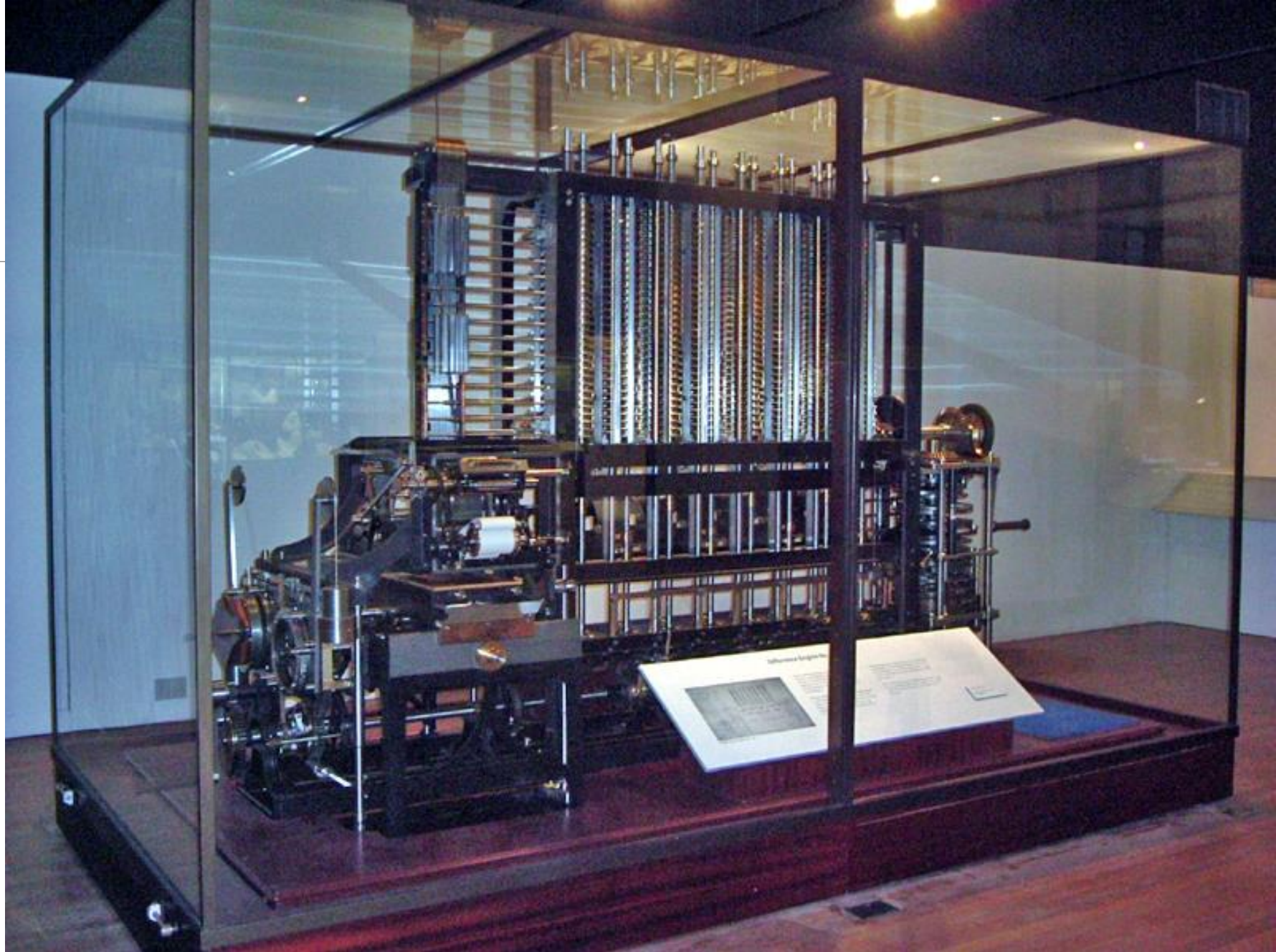
US\$1,995 to US\$2,495



1989

Difference Engine (#2)

Using Charles Babbage's original plans and 19th century manufacturing tolerances, the London History Museum built two functioning replicas of the Difference Engine.



Q/A?

Thank You!

Er. Shiva K. Shrestha

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