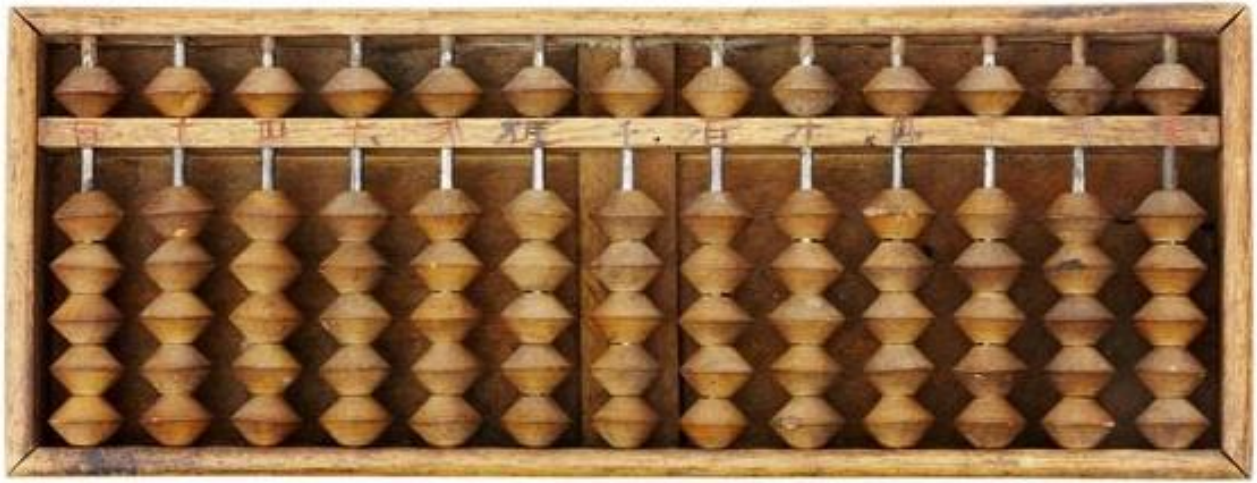
Computer History

What was the first computer?

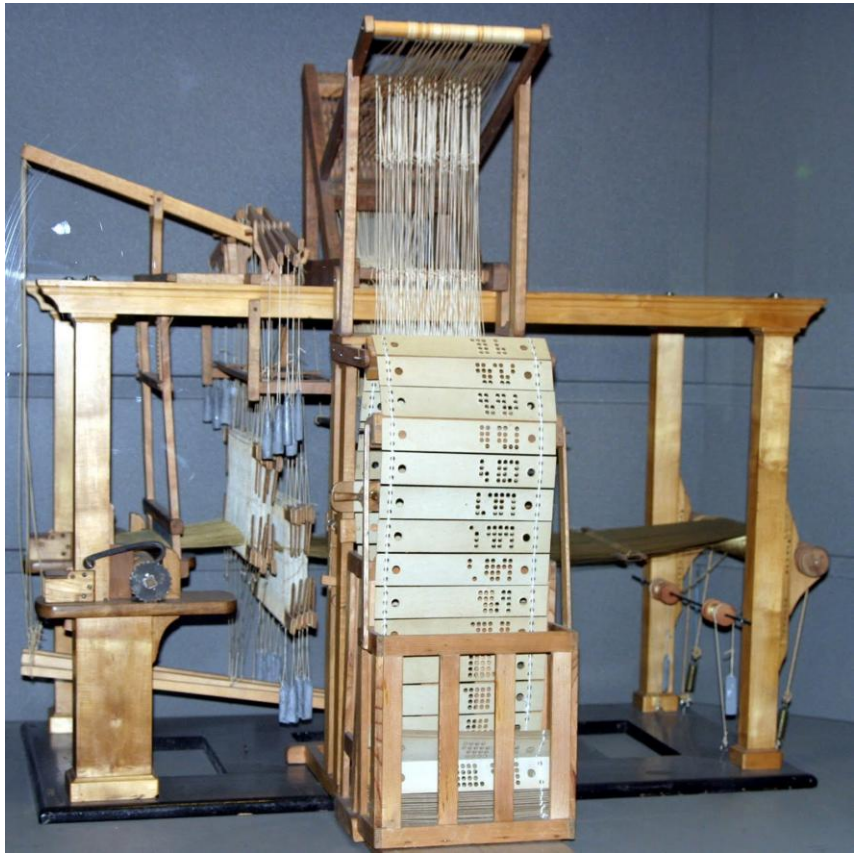
The Abacus



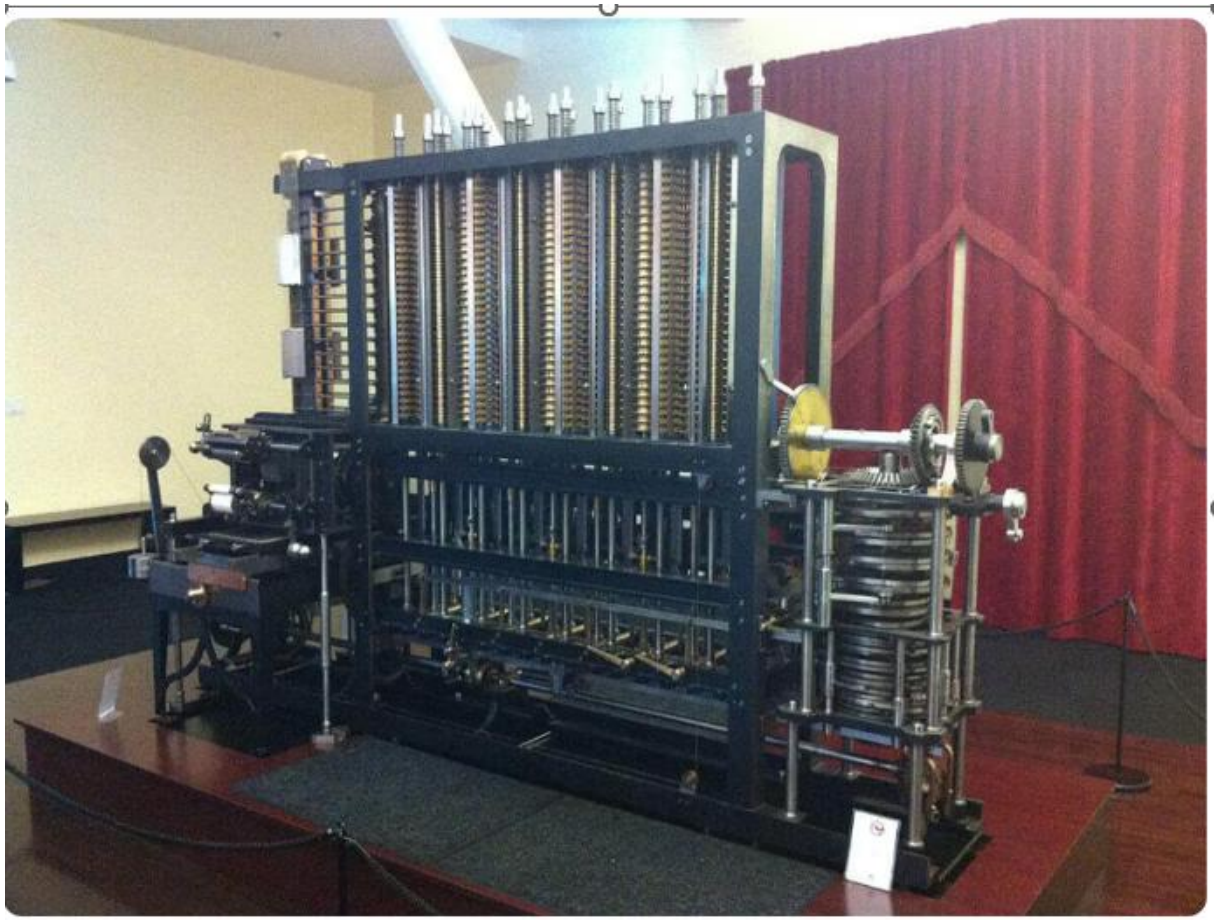
The Abacus

- The abacus was used for addition, subtraction, multiplication and division.
- A competition in Japan in 1946 between a US serviceman using an electronic calculator (that he was an expert with) and a Japanese abacus operator resulted in a win for the Japanese abacist.

1801 - The Jacquard Loom –Punched Card Operation



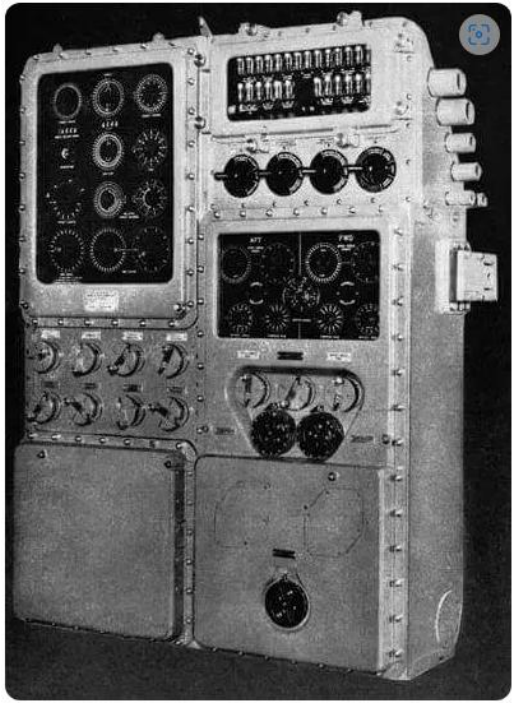
1822 Babbage’s Difference Engine (model built in 1991)



First Programmable Analogue Computer

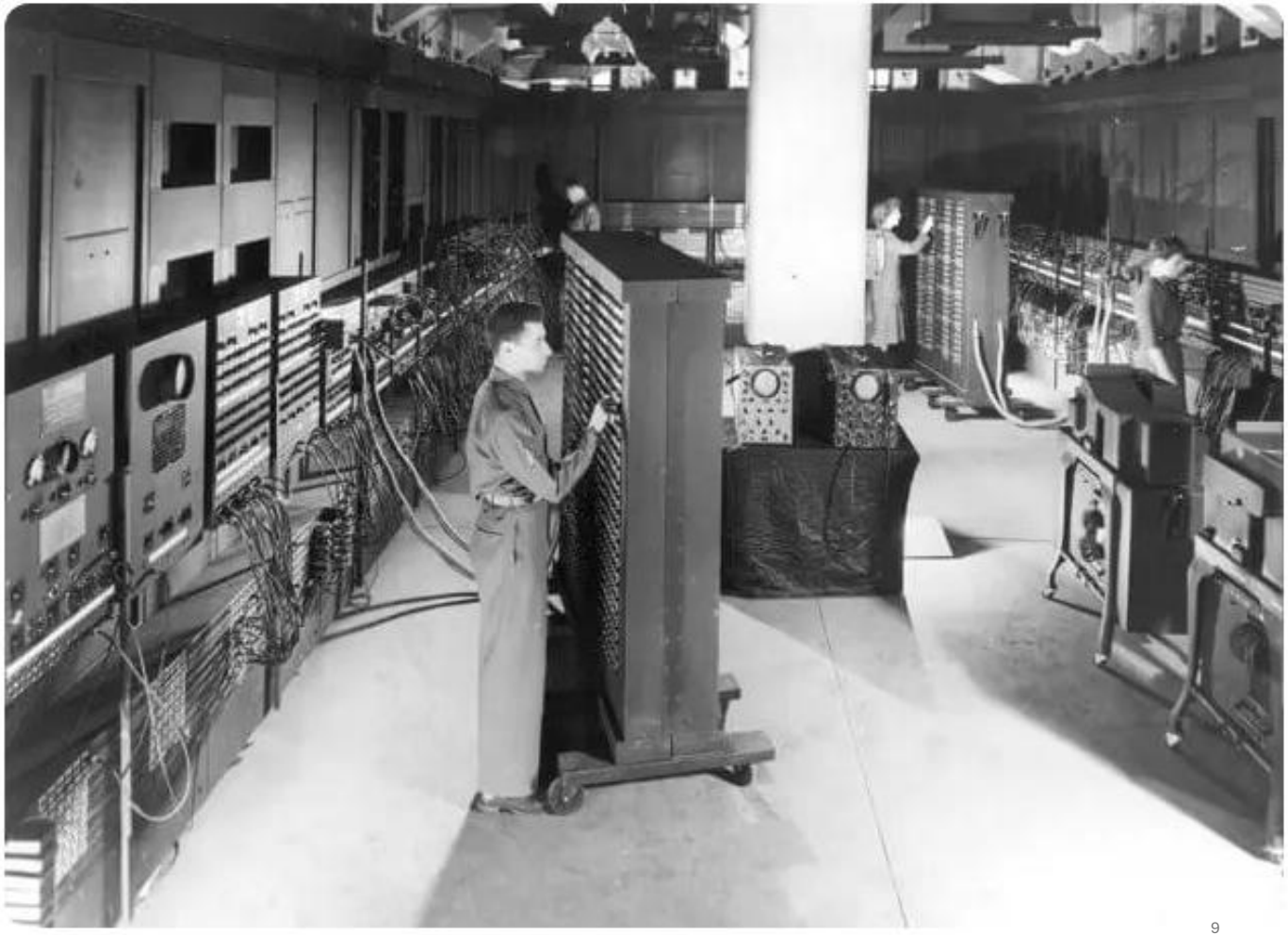
- First programmable analogue computer was the Totaliser.
- George Julius, a university-trained engineer working in Western Australia, devised a machine which automated the counting of tickets and calculation of odds and dividends in betting at the racecourse.
- The world's first automatic totalisator machine was set operating in 1913 at the Auckland Racing Club's grounds in the Ellerslie suburb of Auckland. Also installed in Newcastle, NSW, Racecourse in 1913.

In 1938 the United States Navy invented the Torpedo Data Computer (TDC), possibly the world's first electromechanical computer



Torpedo Data Computer -- one of the world's first electromechanical computers.

1943
The Eniac



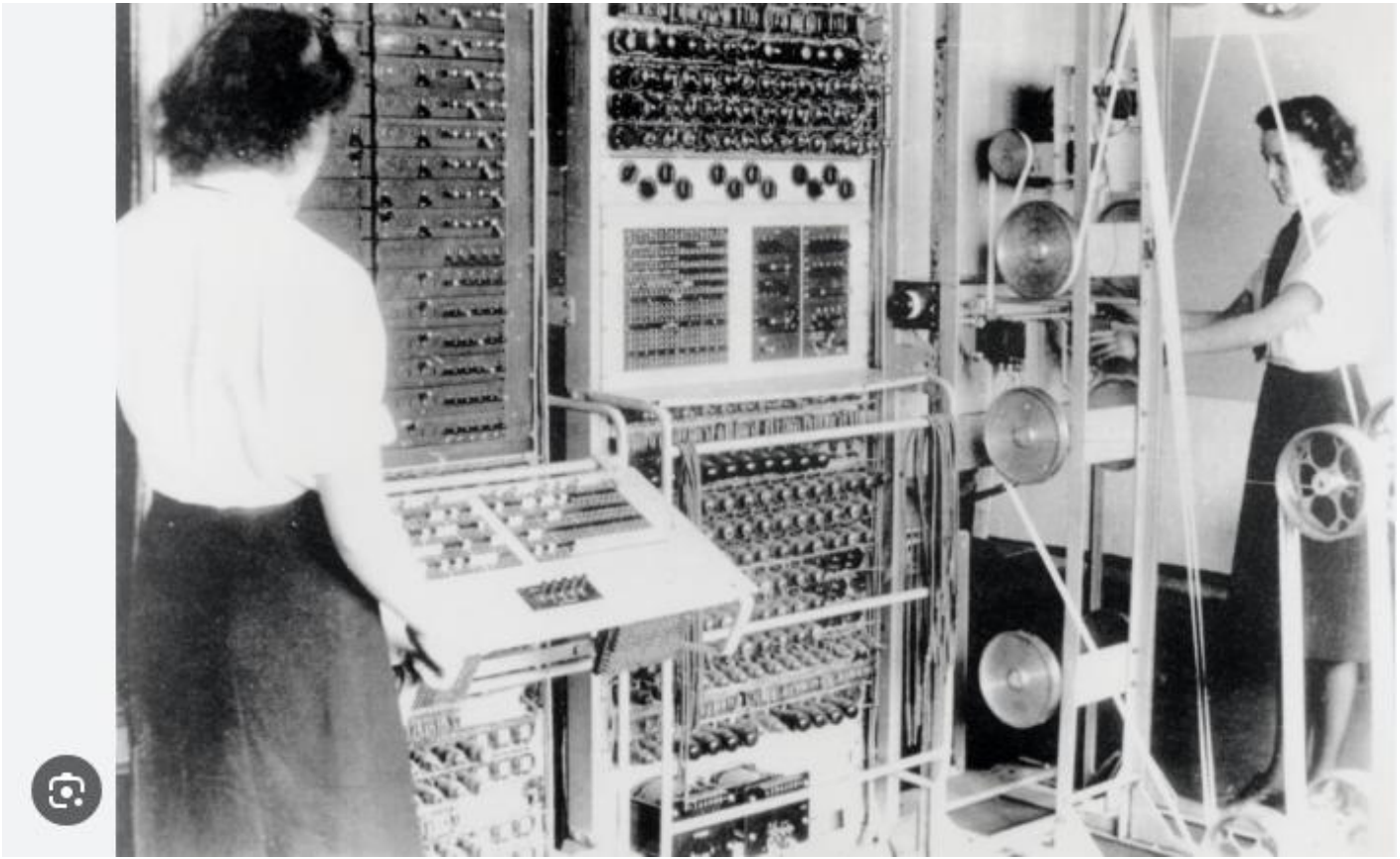
1943 - The Eniac

- Electronic Numerical Integrator & Computer. Built for US Army ballistic calculations but actually used for hydrogen bomb calculations.
- The ENIAC contained 20,000 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors, and 5,000,000 hand-soldered joints. It was 2.4 m × 0.9 m × 30 m (8 ft × 3 ft × 98 ft), weighed over 27,200kg (30 US tons), and cost around $500,000.
- The Eniac filled a room and required 6 programmers.

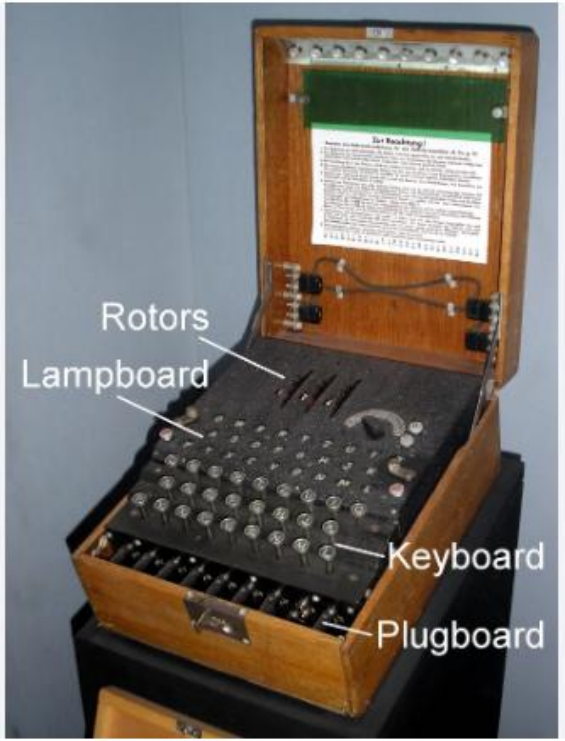
Quotable quotes

- Thomas J Watson, president of IBM in 1943:
- "I think there is a world market for maybe five computers."

1944 - The Colossus Computer



The Enigma Machine

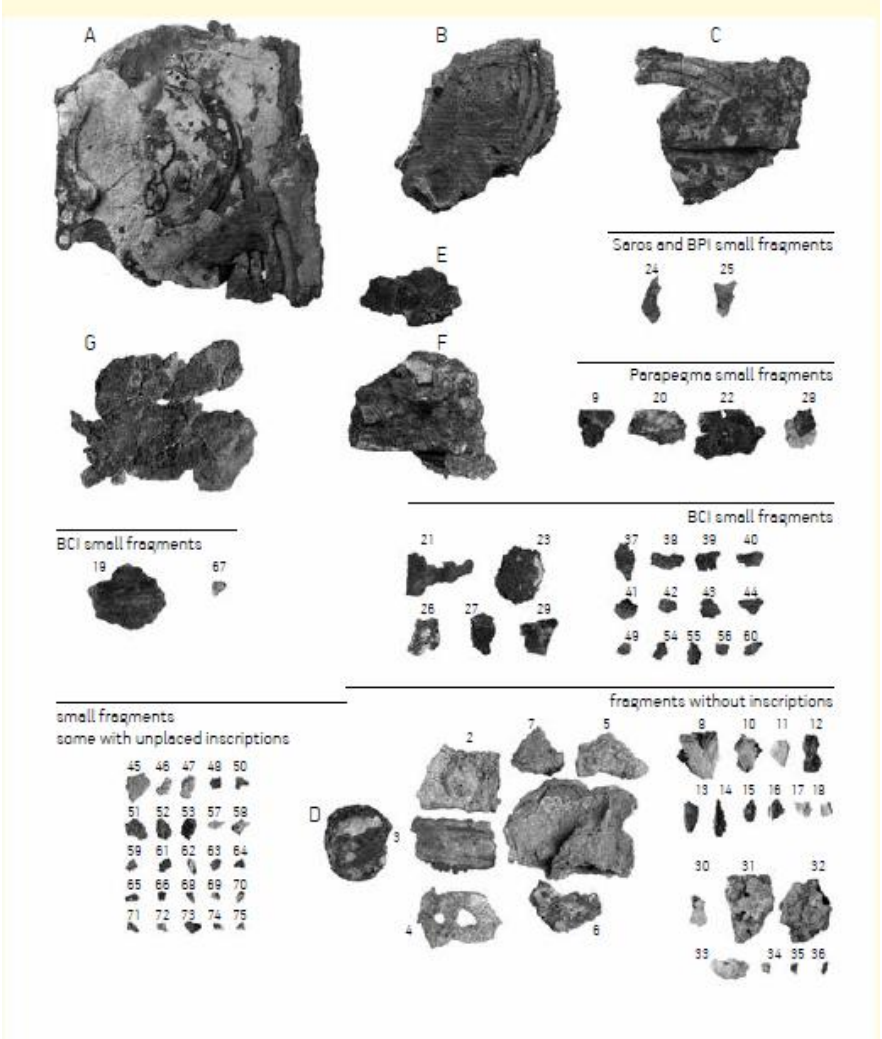


- The Colossus computer was used at Bletchley Park to decipher Enigma messages during World War 2.

c.205-100 BCE - The Antikythera Mechanism

The Antikythera Mechanism Research Project

The 82 known fragments of the Antikythera Mechanism



Reconstruction by Professor Tony Freeth

Scientists used computer modelling to recreate the device's complex gear system

.

The Antikythera Mechanism

- Considered to be the world's first mechanical computer.
- Now split into 82 fragments and 30 corroded bronze gear wheels. Only about a third of the original remains.

The Antikythera Mechanism

- Oldest known example of an analogue computer.
- An Ancient Greek hand-powered orrery (model of the Solar System).
- It could be used to predict astronomical positions and eclipses decades in advance. It could also be used to track the four-year cycle of athletic games similar to an Olympiad, the cycle of the ancient Olympic Games.
- Constructed c.205-100 BCE.
- Compare with Astronomical Clocks found on important old European buildings.

Prague Astronomical Clock 1410.

Oldest functioning astronomical clock in the world.

The clock tower

Analogue computers

- Analogue computers use continuous physical magnitudes to represent quantitative information. At first, they represented quantities with mechanical components, but after World War II voltages were used; by the 1960s digital computers had largely replaced them.
- One advantage of analogue computation is that it may be relatively simple to design and build an analogue computer to solve a single problem. Another advantage is that analogue computers can frequently represent and solve a problem in “real time”.

Digital computers

- In contrast to analogue computers, digital computers represent information in discrete form, generally as sequences of 0s and 1s (binary digits, or bits).
- The modern era of digital computers began in the late 1930s and early 1940s in the United States, Britain, and Germany. The first devices used switches operated by electromagnets (relays). Their programs were stored on punched paper tape or cards, and they had limited internal data storage.

The Antikythera Mechanism

Sponge divers boat – Libya to Antikythera.

Probable route of wrecked boat - Asia Minor to Antikythera.

Intended route of boat – Antikythera to Rome.

Discovery of wreck

- 1900 Sponge divers 40 m boat took refuge from the weather near Greek island Antikythera.
- When weather moderated, a diver investigated surrounding waters and found a wreck with a ghostly cargo of statues.
- Further investigation by the Captain revealed a wreck with statues, amphoras, etc. He surfaced with a bronze arm from a statue.
- This was duly reported to Greek authorities, and some of the cargo was salvaged over the years.
- Items salvaged were not properly recorded or looked after initially.
- Later investigations suggested they may have been wartime loot by the Romans from about 65 BC, or personal possessions of a rich family.

Free divers or standard driving dress?

Standard Diving Dress of the Period.

Depth in the area 45 to 70 or 80 metres.

Darwin – Museum & Art Gallery of the Northern Territory

Typical Roman Galley

Statue ex wreck

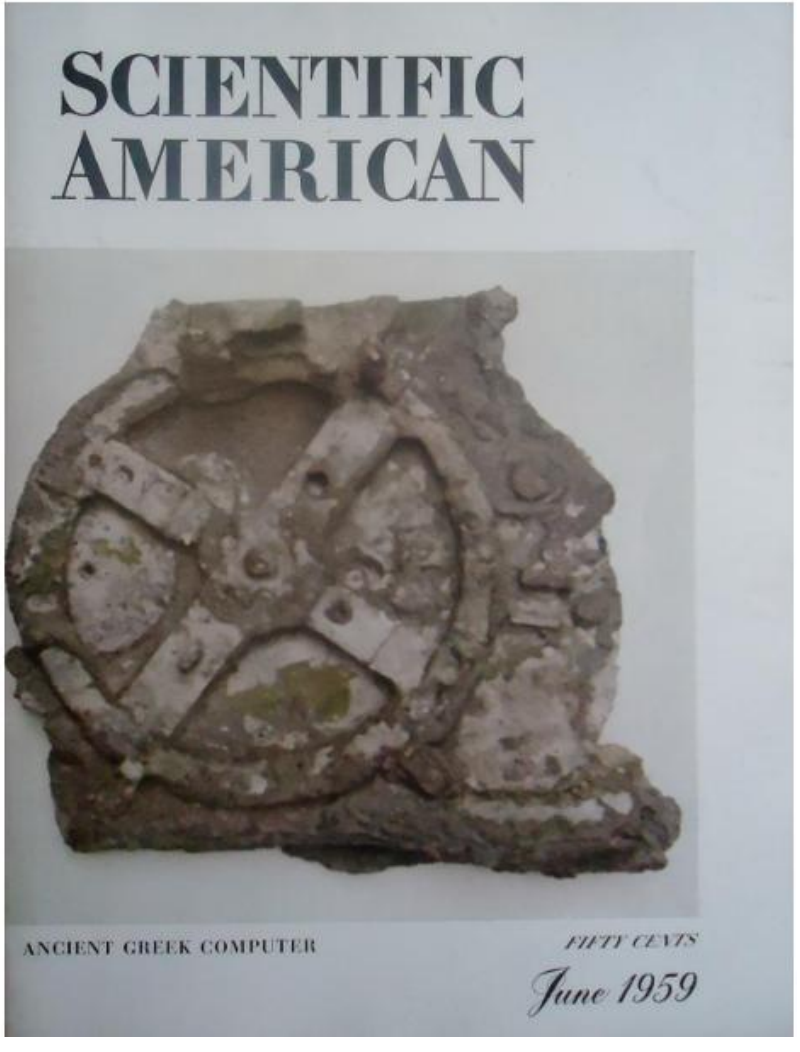
Some items recovered from the Wreck

The Antikythera Mechanism

An Ancient Greek Computer

Article by Derek de Solla Price

June 1959



An Ancient Greek Computer

In 1901 divers working off the isle of Antikythera found the remains of a clocklike mechanism 2,000 years old. The mechanism now appears to have been a device for calculating the motions of stars and planets

by Derek J. de Solla Price

Derek de Solla Price with a model of the Antikythera Mechanism (August 1982).

Definitions

- The word "computer" is derived from the Latin word computare, which means "to calculate," "to count," "to sum up," or "to think together". The word "compute," which itself comes from the Latin "computare" via Old French, refers to the act of calculating or reckoning. Historically, the term "computer" was used to describe a person who performed calculations, and it was later applied to mechanical and then electronic devices designed for computation.
- The earliest definition in the Oxford English Dictionary (OED) describes a "computer" as a person who performs calculations.
- This human-centric meaning persisted for centuries, with the first recorded use of the word in 1613 referring to a person skilled in arithmetic.

Definition of Computer

- **Early computers** were actually **people, not machines** -- it was a **job title**.
- "Computers" performed complex calculations; they were mathematicians and bookkeepers.
- The first time the word "computer" was used to describe a machine was 1897.

A Model of the Cosmos in the ancient Greek Antikythera Mechanism by Tony Freeth et al.

“The *Antikythera Mechanism*, an ancient Greek astronomical calculator, has challenged researchers since its discovery in 1901. Now split into 82 fragments, only a third of the original survives, including 30 corroded bronze gearwheels. Microfocus X-ray Computed Tomography (X-ray CT) in 2005 decoded the structure of the rear of the machine, but the front remained largely unresolved. X-ray CT also revealed inscriptions describing the motions of the Sun, Moon and all five planets known in antiquity and how they were displayed at the front as an ancient Greek Cosmos. “

A Model of the Cosmos in the ancient Greek Antikythera Mechanism by Tony Freeth et al

- The Antikythera Mechanism is a cultural treasure that has engrossed scholars across many disciplines. It was a mechanical computer that used ground-breaking technology to make astronomical predictions.

Modern Scientific Analysis 1951-2006

- Numerous articles and authors (e.g. Michael Wright, Alan Bromley, etc.) over many years concerned with the internal construction of the Mechanism such as gear wheels, cogs, etc. X-rays were used but insufficient coverage and clarity until Computer Assisted Tomography (CAT scans) was used .
- Some of Price's conclusions were found to be incomplete or inaccurate as more accurate information became available.
- X-ray tomography revealed virtually all the construction details.

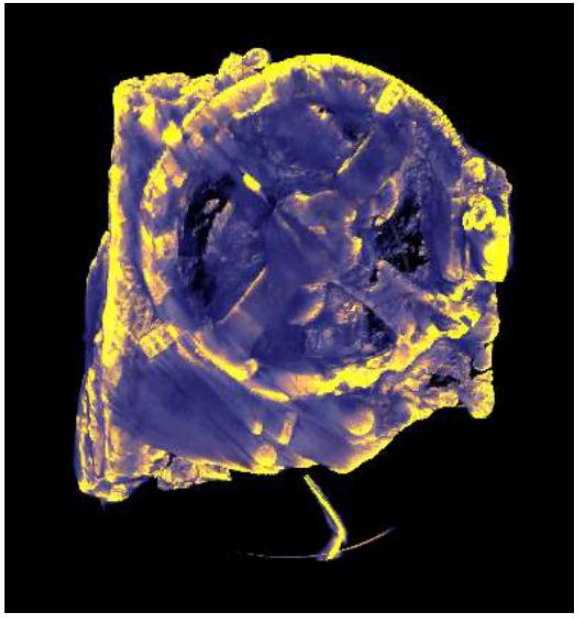
“We had to ship the X-ray system to Greece!
All 8 tonnes of it.” (2005)

Tomography

- A technique for displaying a representation of a cross section through a sold object using x-ray or ultrasounds.
- X-ray Tomography of the Antikythera Mechanism - Andrew Ramsey Nikon Metrology UK Ltd (formerly X-Tek Systems Ltd)
- See article X-ray_Tomography-Ramsey.pdf

X-ray Tomography of the Antikythera Mechanism

Andrew Ramsey
Nikon Metrology UK Ltd
(formerly X-Tek Systems Ltd)

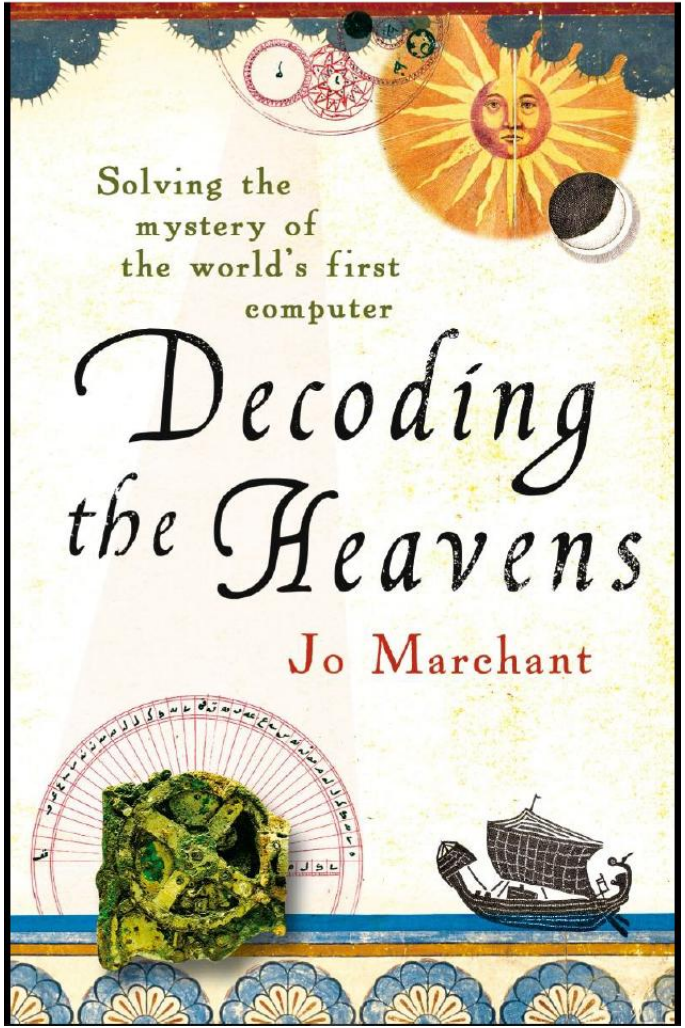


Summary Timeline 1

- c. 287-212 BCE – Archimedes, Greek mathematician & astronomer. Said to have built a planetarium and may have been a precursor to Antikythera Mechanism.
- c. 180-260 BCE - Vessel constructed of Roman timber, (timber dating).
- c. 205-100 BCE - Antikythera Mechanism constructed (inscriptions on machine), possibly built in Rhodes. Possible constructors Posidonius or Hipparchus (world class astronomers).
- c. 70-60 BCE - Roman vessel sailing from Rhodes to Roman area wrecked in storm. Dated by coins on board ex Pergamon (Asia Minor).
- 1900 - Wreck discovered.
- 1901-02 - Salvage operation on wreck and artefacts transferred to Greek Museum of Archaeology. Start of continuing scientific articles re Mechanism. Originally thought it might be an astrolabe (i.e. star finder, etc.). Objects from wreck were never properly catalogued or labelled.

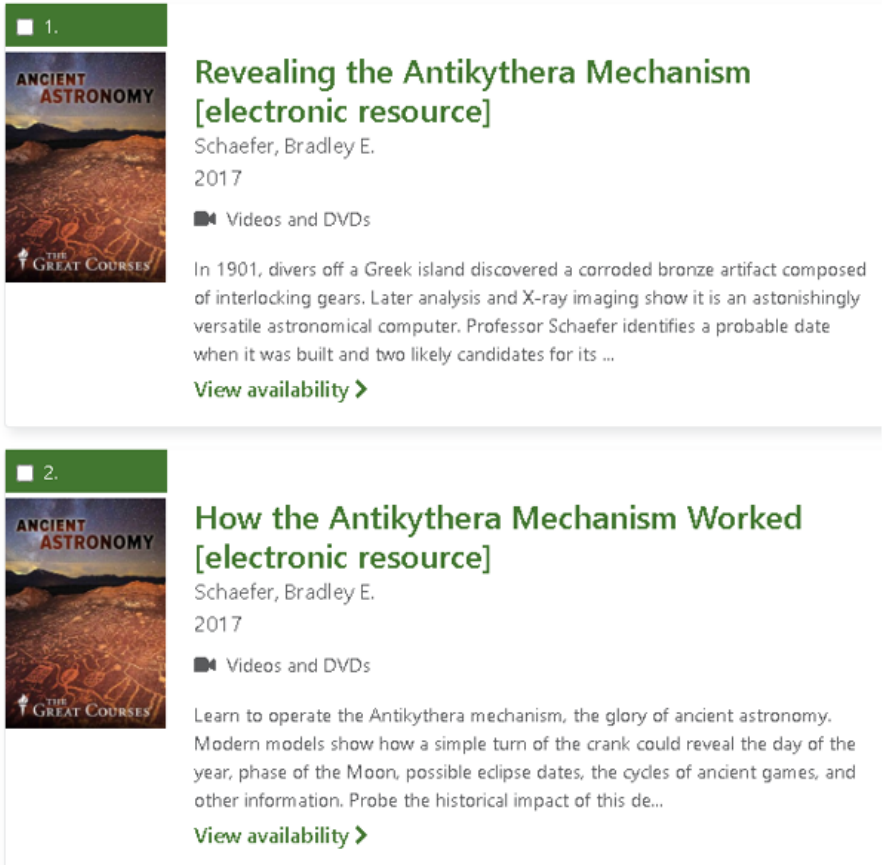
Summary Timeline 2

- 1959 - Scientific American article June 1959 “Ancient Greek Computer”. Many articles followed by various researchers.
- 1960s - Further investigation of wreck and Mechanism.
- 1972 & onwards - X-rays of Antikythera Mechanism.
- 1953 & 1976 - Jacque Cousteau investigated wreck.
- 2005-2006 Computer Assisted Tomography (CAT scans) of Mechanism provided considerable detail of discs.


Solving the mystery of the world's first computer
Decoding the Heavens
Jo Marchant

Ku-Ring-Gai Library

- Requires hoopla app (free).



Podcasts

12/12/2024 · 51 MIN

The Antikythera Mechanism

In Our Time

▶ Play

NO ONE SAW IT COMING →

The First Computer Was Greek (And Shipwrecked)

Tue 2 Dec 2025 at 6:00am

▶ Play 25m

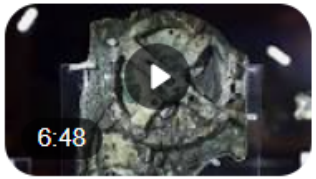
YouTube · BBC Global
12M+ views · 4 years ago

Antikythera Mechanism: The ancient 'computer' that simply ...

Antikythera Mechanism: The ancient 'computer' that simply shouldn't exist - BBC REEL. 12M views · 4 years ago #bbcnews #bbc #bbcreel ...more ...

BBC
https://www.bbc.com · 23 Feb 2022

Unlocking the secrets of the world's oldest computer



The mysterious Antikythera Mechanism has captured the imagination of archaeologists, mathematicians, and scientists ever since. Now ...

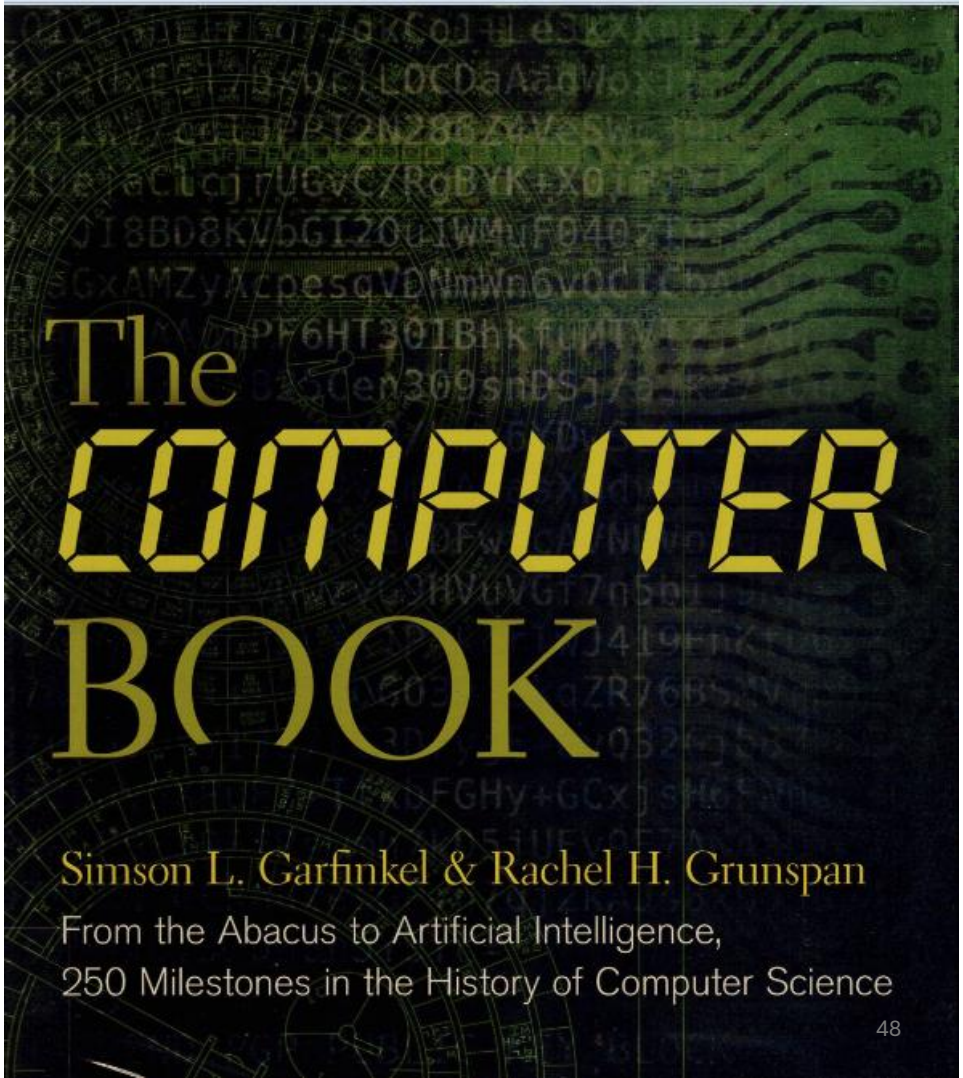
BBC
https://www.bbc.co.uk › Programmes › In Our Time

In Our Time, The Antikythera Mechanism

Melvyn Bragg and guests discuss the **2,000-year-old Greek astronomical computer**, one of the most important discoveries in marine archaeology. Show more. Read more

Useful Reference

- Weight 2.5 kg
- Thickness 4 cm
- One page + photograph of item
- 527 pages
- Not for bedtime reading



Was The Antikythera Mechanism the the First Computer?

- This paper suggests it was The Antikythera Mechanism, and this is supported by many articles.
- Originally named as a computer by Derek de Solla Price .
- Naming continued by Tony Freeth and others.
- Later researchers more concerned with astronomical details.
- Doron Slade, Senior Curator of Computing (and a computer historian) in Science Museum, London defined a computer as any device that can not only calculate a mathematical function but also display the answer on a numerical scale.
- Perhaps it is up to the individual to decide their preference.

First Computer?

- First calculator — Abacus
- First analogue computer — Antikythera mechanism
- First programmed analogue computer — Totaliser
- First digital computer — Eniac or Colossus

Five early electronic computers:

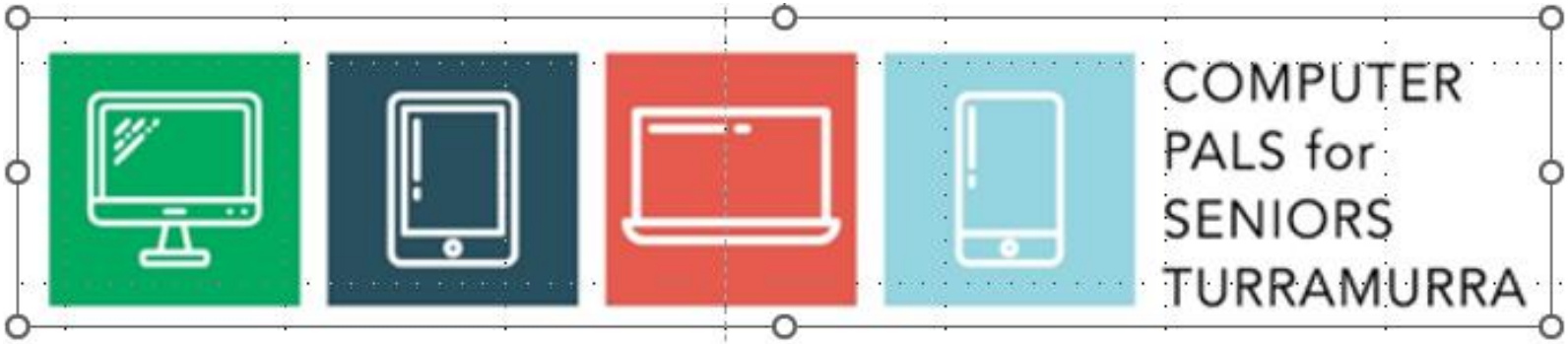
- **1942 Atanasoff-Berry Computer (ABC)-**Developed by John Atanasoff and Clifford Berry, the ABC was a special-purpose electronic digital computer designed to solve systems of linear equations. It was the first electronic digital computer, though not programmable.
- **1944 Colossus-**Created in Britain during World War II, the Colossus was the world's first fully electronic, programmable computer. It was used for codebreaking.
- **1945 ENIAC (Electronic Numerical Integrator and Computer)-**Completed in 1945, the ENIAC is considered the first general-purpose, electronic, digital computer. It was a massive machine with a vast number of vacuum tubes.
- **1949 Manchester Mark 1-**This British computer was the world's first stored-program electronic computer, capable of holding both its instructions and its data in electronic memory.
- **1951 UNIVAC I (Universal Automatic Computer I)-**This was the first commercially produced and sold computer in the United States, playing a significant role in the transition from research machines to business computing.

Powerhouse Museum - Model of the Antikythera Mechanism made of brass, Perspex and paper. Made by Allan Bromley and Frank Percival , Sydney NSW, 1985-89.

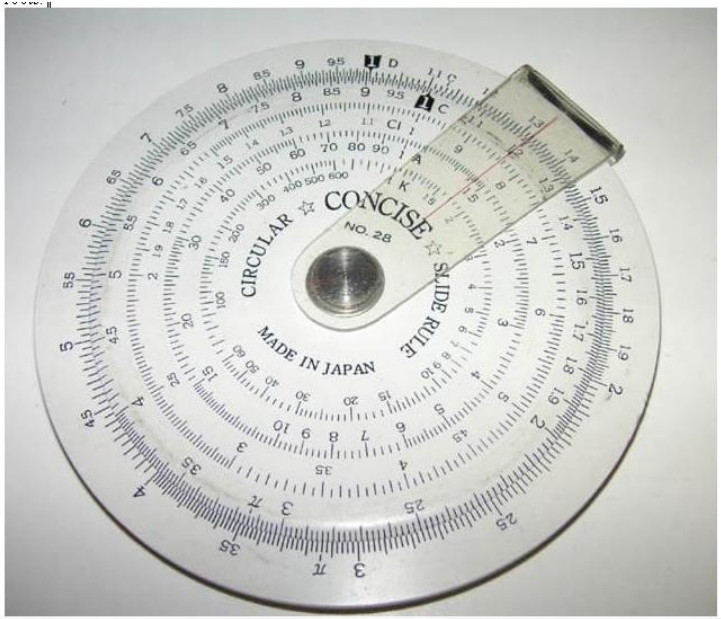
Further Research

- Australian Computer Museum Society, 2 West Street, Croydon.
- Computer History Museum (Netherlands) - “Timeline of Computer History”.
- Association for Computing Machinery (ACM).

The End



Circular Slide Rule



Analog & Digital Computers

- Analog computers use continuous physical magnitudes to represent quantitative information.
- Digital computers represent information in discrete form, generally as sequences of 0s and 1s (binary digits, or bits).

- The First Generation, 1940–1956 (Vacuum Tubes)
- The Second Generation, 1956 – 1963 (Transistors)
- The Third Generation, 1964 – 1971 (Integrated Circuits)
- The Fourth Generation, 1971 – 1980 (Microprocessors)
- The Fifth Generation, 1980 & Above (Artificial Intelligence)