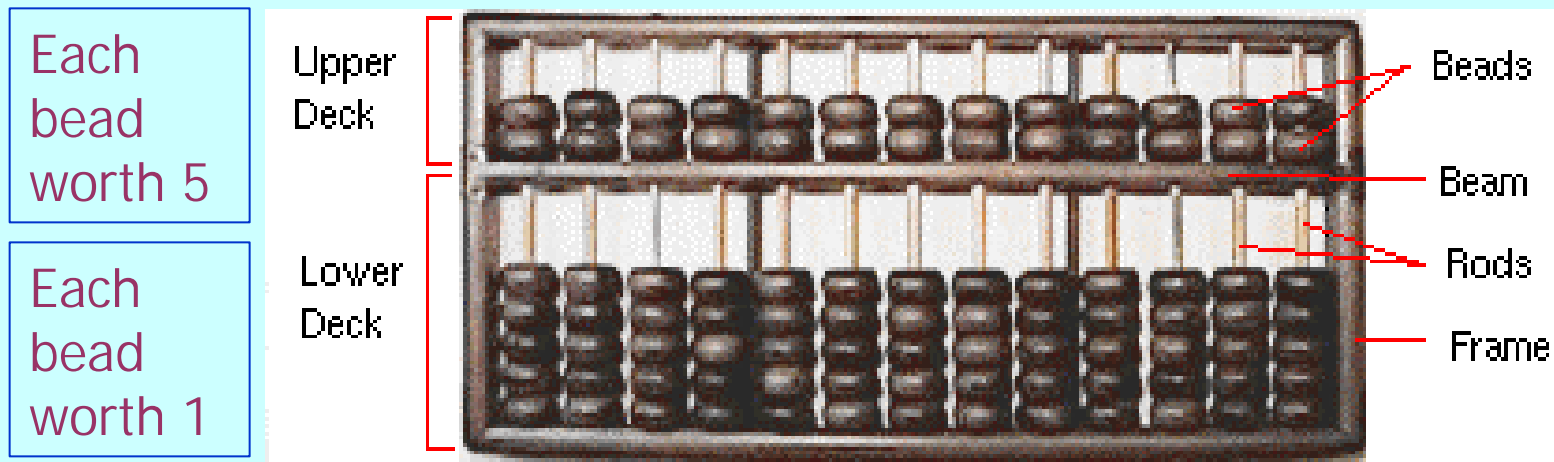# From early mind tools to the electronic computer...

What to focus on...

- As people started to carry on trade ...
  - What sorts of items did they use to keep track of things?
- The abacus. *So what?*

Each bead worth 5

Each bead worth 1

Upper Deck

Lower Deck

Beads

Beam

Rods

Frame

Early 1800s

- **Joseph Jacquard**, French inventor (1752-1834)
  - What did his loom *automate*?
  - Briefly, how?
  - *So what?*
  - In essence, what was the "program"?
 - How do you suppose the weavers reacted to all this?

Early 1800s

- **Charles Babbage**, British inventor, eccentric… (1791-1871)

  - Where have you seen this name before?

  - What were *mathematical tables* used for during that time?

  - Then why did Babbage want to build his **Difference Engine**?

  - Why so many errors?

  - So what would the Difference Engine do to change this (in non-technical terms)?

Difference Engine

3
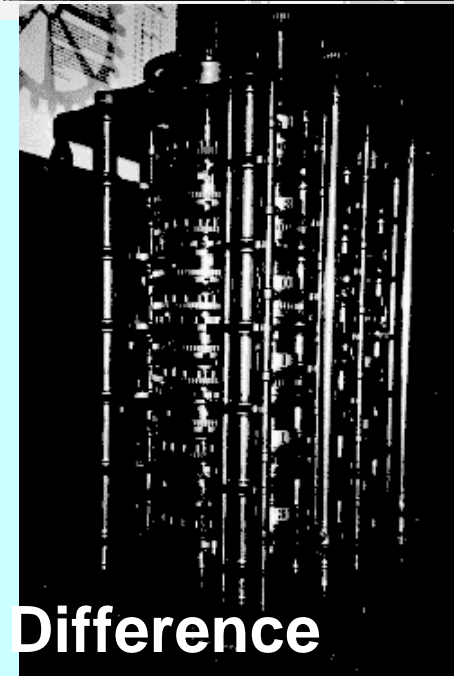
– **So what?** (why would that have been important?)

– Did Babbage ever finish building it? Why or why not?

  • What was the most important reason?

– Engineers in London, **1991** …! (his 200th birthday)

– *Fundamentally*, how would the **Analytical Engine** differ from the Difference Engine?
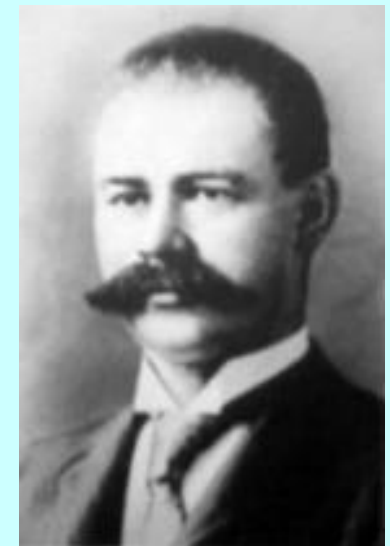
Analytical Engine
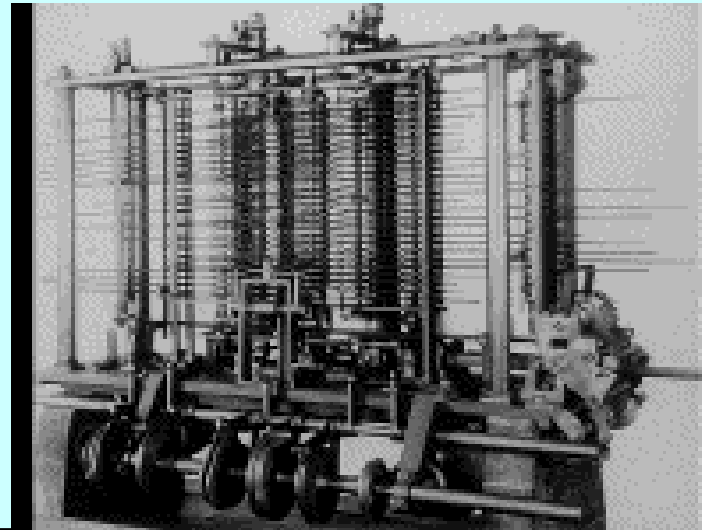
- **So what?** Hint: till now, how were all machines *defined*?

- Was the Analytical Engine ever built?

- Again, *so what!* What had he <u>accomplished</u> more than 150 years ago?

- *Brief video*

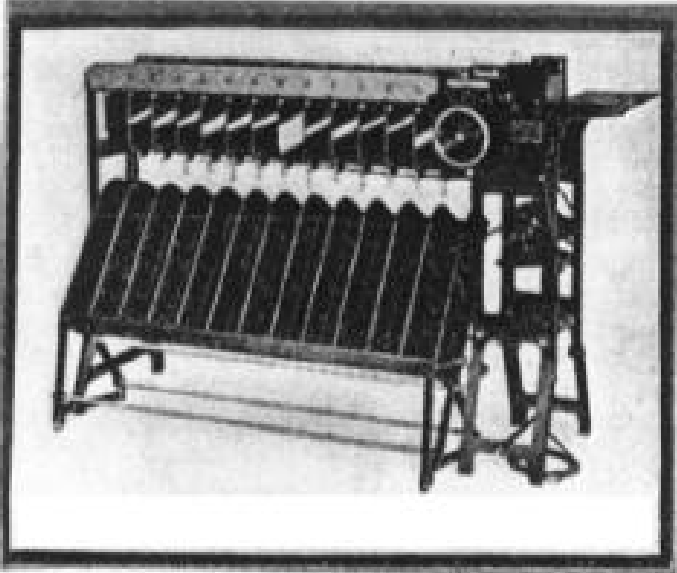**Hollerith (1860-1929)**

Late 1800s

- Population boom from 1870 to 1880.
  - **So what?**
  - What did Herman Hollerith do about this?
  - Did things change in 1890? *How?*
  - Workers' reactions? --What became of Hollerith?

Punched cards

Tabulating equipment

1930s, 40s (pre-war and WWII)

- **Konrad Zuse**, civil engineering student in Berlin

  – Calculations for designing and building bridges <u>not</u> fun…! personal project.

  – His approach…

    The electromagnetic relay

    - switching done physically
    - arithmetic: carried out by circuits of these relays
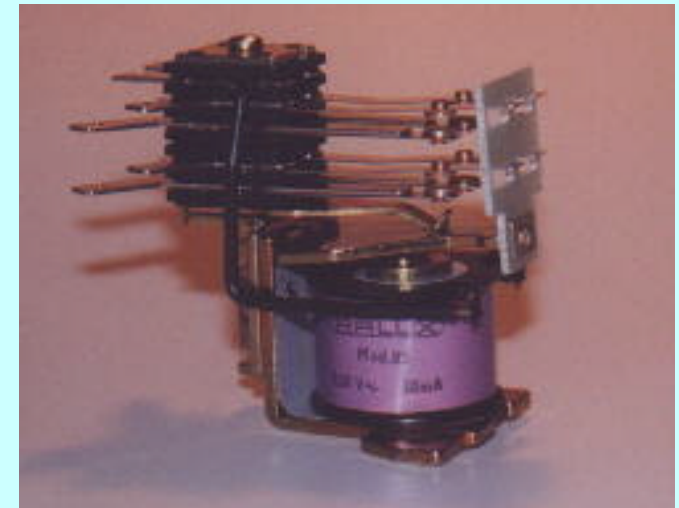
- What do you suppose the German High Command thought of such a device?
- By end of 1941: **Z3:** first *programmable* <u>electro-mechanical</u> computer actually *built*.
- But relays are slow to switch states….why?
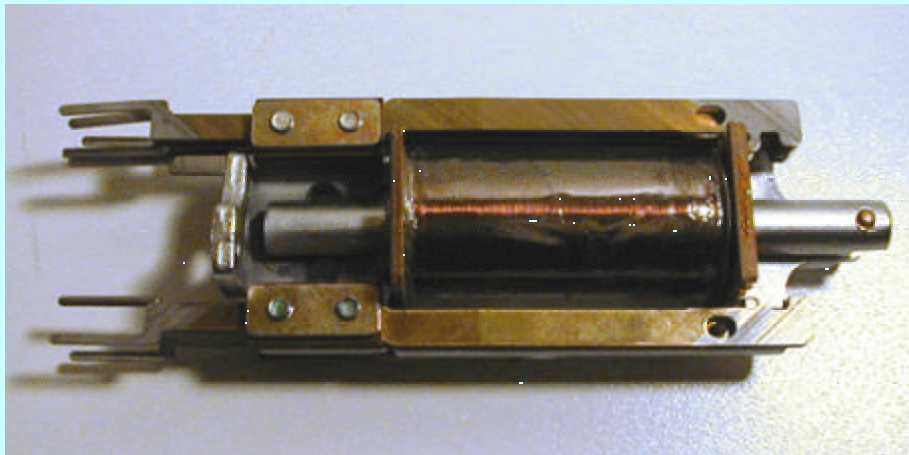
A Relay *c1950*
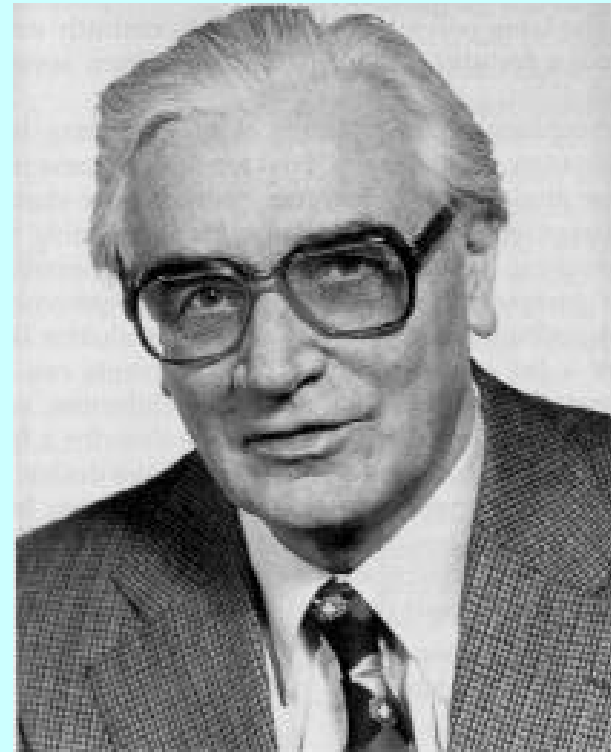
Zuse (1910-1995)

- What *electronic* components were used as amplifiers in radios, then later in televisions?

  - **So what?** What would be the difference using these instead of *relays*??

  - Zuse proposed building such an electronic computer…

  - *Brief video*

- **Alan Turing**, British scientist, eccentric genius
  - You read about him in RH-07's feature story.
  - His contribution to the allies in WWII?
  - The Imitation Game; came to be known as the Turing Test *(can machines think?)*
  - The Loebner Prize
  - http://www.dcs.shef.ac.uk/~u6rs/turing/loebnerprize.html
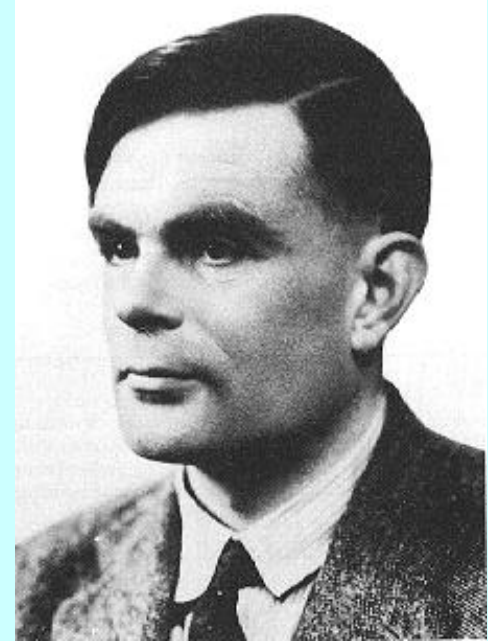
Alan Turing 1912-1954

America enters the War

- **Artillery tables used for**? (how computed?)
- Number of "human computers"
- What was **ENIAC** initially *designed* for?
  - How was it *fundamentally* different from Zuse's Z3?
  - **So what?**
  - Some statistics …
  - Its inventors?
- Completed in time to do what was intended for it?
  - But *so what!*
  - What was it initially used for instead?

- How was **ENIAC** introduced to the public?
  - *Why do you suppose they did this?*
- How did most journalists describe ENIAC?
- What impact did media reports have on the public's perception of computers during early days of computing?

  Digression:
  - What did the author say about how journalists often deal with reporting difficult science and technology issues?   Why?
    - What effect could this have on the public today?
    - Do you agree or disagree with the author? Why?

Post war '40's and '50s

- **1946: Patent dispute with U of Penn**
  - Eckert and Mauchley Computer Corporation
    - Needs a MARKET!
    - Needs funding $$$!
      - U.S.Census Bureau once again!

- **Design UNIVAC**
    - Would be first COMMERCIAL general-purpose computer
    - Problems abound ….   Time, $$, historical climate
  - E & M sell their company to Remington-Rand, who would ultimately deliver first UNIVAC…

1950s to early 60s (from the video)

- Was IBM first to get into *commercial* computer market? Who was?
- Who eventually swept the market during this time?
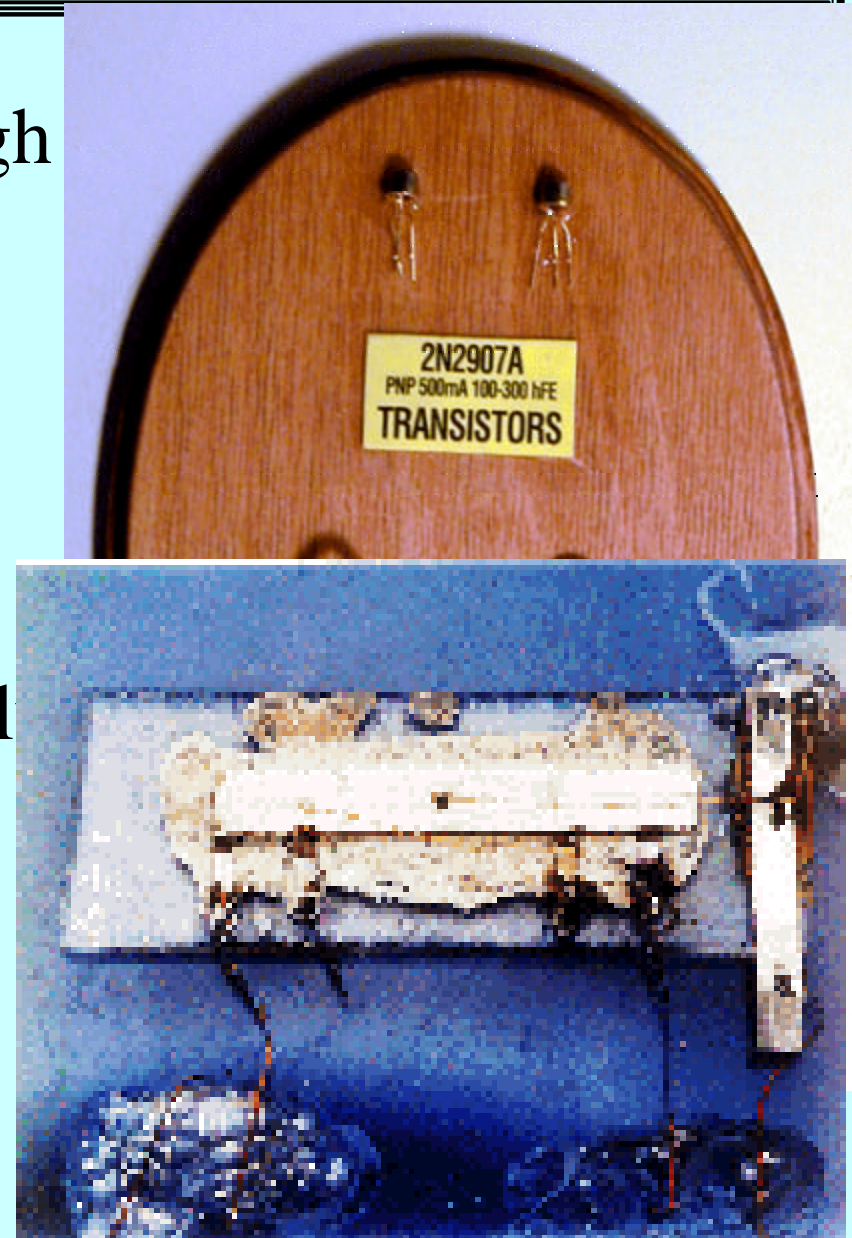- Why did the IBM 650 do so well?
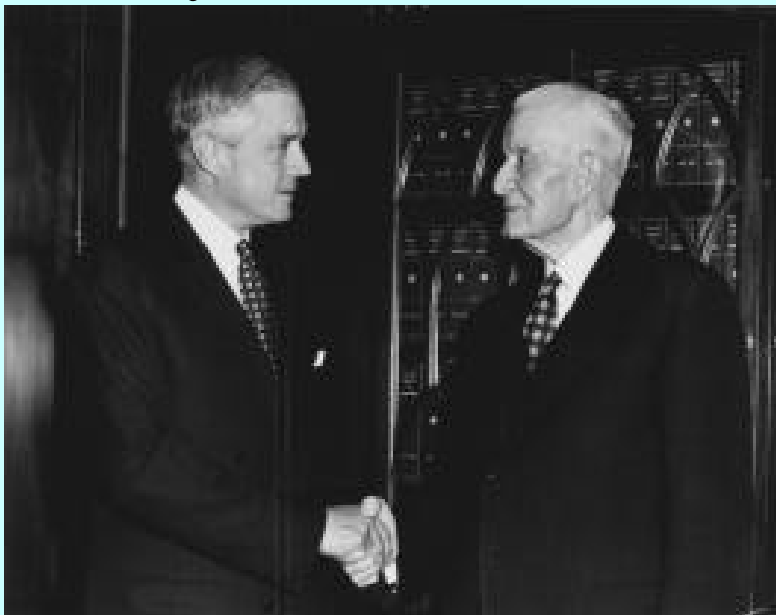
T.J. Watson Jr., Sr.
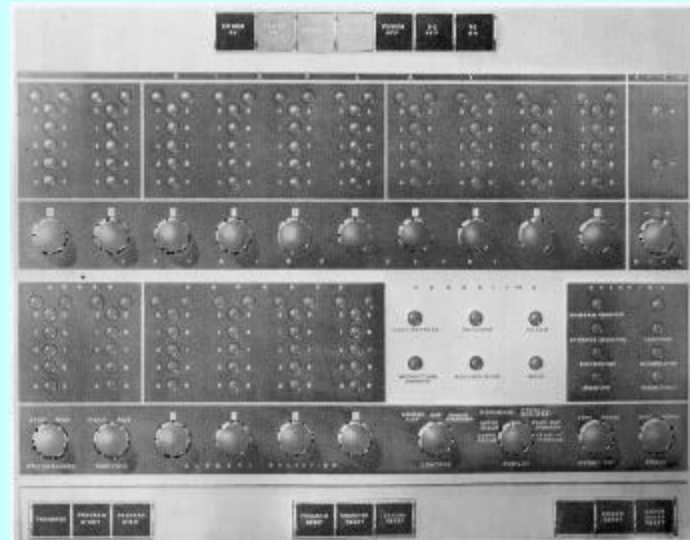
IBM 650

- What hardware breakthrough changed the field of electronics, and then computing? Why?

- What was the "tyranny of numbers"? Solution?

- Worldwide events (50s, earl 60s) that spurred the use of **IC**s?

- What was Kennedy's challenge to the scientific community? Was it met? How?

2N2907A
PNP 500mA 100-300 hFE
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1959: 1ˢᵗ I.C.

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