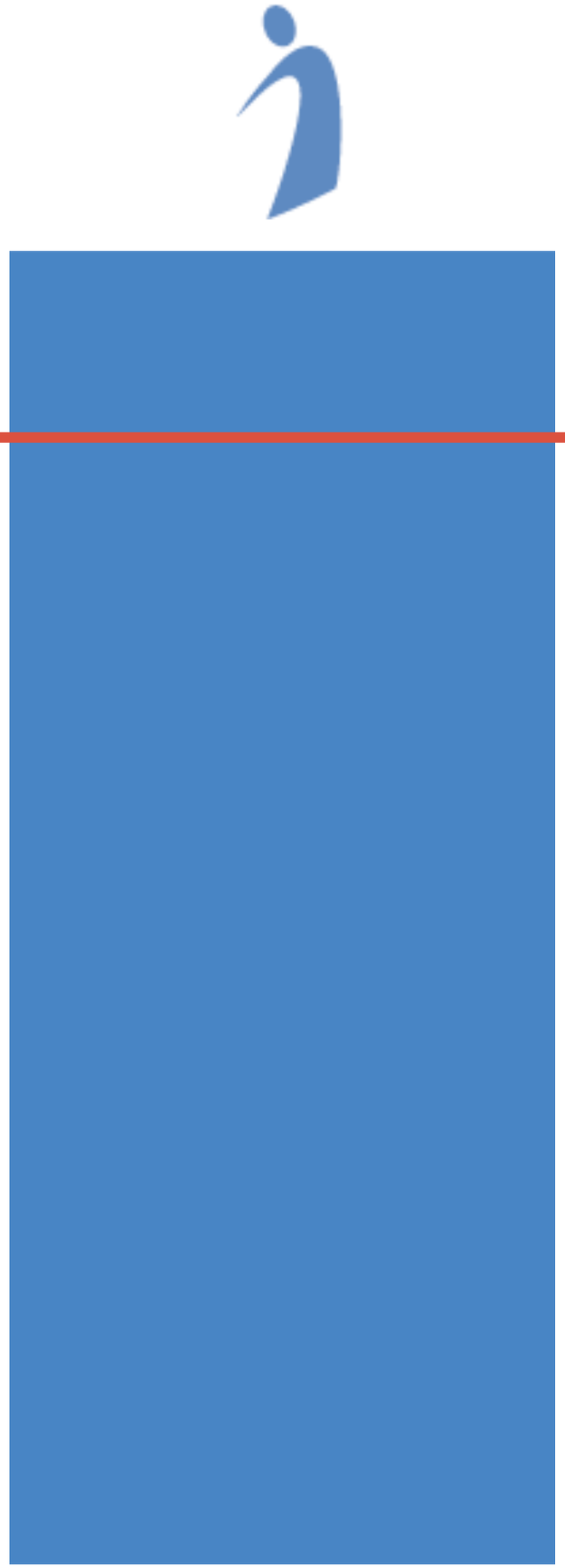
computers

History of Information

November 26



overview

what is a computer?

proto-computers

why computer?

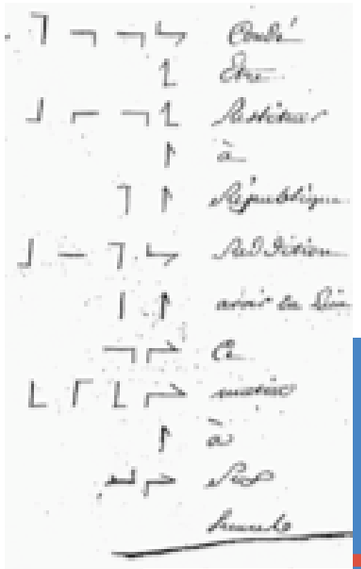
business uses

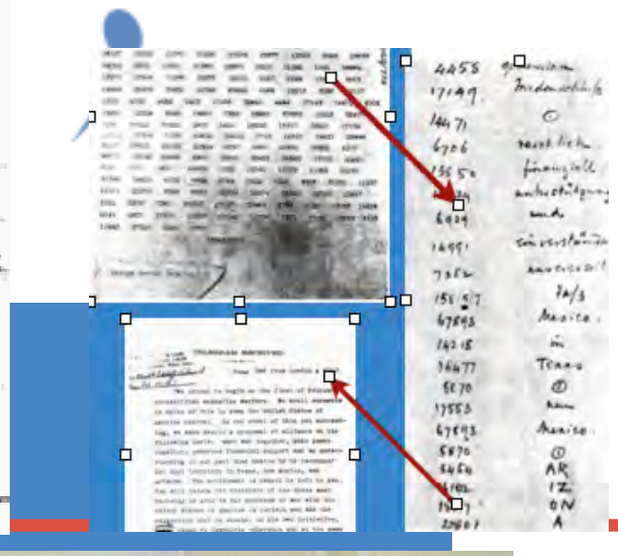
government uses

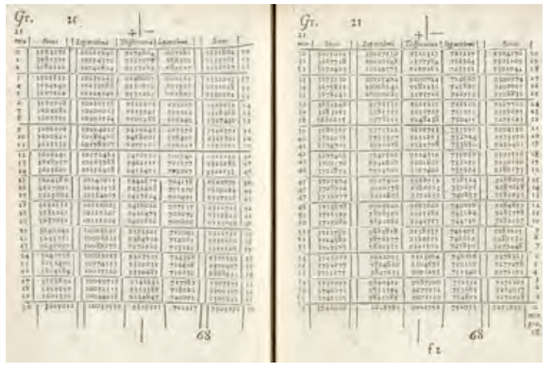
military uses

scientific uses

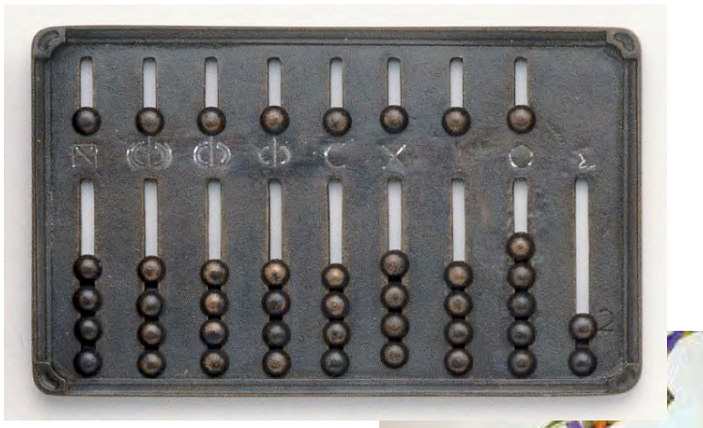
computing after WWII

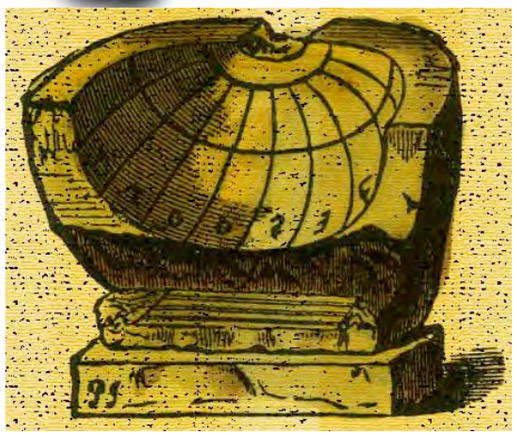


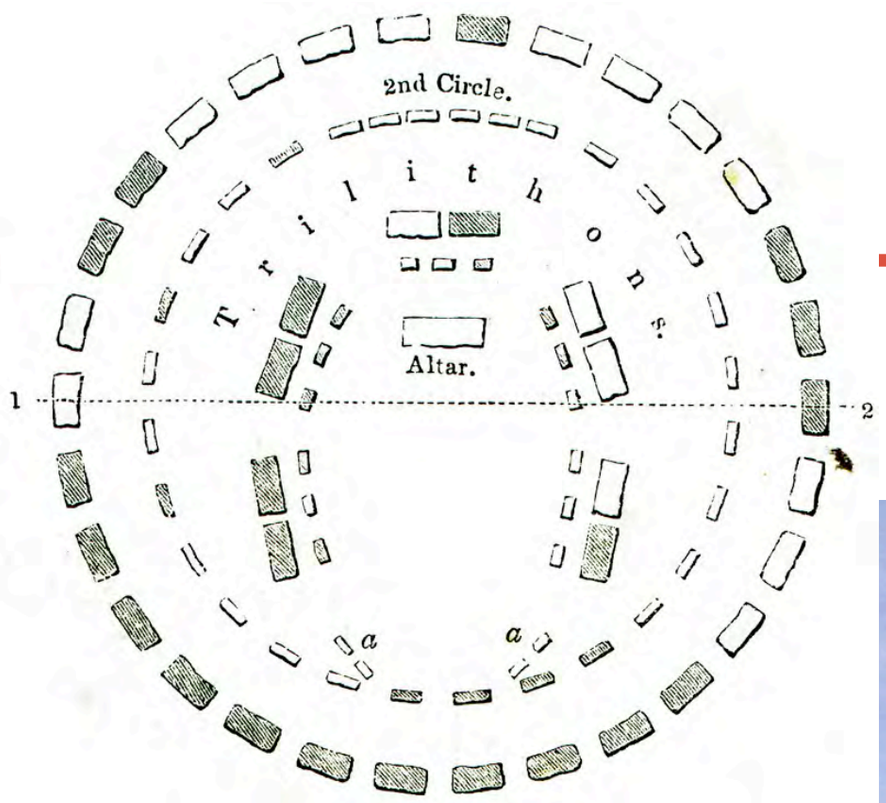




what is a computer?



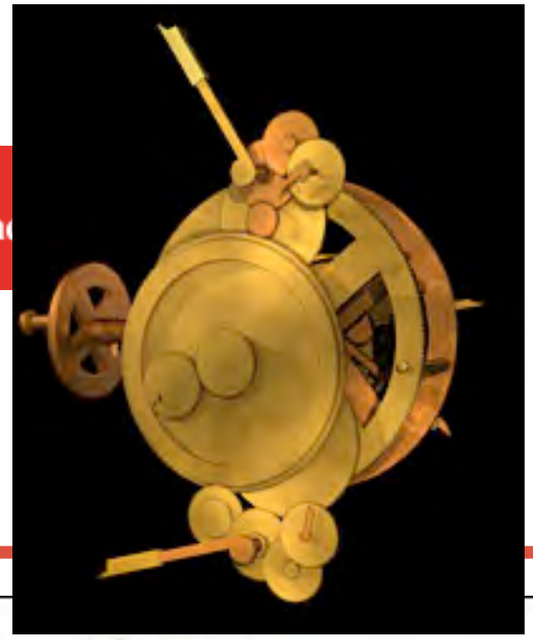




the long then

c 3100 bce

nature International weekly journal of scien



Antikythera

The Antikythera Mechanism is a unique Greek geared device, constructed around the end of the second century bc. It is known that it calculated and displayed celestial information, particularly cycles such as the phases of the moon and a luni-solar calendar. Calendars were important to ancient societies or timing agricultural activity and fixing religious festivals. Eclipses and planetary motions were often interpreted as omens, while the calm regularity of the astronomical cycles must have been philosophically attractive in an uncertain and violent world. Named after its place of discovery in 1901 in a Roman shipwreck, the Antikythera Mechanism is **technically more complex** than any known device for at least a millennium afterwards. Its specific functions have remained controversial because its gears and the inscriptions upon its faces are only fragmentary. Here we report surface imaging and high-resolution X-ray tomography of the surviving fragments, enabling us to reconstruct the gear function and double the number of deciphered inscriptions. The mechanism predicted lunar and solar eclipses on the basis of Babylonian arithmetic-progression cycles. The inscriptions support suggestions of mechanical display of planetary position, now lost. In the second century bc, Hipparchos developed a theory to explain the irregularities of the Moon's motion across the sky caused by its elliptic orbit. We find a mechanical realization of this theory in the gearing of the mechanism, revealing an unexpected degree of technical sophistication for the period.
[Nature, 30 Nov, 2006

176 Daniel's *Prophecy Vindicated.*

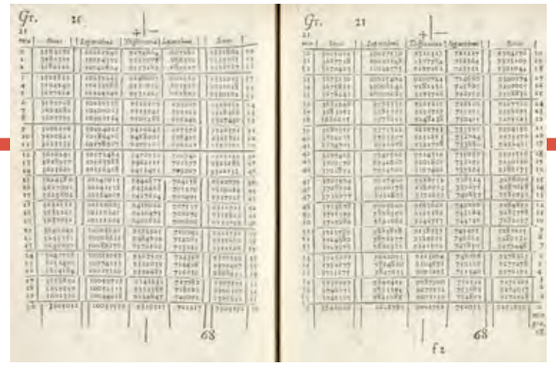
conclude any thing from the account of *Gabriel* given unto *Daniel* in this place. This they plainly acknowledge in a Diſputation which they had with a converted *Jew* before the *Biſhop of Rome* recorded in their *Shebet Jehuda.* Only they would except *Daniel* himſelf, affirming that he was not מחשב, *a Computer of the time*, but ראה, *a Seer*; as though the Queſtion were about the way and means whereby we attain a juſt computation of the time, and not about the thing it ſelf. *Daniel* received the knowledge of this time by Revelation, as he did the time of the accompliſhment of the Captivity, though he made uſe of the computation of time limited in the Prophecy of *Jeremiah*; but in both he gives us a perfect Calculation of the time, and ſo cannot be exempted from the Talmudical Malediction. And I mention theſe things in the en-

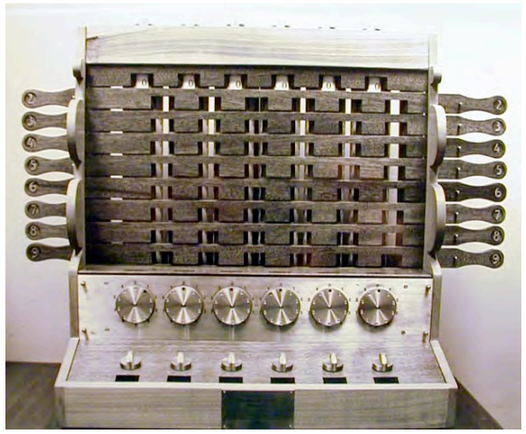
computer

"I have read the truest computer of Times"
The Young Man's Gleanings, 1614

In the Talmud ... they have laid down this general Rule, Male pereant qui temporum articulos suppetunt quibus venturus est Messiah. Or as they express it by a solemn Curse in the name of Rabbi Jonathan, a great man among them, let their bones rot who compute the times of the end. ... [Daniel] was not a Computer of the time but a Seer as though the Question were about the way and means whereby we attain a just computation of the time, and not about the thing it self. Daniel received the knowledge of this time by Revelation, as he did the time of the accomplishment of the Captivity, though he made use of the computation of time limited in the Prophecy of Jeremiah; but in both he gives us a perfect Calculation of the time, and so cannot be exempted from the Talmudical Malediction

John Owen, *Exercitations on the Epistle of the Hebrews*, 1688





calculators

John Napier (1550-1617)
Mirifici Logarithmorum
Canonis Descriptio, 1614

Wilhelm Schickard (1592-1635)
automatic calculator, 1623

Blaise Pascal (1623-1662)
probability, syringe
hydraulic press, wager
"Pascaline"calculator,1642
Royal privilege, 1649

Gottfried Leibniz (1646-1716)
windmills, submarines, clocks
binary system
stepped calculator, 1671

calculating

Charles Babbage, FRS (1791-1871)
speedometer, cowcatcher

calculator, 1821

difference engines, 1 & 2, 1830s
12,000 parts; +printer, +12,000

analytical engine, 1834
the *store* and the *mill*

On the Economy of Machinery and Manufactures, 1832

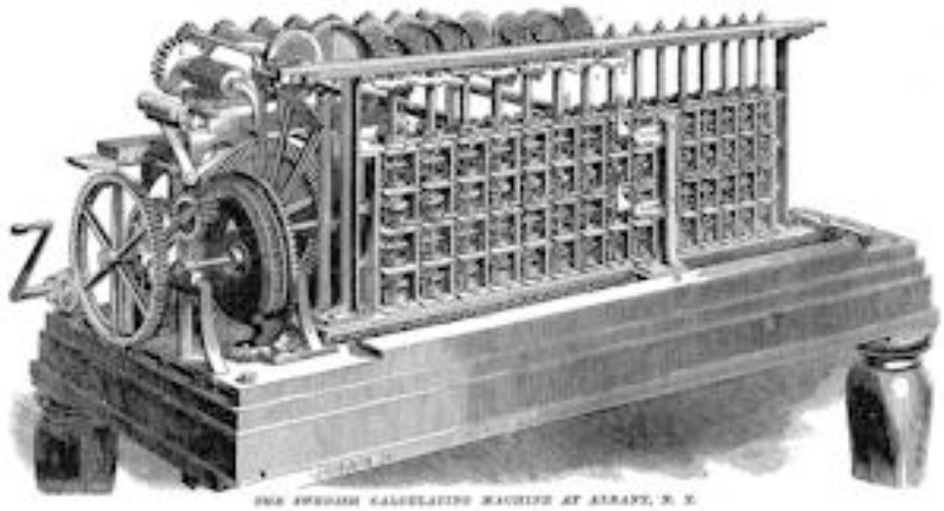
difference engines

George & Edvard Scheutz

Scheutz Difference Engine, with printer
c 1853

Dudley Observatory, Schenectady

British Government, actuarial calculations



Ada Lovelace

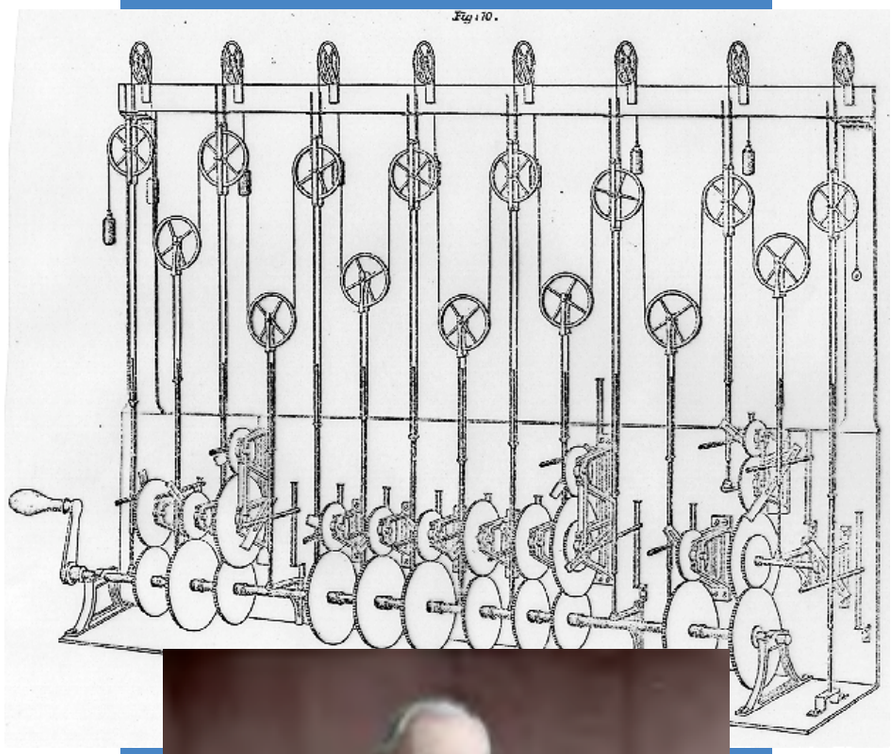
Augusta Byron, Countess of Lovelace (1815-1852)
unbyronic education

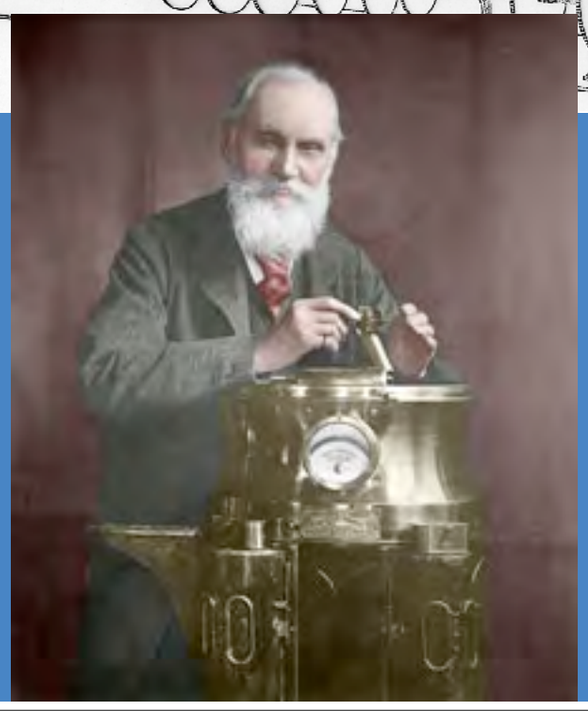
"a machine that not only would have foresight, but could act on that foresight"

"I want to put in something about Bernoulli's Number, in one of my notes, as an example of how an explicit function, may be worked out by the engine, without having been worked out by human head and hands first"
Lovelace to Babbage. 1843

"Analytical Engine *weaves algebraical patterns* just as the Jacquard loom weaves flowers and leaves'
-Taylor, *Scientific Memoirs*, 1843

analog predictors



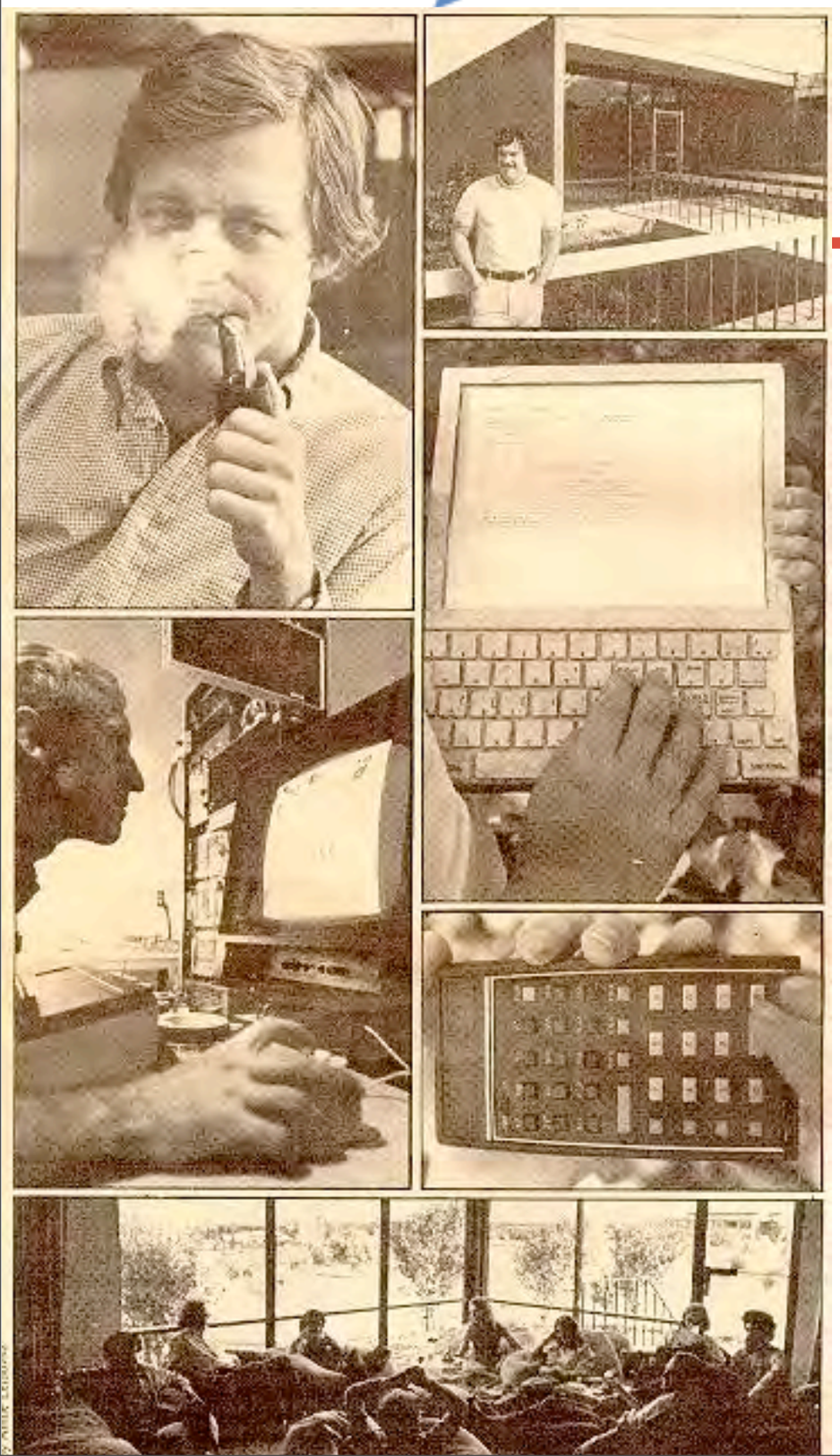


Charles Boyle, Earl of Orrery

William Thomson,
Lord Kelvin (1824-1907)
tide predictor, 1872

Lewis Fry Richardson (1881-1953)
Weather Predictions by Numerical Process, 1922 [1916]

Statistics of Deadly Quarrels, 1960



fast forward

Stewart Brand, "Fanatic Life and Symbolic Death Among the Computer Bums"

Rolling Stone, 7 December, 1972

a libertarian vision

Brand, Barlow, Dyson,

Gilder, Kelly, Rosetto, Toffler

"the internet ... an exciting kind of metaphor for spontaneous order" --Gilder

Fred Turner, *From Cyberculture to Counterculture*, 2006

why?

what were computers for?

control & data processing

business

government

military

anything *but* personal

the business of computing

& the computing of businesses

the growth of the factory

the control revolution

science, barometers, earthquakes

gas meters water meters; regulations of excise

One great advantage which we may derive from machinery is from the check which it affords against the inattention, the idleness, or the dishonesty of human agents.

Few occupations are more wearisome than counting a series of repetitions of the same fact

one for ascertaining the vigilance of a watchman. It is a piece of mechanism connected with a clock placed in an apartment to which the watchman has not access; but he is ordered to pull a string situated in a certain part of his round once in every hour. The instrument, aptly called a tell-tale, informs the owner whether the man has missed any, and what hours during the night.

Clocks and watches may be considered as instruments for registering the number of vibrations performed by a pendulum or a balance. .... Working models, on an enlarged scale, are almost necessary to make their action understood by the unlearned reader.

business processing

business processors
banks: Lubbock's Clearing House

railways: *Control through Communication*
Yates (1992),
Railway Clearing House

insurance: Prudential (1865) and
the "thrift movement"

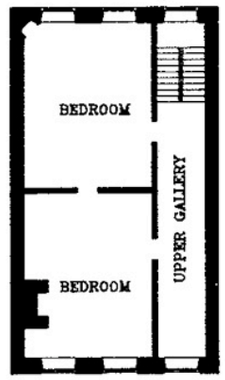
"1839, £954 million was cleared--$250 billion in today's money."

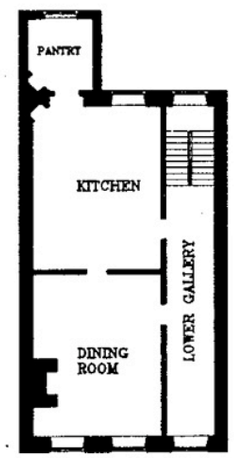
the clearing house and the computer

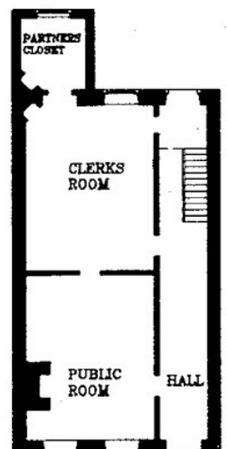
In a large capital, each bank receives, through its numerous customers, checks payable by every other; and if clerks were sent round to receive the amount in banknotes due from each, it would occupy much time, and be attended with some risk and inconvenience. .... In London this is avoided, by making all checks paid in to bankers pass through what is technically called The Clearing House. In a large room in Lombard Street, about thirty clerks from the several London bankers take their stations, in alphabetical order, at desks placed round the room;each having a small open box by his side, and the name of the firm to which he belongs in large characters on the wall above his head. From time to time other clerks from every house enter the room, and, passing along, drop into the box the checks due by that firm to the house from which this distributor is sent. The clerk at the table enters the amount of the several checks in a book previously prepared, under the name of the bank to which they are respectively due

--Babbage,*On the Economy of Machinery and Manufactures*,1835

the office







GROUND FLOOR

the merchant's house

the chartered company

information work

joint-stock
Joint-Stock Companies Act 1844

more information

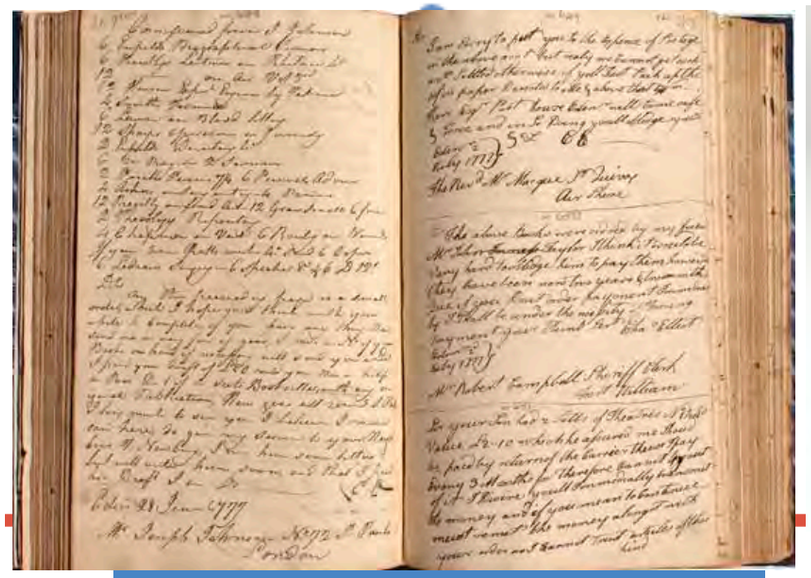
SECRET-OFFICE, AT THE GENERAL POST-OFFICE.

information workers

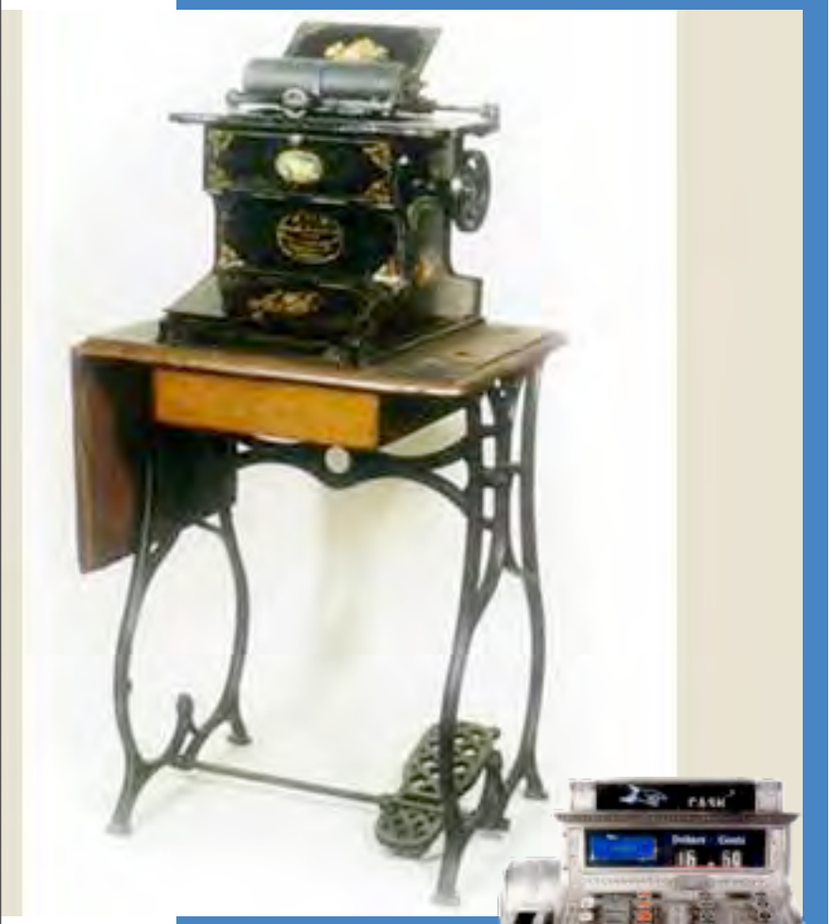
clerks (UK)
1871: 262,100
1891: 534,622
1911: 918,186

female clerks
1891: 17,859
1911: 117,057
1921, women 46% of all clerks

typewriter girls
1931, 212,296 female typists
5,155 male typists



information technology



carbon paper
Wedgewood, 1806

typewriter
Remington, 1874

calculator
Burroughs. 1892

cash register
mechanical register, 1884

"No simple economic explanation
... America was gadget happy"
--Campbell-Keely and Aspray, *Computer,* 1996

hi-tech firms

Remington

Burroughs

NCR

IBM

ibm

Thomas J. Watson (1874-

1895-1911, NCR salesman

1911, Computing-Tabulating-Recording Co

"rent-and-refill"

"The curtains behind the central podium were drawn back, Watson threw a switch, and the new machine standing at the centre of the stage began printing results as cards flowed through it. Salesmen stood up in the chairs and cheered" 1919

1924, "International Business Machines"

"the sun never sets on IBM"

less hi-tech

Lyons Corner House
Samuel Gluckstein & Joseph Lyons, 1887

from London to Darjeeling

tea & cakes
wheat, flour
baking
printing
packaging
laundry

LEO

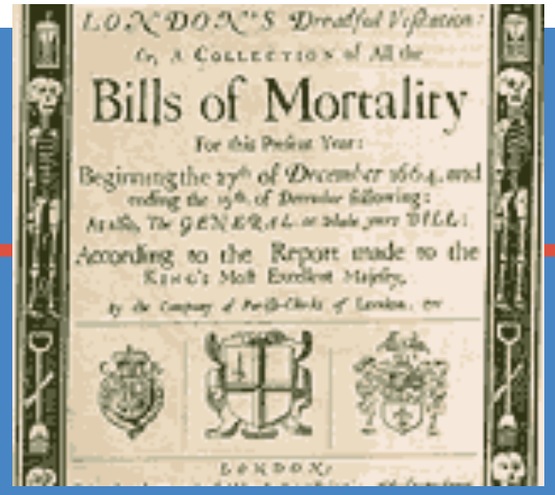

LEO 1

John Simmons
Lyons & Cambridge (1947)
ENIAC
EDVAC
UNIVAC
EDSAC

CLEO
1954
from payroll to baking

pros & cons?
LCL to ICL to IBM

government processing: statistics and the state


LONDON'S Dreadful Visitation:
Or, A COLLECTION of All the
Bills of Mortality
For this Present Year:
Beginning the 29th of December 1664, and ending the 19th of December following:
Wherein, The GENERAL or Whole year's BILL:
According to the Report made to the KING's Most Excellent Majesty,
by the Company of Parish-Clerks of London, &c
LONDON:

***Statistics*: a word lately introduced to express a view or survey of any kingdom, country, or parish**

***Encyclopaedia Britannica*, 1797**

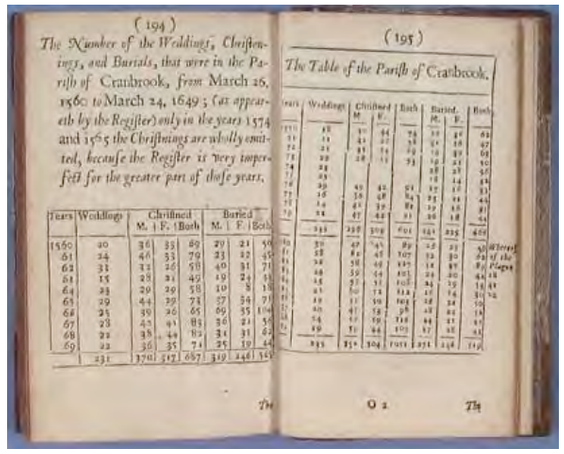

A generall Bill for this present year, ending the 19 of *December* 1665. according to the Report made to the KINGS most Excellent Majest[y].
By the Company of Parish Clerks of *London*, &c.

The Diseases and Casualties this year.

Abortive and Stillborne	617	Executed	21	Palsie	50
Aged	1545	Flox and Small Pox	655	Plague	68596
Ague and Feaver	5257	Found dead in streets, fields, &c.	2	Planets	6
Appoplex and Suddenly	116	French Pox	86	Pleurisie	19
Bedrid	12	Frighted	23	Poysoned	2
Blasted	5	Gout and Sciatica	27	Quinsie	35
Bleeding	16	Grief	46	Rickets	557
Bloody Flux, Scowring & Flux	185	Griping in the Guts	1288	Rising of the lights	467
Burnt and Scalded	8	Hanged & made away themselves	7	Rupture	34
Calenture	2	Headmouldshot & Mastiff	14	Scurvy	17
Cancer, Gangrene and Fistula	56	Jaundies	120	Shingles and Swine pox	2
Canker, and Thrush	11	Impostume	225	Sores, Ulcers, broken and bruised	
Childbed	625	Kill by severall accidents	46	Limbs	82
Chrisomes and Infants	1258	Kings Evill	56	Spleen	14
Cold and Cough	62	Leprosie	2	Spotted Feaver and Purples	1929
Collick and Winde	134	Lethargy	14	Stopping of the stomack	334
Consumption and Tissick	4808	Livergrown	21	Stone and Strangury	98
Convulsion and Mother	1036	Meagrom and Headach	12	Sudden	2
Diffracted	11	Measles	7	Teeth and Worms	2614
Dropsie and Tympany	1478	Murthered and Shot	9	Vomiting	71
Drowned	53	Overlaid & Starved	45	Worm	7

Christened: Males 5114, Females 4853, In all 9967
Buried: Males 48568, Females 48137, In all 97205
Of the Plague 68596

Increased in the Burials in the 130 Parishes and at the Pest-houses this year 79059
Increased of the Plague in the 130 Parishes and at the Pest-houses this year 68590


(194)
The Number of the Weddings, Christenings, and Burials, that were in the Parish of Cranbrook, *from* March 26, 1560 *to* March 24, 1649; (*as appeareth by the Register*) *only in the years* 1574 *and* 1575 *the Christenings are wholly omitted, because the Register is very imperfect for the greater part of those years.*

Years	Weddings	Christned M.	Christned F.	Christned Both	Buried M.	Buried F.	Buried Both
1560	40	36	33	69	29	21	50
61	24	46	33	79	23	22	45
62	31	33	26	59	40	31	71
63	15	28	21	49	19	24	43
64	23	29	29	58	10	8	18
65	29	44	29	73	37	34	71
66	25	39	26	65	69	35	104
67	23	42	41	83	36	21	57
68	22	38	44	82	34	31	65
69	22	36	35	71	25	19	44
	231	370	317	687	319	246	565

(195)
The Table of the Parish of Cranbrook.

bills of mortality

births & marriages

parish members

population

population

Spain, 1787

US, 1790

"Vulgar and arithmetical"

Edinburgh Review, 1818

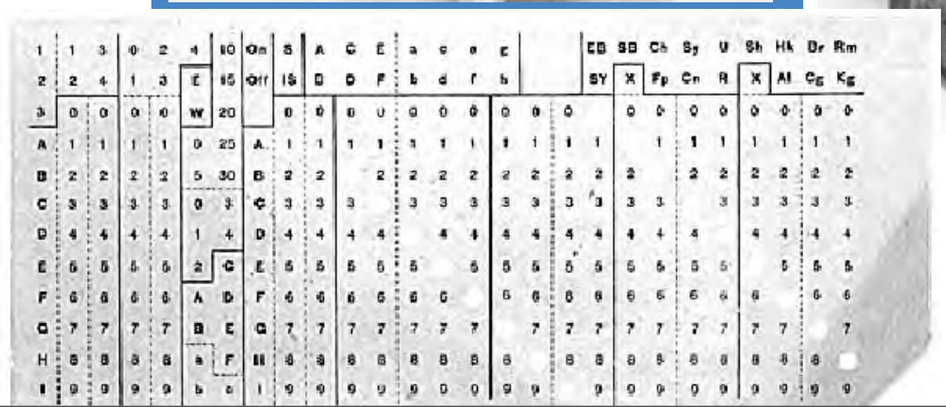
Census

"[An] Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct."

				clerks
1900	76,212,168	13,232,402	21.0	
1890	62,979,766	12,790,557	25.5	2000
1880	50,189,209	11,630,838	30.2	1495
1870	38,558,371	7,115,050	22.6	483
1860	31,443,321	8,251,445	35.6	
1850	23,191,876	6,128,523	35.9	
1840	17,063,353	4,202,651	32.7	28
1830	12,860,702	3,222,249	33.4	
1820	9,638,453	2,298,572	33.1	
1810	7,239,881	1,931,398	36.4	
1800	5,308,483	1,379,269	35.1	
1790	3,929,214	-	-	

tabulating

Herman Hollerith (1860-1929)
Electronic Tabulating Machine
1890 Census



THAT UNRELIABLE CENSUS

SURPRISING EVIDENCE FURNISHED BY THE HEALTH BOARD.

MAYOR GRANT WILL MAKE THE HOUSE-TO-HOUSE CANVASS A BASIS FOR A RECOUNT—WHAT MR. PORTER SAYS.

President Wilson of the Board of Health yesterday sent a letter to Mayor Grant answering the Mayor's letter of the 10th inst. regarding the census figures. In his letter President Wilson incloses elaborate schedules on the death rate of the city of New-York and the total number of deaths since 1879, as well as all estimates of the population that have been made by the Health Department between 1879 and 1890. From these tables President W
following deductions, which go t
tice of the demand for a revis
sioner of Census Porter's figure

[redacted]

NEW-YORK'S PROOFS AT HAND.

A REASON WHY THE CENSUS FIGURES WERE HURRIEDLY MADE PUBLIC.

WASHINGTON, Oct. 31.—Secretary of the Interior Noble and Superintendent of the Census Porter learned this morning that statistical and documentary proof of the gross inaccuracy of the census count of New-York City would probably be presented to the Secretary before night. This afternoon Mr. Porter issued census bulletin No. 12 giving the completed enumeration of the people of the United States.

Inquirers at the Census Office had been told for several days that the grand total would be ready for publication next Monday. Its announcement to-day was, therefore, a good deal of a surprise to a great many persons. To those who knew that proof that New-York had been undercounted was on its way, the sudden appearance of Mr Porter's bulletin was not much of a surprise. If New-York gets a recount now, it will involve a change in the official figures of the population of the entire country, and the authorities may be expected to plead that such a change should not be made unless for the gravest possible reasons.

New-York was warned, in Chief Clerk Child's insolent reply to Mayor Grant's first letter, that it had better hurry up with any reasons it had to present for a new count, and now it will be told that it is too late.

Supervisor of the *City Record* Kenny, who comes as the Mayor's special representative, reached Washington this evening. He brought with him the census books for the first five wards of the city, with the affidavits of their accuracy sworn to by the policemen who collected the figures. Mr. Kenny will submit these books to Secretary Noble to-morrow, and he will suggest that the Secretary direct that a careful comparison be made between the police returns and the sheets of the Federal enumerations taken in June.

[For Superintendent Porter's statement see page 9.]

THE COUNTRY'S POPULATION.

MR. PORTER SEEMS TO HAVE A HARD TIME TO SATISFY HIMSELF.

WASHINGTON, Nov. 2.—Superintendent of the Census Porter seems to be having a hard time to satisfy himself as to just what figure he will finally settle upon as the official statement of the population of the United States.

Various "estimates" have been made by the Census Office since the June enumeration. No two of them have been alike and all differ from the total given in the official bulletin which was issued in such a hurry last Friday, when it was learned that additional reasons for a recount of New-York were on their way to Washington in Supervisor Kenny's custody. This official bulletin, which puts the population at 62,480,540, has been taken as the final announcement, but it is noticed that Mr. Porter has been careful to tie a string to the figures in the casual announcement that "these figures may be slightly changed by later and more exact compilations," although he adds that such changes will not be material.

If there are to be later and more exact compilations, it seems a little queer that he should issue a bulletin now, giving a total which may be changed hereafter. When Representative Dunnell of Minnesota introduced his Reapportionment bill in the House of Representatives two months ago, its allotment of State representation was based on figures furnished by Superintendent Porter which showed a population of 63,112,353. This was exclusive of the Territories, which would have brought the total up to more than 64,000,000. That the Census Office thought at that time the United States had so many inhabitants is evident from the fact that, in another private statement, prepared by it a little less than two months ago, the population was given as 64,211,264.

Now comes an official announcement that the population is 62,480,540, but "these figures may be slightly changed." Mr. Porter will be entitled to the congratulations of his friends

PORTER'S LITTLE SCHEME.

A PLAN TO PERPETUATE REPUBLICAN CONTROL WHICH FELL THROUGH.

WASHINGTON, Nov. 9.—Superintendent of the Census Porter seems to have decided, as long ago as when Quay was trying to postpone action on the Force bill in the Senate, that the population of the United States would not exceed 63,000,000.

It has just leaked out that when the anti-Force bill Republican Senators were dickering with the Democrats to shelve the Force bill and limit debate on the Tariff bill, Porter called upon Quay and a few other Republican Senators and Representatives and informed them that if the population of the country should turn out to be not more than sixty-three millions it would be the easiest thing in the world to prepare a reapportionment scheme which would insure Republican control of the Government for an indefinite number of years. The Census Superintendent had figured the thing down to a fine point, and was prepared to give the basis of representation upon which the reapportionment should be made to accomplish its purpose, provided that the census returns did not go above the sixty-three millions.

Porter urged the immediate preparation of the bill, and earnestly advised that it be taken up immediately after the passage of the Tariff bill and put through before the adjournment of the session. It happened, however, that one of the leading Democratic Senators got a hint of what Porter was at, and the result was the refusal of the Democrats to make the Force and Tariff bill bargain unless the Republicans pledged themselves to try no further legislation after finishing the Tariff bill, and Porter's little scheme had to be postponed.

This was long before the census returns had been counted in Porter's bureau. When the figures did come out, ten days ago, they gave the United States a population of 62,480,540.

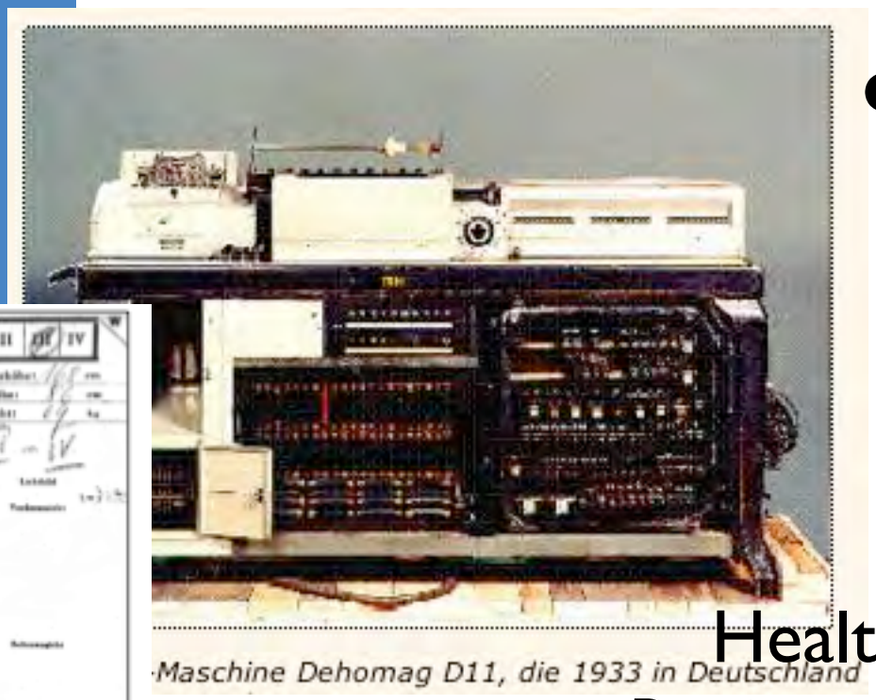
success or failure?

only 63 million

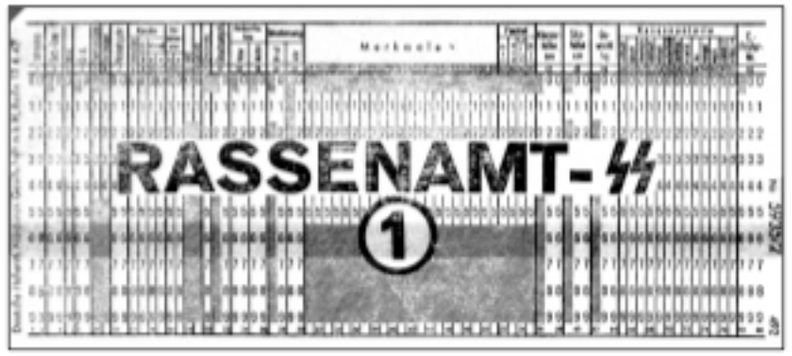
Robert Porter

(British Tabulating Machine Co)

controlling numbers



Maschine Dehomag D11, die 1933 in Deutschland



controlling people

"the Nazi census"
--Aly & Roth, 2004

IBM D11

Census, 1933, 1939
Labor Book, 1935
Health Pedigree book, 1936
Registry of the Populace, 1939
Blood (high, average, acceptable inferior), 1940
Personal Identification Number, 1944

out of control?

Six more data discs 'are missing'

HM Revenue and Customs has confirmed that a further six data discs have gone missing in transit between its offices in Preston and London.

The discs, which were reported missing on 30 October, contained recorded conversations between a member of staff and a customer making a complaint.

Police are still searching for two computer discs containing the details of 25m Child Benefit claimants.

The HMRC says evidence suggests these two discs are still on its premises.

Police have finished their search for the discs at HMRC offices

U.K. PM Brown Says Government Lost Data On 25M Britains

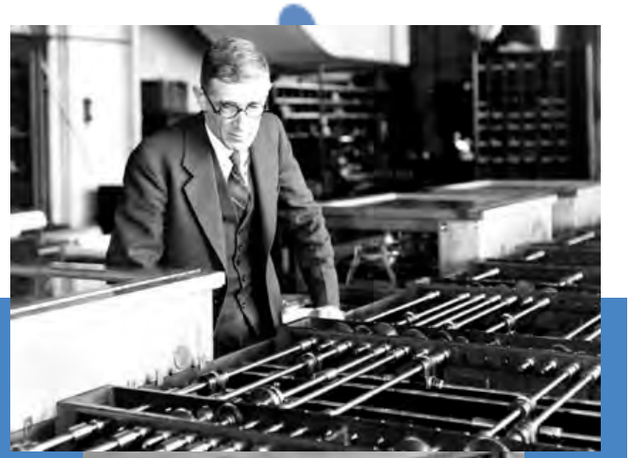
November 21, 2007 10:41 a.m. EST

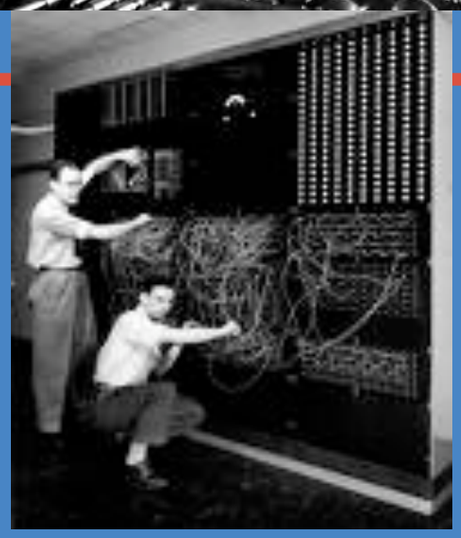
sundayherald

Lost discs are last nail in the coffin of the ID card scheme

Biometric security could have protected 25m lost data files

Published: 23 November, 2007





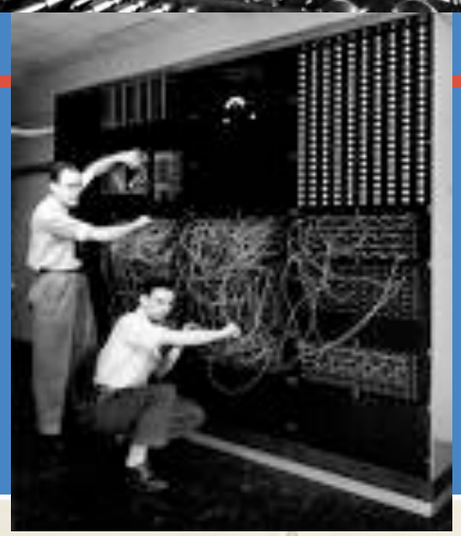
military processing

ballistics "firing tables"
human computers

Vannevar Bush
1935, Differential Analyzer

1939-43: Harvard Mark I
(IBM Automatic Sequence Controlled Calculator)

Eckert & Mauchly, Moore School
1945, ENIAC,
(**Electronic** Numerical Integrator Computer)
18,00 vacuum tubes, 70, 000 resistors,
10,000 capacitors, 6,000 switches, 1,500 relays



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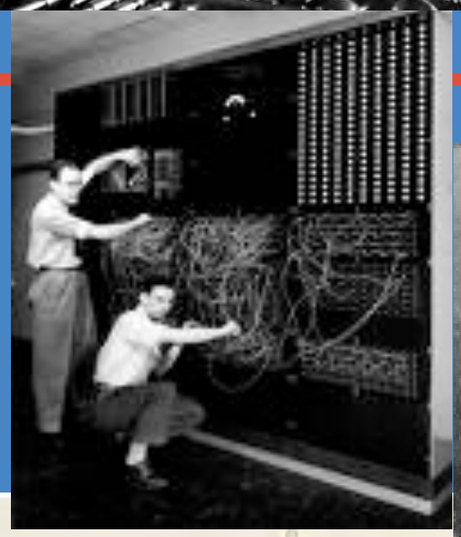
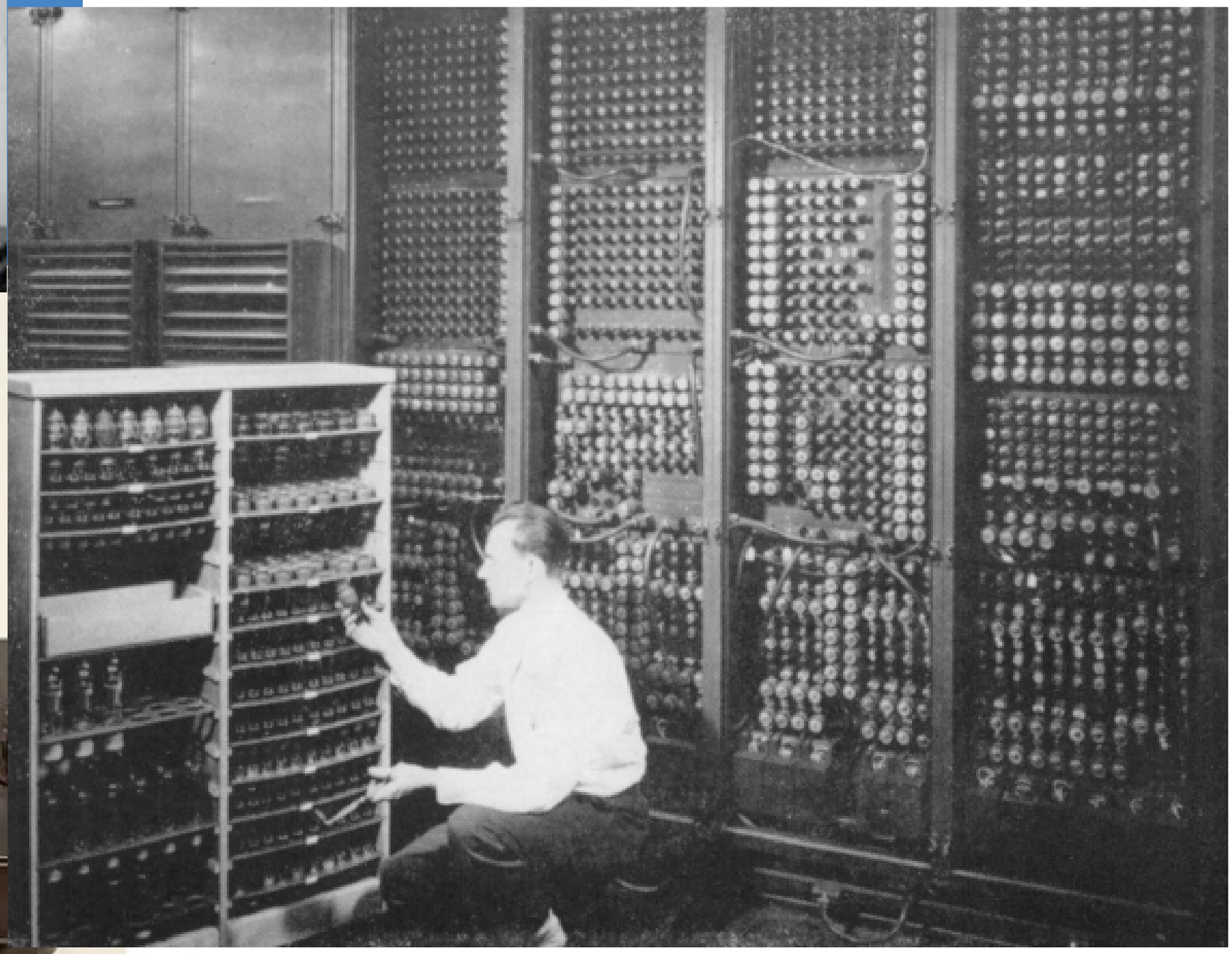




army & government

ENIAC to UNIVAC
(Universal Automatic Computer)

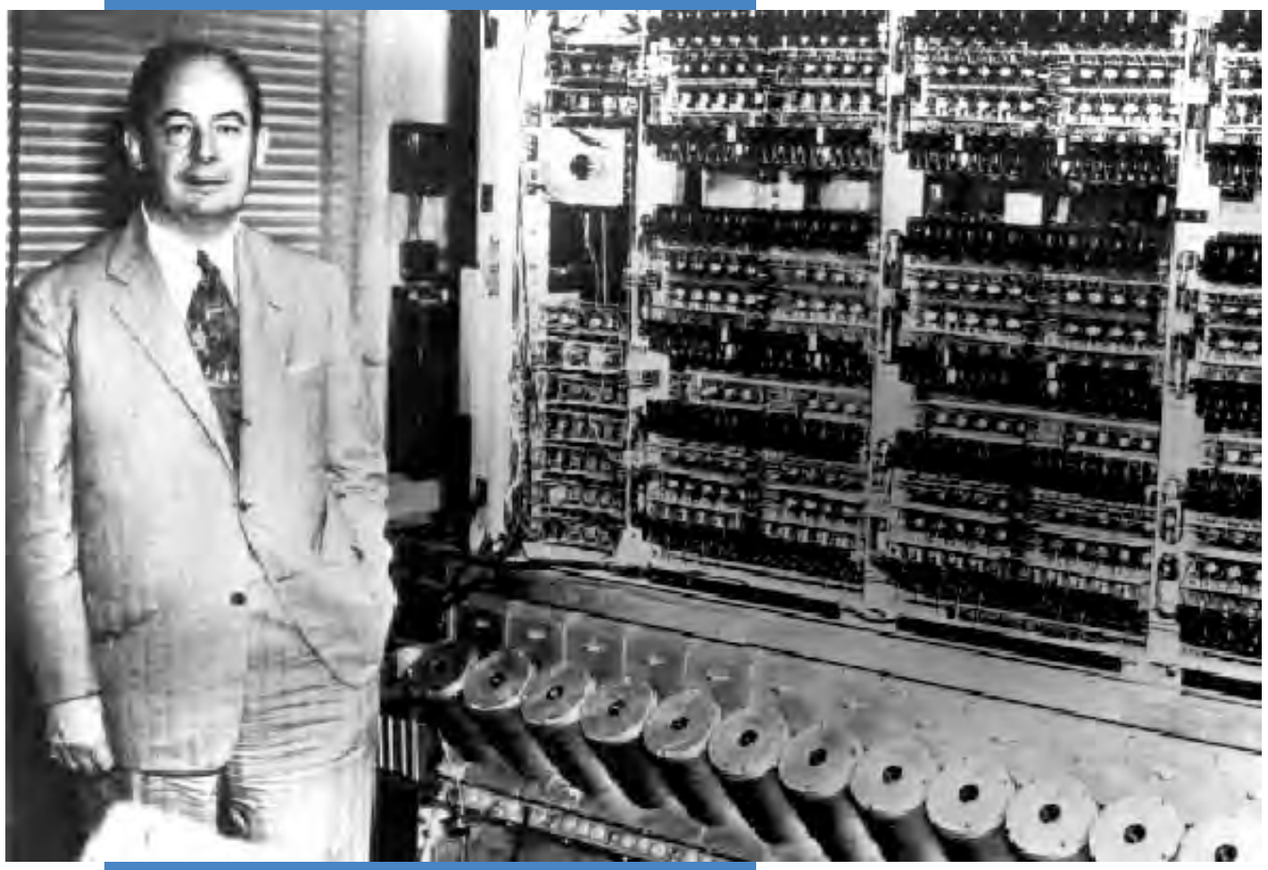
1946: Moore School to Eckert & Mauchly

1950: Eckert & Mauchley to Remington Rand

1951: Census computing

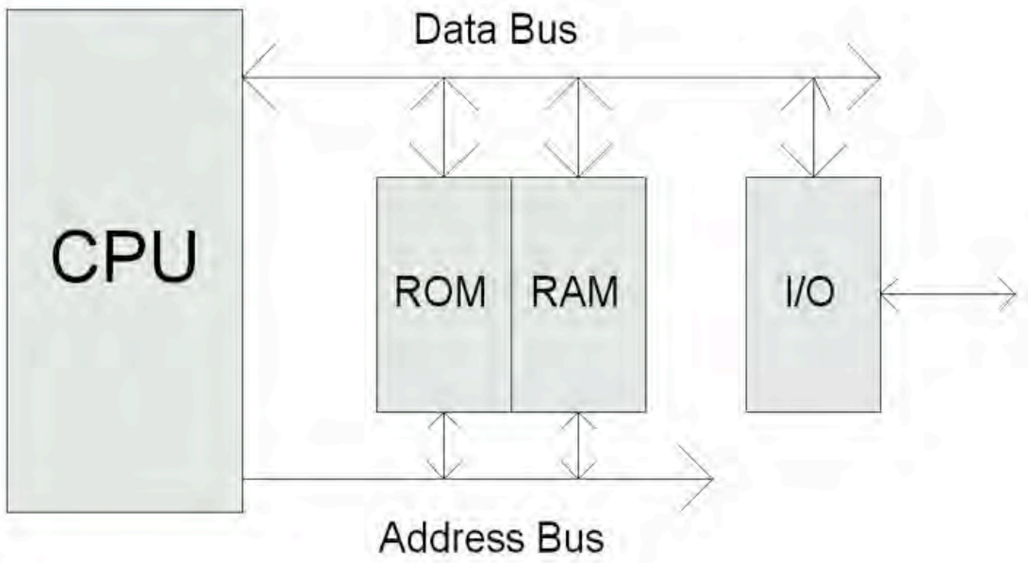
1952: LLNL

ENIAC to EDVAC



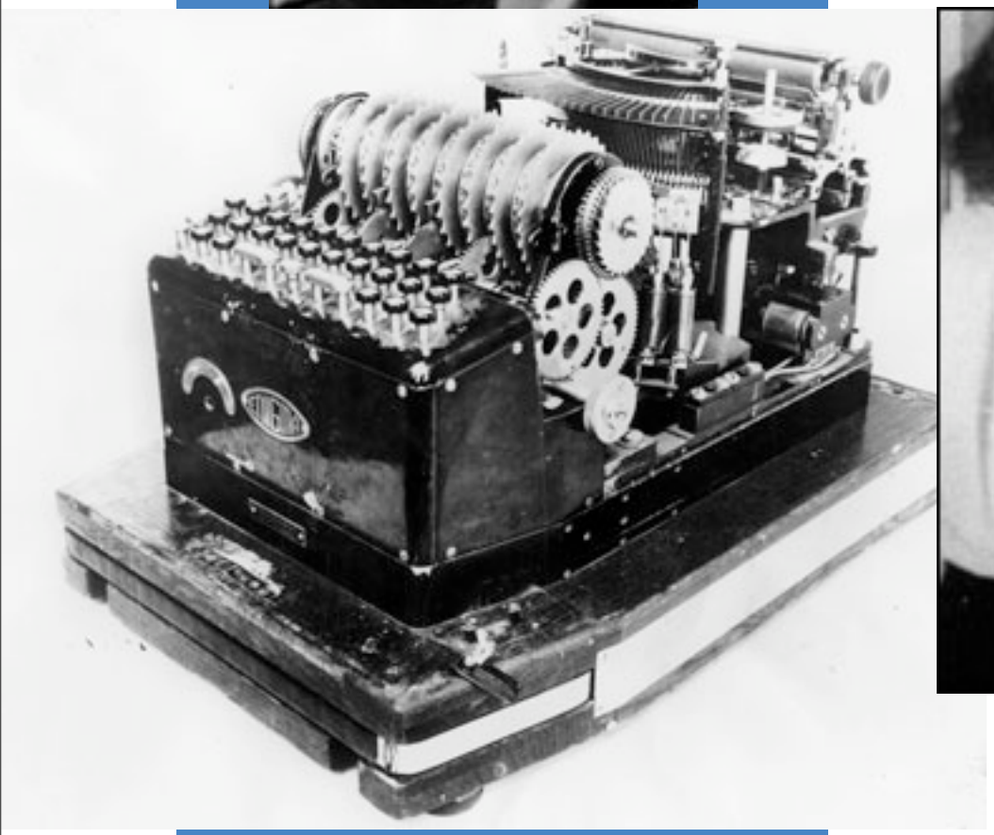
EDVAC: electronic discrete variable automatic computer

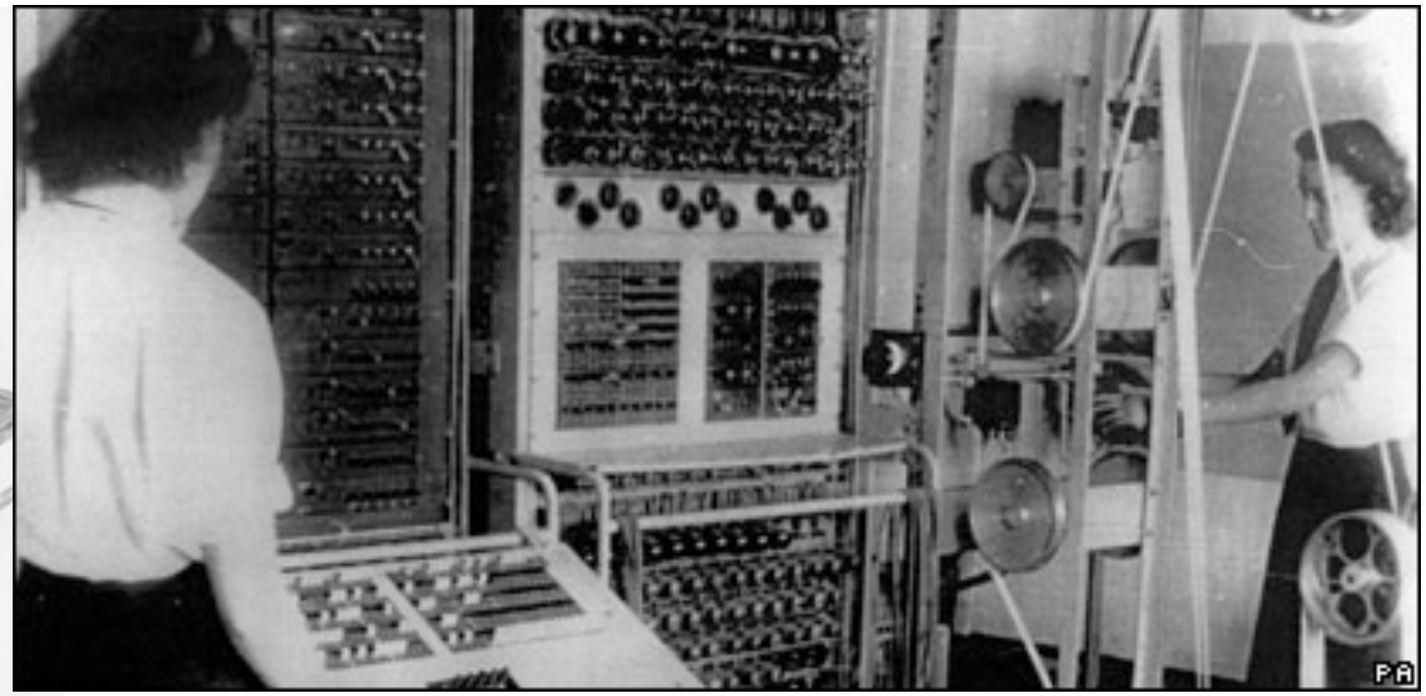
John von Neumann
von Neumann "architecture"
von Neumann network
Hilbert, Gödel, Einstein, Turing



decoding

1943, Colossus





onward ...

1947 transistor
(Bell Labs Bardeen, Brattain, Schockley)

1958 integrated circuit

(Texas Instruments: Jack Kilby)

(Fairchild: Robert Noyce)

1965-1969 , Packet switching,
Davies (NPL), Baran (RAND)

1968 HP 911A

1969 Xerox PARC

1975 Altair

1976 Apple I

1981 IBM PC

after LEO:breaking down the computer

pc supply chain

Software	IBM
OS	IBM
CPU	IBM
Hardware	IBM

pc supply chain

Software	IBM	DEC (Unix libraries)
OS	IBM	DEC/VAX (3BSD-Unix)
CPU	IBM	DEC/CVAX
Hardware	IBM	DEC

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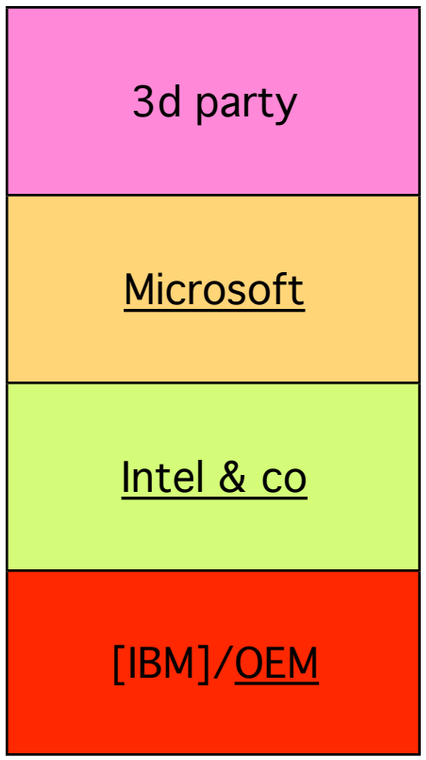
Hardware	IBM	DEC	Apple	Sun	IBM

struggle over quality

decline of IBM monopoly:
"nobody ever lost their job ..."

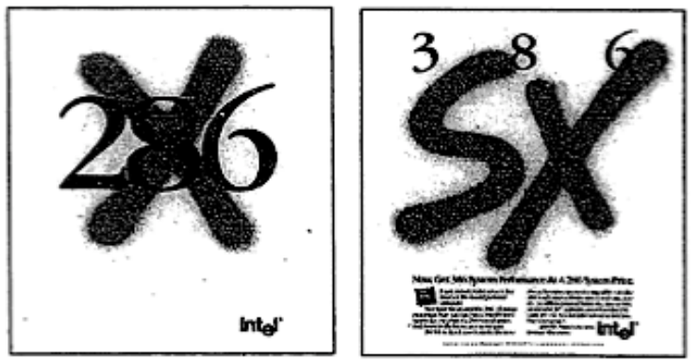
rise of the "PC":
"compatibles" to "clones"
whitebox worries

who brands the chain?
just-in-time



the accidental brand

"I didn't really know what a brand was. But it became evident that we had created a brand"
-- Denis Carter



"trash marketing" -- AMD

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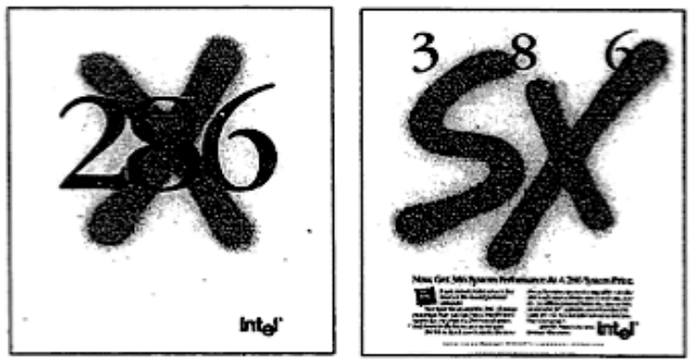

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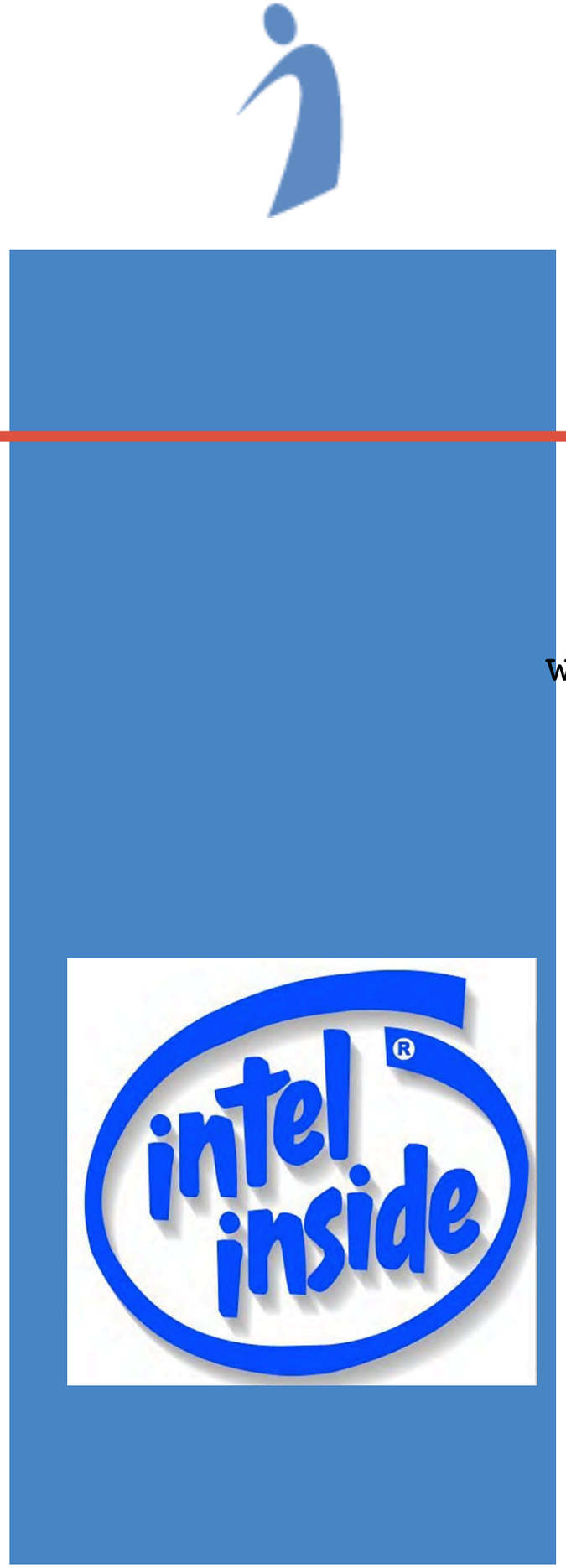
vertical competition



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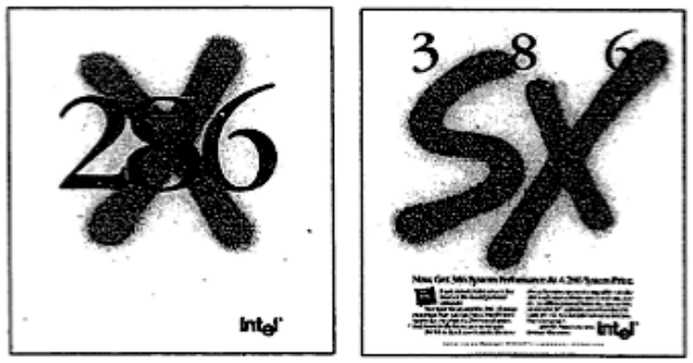

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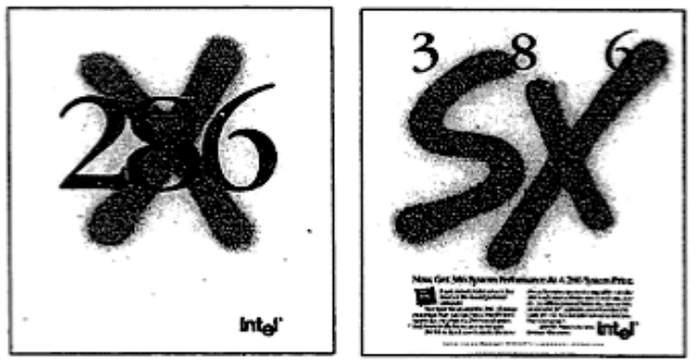

"trash marketing" -- AMD

vertical competition

"promoting the semiconductor company at the expense of Compaq's brand" -- Compaq

We established a mindset in computer users that they were, in fact, Intel's customers, even though they didn't actually buy anything from us."--Andy Grove

intel.

the accidental brand

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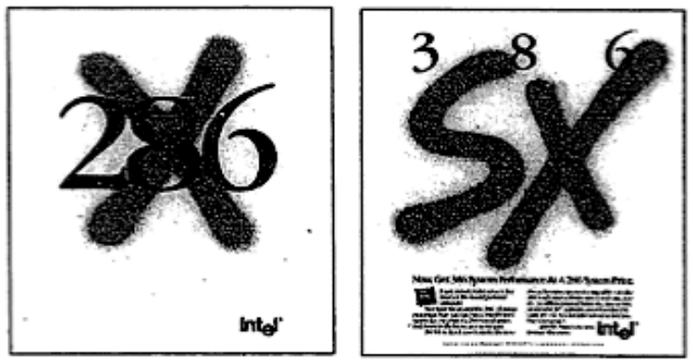

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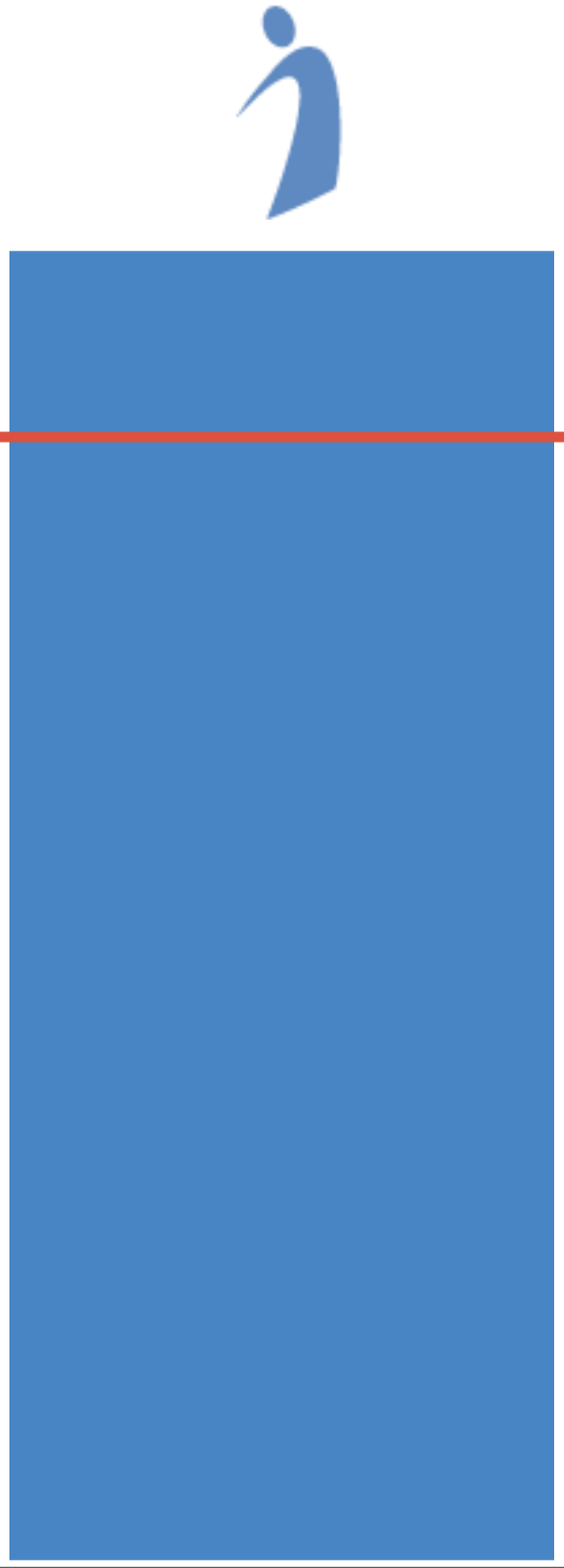

the story so far

registering

predicting

controlling

calculating

coming up, communicating