From ABACUS to PHABLET

The full history of the computer, starting with the early ABACUS until the latest product in the computer world … the PHABLET, a handheld thin personal computer.



Painted artwork by Said Abdel Aziz (Egypt - 20.04.1996); 50 years Egyptian society of accountants and auditors



Photo proof



intensive red



orange screen



normal print



weak colors

1. What's the history of the 'great invention'?

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1
What's the history of the 'great invention'?

1.1 The earliest counting tools.

Counting on fingers

As long as there have been numbers, mankind has suffered and struggled with counting, also when we were young. So, it is no surprise that he has searched for tools. The starting point was counting on fingers and basic material found in nature around them.







Inca quipu keeper



Paintings found in caves have been variously interpreted as counting methods, calendar records, lunar variations or depiction of life.



◄ ▼ *proof*



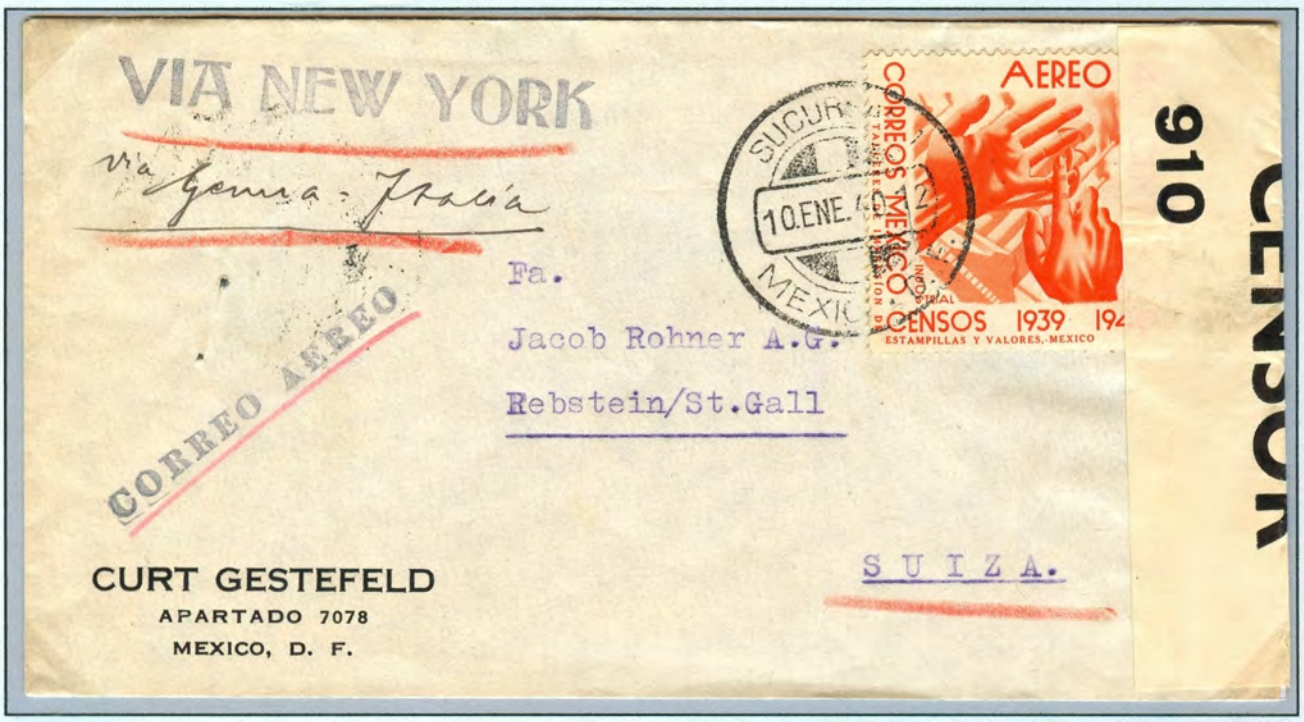




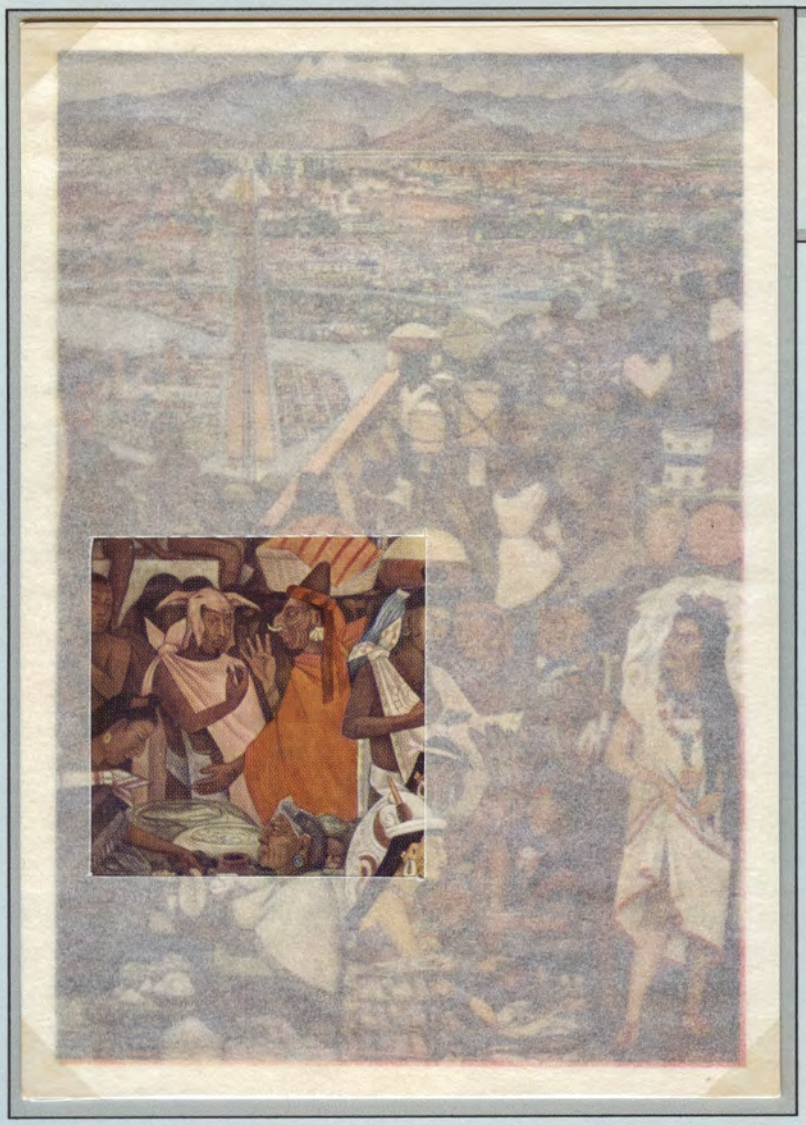
Scribes noting down counts (fragment Theban tomb no.69)

The hieroglyphic system was only suitable for memorial inscriptions on stone monuments.

Other tools like knots in strings (quipu), noting on boards or bones are calculating tools used primarily in the ancient time for performing arithmetic processes.



American Censored letter (10 JAN 1940) from Mexico to Switzerland via New York (US) and Genua (Italy); counting on fingers (the number of stages this letter has done from Mexico to Switzerland: 4 stages)



Stationery (Mexico); finger-counting among Aztecs. Detail of mural by Diego Rivera. (National Museum of Mexico)





Tallying the chimes

Counting on fingers is very temporary or isn't always sufficient when bigger numbers. Over the years more tools like keeping a tally, or calculating tables became common and are even today primary calculating tools.



European table abacus (14th century) variant

Many traders and lords all had their calculating tables showing their importance, wealth and social standing.



The tally of 6 Brabant Sols (pennies) marked on letter from Ostend to Antwerp in 1694; a very usual notation at that time.



Antikythera Mechanism

The **Antikythera Mechanism** was an ancient calculator, which revealed to its owner his position and the position of the Sun, Moon, or other known planets, after entering a date via a crank.



Soroban; 1 upper bead and 4 beads below

Probably the oldest calculating aid with longest tradition has to be found in the Chinese and Japanese tradition.



Old Japanese abacus

Because of its long history, the so called abacus is found in many shapes; like boards, metal rods with wooden beads.





Suan-pan : 2 upper beads and 5 beads below



Soroban

The difference between a **Soroban** (Japanese word for abacus) and the Chinese **Suan-pan** is the form and the number of beads above and below the wooden partition.



Still today many Chinese people carry out every kind of calculation using the abacus (suan-pan) despite having access to electronic calculators, its use is so deeply ingrained in their culture.



Reception cancel Flamme KRAG (France) 8.8.1938 text: Pope Gerbert millennium



Front letter



Pope Silvester II (938-1003), known as monk Gerbert, gave the abacus back the needed attention in combination the 9 Arabic numbers, a lot used in Spain at that time.



colour proof

The Russian abacus is the grandfather of all the models we know and are used to from school time.



*Russia (1929) ill.; bookkeeper using an abacus (**stchoty**) calculating the labourers bill (N. Verkhotouroff)*

The Russian abacus named **Stchoty,** recognized by the 10 beads on each rod, of which two (the fifth and sixth) are usually of a different colour, which makes it easier for the eye to recognize the numbers from 1 to 10, and two times four white beads, was model for the abacuses we know.



A French mathematician, being a French lieutenant in the Army of Napoleon, imported the Russian abacus into our region.







Many different shapes, but mostly a vertical frame with horizontal straight wires, found their way in pre-schools and elementary schools, used as an aid in teaching of the numeral system and arithmetic, or why not as a playing tool.



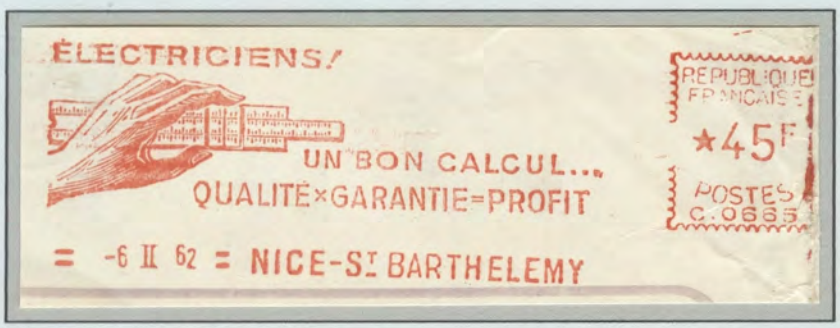
Stationery printed to order (Bayern - 1898); ill. Abacus as school attribute

The Scottish mathematician, John Napier (1550-1617) introduced the concepts of logarithms and a simple way to perform multiplication. The Napier 'rods' is one of the earliest attempts of using a new calculator.



John Napier (photo nr 26)

Prestige Booklet page (Scotland, Great Britain); John Napier: created logarithms ▶





Napier's logarithms resulted in the inventions of the slide rule in 1633. The real breakthrough in its modern form was in 1859. This device appeared in a linear or circular form enables scientists to do calculations quicker.

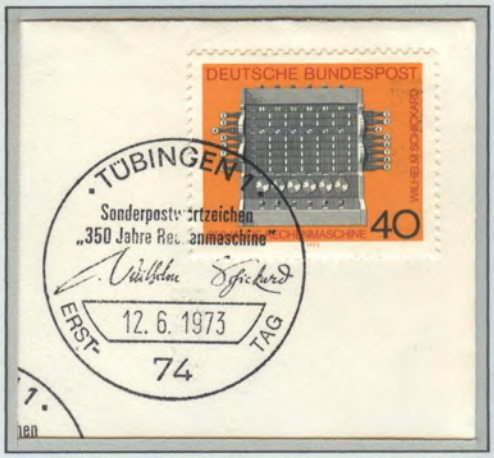


Postgiro-envelope (France - 1931): illustration bottom left; circular slide rule

End 1970's it became obsolete by handheld calculators having taken over all of its functions.



Leonardo Da Vinci (1452-1519) made drawings of calculators, but never made a prototype of the calculators he published in his book; the "Codex Madrid I". Those drawings showed 13 registering wheels and how to propagate a carry to the next digit wheel.



Schickard's machine set to show number 100722 multiplied by 4.

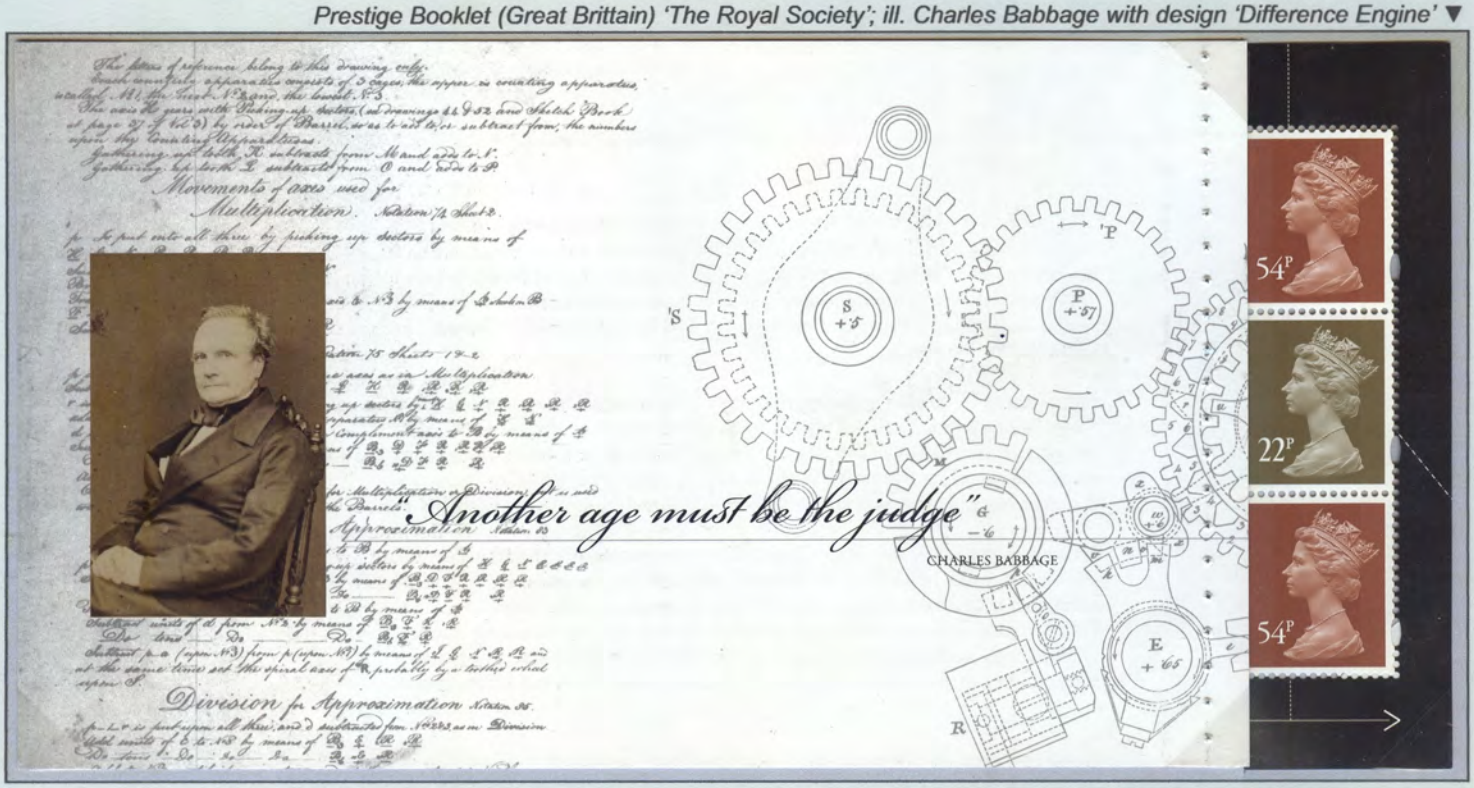
The very first mechanical calculator was built by **Wilhelm Schickard** (1592-1635), professor mathematics and astronomy in Tobingen, was based on the bones of Napier. A copy for the famous astronomer **Johannes Kepler** (1571-1630) got lost in a fire. It would have help in Kepler's laborious task of calculating astronomical tables.





*Letter Ballon Monté **'Le Kepler'** (Paris - 7e I 9JAN1871 - Nîmes 17JAN1871) flown 11JAN1871; named after famous astronomer Kepler.*

Prestige Booklet (Great Brittain) 'The Royal Society'; ill. Charles Babbage with design 'Difference Engine' ▼



Mathematician **Charles Babbage** (1791-1871) designed 2 models of its "Difference Engine" from 1823 till 1849, an advanced calculator using a large number of gears. He never finished one due to thousands of parts he needed.



Blaise Pascal (1623-1662), born in Clermont, designed and constructed in 1642 the 'Pascaline' at age of 19.

Pascal put several machines into production, but it wasn't successful venture, only fifty got sold. However, this did result in 8 survived to the present day.



Registered at Tours Blaise Pascal ►



Proof by P.Munier





Misperforation

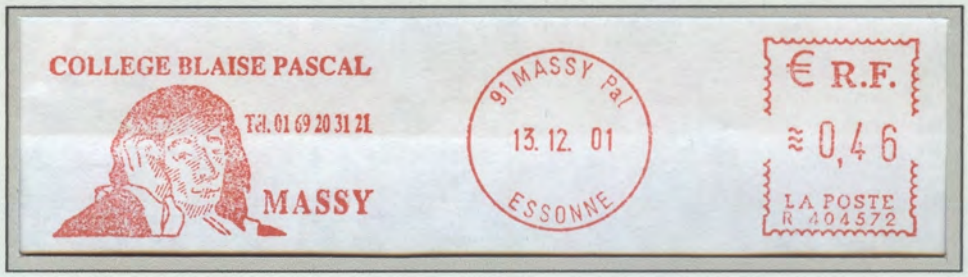
Pascal received a patent on the arithmetical machine from Louis XIV.



Early usage of cancel dated 11APR1865 bureau (star 29) Rue Pascal, named after Blaise Pascal. Bureau started 1865 till April 1873.



Pascal's portrait wrongly depicts priest Louis Isac Lemeister de Sacy.





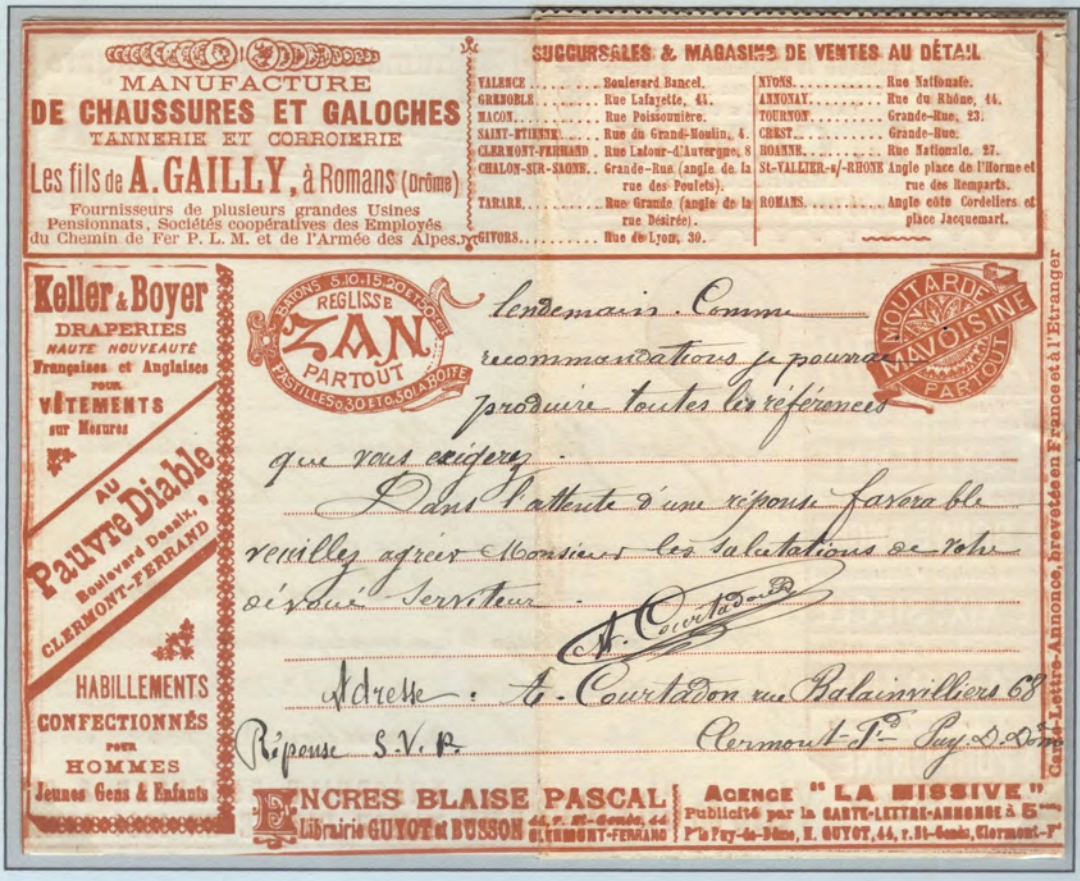


Detail stamp: among other scientific studies Pascaline gear wheel

The 'Pascaline' carry mechanism didn't function perfectly. The device came in both decimal and non-decimal varieties.



Die Proof, signed by engraver Mazelin, with embossed stamp "contrôlé". ►





Letter card (France) edition 176 sold at 5c i.o. 15c; Blaise Pascal bulk of his work was published post-humously; text: Encres Blaise Pascal Library.

1.2 The great inventors at the start of the automation process.

G. W. Leibniz (1646-1716) completed Pascal's calculator. He made the carry mechanism more reliable by using his own invention, "stepped drums". He also added the multiplier to the machine.





CityPost local postal service (Germany): ill.: detail Leibniz calculator





Pneumatic tube postal stationery (Berlin, Germany); envelope sent as airmail to Braunschweig. ►



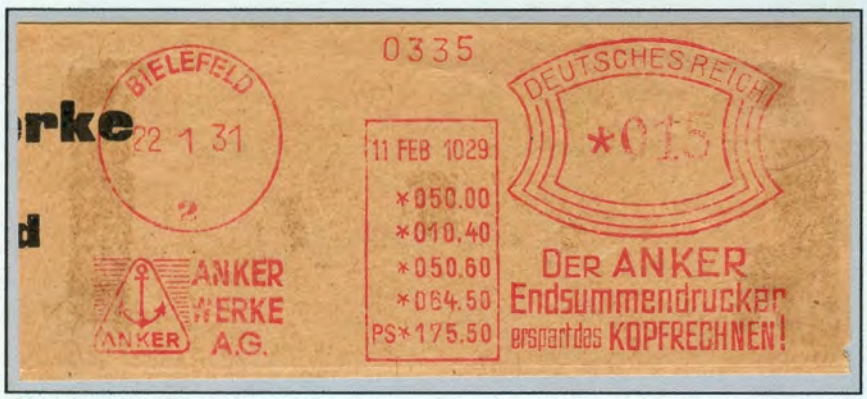
Engineer **Phillip Mathieus Hahn** (1730-1790) developed in 1773 the first functional calculator based on Leibniz's Stepped Drum. He made these machines until his death.

His brother-in-law, **Johann Christopher Schuster** (1759-1823), a skilled watchmaker, continued with the manufacture and finished a cylindrical counting machine in 1822, which was assembled of 1025 individual parts.





Around 1910 machines were invented which could perform all four arithmetic operations automatically. From the very beginning numbers and results could be printed on check strips, which improved the verification.



Check strip of a calculator

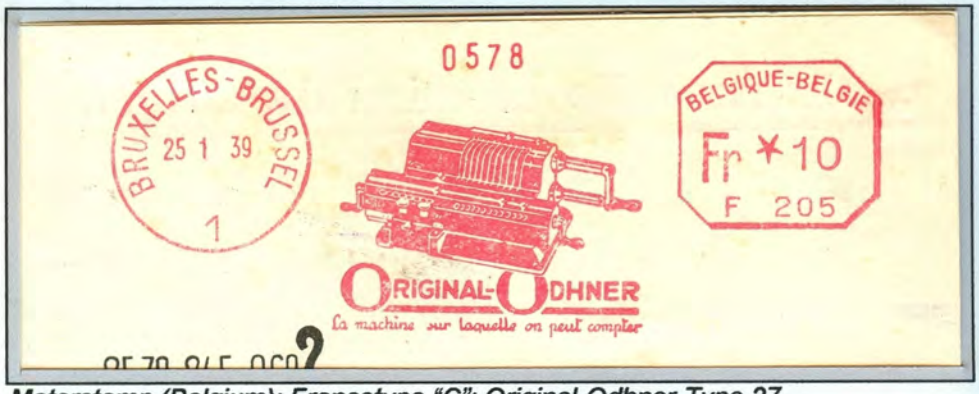


Supermétal Sar 11e



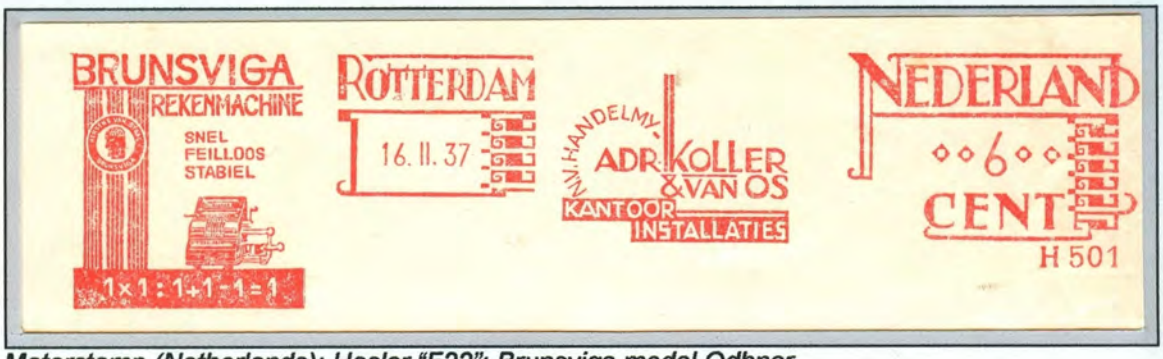
Postgiro-envelope illustrated with an advertisement of the mechanical calculator RECORD

These designs implied that those machines were like monsters; heavy (sometimes up to 30kg) and full of complex chain wheel combinations. Luckily with constant improving performance, reliability and weight, with maximum correctness of arithmetical operations and in producing results with rapidity never before equalled.



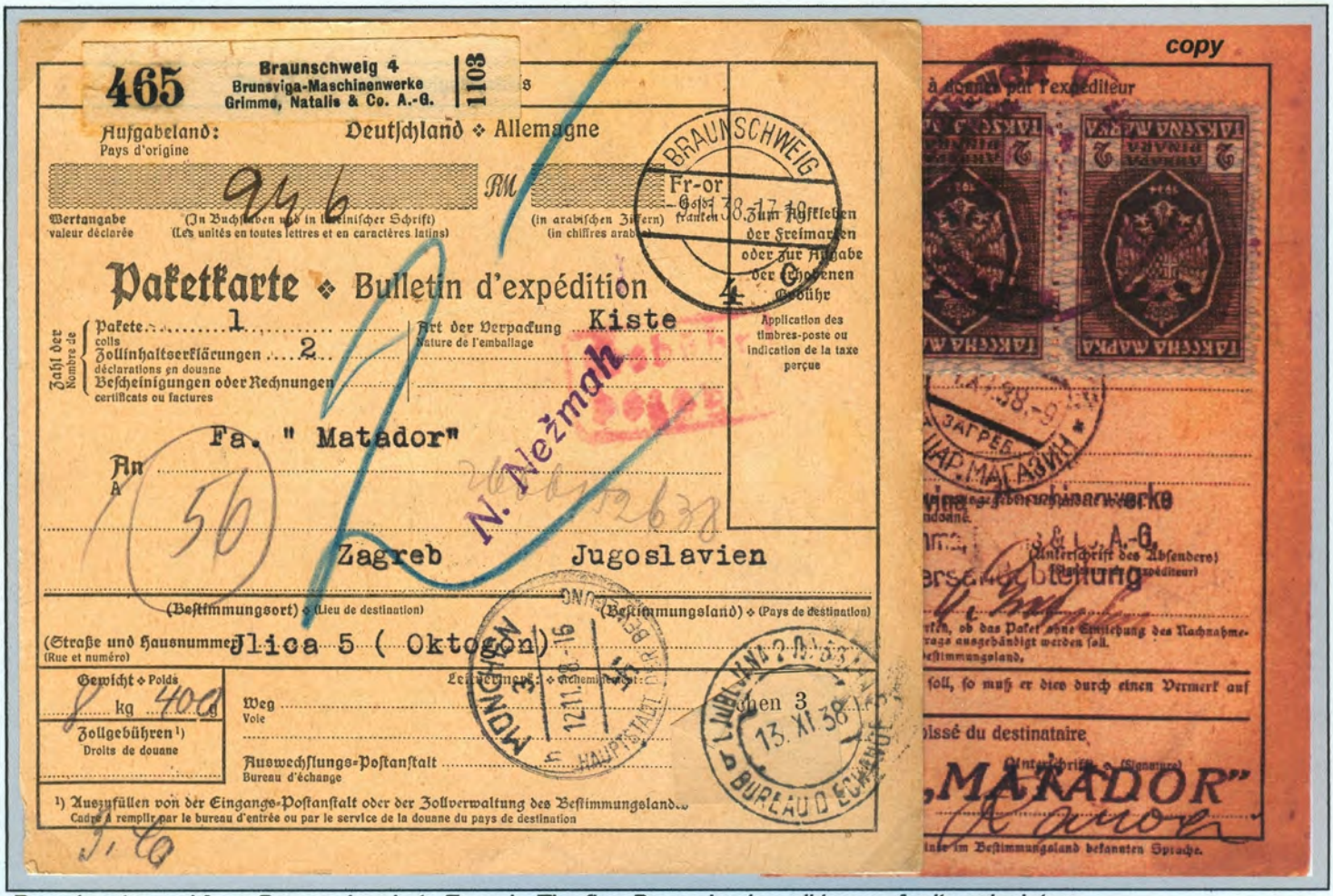
Meterstamp (Belgium): Francotype "C"; Original-Odhner Type 27

W.T. Odhner, a Swede working in Russia, constructed as first calculators with movable pins and variable-toothed gears. The benefit was ease of use and high reliability, and also a quite dramatic decrease of size and weight.



Meterstamp (Netherlands): Hasler "F22"; Brunsviga model Odhner

Brunsviga Co. and others took over the patent from Odhner and manufactured ten thousands of those machines.



Parcelpost; used from Braunschweig to Zagreb. The firm Brunsviga is well known for its calculators.



Francotyp "Cc" (Germany): calculator brand Walther

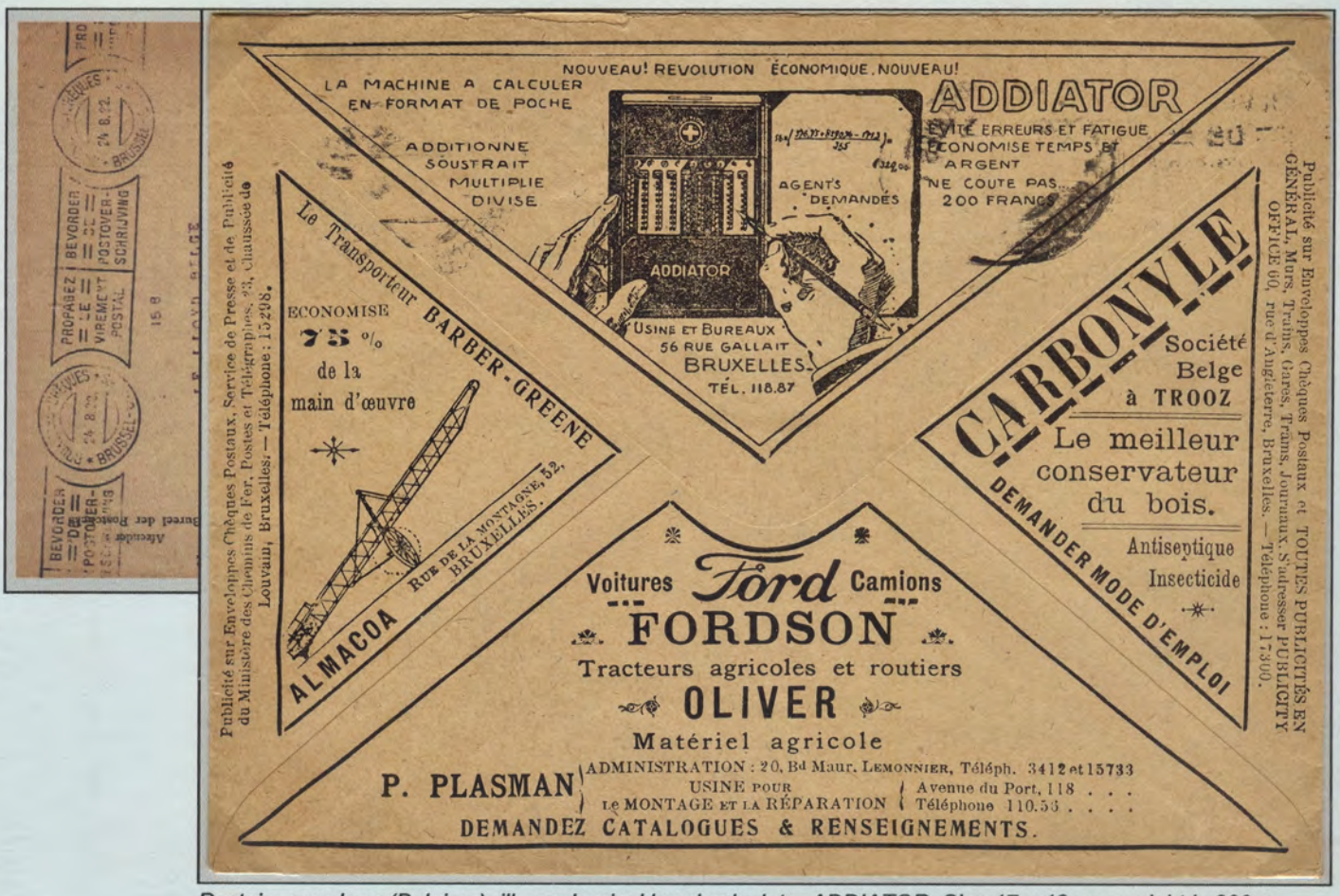


Curta



Universal "Multi-Value" (Hong Kong): ill. Calculator Friden STW 10

All mechanical models had an hand-crank to rotate the wheels and perform the calculation. Manpower was needed! But there were also extremely compact and light weight calculators, compared to the big and heavy (monster) ones. The **Curta,** made in Liechtenstein, invented by Curt Herzstark, was a small, hand-cranked mechanical calculator introduced in 1947. The small cylinder design fits in the palm of the hand. It could perform all the operations like the heavy ones.



Postgiro envelope (Belgium); ill. mechanical hand calculator ADDIATOR. Size 17 x 12 cm, weight is 300gr.

Desktop or portable calculators became common. Many engineering improvements made them smaller and lighter with the necessary strength of the parts. The electro-mechanical models were introduced since WWII.



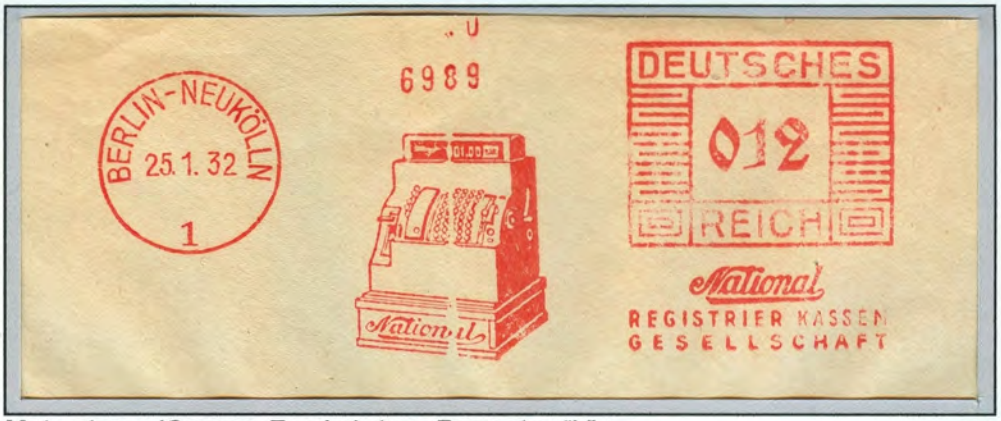


Meterstamp (German Empire): type Francotyp "A"

The first cash registers appeared in the market around 1879. Those original machines were nothing but simple adding machines, were entirely mechanical and really heavy. In fact, cash registers were first invented for the purpose of eliminating employee theft, therefore the employee was required to ring up every transaction on the register, and when the total key was pushed, the drawer opened and a bell would ring, alerting the manager to a sale taking place.

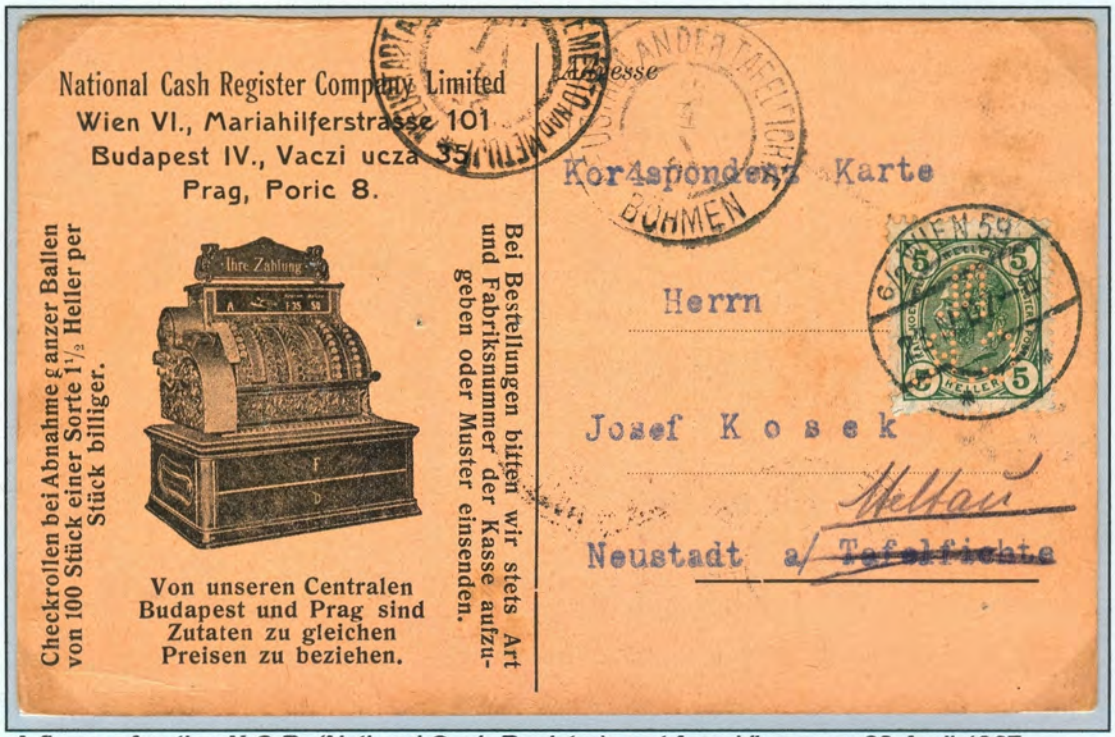


When the drawer opens a bell rings

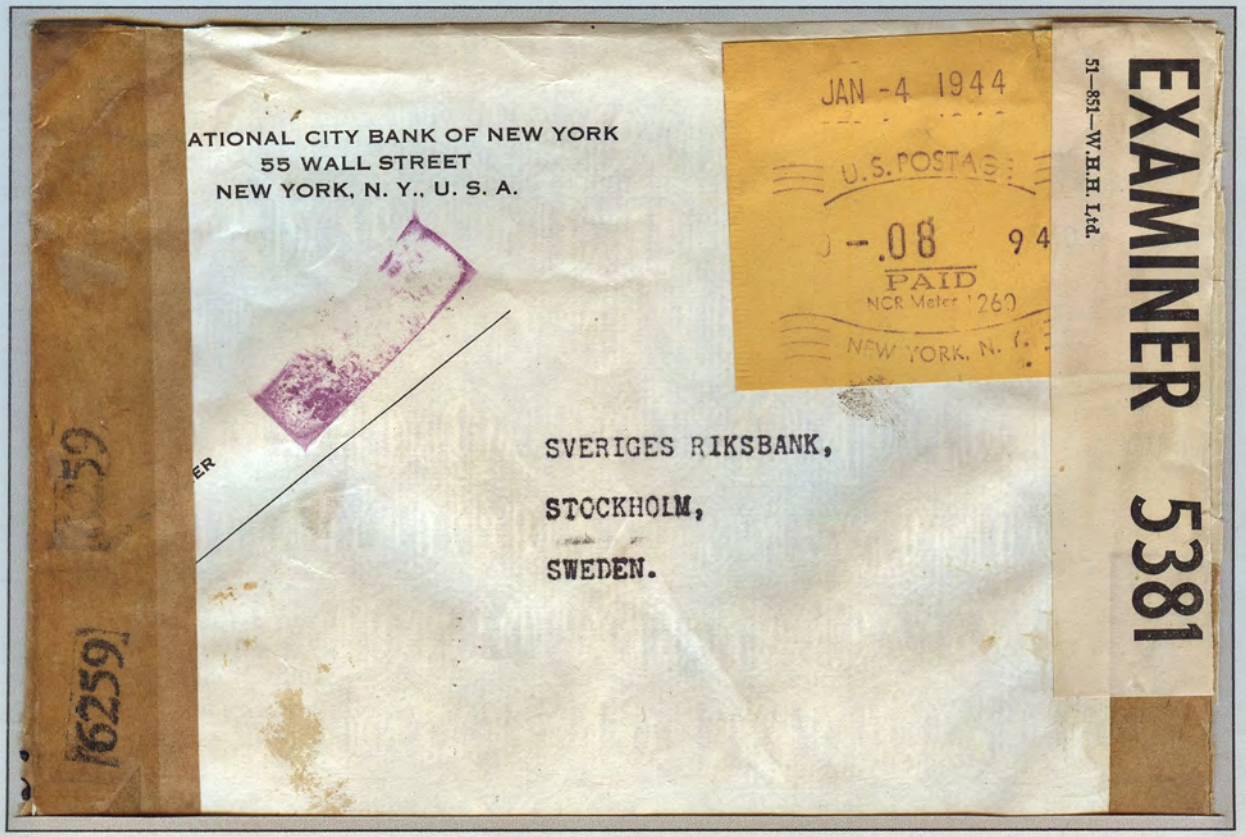


Meterstamp (German Empire): type Francotyp "b"

In 1879 James and John Ritty patented a cash register and in 1884 John H. Patterson and his associates acquired the Ritty patents and established National Cash Register Company (NCR). NCR had the biggest market share and sold around 2 million devices each year.



*A firm perforation **N.C.R.** (National Cash Register) sent from Vienna on 23 April 1907*



Censored letter from New York to Stockholm (4 jan 1944); The US Postal Service introduced in 1931 meter stamps, which were produced by National Cash Register meter model P-1924(3-3)P-P, a multi-value machine.

Cash registers followed every evolution in the calculator industry. These calculators have found their way into the common world of stores and warehouses. This specialisation was a combination of different applications like: adding or subtracting amounts, ...





model Commercial Controls Corp. (USA): ill. Clary Cash Register

...printing results, security, reliable, availability, and also size and weight.



Postal stationery (Portugal) with advertisement of the ANKER Cash register.



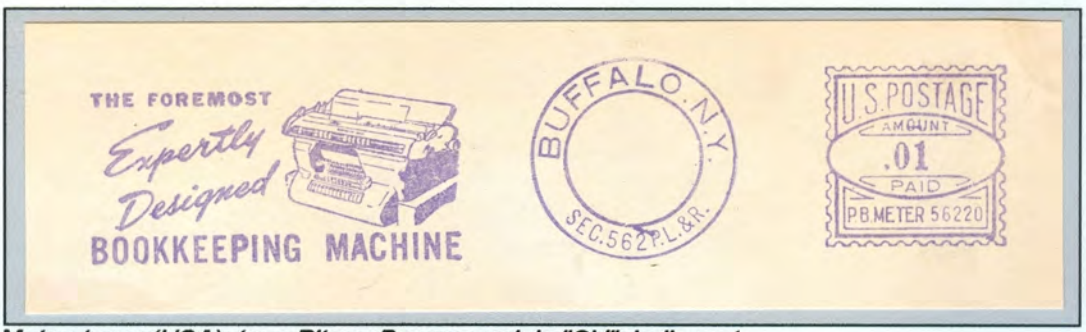


As we noticed with the traditional calculators those cash registers became available in electronically driven versions.





Between the World Wars and a while after the Second, bookkeeping or invoicing machines made their entrance in companies. They were calculators with typewriting and printing capabilities and were assembled together into one machine. The main purpose was the production of accounting documents more complex than a simple totalled list. These automated machines were the real monsters complex and often weighted more than 100 kg.



Meterstamp (USA): type Pitney Bowes models "CV"; bulk post



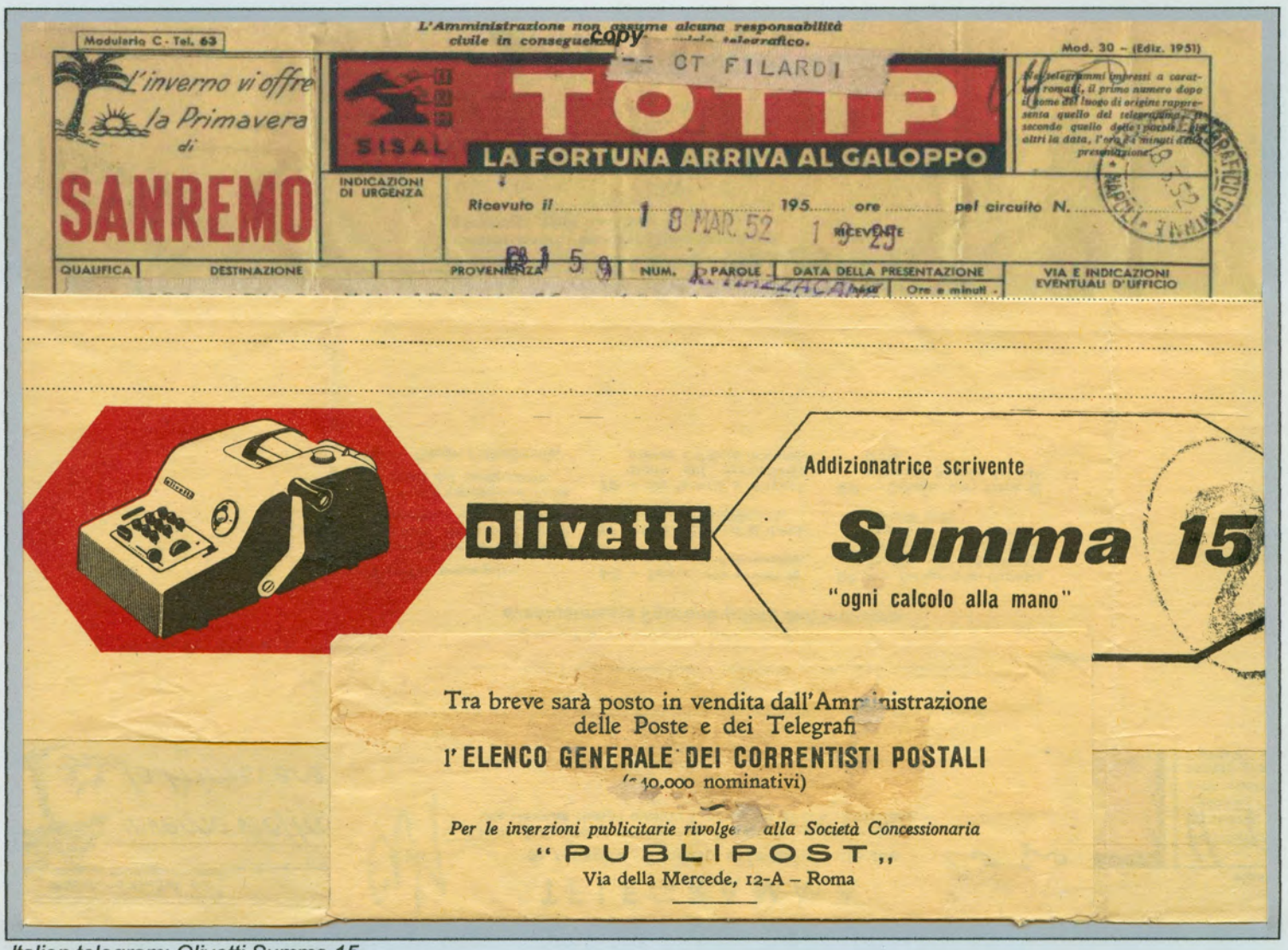
Belgian postgiro envelope with bookkeeping machine (right) Astra having 16 accumulator registers.







Instead of requiring the operator's hand to exert the force and power needed to set the numerical registers and do the calculation. The power could be drawn from electrical energy. The speed of operations had only mechanical limits and later electronically.



Italian telegram: Olivetti Summa 15

Even the early electromechanical desktop calculators were as large as many of today's personal computers. With the inventions of thermionic valves, transistors, and then hard-wired integrated circuit logic they were soon replaced by smaller electronic devices and enlarged capabilities.





French Postgiro envelope: 1975 Publicity AddMaster : electronical printing calculator

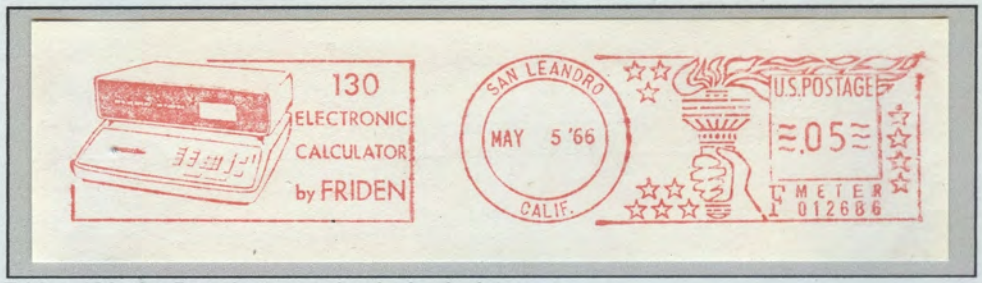


Swiss (Lausanne) Postgiro envelope: Publicity Precisa : electrical printing calculator

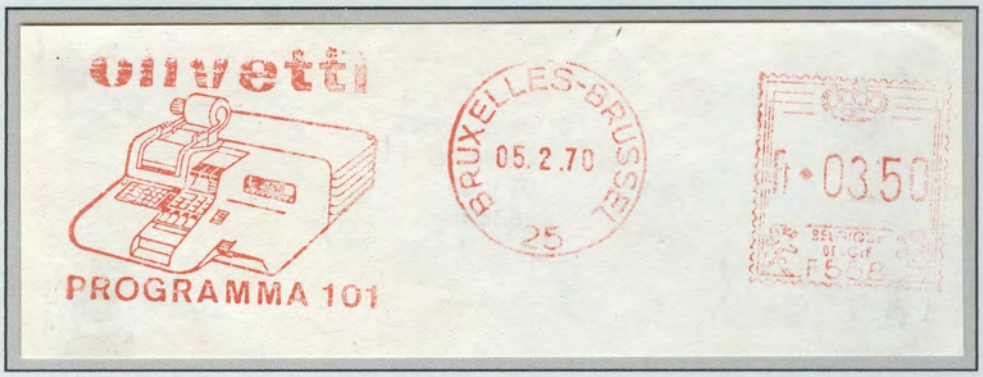


Elka 55

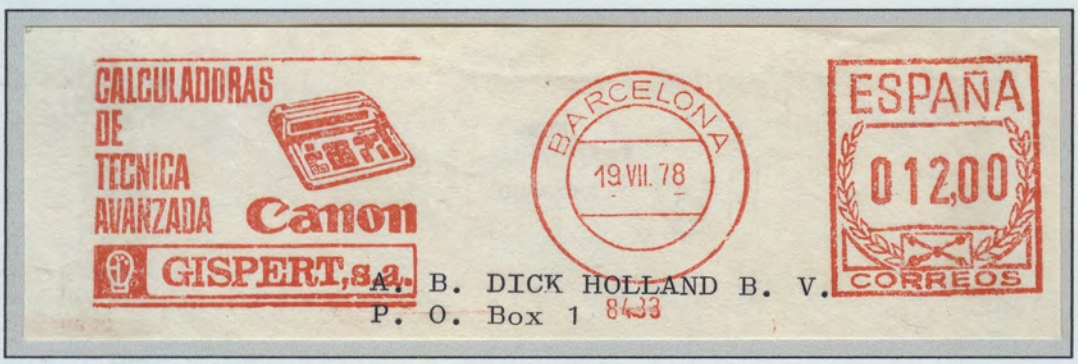




Friden 130; the first electromechanical calculator



The first electronic calculator was created in the early 1960s. Pocket-sized devices became available in the 1970s as the incorporation of ICs reduced their size and cost.



Frama "M/E bzw.100" (Spain): ill. Canon advanced technical calculator

They became cheap and were able to do more than the four conventional main operations, also able to memorize results, and in later versions able to be programmed by the user.



Most students use calculators for schoolwork and become "too dependent" on it; why not learn to calculate in the head.





In 1822, the English mathematician Charles Babbage (1792-1871) demonstrated the concept of memory in a form so that the machine (Difference machine) could handle calculations without any human intervention. The idea came as an actuary in an assurance company, from the repetitive calculations he had to do to verify hundreds of tables, and detected a lot of errors in those tables.



Aud

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PHYSICIAN—JOHN A. PARIS,
SURGEON—BENJAMIN TRAVERS
SOLICITOR—HENRY YOUNG,
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ACTUARY—JAMES JOH
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The following are among the advantages of this Society:

1st. The security of an ample Assurance Fund, besides the subscribed

2ndly. For young and middle-aged lives the lowest RATES OF PREMI

3rdly. *Three-fourths of the profits divided every fifth year among those who have been assured four years on the equal scale of premiums. The bonus declared in* 1834 *averaged* £16 *per cent. on the premiums then paid; and the bonus awarded in* 1839, *on the average, equalled* £31 *per cent. on the premiums received during the preceding five years.*

4thly. Assurers may have the bonus applied to increase the sum assured, or in reduction of future premiums, either for the remainder of life or for the next five years only.

5thly. Policies granted without any charge to the Assured beyond the stamp duty.

6thly. An option given to Assurers, on the increasing scale of rates, after the lapse of any number of years, to commute the future increasing premium by an equivalent equal annual one for the remainder of life, and thereafter to participate in the profits. The same advantages are applicable to Assurers on the decreasing scale of rates.

7thly. Policies on the lives of parties dying by suicide, duelling, or by the hands of justice, not void as respects the interests of persons to whom they have been legally assigned.

8thly. No extra charge for residence in any part of Europe, nor for proceeding (in a decked, sailing, or steam vessel,) from any one Port thereof to another during Peace, to Assurers not being seafaring men by profession. Licenses are granted to go to any part of the world upon terms proportionate to the risk.

9thly. Whole-life policies on the equal scale of premium purchaseable after four years. Lapsed Policies revived on favourable terms to the Assured.

The Board-day is every FRIDAY *at ½ past Two o'Clock; but appearances may be taken on any day between the hours of* 10 *and* 12 *in the morning, before either of the Medical Officers, at their respective Residences, as stated above.*

TABLES.

WHOLE LIFE.

Equal Rates of Premium.

I. TABLE of Annual Premiums required for an Assurance of £100 for the whole Term of Life.

Age.	Annual Premium. £ s. d.
15	1 10 8
16	1 11 5
17	1 12 3
18	1 13 0
19	1 13 10
20	1 14 7
21	1 15 5
22	1 16 3
23	1 17 2
24	1 18 1
25	1 19 0
26	2 0 0
27	2 1 0
28	2 2 0
29	2 3 1
30	2 4 3
31	2 5 5
32	2 6 8
33	2 8 0
34	2 9 5
35	2 10 11
36	2 12 6
37	2 14 2
38	2 15 11
39	2 17 9
40	2 19 9
41	3 1 10
42	3 4 1
43	3 6 6
44	3 9 0
45	3 11 9
46	3 14 7
47	3 17 8
48	4 0 11
49	4 4 4
50	4 8 0

II. TABLE showing the Annual Premium Payable during Ten Years only, to Assure £100.

Age.	Annual Premium. £ s. d.
20	4 2 6
21	4 4 0
22	4 5 6
23	4 7 1
24	4 8 9
25	4 10 5
26	4 12 1
27	4 13 9
28	4 15 6
29	4 17 4
30	4 19 2
31	5 1 1
32	5 3 0
33	5 5 0
34	5 7 1
35	5 9 5
36	5 11 9
37	5 14 2
38	5 16 8
39	5 19 3
40	6 1 11
41	6 4 8
42	6 7 6
43	6 10 6
44	6 13 10
45	6 17 4
46	7 0 11
47	7 4 7
48	7 8 4
49	7 12 4
50	7 16 5
51	8 0 9

Increasing Rates of Premiums.

Annual Premiums increasing every Fifth Year until the Twentieth inclusive, after which period a fixed Annual Premium is payable during the remainder of Life.

Age.	Premium per Cent. per Annum payable during First Five Years.	Second Five Years.	Third Five Years.	Fourth Five Years.	Remainder of Life.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
15	1 2 9	1 6 7	1 10 1	1 13 7	1 17 7
16	1 3 5	1 7 3	1 10 9	1 14 5	1 18 7
17	1 4 1	1 7 11	1 11 5	1 15 3	1 19 7
18	1 4 9	1 8 6	1 12 2	1 16 1	2 0 8
19	1 5 5	1 9 2	1 12 10	1 16 11	2 1 9
20	1 6 0	1 9 10	1 13 7	1 17 10	2 2 11
21	1 6 8	1 10 6	1 14 4	1 18 10	2 4 2
22	1 7 3	1 11 2	1 15 2	1 19 10	2 5 5
23	1 7 11	1 11 10	1 15 11	2 0 10	2 6 9
24	1 8 6	1 12 6	1 16 9	2 1 11	2 8 1
25	1 9 1	1 13 2	1 17 8	2 3 1	2 9 7
26	1 9 9	1 13 10	1 18 7	2 4 4	2 11 2
27	1 10 4	1 14 7	1 19 6	2 5 7	2 12 9
28	1 11 0	1 15 4	2 0 7	2 7 0	2 14 6
29	1 11 7	1 16 2	2 1 8	2 8 5	2 16 4
30	1 12 3	1 17 0	2 2 10	2 10 0	2 18 3
31	1 12 11	1 17 11	2 4 1	2 11 8	3 0 4
32	1 13 7	1 18 10	2 5 4	2 13 5	3 2 6
33	1 14 4	1 19 10	2 6 9	2 15 3	3 4 9
34	1 15 1	2 0 11	2 8 4	2 17 3	3 7 3
35	1 15 11	2 2 1	2 9 11	2 19 5	3 9 10
36	1 16 9	2 3 4	2 11 8	3 1 9	3 12 7
37	1 17 8	2 4 8	2 13 7	3 4 3	3 15 6
38	1 18 8	2 6 2	2 15 8	3 6 10	3 18 8
39	1 19 9	2 7 9	2 17 10	3 9 8	4 2 0
40	2 0 11	2 9 5	3 0 2	3 12 8	4 5 6
41	2 2 2	2 11 4	3 2 9	3 15 11	4 9 3
42	2 3 6	2 13 4	3 5 5	3 19 4	4 13 3
43	2 5 0	2 15 6	3 8 5	4 3 1	4 17 6
44	2 6 8	2 17 10	3 11 7	4 7 0	5 2 0
45	2 8 5	3 0 4	3 15 0	4 11 3	5 6 10
46	2 10 4	3 3 1	3 18 8	4 15 9	5 12 0
47	2 12 5	3 6 1	4 2 7	5 0 7	5 17 5
48	2 14 8	3 9 4	4 6 10	5 5 9	6 3 3
49	2 17 2	3 12 10	4 11 5	5 11 4	6 9 5
50	2 19 10	3 16 7	4 16 3	5 17 3	6 16 1

*** *By comparing the rates in* No. I. *with those of* No II. *it appears that this Table offers peculiar advantages to those to whom the least possible present payment is desirable.*

PERIOD ASSURANCES.

TABLE of Annual Premiums required for an Assurance of £100, for the respective Terms of One and Seven Years.

Age.	One Year. £ s. d.	Seven Years. £ s. d.
15	0 16 3	0 18 0
16	0 16 10	0 18 7
17	0 17 6	0 19 4
18	0 18 1	1 0 0
19	0 18 9	1 0 11
20	0 19 5	1 1 9
21	1 0 2	1 2 6
22	1 1 0	1 3 4
23	1 1 10	1 4 1
24	1 2 8	1 4 10
25	1 3 5	1 5 7
26	1 4 2	1 6 3
27	1 4 11	1 6 11
28	1 5 8	1 7 9
29	1 6 4	1 8 3
30	1 7 0	1 8 11
31	1 7 8	1 9 7
32	1 8 3	1 10 3
33	1 8 11	1 10 11
34	1 9 7	1 11 7
35	1 10 3	1 12 4
36	1 10 11	1 13 1
37	1 11 7	1 13 11
38	1 12 4	1 14 9
39	1 13 1	1 15 9
40	1 13 11	1 16 9
41	1 14 9	1 17 10
42	1 15 9	1 19 0
43	1 16 9	2 0 0
44	1 17 10	2 0 11
45	1 19 0	2 1 11
46	1 19 10	2 3 1
47	2 0 9	2 4 4
48	2 1 11	2 5 11
49	2 3 1	2 7 8
50	2 4 4	2 9 7

Example of actuarial table with life assurance premiums; according to Babbage containing a lot of errors, due to human repetitive calculations, from this he believed this could be avoided when using his invention; the Difference machine.

During World War II, the British Government Code and Cypher School at Bletchley Park, outside London, broke the German coded messages generated by the famous **Enigma**.



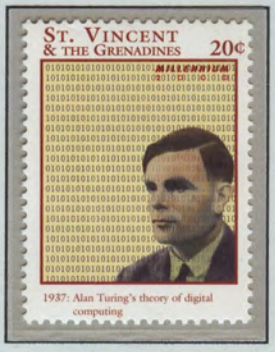
Rejewskin, a Polish mathematician, and two colleagues, deduced the secret internal wiring of the **Enigma,** but still it was a very time consuming task to break all incoming messages.



Rejewskin (left) and Enigma (bottom)



◄ *T. Flowers & Collosus(left) - pane prestige booklet.*



Alan Turing and **Tommy Flowers** build the world's first electronic and programmable computer **"Collosus"**. It got the name because of the big number of vacuum tubes (1850) used to be able to decode the German messages. Ten of those computers were completed and used, and were crucial for deciding start of D-Day.





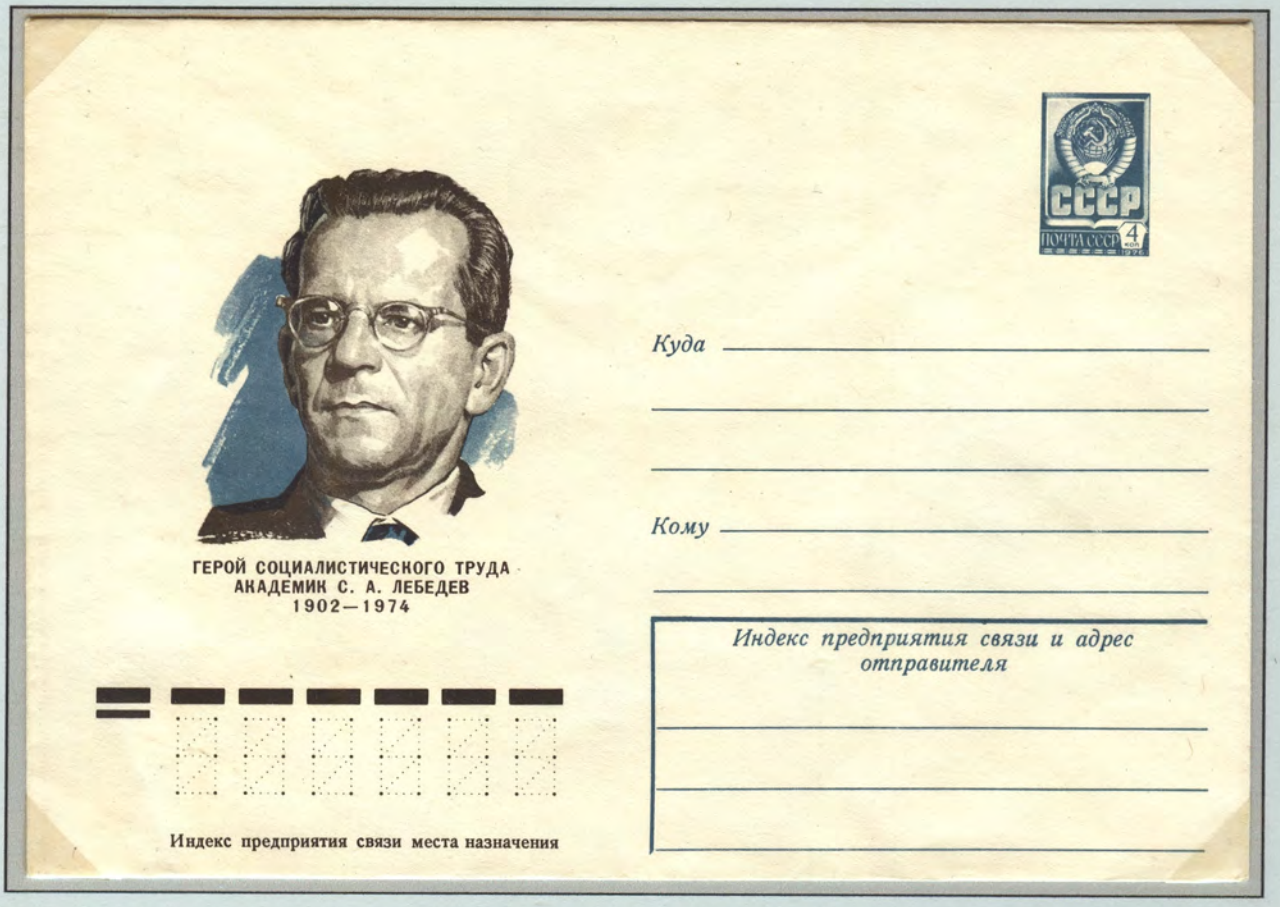


Secret PO box 111 letter (Great-Britain – 4.03.1943): undercover mail address of Bletchley Park, sent via FPO 676 at Inverness, Scotland with RAF censor cancel.



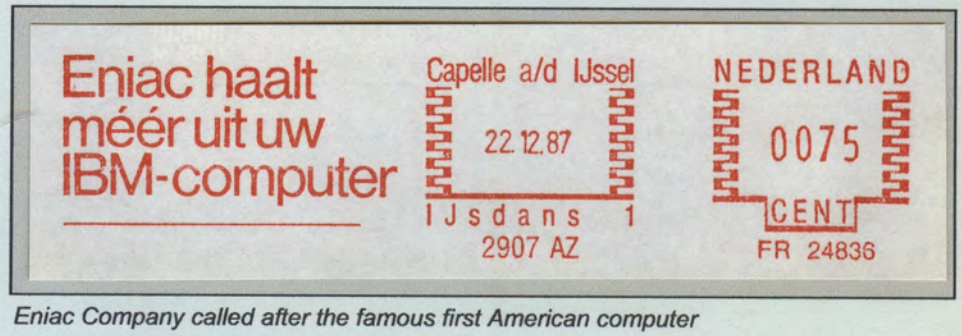


During WW II **Konrad Zuse** (1910-1995) developed the computers Z3 and Z4 and was the first to demonstrate how to load a program. In 1949 Zuse re-established his own company under the name Zuse KG and completed the Z4. The Z4 can be considered as the first commercial computer in operation.



In 1946 **Sergei Lebedev** (1902-1974) developed as head of the Kiev Electro technical Institute of the Ukrainian Academy of Sciences with his team the first computer in the USSR. The MESM (meaning translated Small Electronic Calculating Machine) had about 6000 vacuum tubes, did fixed-point binary representation, used parallel arithmetic processors and could operate at an average speed of 50 operations per second.





Eniac Company called after the famous first American computer

Meanwhile in the U.S. in 1946 the **ENIAC** (**E**lectronic **N**umerical **I**ntegrator and **A**utomatic **C**omputer) was completed by two American university professors, **John Mauchly** and **Prosper Eckert**, using as first the Babbage concepts.







Shifted perforation

The Eniac, extremely large and heavy (5m x 24m – 30 ton) was developed at the University of Pennsylvania.



◄ *U.S. Postal Service issued below stamp commemorating the 50th birthday of the ENIAC and the computer technology that have followed*



cancel Aberdeen Proving Ground, Maryland 24.04.1951 ►

In 1947 it was transferred to U.S. Army Ordnance Corps in **Aberdeen Proving Ground**, Maryland, where it was in continuous operation until October 1955 to support the American ballistic research lab. It was able to calculate a trajectory in 30 seconds that took a human 20 hours.

Dr. Atanasoff, from Bulgarian origin, and graduate student C. Berry built successfully the **A**tanasoff-**B**erry **C**omputer (ABC) at Iowa State College during 1939-42. The machine was only capable of solving up to 29 simultaneous linear equations, further development stopped due to WW II assignments.





An American mathematician with Hungarian roots, **Johannes von Neumann** (1903 - 1957) engineered the first computer that loaded a stored program into memory and executed it. This machine, called EDVAC (Electronic Discrete Variable Automatic Calculator), was created at the University of Princeton.



Francotyp "Cc/Ccm" (Sweden) ►





In 1951 the first commercial computer was successfully developed, the **UNIV**ersal **A**utomatic **C**omputer (UNIVAC). It was part of the so-called 'First Generation Computers'; they were built with tubes.

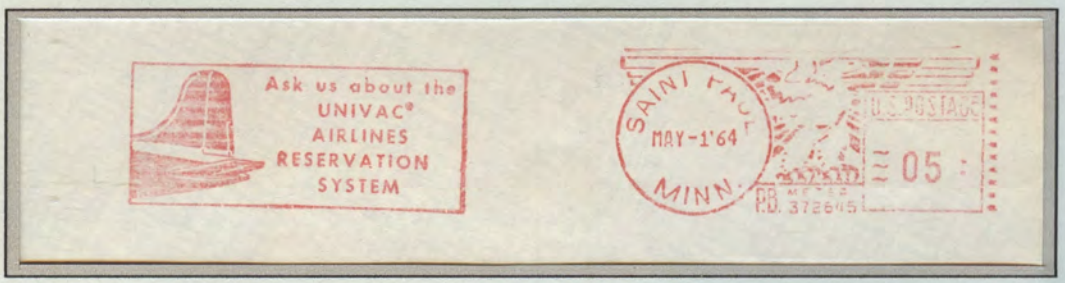


Magenta color missing



In 1955 Lawrence and Elmer Sperry, founders of the Sperry Corp., acquired the Eckert-Mauchly Computer Corp. and Remington-Rand, developers of the Univac system. The company name changed to Sperry Rand and later (1986) merged with Burroughs and exists today under the name of UNISYS.

The Univac airlines reservation system (part of USAS) is still in use today but is slowly diminishing and is being replaced with Open Source and Front-End products.

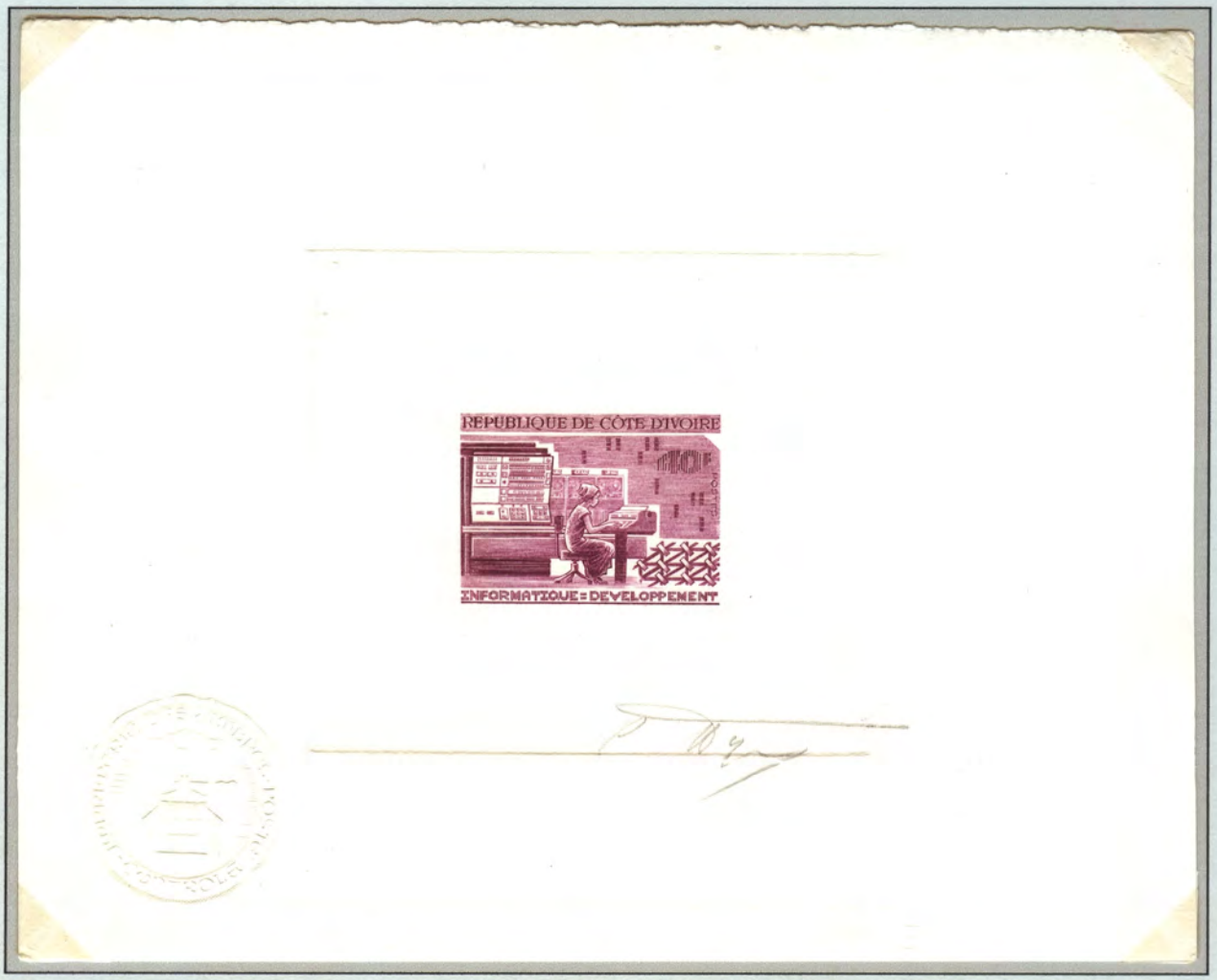






"Fifty years computers" *UNIVAC exists 50 years*

The second generation of computers (1958-1964) is identified by the use of transistors instead of tubes, enormous reduction of used space, use of higher level of computer languages, tape-devices and removable disks.



Die proof designed by P. Forget: ill. Mainframe ***IBM 360/40*** *model; bottom right Magnetic core memory*

The third generation computers (1964-1970) use integrated circuits, which result in dramatic reduction of power and space. A lot of attention goes to high availability and stability. This generation was completely dominated by IBM's first commercialised "computer family", the IBM/360 series announced in 1965. Lots of major companies were buying and using these systems. In the beginning IBM didn't believe that companies would spend that amount of money in computers. The successes of the UNIVAC took away every doubt, and IBM started a big campaign. In 1956 it became number 1 and is still today a market leader in the computer business.





3rd Generation CPU; EC 10xx series



German Company Robotron

The fourth generation computers started around 1970 have IC's that contain many processing circuits. Also Timesharing was introduced, being the optimal use of the processor power and time by dividing it between all users of that CPU. This allows many users to work at the same time on a single computer.





Roneo Neopost "205" completed box (Australia): CDC 6600 mainframe computer



Echocard (Japan): text: minicomputer IBM AS/400



Color proofs

Mainframe and mini-computers (as IBM AS/400) are meant to be available 24hrs a day and 7 days in a week. Maintenance on these types of systems are planned and are using fail-over systems.



The needs for smaller computers became visible in the 70s, and they were available under the name minicomputers.



Inflation (German Empire - 1923): stamp with highest value ever issued: 50 billion (50 miljarden), one sheet has 100 stamps gives 5 trillion (5 billionen), see border.

A supercomputer in 1985 could count from 1 to 5 trillion in a sec. Today they do it 20 million times faster. Or same as cracking a password with 95 characters with all numbers, upper and lowercase letters and special characters in one second.





A supercomputer is used mainly for particular highly calculation-intensive tasks such as quantum physics, climate research, forecasting and, encryption technology by searching for the next prime number. US; china and japan are key players.



Registered letter (Argentina): number 876023 is a prime number. ▶
Supercomputers are always in search for the next prime number.

Processing capacity or speed of calculation is measured by number of FLoating point Operations Per Second. Todays supercomputers can do 1.759 PFLOPS (Peta=10^{15} =1000 trillion).



Stationery (China - 2001) - ill. Shanghai Supercomputer Center



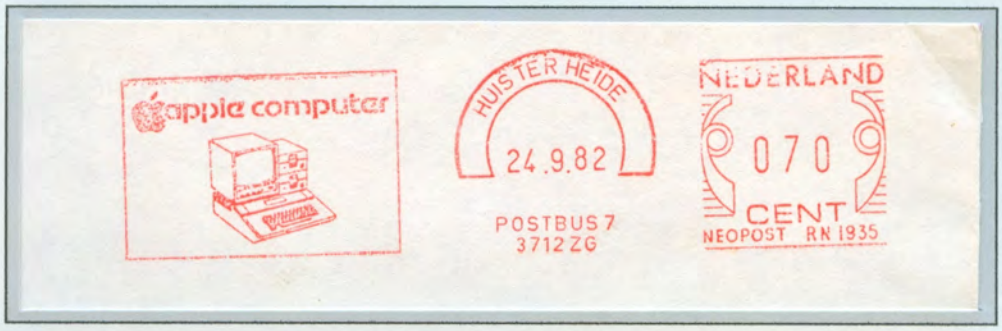
Altair, Tandy (TRS-80), Atari and Commodore constructed the first microcomputers in the late 70s.







APPLE II reached markets in 1979

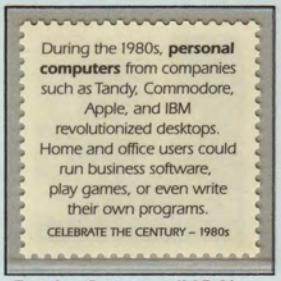


In 1976 Steve Jobs and Steve Wozniak developed their first Apple computer in their garage. In 1979 they reached the markets with the Apple II model and already in 1983 the Apple Company became one of the Top 500 companies.



APPLE II E -model





Back of stamp (USA)

On March 8, 1983 IBM launched their "Personal Computer", the IBM PC XT with an 8088 processor, as product number **5160.**
XT stands for eXtended Technology.



Black-White stamp on notification paper.



IBM/XT was the first computers with standard hard drive and a BASIC operating system.



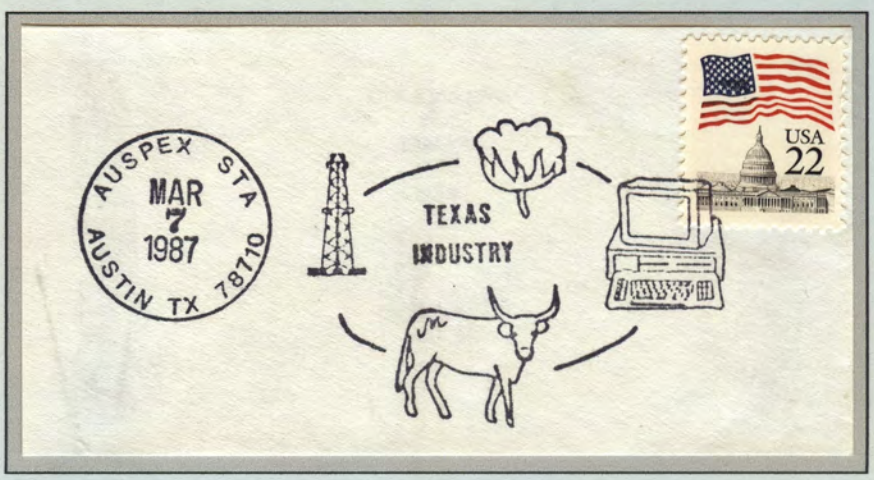
▲ *Echo card (Japan): IBM PC 5550 is the Azian version of the IBM PC XT, with special more powerful processor for eastern languages.*



▲ *Specimen Meterstamp (France): SECAP model S; ill. Olivetti M24 (8O86 processor)*

Eighteen months later the new architecture was a proven standard and got more than 50% of the market share. Thanks to many other manufacturers like e.g. Olivetti.

From then on everybody talked about PC or home computer that replaced the word microcomputer.







After the XT came the AT PCs, second generation PC. AT stands for 'Advanced Technology'. It was a more robust system having a 286 or higher type processor, a 20MB hard disk and more advanced graphical interface.



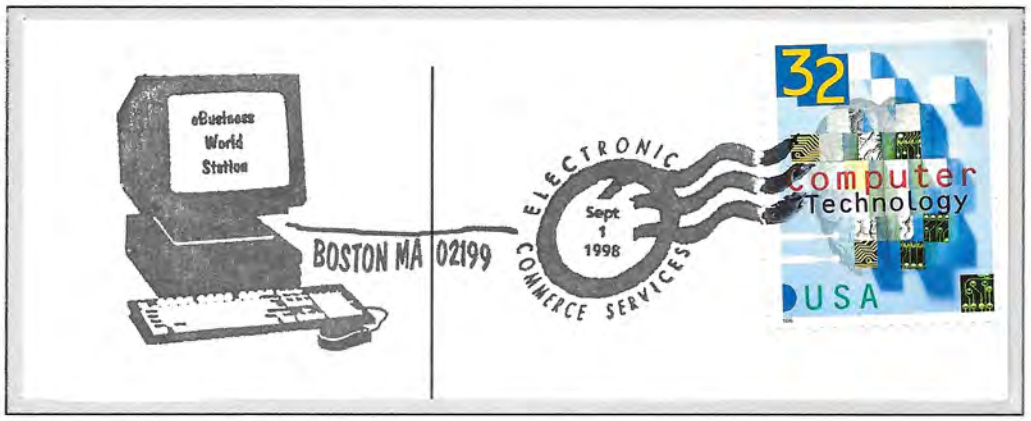
IBM's efforts to trademark the name AT largely failed and many computer manufactures copied the 286-based architecture, called clones. Most systems with processor types 286, 386, 486 and Pentium CPUs, and at least some with Pentium Pro and Pentium II processors, were describable as AT-class. A processor is needed for processing the programmed instructions.



Private Booklet (Israel): IBM PS/2 (Personal System/2)

The PS/2 line was created by IBM in an attempt to recapture control of the PC market by introducing an advanced yet proprietary architecture, which was not a big success due to its hardware incompatibility.





In the PC-world the processor type is one of the major differences. The processor speed is dependent on the type of the processor types; following types exist 8086, 286, 386, 486 and 586 (Pentium) processors. The Pentium processors empowered with dual or quad core technology.





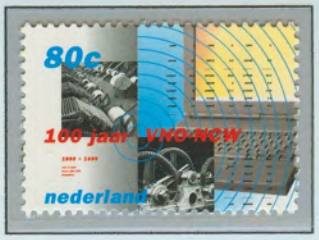
Personal Computers don't differ that much from big mainframes; besides the fact that PC's are much smaller, there is a major difference; a PC reacts on the movement of the mouse and the mainframe only reacts after the "enter"-key is hit. The result is that PC programs can be user-friendlier.





Robotron A512C

Portable computers appeared on the market shortly after the introduction of the Personal Computer. In the beginning they were transportable because the screen, keyboard and processor were integrated in one box.









With the introduction of the flat screens the LAPTOP became flat, slim and very light (few kg).



*A **LAPTOP** of TOSHIBA model J-3100SL*



The word LAPTOP exists out of LAP and TOP. So, it is a PC that you can put on your lap.





The story of the electronically "one hand-design" devices, often called handheld, palmtop or PDA (Personal Digital Assistants) started already with certain electronic calculators in the early 80's. The light-weight, robust yet small go-anywhere device that help people to manage and organize their personal and professional lives by providing instant information, anytime access to agendas, phone numbers, to-do lists and many other ...





... all accessible thru 3G or 4G connectivity and with the data available in the cloud.





Light-weight devices are not only expensive phones with some additional functionality but can run today all kind of applications which were before only available on PC and installed from CDs or DVDs.



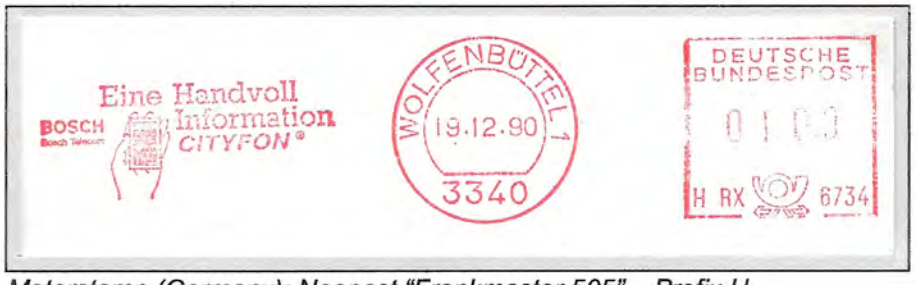




PDA BlackBerry ▶



A phablet is blended from the words phone and tablet. It is a class of mobile device designed with a screen which is intermediate in size between that of a typical smartphone and a tablet computer. The screens measure (diagonally) between 130 mm and 180 mm. With a display larger than traditional smartphones, a phablet offers a better visual experience for viewing web pages or multimedia sources, but can be bulky in a small shirt or pants pocket.



Meterstamp (Germany): Neopost "Frankmaster 505" – Prefix H



As a smartphone or PDA, a phablet combines phone with all other applications and functionality in one device; a handful of information. This is growing market overtook shipments of both laptops and tablets worldwide in the second quarter of 2013.





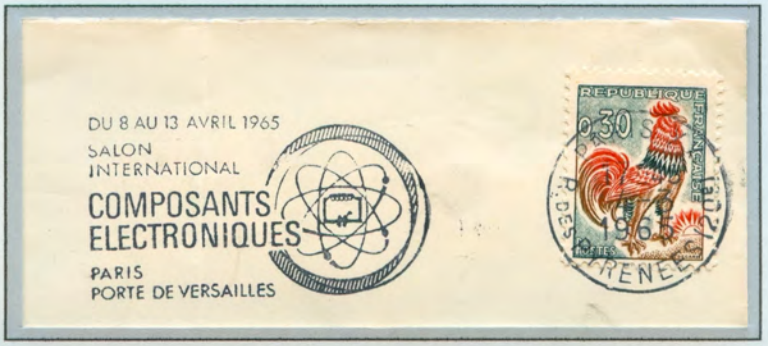




◄▲*Black and color trial proof: "Hotel des Invalides" in Paris for the industry exhibition.*

To become an industry means convincing investors and raising funds to deploy the first devices. This was what the first inventors did at exhibitions.

The first industry exhibitions were an idea of Napoleon's minister of internal affairs, François Neuf-château. They took place 1798, 1801, 1802, 1803 and 1806 in "Hotel des Invalides" and later in the grand court of the Louvre in Paris. In 1802 Jacquard, inventor of the punch card driven loom, received the bronze medal for it.
Later those exhibitions became the famous world exhibitions or, more specific technology exhibitions.





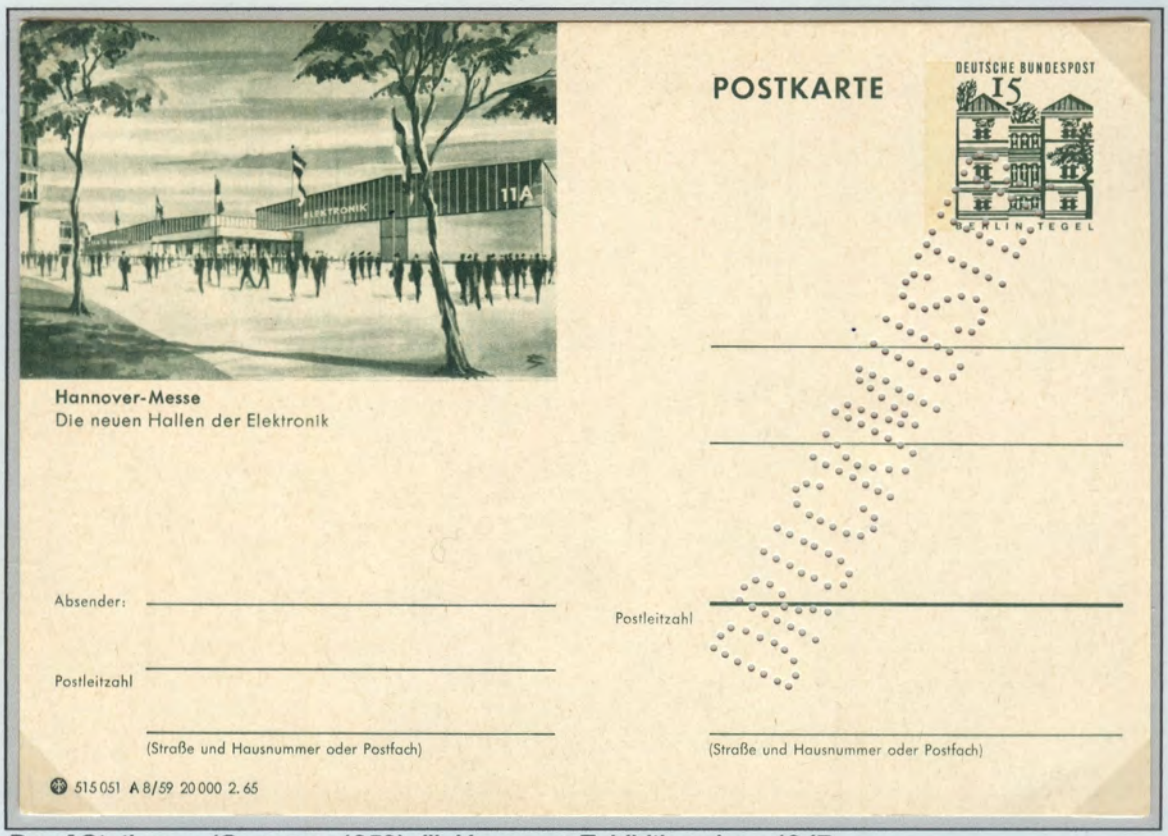
▲ *Stationery printed to order (Bayern); Bureau Exhibition*





▲ *Booklet (Germany) CeBIT (**Ce**ntrum für **B**üro- und **I**nformation**s**technik) in Hannover.*

Marketing is enormously important and companies have always recognized the importance of being present on exhibitions, like Hannover ***Cebit*** is one of the biggest in Europe for all technologies. It allows them in a way to realize bigger name recognition and to promote and demonstrate new products. Being in the picture, that's how computers got into everybody's day life.



Proof Stationery (Germany-1959); ill. Hannover Exhibition since 1947



▲ *Communication specialist 3Com sponsoring a yacht.*





Specimen ATM: Germany

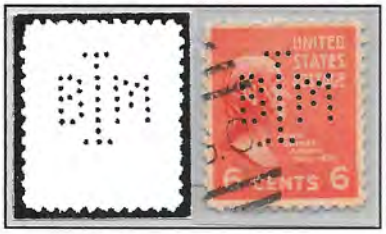
Big computer players spend billions of dollars on marketing. Branding; being awidely-recognized trademark. A brand is the personality that identifies a product, service or company (name, term, sign, symbol, or design, or combination of them) and how it relates to key constituencies: customers, staff, partners, investors etc.
Sometimes they manage to have access to the stamp world.







*Thomas J. Watson Sr (**incorrectly** mentioned as George J. Watson) CEO of IBM.*



International Business Machines Corporation (commonly referred to as **IBM** got this name in 1926, before named as CTR) is an American multinational technology and consulting corporation, with corporate headquarters in New York. IBM manufactures and markets computer hardware, middleware and software.

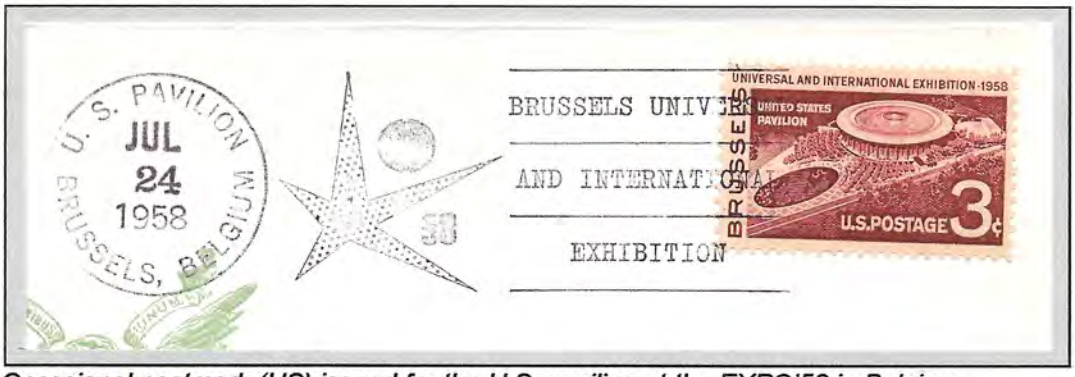




Meterstamp (Libanon) type Satas 'R' bilingual: IBM slogan

Thomas J. Watson Sr, CEO of IBM and also chairman of the ICC (International Chamber of Commerce) launched in 1937 the slogan 'World Peace through World Trade'





Occasional postmark (US) issued for the U.S. pavilion at the EXPO'58 in Belgium

Who doesn't remember the presence of IBM in the U.S. pavilion at the World's Fair EXPO '58 in Belgium where an IBM RAMAC system answered questions on world history in 10 languages? Or who remembers the commercial with Charlie Chaplin to promote their IBM XT PC, which became a standard for the personal computer market?







IBM, a world trader, has worldwide the most recognized logo in the world. In 1956 the letters "IBM" took on a more solid, grounded and balanced appearance. Since1972 horizontal blue stripes replaced the solid letters to suggest "speed and dynamism". Recognition is key in the IT business.

1.8 Calculating became IT industry.

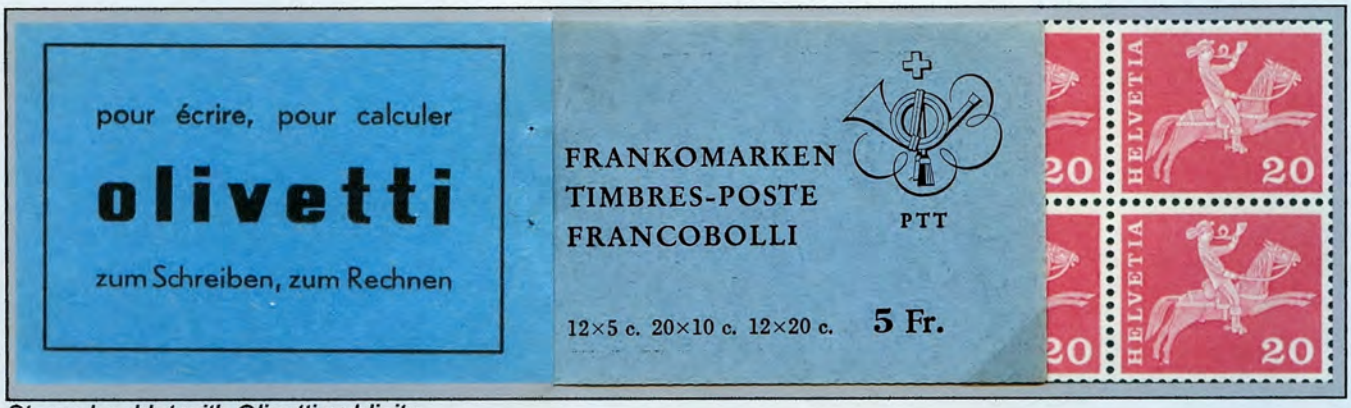
Olivetti, an Italian manufacturer of calculators, typewriters and later personal computers, is just one example how they were able to promote their ideas and products to the consumer. Olivetti was the first in the world that managed to promote their product and name on an official (Italian) post stamp.



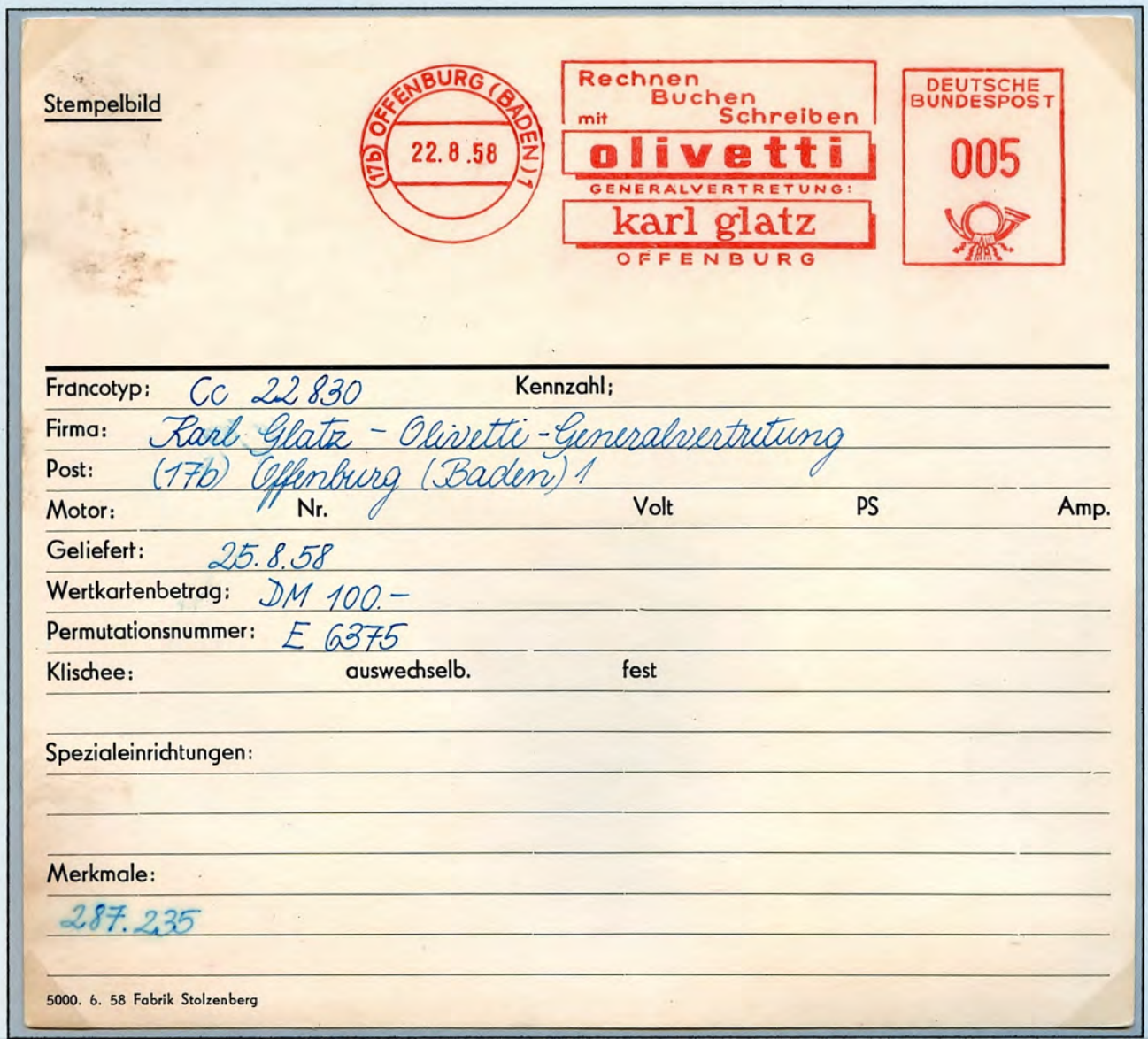
IBM compatible PC Olivetti M24



Heavy Colour shift (ED certificate)



Stamp booklet with Olivetti publicity



A Francotyp company specimen cart of showing publicity of Olivetti: These types of carts records registration date and number, change of publicity by requestor, sample strike of the metermark, etc…

2

The Physics of a computer, the hardware.

2.1 What's in the box?

Vacuum tubes



'Porte Timbre' postage stamps (Russia - 1925); sold in a post office with reduction ill.: advertisement of radio tubes.



Timbrographe meterstamp (Belgium - 1939); ill. radio tube of Tungsram



The first computers, like ENIAC, Colossus and Atanasoff-Berry Computer (ABC), developed in 1940s were constructed with all kind of electrically elements and radio tubes, also called vacuum tubes, invented in 1906.



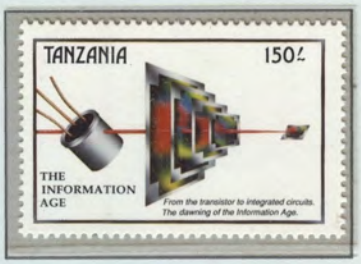
missing perforation

The ENIAC filled a 70m² room, weighted 30 tons, used more than 18.000 tubes consuming 175KW of electricity power.



Telegraph receipt (Ottoman Turkish); ill. advertisement radio tube of Tungsram.

The Hungarian company Tungsram was founded in 1896 and produced worldwide vacuum tubes. They were taken over by General Electric in 1990.





2 Penny tax; mandatory as support for suffering Berlin just after 2nd World War

The second generation of computers, started around 1959, was built with transistors and resistors.



Misperforation (Great-Britain) small perforation central stamp without Queen symbol and face value: ill. transistor symbol

The transistor was invented in 1948 and was the first start of the miniaturization of the computer.



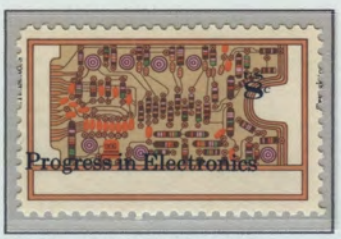
Francotype "Cc" (Netherlands): ill. symbol vacuum tube and semi-conductor transistor



These semi-conductors were less expensive, smaller, required less electricity, and emitted less heat than vacuum tubes. The introduction of circuit boards is a fact. The second advantage was increase of the calculation speed and reliability.



black print shift right



black print shift up + left



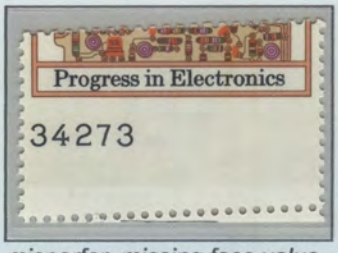
One small error in these circuit boards meant the whole board became useless and replaced, as it was cheaper than searching for the error and repair the board.



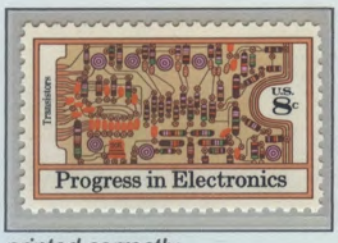
black print shift up



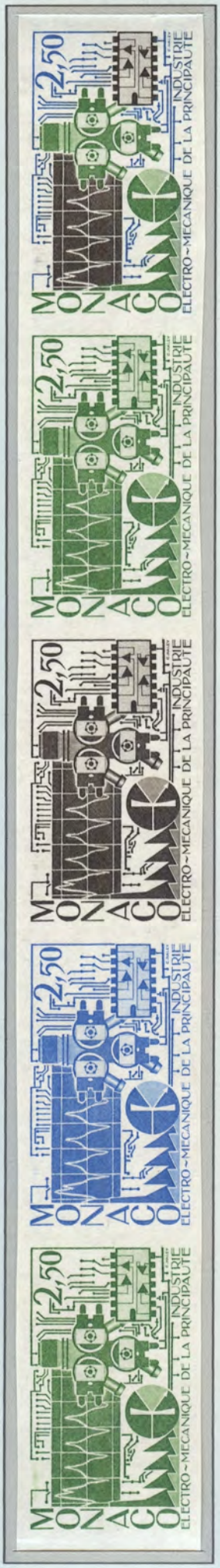
brown + purple shift down



misperfor. missing face value



printed correctly



◄ Color trial proof (Monaco): Integrated Circuits (ICs)





Color proofs



◄ ▲ Magnetic core memory; bottom right



Typically for the second-generation computers was the use of magnetic cores memory. It was introduced as central storage memory. Cores can be magnetized, and can be read again by detecting if a core contains a 1 or 0; meaning a core is loaded positive or negative.



Magnetic core memory



Jack Kilby



Microchip 600X enlarged



Specimen perfin MUESTRA (Mexico): Electronic components

The third generation of computers appeared in 1965. They started to use Integrated Circuits (IC), invented in 1959 by **Jack Kilby** of Texas Instruments. The evolution of 'chips' went very fast. By the beginning of the 21st century, the ICs had over 100 million transistors on it, with the total number of components including resistors, capacitors, and conductors being even larger. Result of increasing efficiency and compressing on each mm² and less power consumption.



Hasler "Smile" (Netherlands): ill. Integrated Circuit (IC)

Those microchips were massively in use since 1971 as central memory, processor and control.









The speed of the computers is now measured in millionths of a second, the term MIPS is born; **M**illions of **I**nstructions **P**er **S**econd.

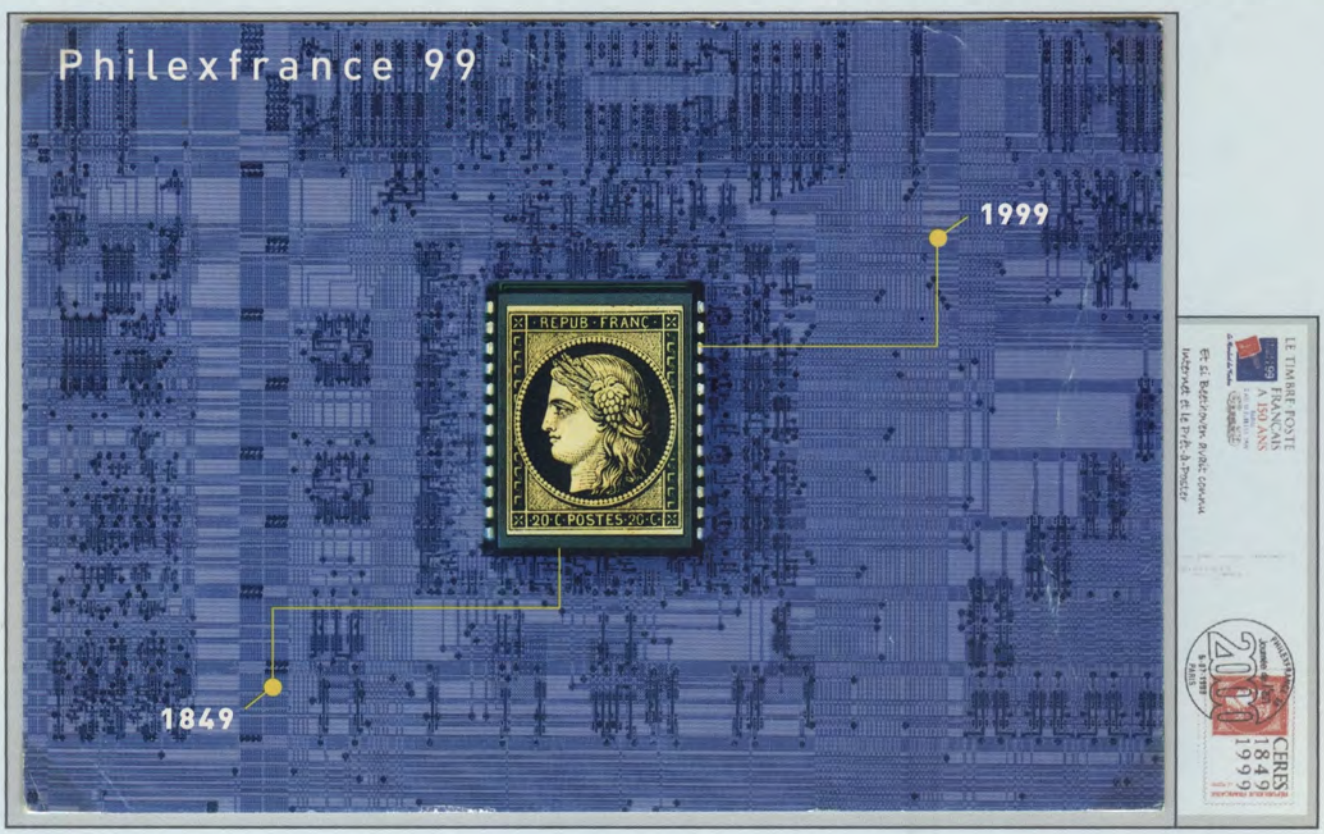


*Letter sent as **"PD"** from Guyanne Cayenne on 17.11.1864 rated 70c and canceled with 64-dot losenge arrived in Toulon, France on 16.12.64, via Paris 14.12.64, Paris Gare de Lyon 14.12.64 and Nice 16.12.64.64 - representing a quad-core 64-bit processor; every dot is a bit and can be either 1 or 0, also can address 2^{64} bytes in memory.*

Adding another board containing dozens of ICs was an easy way of extending a computer.



Today's ICs have **quad-core 64-bit** processors, meaning 4 independent units can read and execute central processing unit (CPU) instructions such as add, move data, and branch. Each core operates in conjunction with other circuits such as cache, memory management, and input/output ports. With respect to hardware, 64-bit is referencing the width of the registers on a computer's microprocessor or memory.





Registered letter (Austria) cancel; ill. typewriter of Mitterhofer

The typewriter, invented by **Peter Mitterhofer** (1822-1893) in 1864, was put into production begin 1870s. The first models like '**Caligraph**' had a 'full' QWERTY keyboard to avoid keys to jam and typed only in capital letters. Typing 'blind' was required; to see the writing the typist had to lift up the carriage.
It is clear that the keyboard and application stood the model for the computer keyboards of today.



Printed to order stationery envelope (Berlin; Neue Berliner Omnibus- und Packetfahrt Actien-Gesellschaft; one of the 10 city posts of Berlin) illustration: 'Yost' typewriter based on Sholes & Glidden typewriter with double keyboard.

A practical commercial machine was produced in the United States in 1867 by Christopher Latham Sholes and was manufactured by the Remington Company and placed on the market in 1874. All typewriters also able to type small letters were given a double keyboard with in total eight rows of keys: three for lower case, three for upper case and two for figures and symbols.

LIQUORE STREGA

UFFICIO EMISSIONE BUSTE-LETTERA POSTALI

A FAVORE DELLA FEDERAZIONE DEI COMITATI DI ASSISTENZA AI MILITARI CIECHI, STORPI E MUTILATI

ROMA

Copy recto

On. Signore,

Per speciale concessione governativa, ratificata con Regio Decreto N. 1678 del 29 Ottobre 1920, sono state messe in circolazione le Buste Lettera Postali simili a quella su cui scriviamo: esse hanno avuto la più entusiastica accoglienza da parte del pubblico.

Le Buste-Lettera, affrancate con francobollo speciale, vengono vendute ad un prezzo inferiore di cinque centesimi al valore nominale del francobollo appostovi; sicchè, con l'uso di esse, il pubblico viene a risparmiare su ogni lettera cent. cinque di francobollo oltre ad aver gratis la busta e la carta.

In questi tempi in cui tutto rincara è un bel miracolo operare un ribasso di tal genere: cedere cioè un francobollo di quaranta centesimi per trentacinque e regalare inoltre la busta ed il foglietto.

Ci si chiederà come avviene ciò e la risposta è facile indovinarla: gli annunzi di pubblicità operano il miracolo!

La concessione governativa è a favore della Federazione Nazionale dei Comitati di assistenza ai gloriosi mutilati di guerra e l'iniziativa, che riveste un nobile contenuto, è destinata al più largo successo per l'enorme diffusione delle Buste-Lettera.

Alla S. V. non sfuggirà quale e quanta efficacia abbiano le insersioni pubblicate sulle Buste-Lettera che vengono emesse in serie ed in modo che un

Scopo precipuo della Busta-Lettera è quello di diffondere la pubblicità assolutamente seria, che, fatta con questo nuovo e geniale mezzo, riesce superiore ad ogni altra che si possa immaginare. Basta pensare infatti che le Buste-Lettera arrivano dovunque; che ogni copia passa sotto gli occhi di parecchie persone; che penetra in ogni classe sociale; che viene conservata; per convincersi della sua efficacia come medium pubblicitario. Le inserzioni poi sono disposte in modo tale che si debbono assolutamente vedere.

Convinti di fare cosa utile a codesta spett/ Azienda, chiediamo alla S. V. di voler studiare la nuova forma di pubblicità che abbiamo l'onore di proporre.

Per aver schiarimenti, copie di ordinativi, tariffe, che non impegnano in alcun modo, preghiamo di inviarci la cartolina di ritorno, che va staccata ed affrancata come stampe, e costituisce un altra utilità delle Buste-Lettera Postali.

Indirizzare: UFFICIO EMISSIONE B. L. P. MINISTERO PENSIONI, Via Veneto 50 - ROMA - e curar di scrivere nello spazio riservato al mittente il proprio indirizzo.

In tale attesa, ci è grata l'occasione per inviare distinti saluti e ringraziamenti.

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BUSTA-LETTERA-POSTALE

MITTENTE

Specimen of BLP - Busta Lettera Postale (Italy): series national 1-10; lettercard with advertisement in favor of Italian WO I-victims: ill. typewriter 'Yost' model no 20. Sheet with typed text proving 'specimen' status and explaining: "BLP ratified by Royal Decree 1678 of 29oct1920. BLP will be prepaid with special stamp sold at a value of 5c less then nominal value, … BLP will be printed minimum 100.000 and maximum 1.000.000 copies. …the purpose of this BLP is to spread the advertising absolutely serious, which made this new and ingenious idea successful more than any other can imagine. Just think about the fact that this BLP arrives anywhere, that every copy goes under the eyes of many people that penetrates every social class that is stored, to be convinced of its effectiveness as advertising… contact address is the Office Publishing B.L.P – Ministry of Retirement in Rome. --- end of resume of text.

As a persuasive salesman, G.W. Newton **Yost**, helped to convince the Remington Co. to produce the Sholes & Glidden typewriter. Later he formed his own company and the first typewriter bearing the ***Yost*** name came out in 1887.

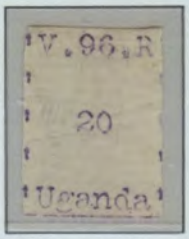


'Porte Timbre' (Uruguay); sold in a post office at lower price. ill. advertisement of typewriter ***Remington*** *(bottom right).*



Shift black print (Italy); ill. Olivetti typewriter

End 1880s models introduced the shift key (instead of double keyboards) causing the carriage to shift position in order to type either a lowercase or capital letter. The shift key we use on our keyboards today does not cause the machine to shift mechanically, the name stuck.

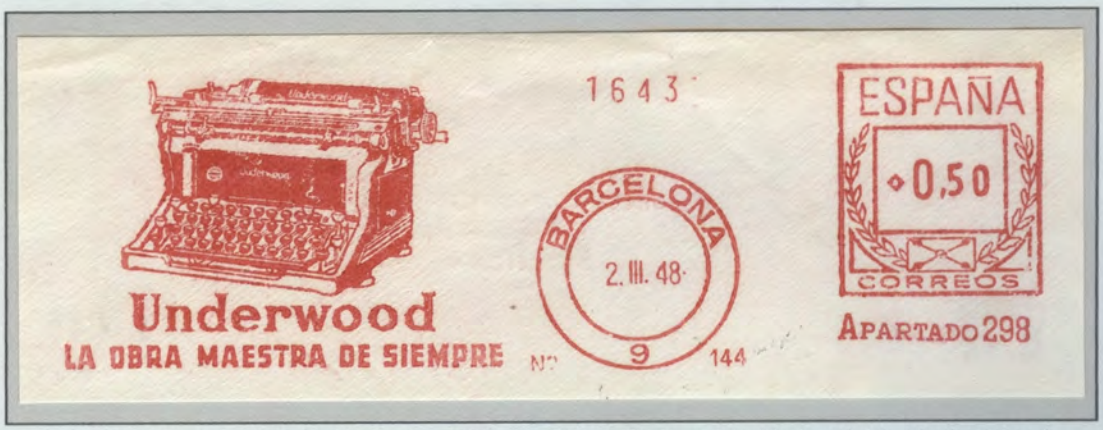


First stamps of Uganda, issued in 1896, were type-written. Violet **V.R.** *version with frame-line dashes showing on three sides.* ***(exp)***



Tonga typewritten provisional black surcharge ***Half-Penny*** *on 1½d red reading upward surcharge on 2d blue King George I.* ***(exp)***





Hasler "F22" (Spain) 1948; ill. Underwood Rhythm Touch first model able to print in black and red

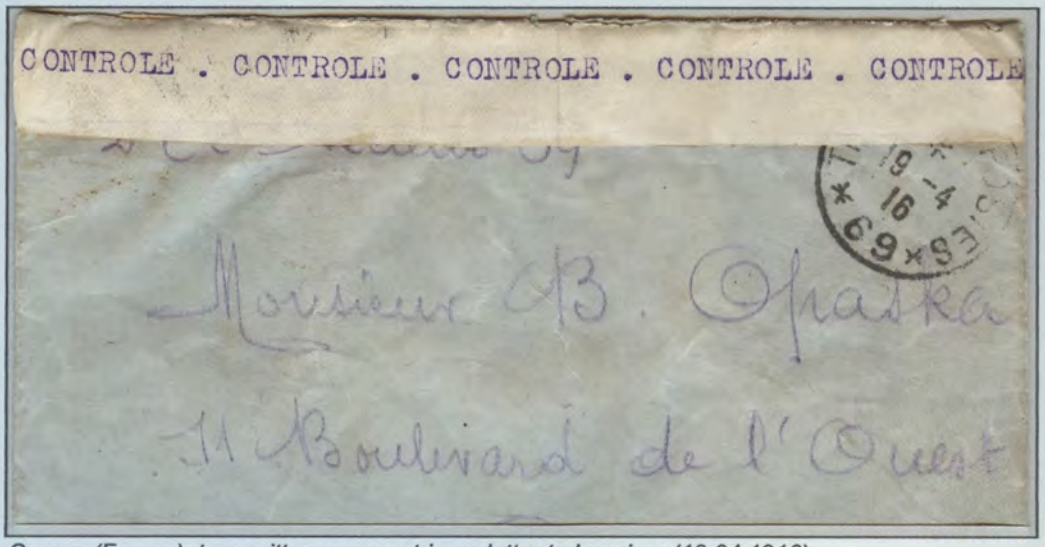


Stationery sold at reduced rate (Russia); sent to Brussels in Sept. 1899; ill. 'Yost' model 2 typewriter.

The typewriter began to inspire the public and started appearing in offices as new source of employment, typing; people stopped complaining about the weird arrangement of keys and started memorizing the keyboard and learning how to type efficiently with the QWERTY/AZERTY variant, which is still in use today.



WW I (1916) provisional stamps British occupation (Long Island – Turkey). Typewritten on tin horizontally laid paper produced on a typewriter in the field.

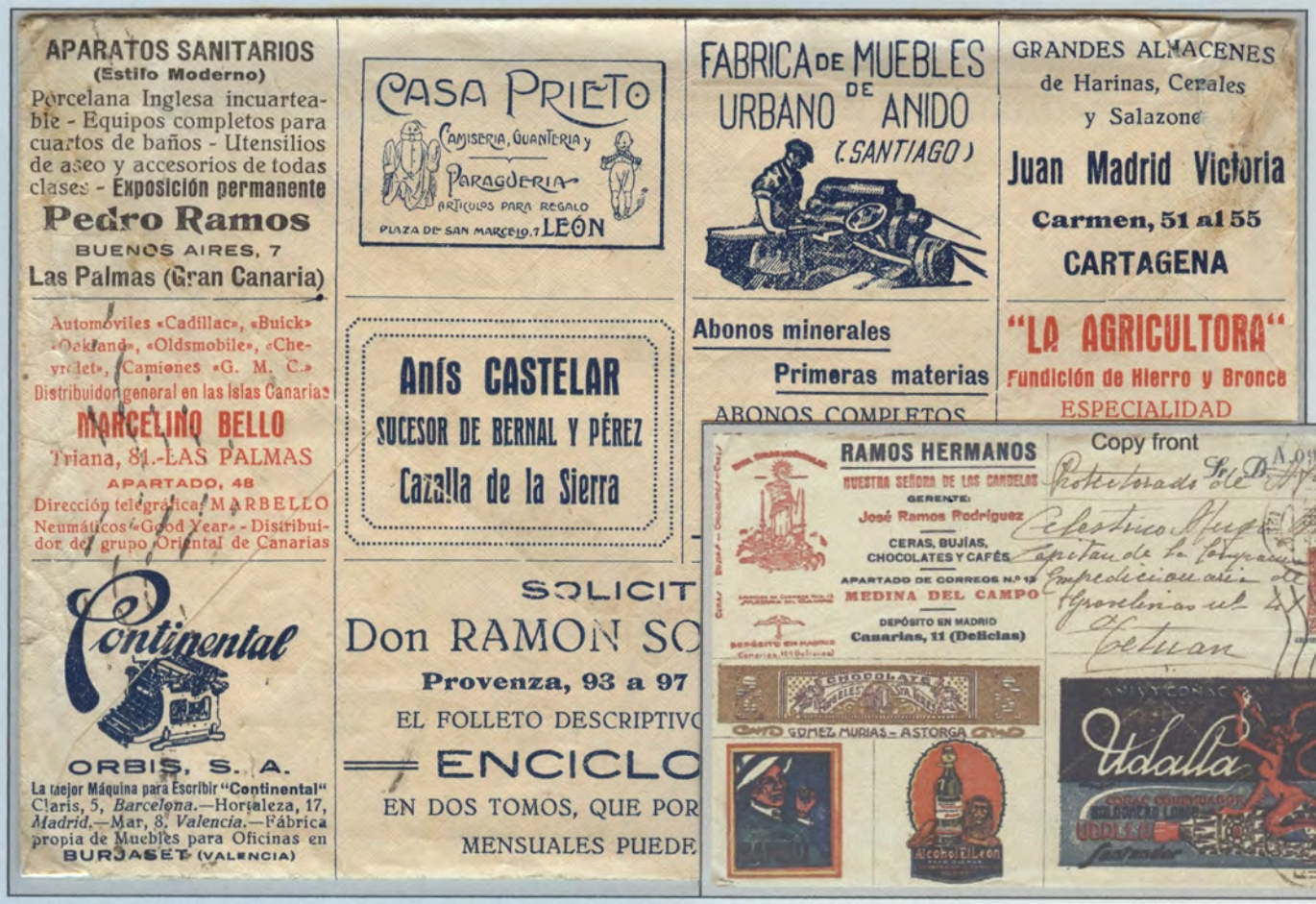


Censor (France); typewritten censor strip on letter to Louviers (19.04.1916)

A few key technological developments, such as making it portable and avoid jamming keys, created the transition of the typewriter into a useful tool in the field.





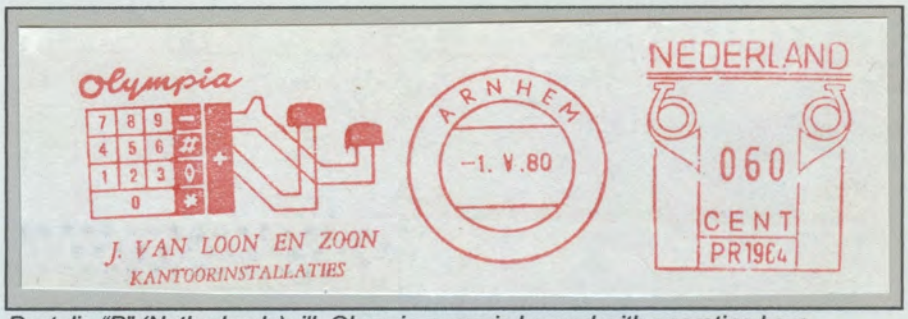


Stationery printed to order (Spain); ill. Continental typewriter modified to be used in Europe.

For Europe some minor modifications were added to allow special letter writing. Continental was once a proud brand on European continent that gained almost full market share in period 1900s till 1950s.



WW I (1916) provisional stamps British occupation (Long Island – Turkey). Typewritten stamps on tin horizontally laid paper; typed with purple ribbon.



Postalia "P" (Netherlands); ill. Olympia numeric keypad with operating keys

A numeric keypad, part of a standard computer keyboard, is based on the electric calculator 10-key pad. The numbers (0-9) are ordered bottom up and surrounded by operating keys.





A number tools were used to increase productivity and/or quality, such as: carbon paper, colored typewriter ribbon, removable typing element for fonts (family of characters), and others.







Early 1980s were a time of transition from typewriters to word processors. There was a time offices had a mixture of systems and the keyboard based on the typewriter made it possible to learn those new systems, one after the other, in just a few years, while typewriting technology changed very little in its first 80 or 90 years.



Fancy Cancellation (USA-15.04.1933) from Briggsdale, Ohio to Lewisburg; ill. Man is sitting at desk in front of typewriter typing.



50 years later the electric driven typewriter became common. One century later the computer having powerful word processors programs using nice fonts and laser printers giving better and nicer results.

Pitney Bowes model "CVS" (USA); text: electric typing







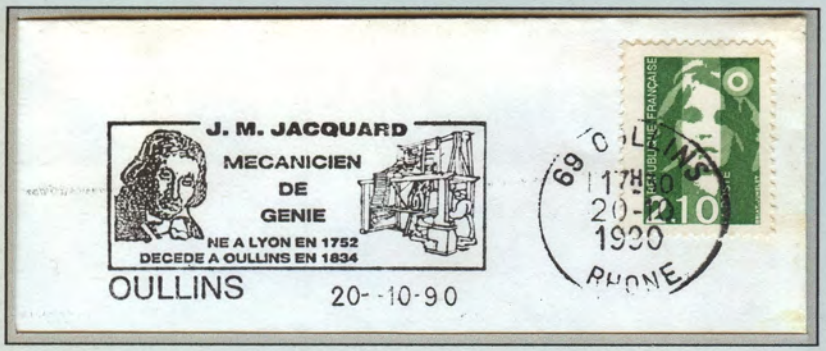




Without a keyboard a typewriter, calculator or computer is worthless. When you want to multiply two figures, you have to type in at least those two figures. This can be done via a keyboard.



Microsoft "Natural" keyboard: the ergonomics (=design and comfort) becomes more and more important.



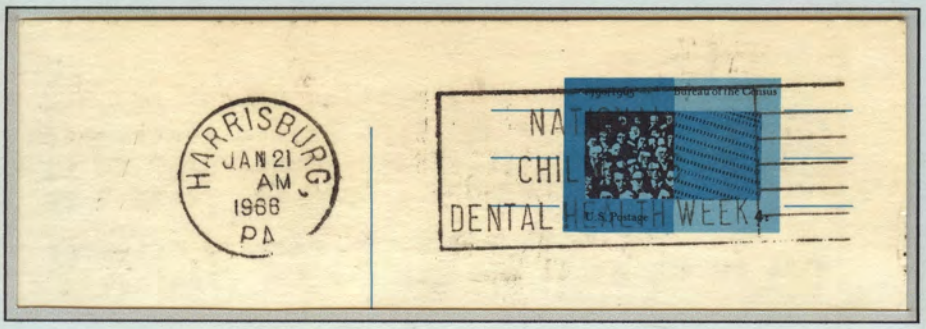


The well-known punch card is an invention of a French silk weaver called Joseph-Marie Jacquard. In 1806 he realized his first industrial automation of a weaving production process. He ran a loom by using plates with holes, punch cards.

Crashed Letter Ballon Monté ***"Le Jacquard"*** *(Paris 24Nov1870 – London 19Dec1870) named after the famous silk weaver. The balloon was crashed near the Scilly Isles to the South of England and the pilot died. Few bags were recovered after the sinking. Stamp was lost (see Ⓡ rebuts) due seawater.* ▶



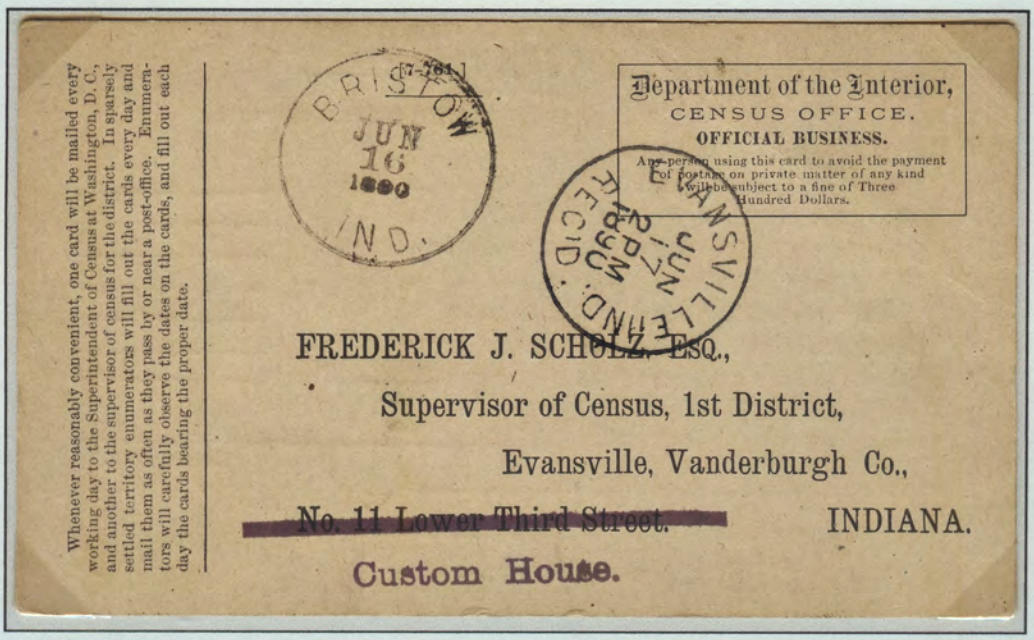




◄ *Stationery (US); celebrate bureau of census 1790-1965 (only stamp shown)*



Stationery (Romania) : Herman Hollerith (only stamp shown)



◄ *Service card Census office (US -1890); sent free of postage*

In 1884 Herman Hollerith, special agent of the US Census Bureau, developed his first tabulating counting system based on Jacquard's system. He developed a punch card to be used for the 12th census in the US. Because the one before took 7 years to complete and with additional 12 million people it would take more than 10 years to complete. 43 punch card readers treating 55 million people's data was completed in 6 weeks.





◄ *Francotyp "B" with tall value figures (German Empire) 1927; text Hollerith punch card systems*

Hollerith Tabulating Company became IBM in 1926. IBM's German subsidiary DEHOMAG (Deutsche Hollerith Maschinen AG) came recently into the news for its involvement in the Holocaust; the punch card systems delivered, helped the Nazi regime processing people's information quicker.

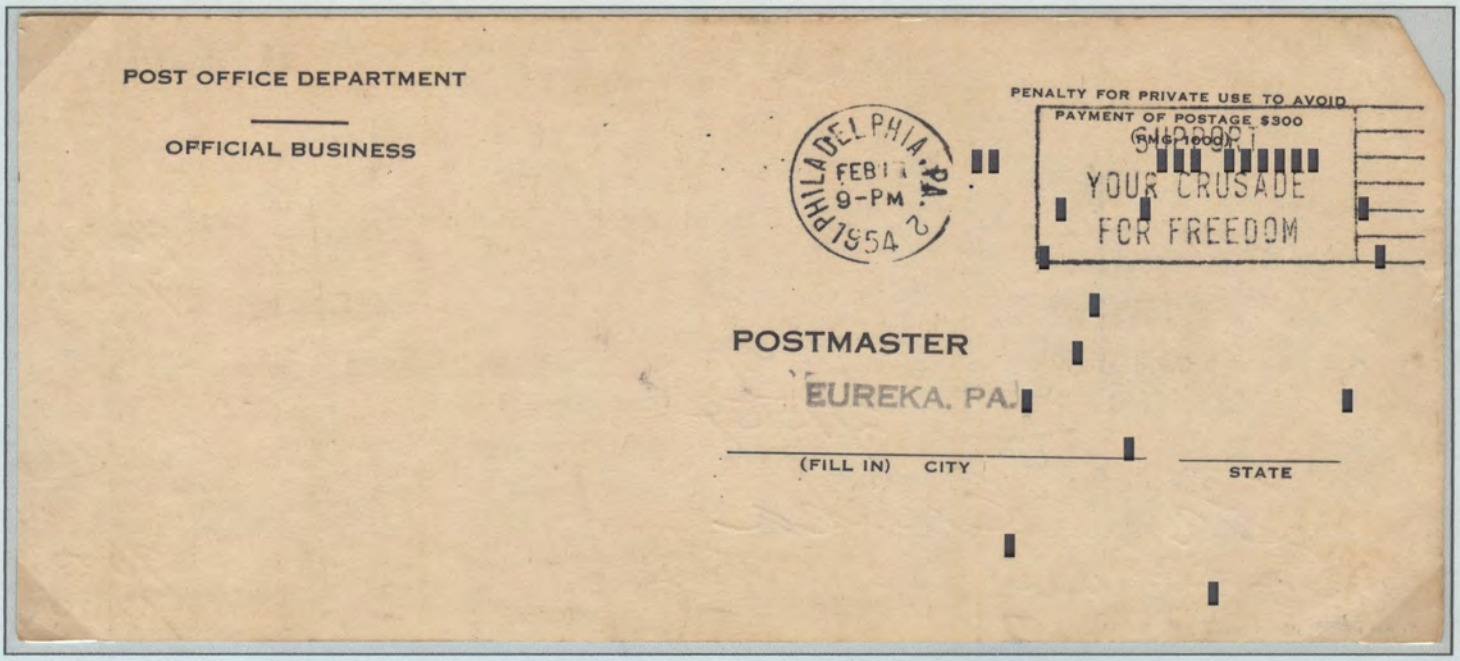


Postalia model (Germany - 1949): 2 Penny mandatory support for suffering Berlin after 2nd World War - ill. Punch card Hollerith Maschinen



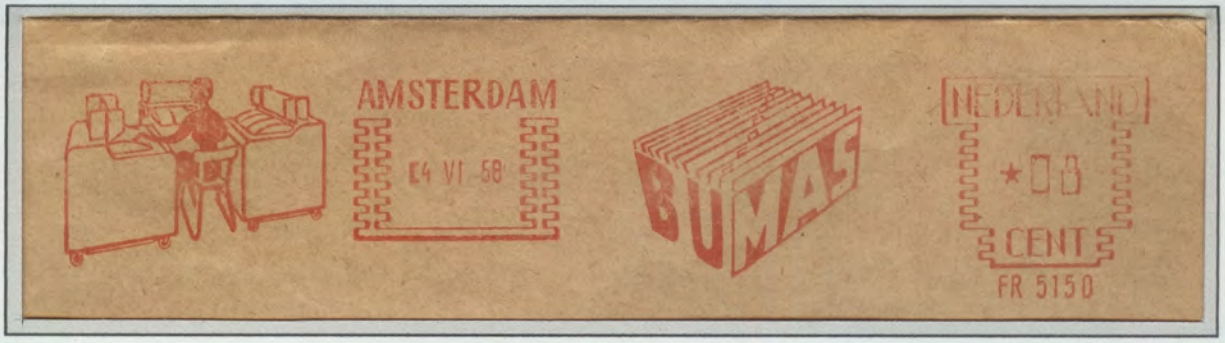
The most common (IBM 80-column) punch card measures 187mm by 83mm and typically had one upper corner diagonal cut so that cards are oriented correctly. It contains 80 columns and 12 lines, corresponding with 1 line of 80 characters of data and the punch positions represents characters using the Hollerith-code.





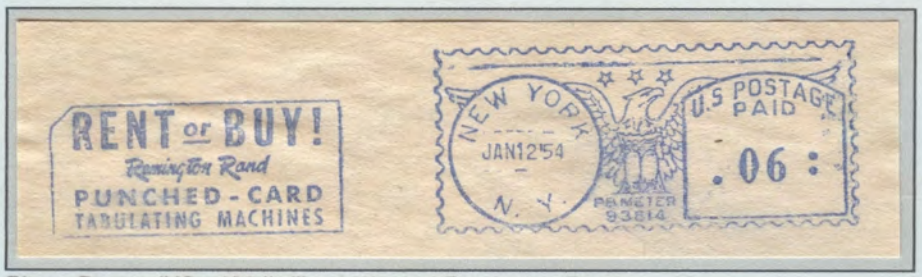
Post office service card - 'penalty for private use' mail (US): sent free of postage. Card format an IBM 80-column

2.3 The soon forgotten punch card.



Francotyp "CC" (Netherlands); ill. punch card reader machines ►

Up to the 1980s data and even programs were read in with this medium thru punch card readers.



Pitney Bowes (US - 1954); ill. punch card Remington Rand

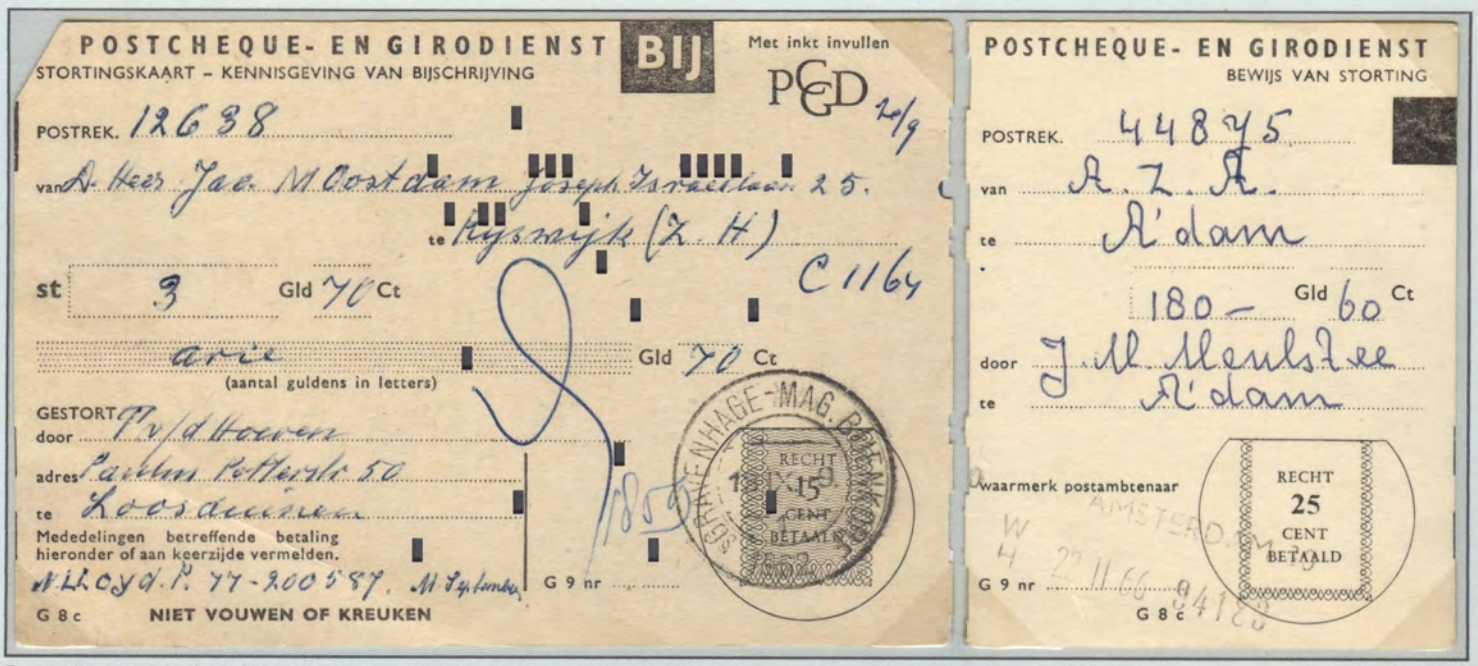


Punch card reader (left)

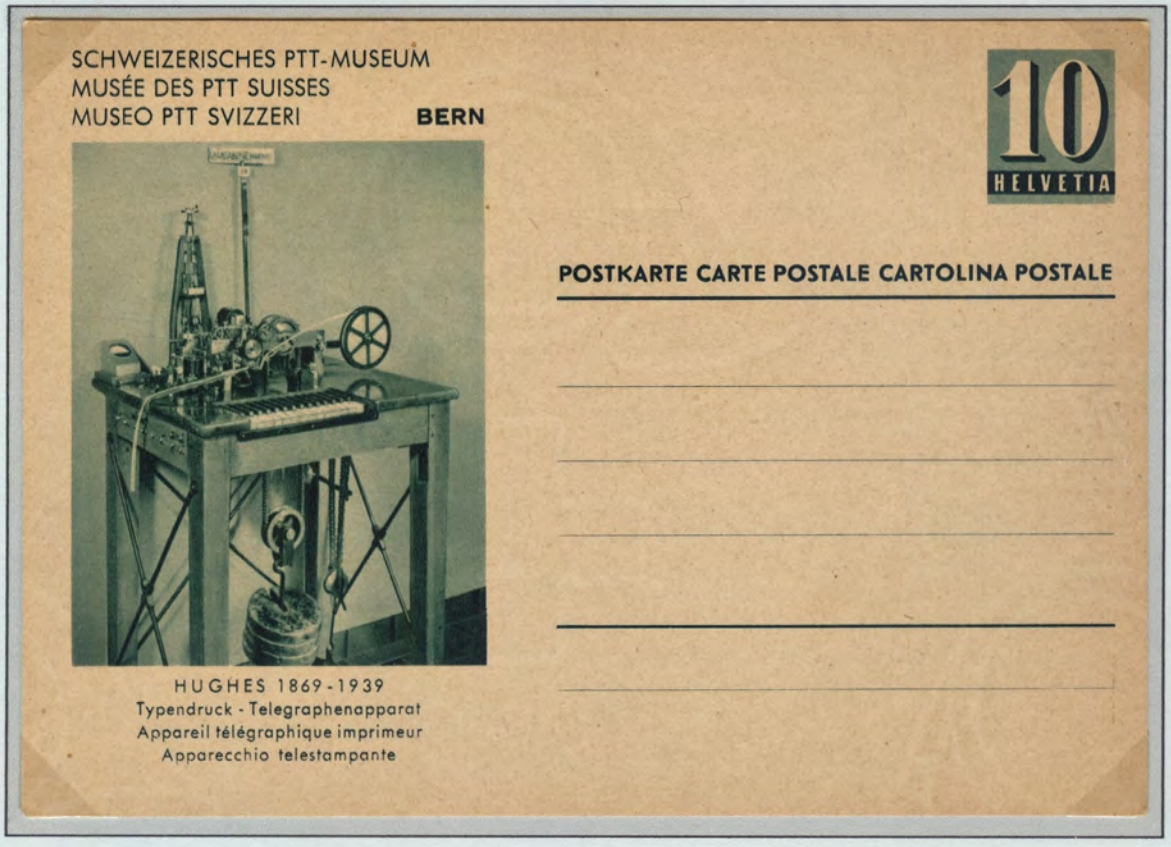


High-speed sorters and readers could process up to 650 punched cards a minute.





Deposit card G8c has IBM 80-column format and uses the Hollorith-system. Used from 02 October 1961, for depositing money. Notification description was coded (see punch holes) for automatic processing of the data. Right part, proof of deposit, was send to the payer. There are 7 different versions of this payment card, including denominations for three tax increases. The printed values were appearing alternating on the left or right part. This payment method was no longer used starting on 30 July 1966.





E. Hughes



The paper punch tape is better known from the telex world. The telegraph and newsagents have used for many years a machine, called *telewriter*, an invention of **E. Hughes** (1831-1900) in 1855.







Punch tapes have always been used as input and output devices. In the late 1950s when speed became more important and the capacity wasn't sufficient anymore, a switch was made to magnetic tape. It was still in use by the telex users till beginning 2000s especially in the US.



Color proof with notes of color numbers used (France); ill. IBM 1621 punch tape machine

2.4 The paper punch tape and the magnetic tape.





Magnetic tape was in the beginning only available on a spool. It was for a long time the most used storage medium, especially for backing up and storing programs.

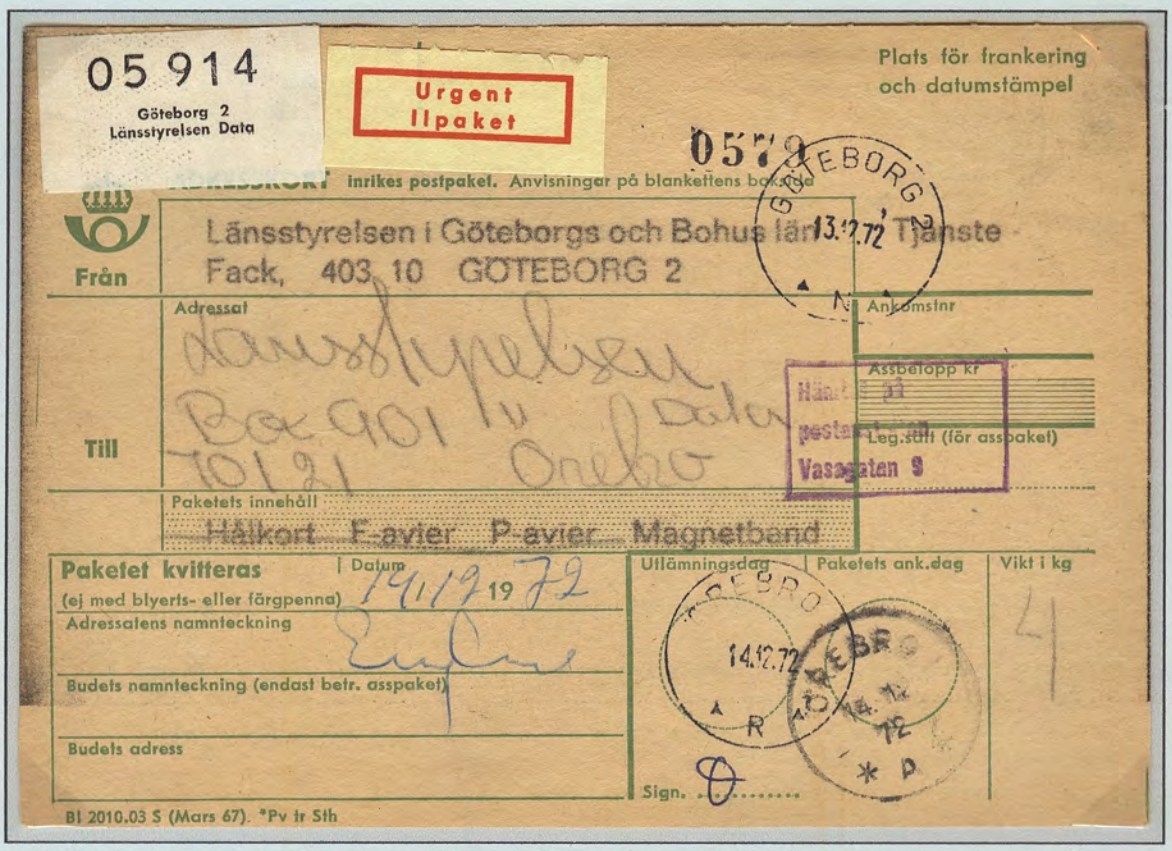






It allowed companies and organizations to store data in a very inexpensive way.

Tapes were portable and could be sent around the world without data loss, but today magnetic tapes are available in cartridges, in which they are better protected against damages.



Official parcel service card for a 4kg package, marked urgent, containing holerith cards and magnetic tapes. Sent 14dec1972 from Göteborg to Örebro

2.4 The paper punch tape and the magnetic tape.





A tape unit unrolls a tape from one spoon to another spoon, while it can read or write the data or instructions on that tape.





Magnetic tape contains very small magnetic particles put on a carrier (tape). Those particles can be magnetized (storing data).



The speed of transfer can be a few hundred thousand bytes a second, which is considered as very "slow" today.





Stationery cassette post (Egypt); facility for private individuals to send spoken messages on cassette tapes to their relatives and friends.

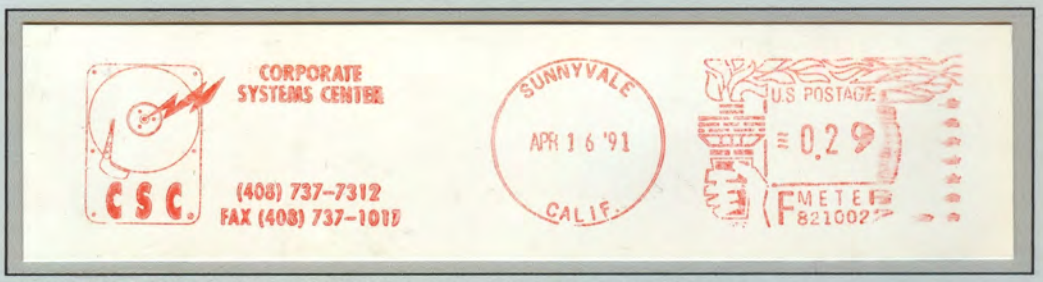
The first personal computers used the classic music recording cassette as a cheap storage medium to store data and programs. It evolved to tape-streamers for daily and/or weekly computer backup.

2.5 From disk to floppy, from floppy to CD.

A memory device, such as a floppy disk or a hard disk is covered with a magnetic coating on which digital information is stored in the form of microscopically small-magnetized needles. Data is read and written by a disk drive that rotates the discs and positions the read/write 'heads' over the desired track(s). The latter radial movement is known as 'seeking'.



Removable disks



Friden 9258 (USA): ill. internal sight disk drive, heads on moveable arm.

Today billions of bits of data can be stored on those disks. The **removable disks** are replaced by fixed redundant inexpensive or independent hard drives (RAID). This provides high availability and secured data access protected by system microcode.





Removable disks



Pitney Bowes "6300 series" (Germany): ill. Removable disk

A **floppy drive** for **diskettes** was standard in every personal computer with a hard disk till 2005. A floppy disk can store data. A floppy drive can be recognized by a covered slot at the front of a PC, where de diskette can be brought in or later removed.

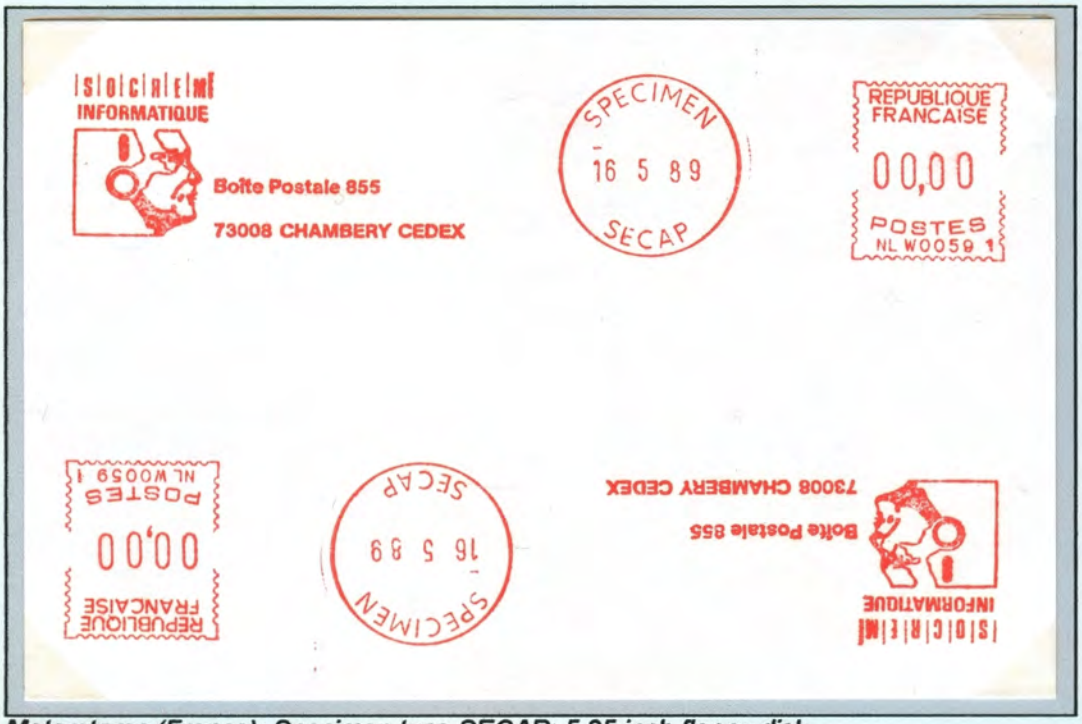
By 1996, there were an estimated 5 billion floppy disks in use. Toward the end of the 1990s, distribution of larger packages therefore gradually switched to **CD-ROM** (or online distribution for smaller programs).



5,25 inch diskette; flexible cover (protective jacket) and a capacity of 360KB to 1.2MB



Bottom right; 3,5 inch diskette; hard cover (better protection)



Meterstamp (France): Specimen type SECAP; 5,25 inch floppy disk



The floppy disk or flexible magnetic disk revolutionized computer disk storage for small systems and became ubiquitous in the 1980s and 1990s in their use with home computers to distribute software, transfer data, and create backups.



USB flash drive, symbol USB in tab (right)



Today they have now been superseded by USB flash drives, external hard disk drives, CDs, DVDs, memory cards and computer networks or internet.



3,5 inch diskette; hard cover (better protection) and a maximum capacity of 1,44MB.



Floppy disks, Cassettes, CD-ROMs or DVDs made a big evolution. By the early 1990s, the increasing size of software meant that many programs and data were distributed on sets of floppies. Toward the end of the 1990s, software distribution gradually switched to CD-ROM or can be easily downloaded from Internet access.



Aerogramme (Great-Britain): The Boggart by Susan cooper

Internet, networks and USB flash drives all connected to each other, made the floppy no longer necessary for data transfer. Finally the floppy disk was essentially superseded. Mass backups are now written to CDs or high capacity DVDs.

2.5 From disk to floppy, from floppy to CD.

May 16, 1960, the laser was born. Arthur Schawlow and Charles Townes outlined the working principles of the laser beam technique, which was derived from the microwave technique. Finally Theodore Maiman observed the first laser action in solid ruby. The laser's continual expansion of the boundaries of science, medicine, industry, and entertainment has resulted in fiber-optic communication, CDs, CD-ROM's, and DVD's.









A CD-ROM disk can store 250.000 A4-pages



Today CD-ROM (**R**ead **O**nly **M**emory), CD-R (**R**ecordable), CD-RW (**ReW**rite) and DVD (**D**igital **V**ideo **D**isk) are often used for music, video, software and encyclopedias. Such a compact disk can easily contain an encyclopedia as Larousse with all its articles and images, up to 650 megabytes (6500 x 2^{20} bytes; being 650 x 1048576 bytes or about 250.000 A4 pages text) of data.





The printing world has its roots long before the computer age. People have always searched for quicker and more efficient way of reproducing text and image. De (r)evolution started in 1436 with Johannes Gutenberg's work on the printing press, that rapidly spread across Europe thanks to the high quality and relatively low price.



Commercial impact and regulations forced companies fulfill more and more paperwork, first written on preprinted paper, and then later fully typed on typewriters, using all kind of tools to reproduce more and quicker.





Francotyp "Cc" (Belgium): missing town + date mark: ill. Carbon paper

Often carbon paper was used, twisted between two sheets of paper copying the text easily. Or the stencil technique (spirit duplicator) was often used when high volumes were needed and when typewriters were involved.





Strike post from Great-Britain (8 Feb. 1971); it was approved in that period to special private postal services to produce and sell stamps. Above envelope franked with stamp produced by the stencil technique.



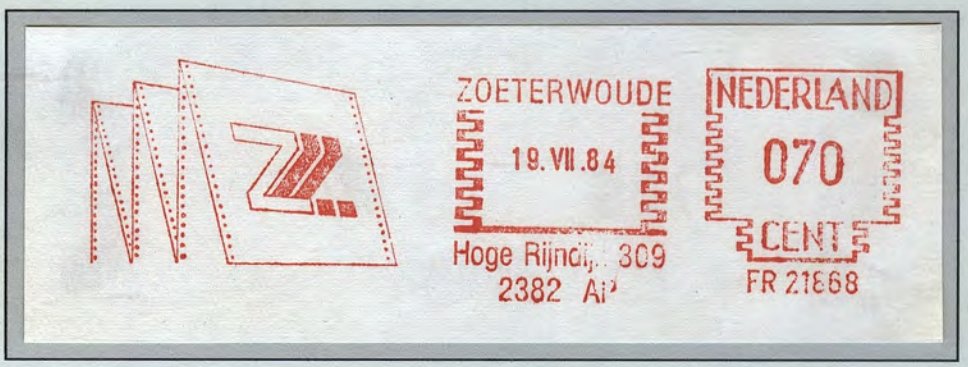
teleprinter



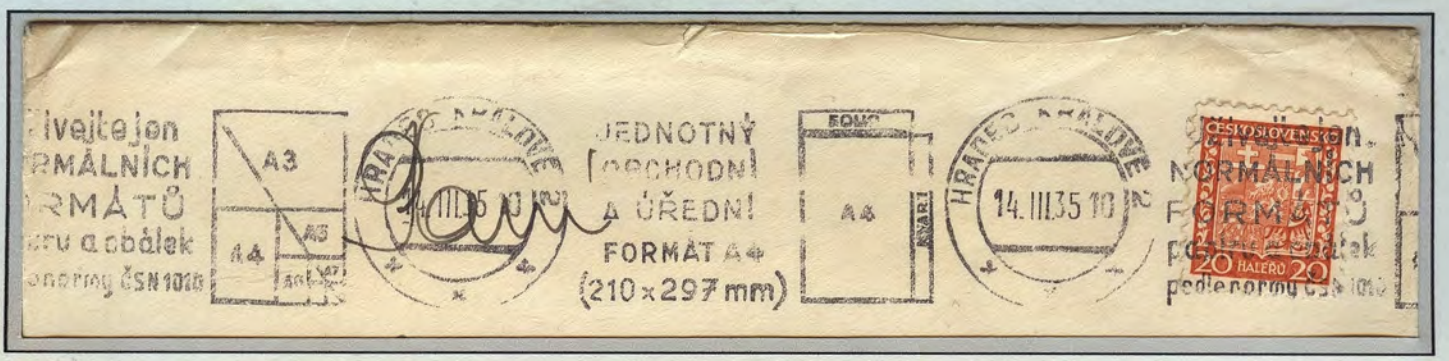
A printer is an output device that started as a "teleprinter" used in the telex world. Text or drawings coming from a computer are printed on paper.



Wide fanfold paper



In the early years wide fanfold paper was most commonly used with impact printers like line and dot matrix printers. The continuous paper with edge perforations is moved through the printer with sprocket wheels or toothed belts.



Today all European laser and inkjet printers are using standard paper sizes like A4 and A3. A4 (210 mm x 297mm) is part of an official metric standard. It was set in 1975 and is based on a German standard originally from 1922. The key feature of this paper size is that A4 is half the size of A3, A5 is half the size of A4.



Since introduction of e-readers and tablets more and more people are working paperless or greatly reduced it.



Line printer quality



Fragment block (Belgium): 3D-print out in plastic



3D-printers are the next printer generation. They work like inkjet printers by extruding small beads of material (like plastic, metal) which harden immediately into forms created with a computer aided design (CAD) packages.



▲ *ill. dot-matrix printers* ►



▲ *pre-printed registered label (Israel): text printed with a 9-needle dot-matrix printer using purple ribbon.*



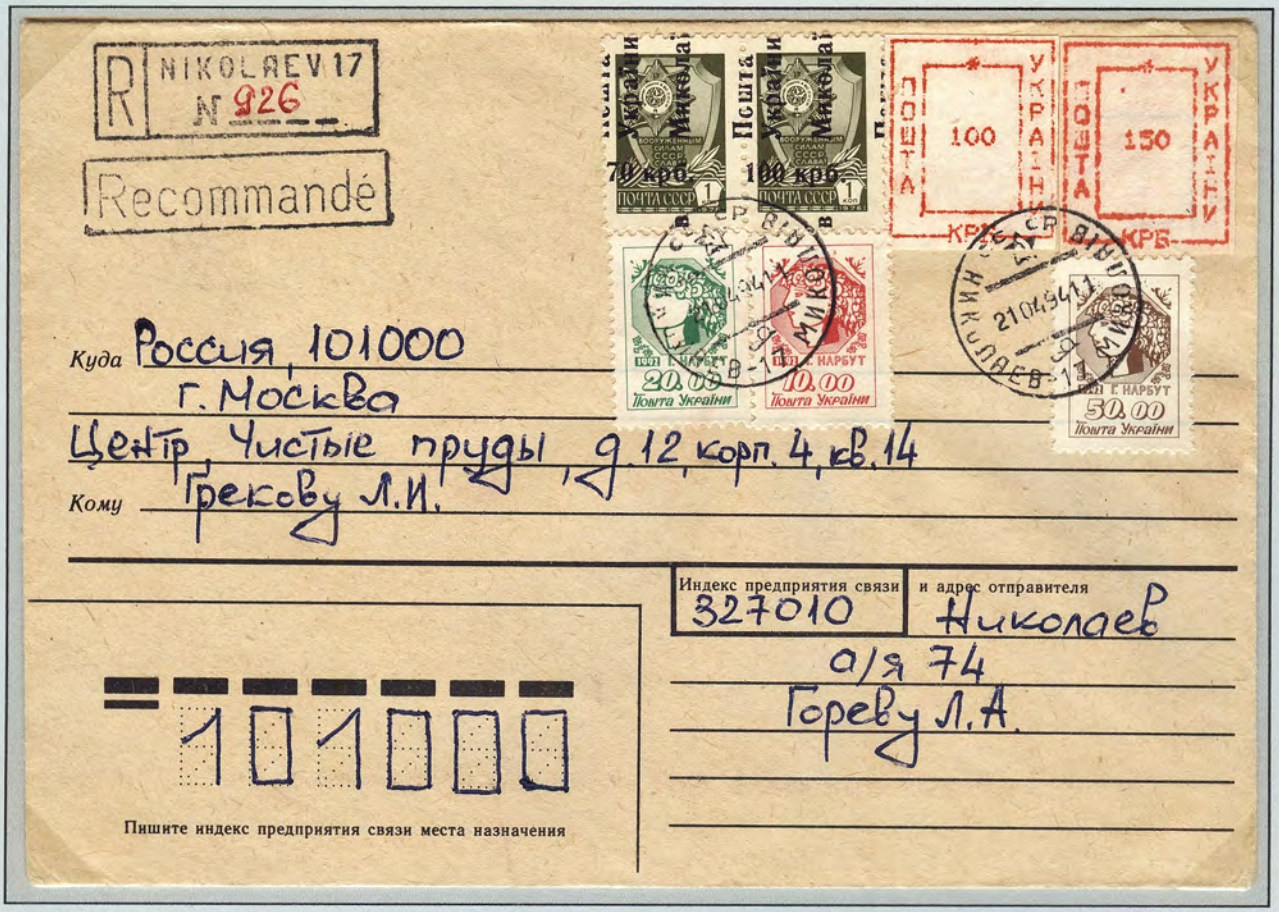


Dot-matrix printers have a vertical column of up to 48 small closely packed needles or pins each of which can be individually forced forward to press an ink ribbon against the paper.

The print head is repeatedly scanned across the page and different combinations of needles activated at each point. Dot-matrix printers are noisy compared to non-impact printers like laser or inkjet printers.



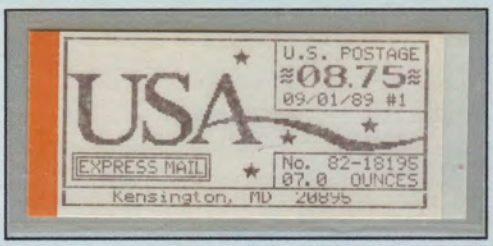
white dot-matrix printer label on letter from Oudtshoorn near Cape Town (South-Africa)



The Nikolaev (principal town of Ukraine) so called computer stamps are printed with a common 9-needle dot-matrix printer. Due to a shortage of stamps in the period of 1992-1994, because of the independence of Ukraine, a lot of those regional (local) stamps were produced. They exist in black and red printed postage and with different values.

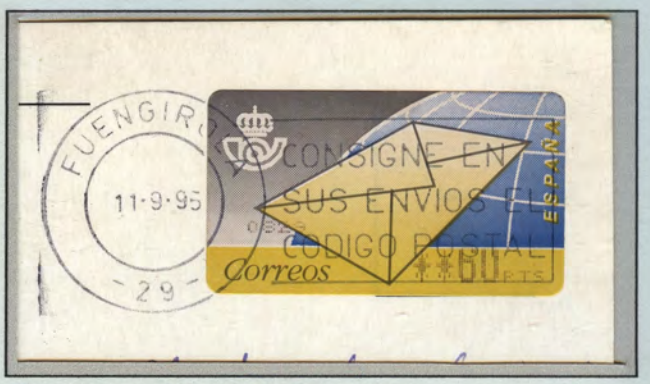


Print out on 1st Class stamps (Great-Britain) of printer test of a self-service payment NCR VK80 thermal printer widely installed in post offices.



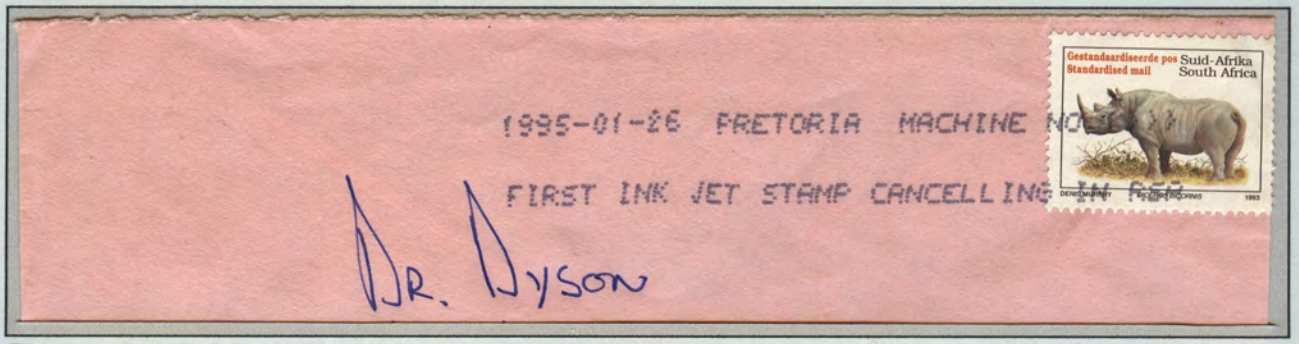
Thermal transfer print used at the 'Autopost' experiment, a self-service postage vending machine. The stamp is printed at selling time. Tests have taken place in the congressional post office in Washington, D.C. and Kensington. After a lot of problems the experiment was cancelled.

A thermal transfer printer uses thermal wax ribbon or paper. During the printing, paper or ribbon is heated on those spots where printing is wanted. These printouts can be used in environments of higher temperatures.



Thermal transfer print (Spain) example

Thermal printers are cheaper and use continuous paper and ribbons which cost more.



The cancellation of the stamps on the above letter was realized by the cancellation machine JAIME 1000SA having a build-in inkjet printer, that can automatically print current timestamps, and 25 different slogans (max length of 140mm). Printing speed is about 4 meter/sec of cancellations.

Inkjet printers are non-impact, electronically driven printers that use hundreds of tiny print head nozzles that each eject, by thermal pressure, a single drop of ink on a surface to form text or images. Technical research in ink drying and sharpness has given them high availability and reliability.



The numbers (every fifth stamp) on those coil stamps (Germany) were printed by an inkjet printer. Before those numbers were printed by traditional printers.





Plotter (detail)

A plotter is a device that uses one or more ink pens that can be raised, lowered and moved over the printing media to draw graphics or text. Combinations of horizontal and vertical movement are used to draw arbitrary lines and curves in a single action, in contrast to printers, which usually scan horizontally across the page.



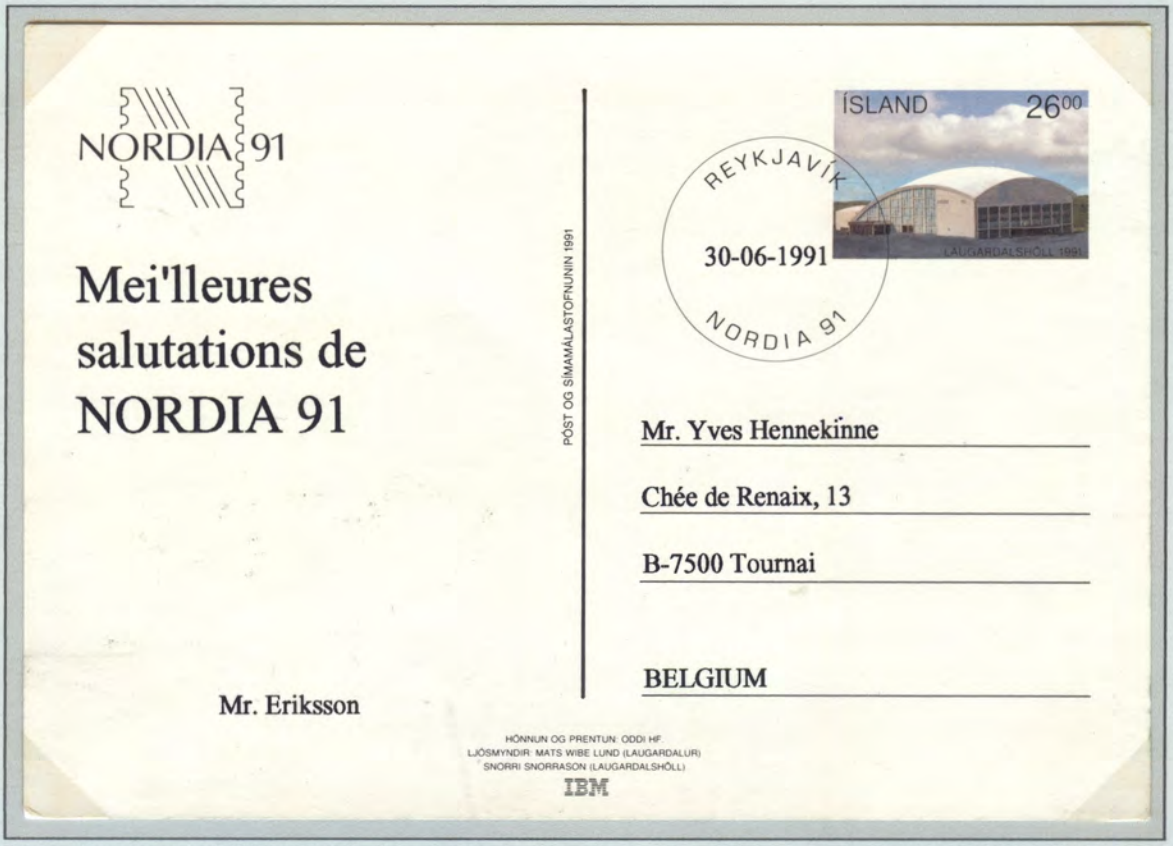




In 1970 the Dutch Post administration designed stamps with very complex drawings and were fully drawn by a plotter driven by data stored on paper punch tape. This technique is to eliminate duplication, as the complexness discourages forgers.

A laser printer uses laser beams to produce an image or text on a rotating selenium imaging drum. The developer drum transfers toner from the toner bin to the charged areas of the imaging drum, which then transfers it onto the paper into which it is fused by heat. Toner is dry ink powder, generally a plastic heat-sensitive polymer.





During the stamp exhibition Nordia 91 a network of terminals and printers setup by IBM could be used to send the above stationary in an automated way. Date of mailing was printed by a central laser printer in the preprinted cancellation, together with an address and message chosen by the sender.



*Letter with 3 different colored stamps; 5c blue, 10c red and 40c yellow with Papal emblem in black, sent as **"PD"** (Postage paid to destination) from Rome (Papal States) on 10.01.1870 via Saint-Michel-de-Maurienne, France (see blue transfer cancel E.-PONT. St. MICHEL – 13JANV1870) arrived in Knowle, Great Britain on 14.01.1870.. Represent the 4 basic colors of every printed image.*



CMYK

Today's laser and inkjet printers print in colors. Most of the entire spectrum or gamut of colors can be reproduced with just the four process ink colors (CMYK); Cyan (blue), Magenta (red), Yellow and black (K stand for *'key'*; a traditional word for the black printing plate). Small dots of these colors are printed at different angles to create the printed image.



Digital Printing



Color copier/laser printer of Rank Xerox; Model 5760

In the 1960s till 2000, the Xerox Corporation held a dominant position in the copier/laser printer market. In 1969 Xerox engineers developed a laser beam to "draw" an image directly onto the drum before printing it.



◄*OCR font*
flam cancellation ►



A tool for electronic identification and digital encoding of printed or handwritten characters by means of an optical scanner and specialized software is OCR (Optical Character Recognition).



Magnetic Ink in combination with OCR



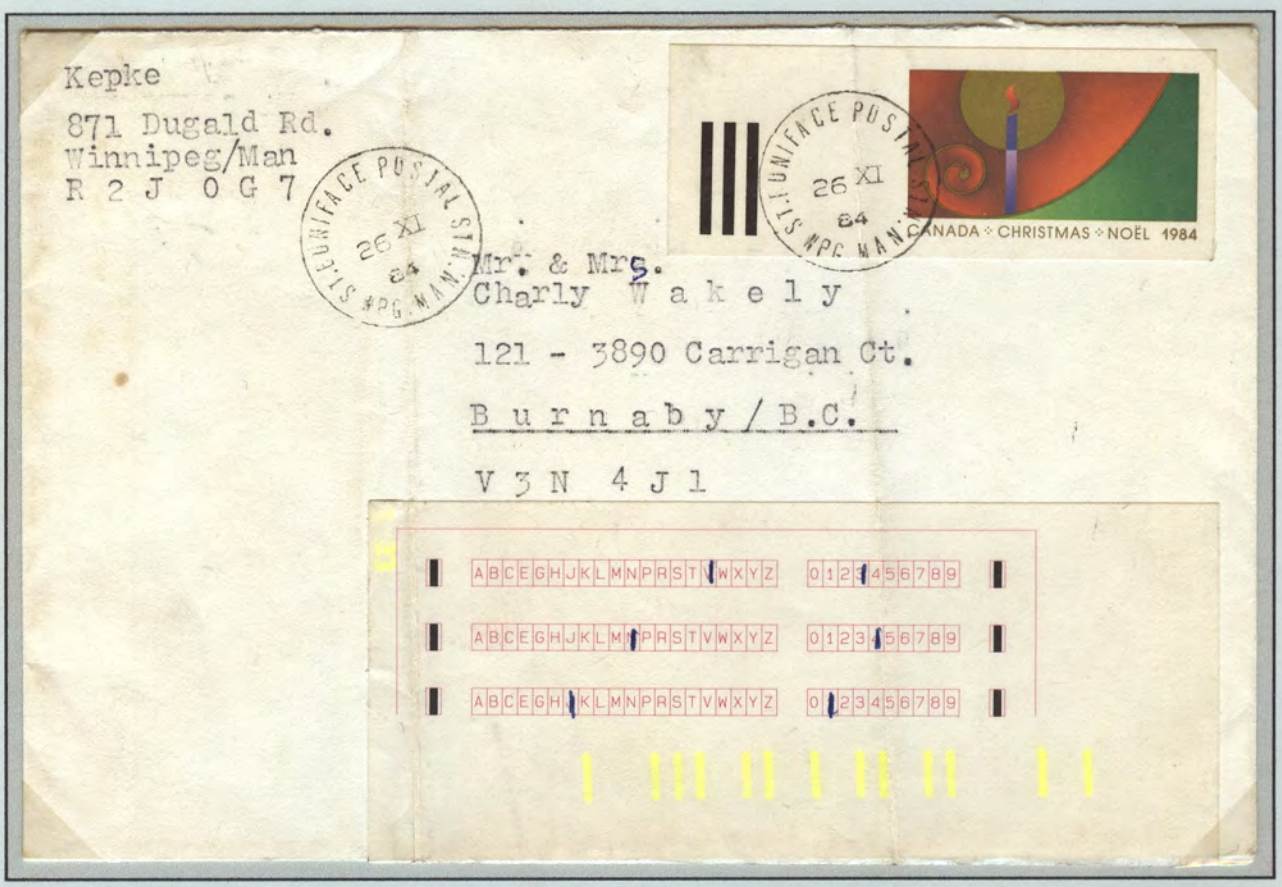
Shift colors

Special magnetic ink is used for printing banknote numbers in OCR character format (font). This way computers can check the banknotes for forgery and where and when used.

In the same way ticking boxes with a black pencil can help a computer optically to read or interpret data.



Optical ticking with a pencil



OCR sticker (Canada): allow senders to tick with a pen the postal code. This simplifies the OCR recognition and quicker sorting.

2.7 Coding with bars.

In 1952 Mr. N. Woodland and Mr. B. Silver received their patent for barcodes. But it wasn't until 1974 that a modern price scanner was first used it in the U.S. food industry. Today, most products sold are marked with a barcode called a Universal Product Code, or UPC. Europe uses a derived version of the UPC called EAN-13 (European Article Number); an extra check-flag was added to it. The EAN will replace the UPC by the year 2005.







Stationery (Switserland) with 3 types of bars; EAN-13 (left), 2-Dimensional CP-code (right) and sorting bar code (center)



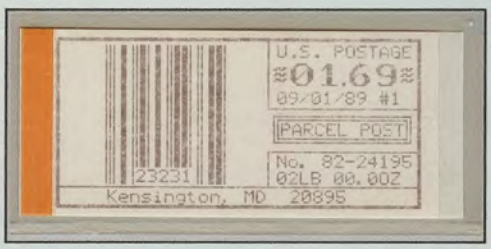
◄ *First stamp booklet with barcode (type UPC - A) issued by US Postal*

▼ *Barcode in border (type EAN-13)*



Each code typically contains a printed horizontal strip of vertical bars of varying widths, groups of which represent decimal digits. Bar codes have a leading "quiet" zone, a start and data character, a check digit, stop character and a trailing quiet zone. Check digits are used to verify that the number has been scanned correctly.

Type UPC-E used for the Autopost Experiment; a self-service stamp machine. The stamp was printed at the moment it was sold. It was tested in Washington DC and Kensington. After a lot of problems, like disappearing ink the experiment was stopped. ►



Meanwhile 2 dimensional barcode are introduced to have access to more data. QR-code is specially designed for the automotive industry in Japan.



QR-code (Quick Response)



Meterstamp (Dresden, Germany Privatpost - Post Modern - 2012); ill. QR-code scan with smartphone. Meters are printed in dark blue instead of red for better automatization.

But QR-code is also very popular outside the automotive industry and now used in consumer advertising to allow smartphone application to route to internet information.



International Reply Coupon (Norway), barcode type CODE-128 used in every country by the treaty of world post signed in Seoul in 1994. A POSTNET barcode that consists of 62 bars with beginning and ending frame bars and 5 bars each for the letters of country code (NO) and digits of beginning and ending of validity, serial number and 074=IRC.

Large amounts of text (860 ASCII characters) and data can be stored securely and inexpensively when using the Data Matrix barcode, which is a very area efficient 2D (two dimensional), barcode using an unique perimeter pattern that helps the barcode scanner determine the cell locations. The cells are made up of square modules. Data Matrix barcode can encode letters, numbers, text and actual bytes of data; it can store and pass just about anything.



Mid October 2001 the Italian Post administration introduced a new self-adhesive label delivered by Tecnost (group Olivetti) containing a bi-dimensional barcode type Data Matrix. The Belgian post administration didn't have that technology, a barcode type CODE-128 was placed to send the registered mail smoothly.



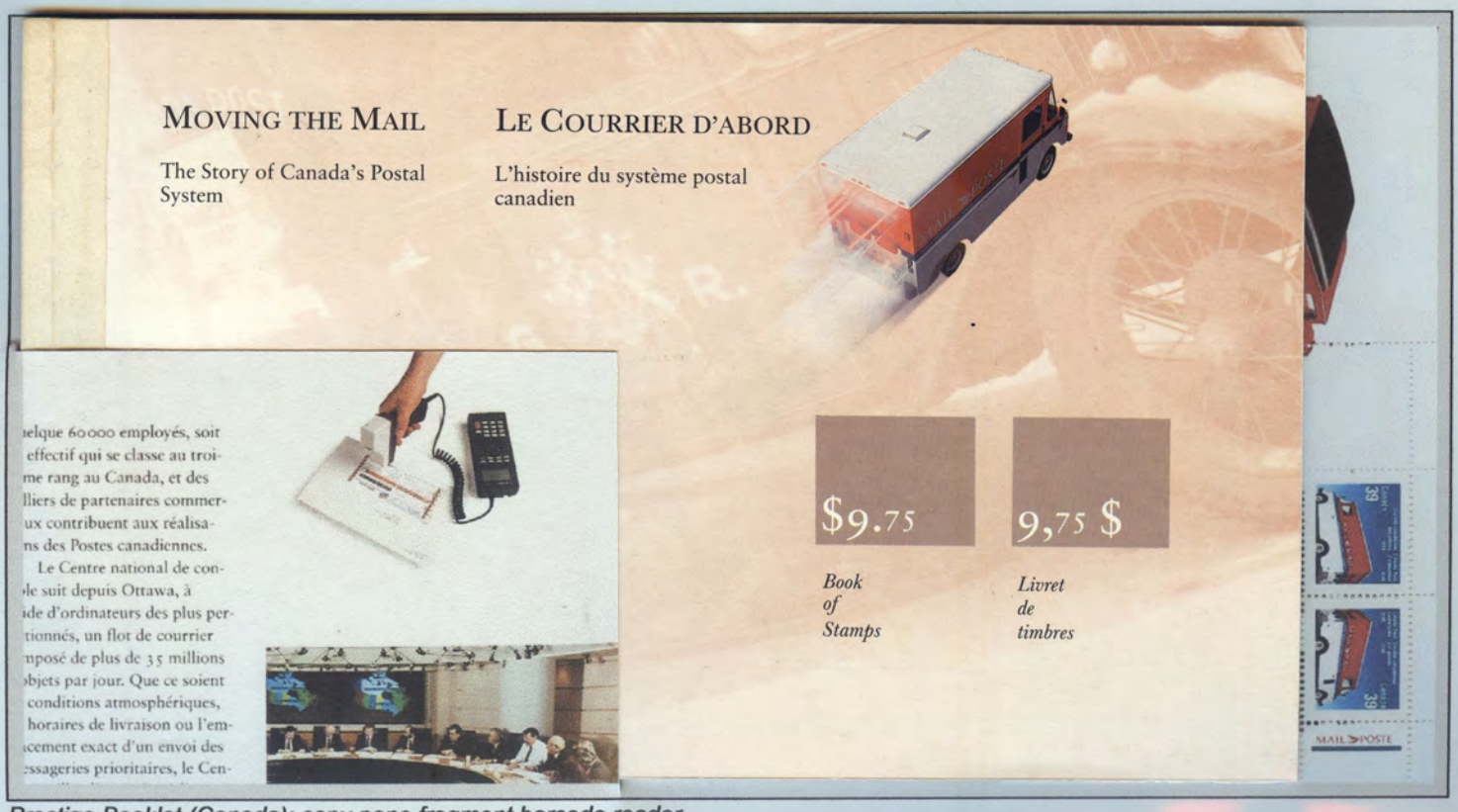


◄ *vignette scan barcode registered (France); ill. barcode reader with red laser.*

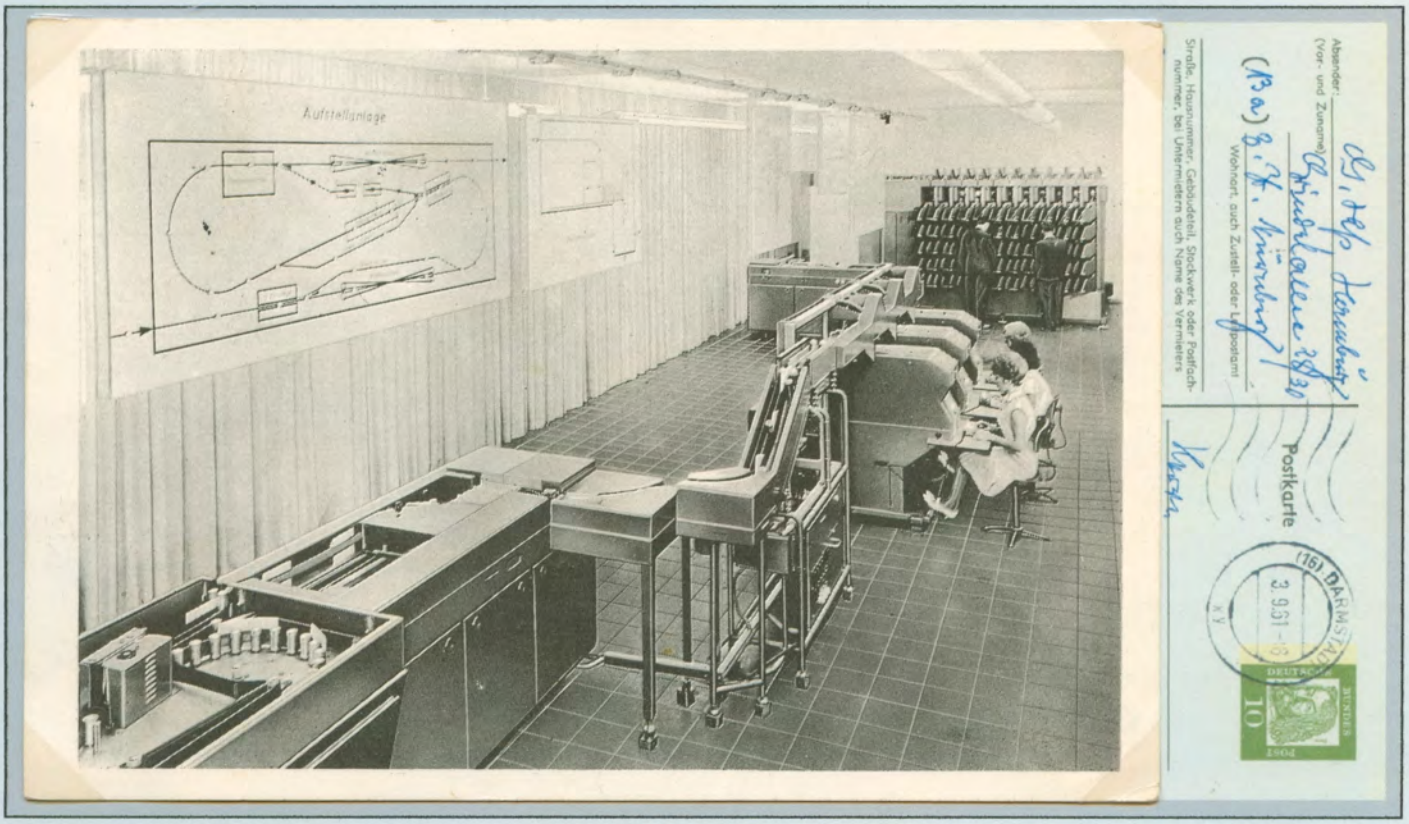


Barcode readers usually use visible red light to read the code and interprets it either through software or a hardware decoder. When read it is send to the application for processing.





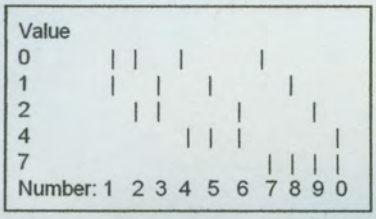
Prestige Booklet (Canada); copy pane fragment barcode reader.



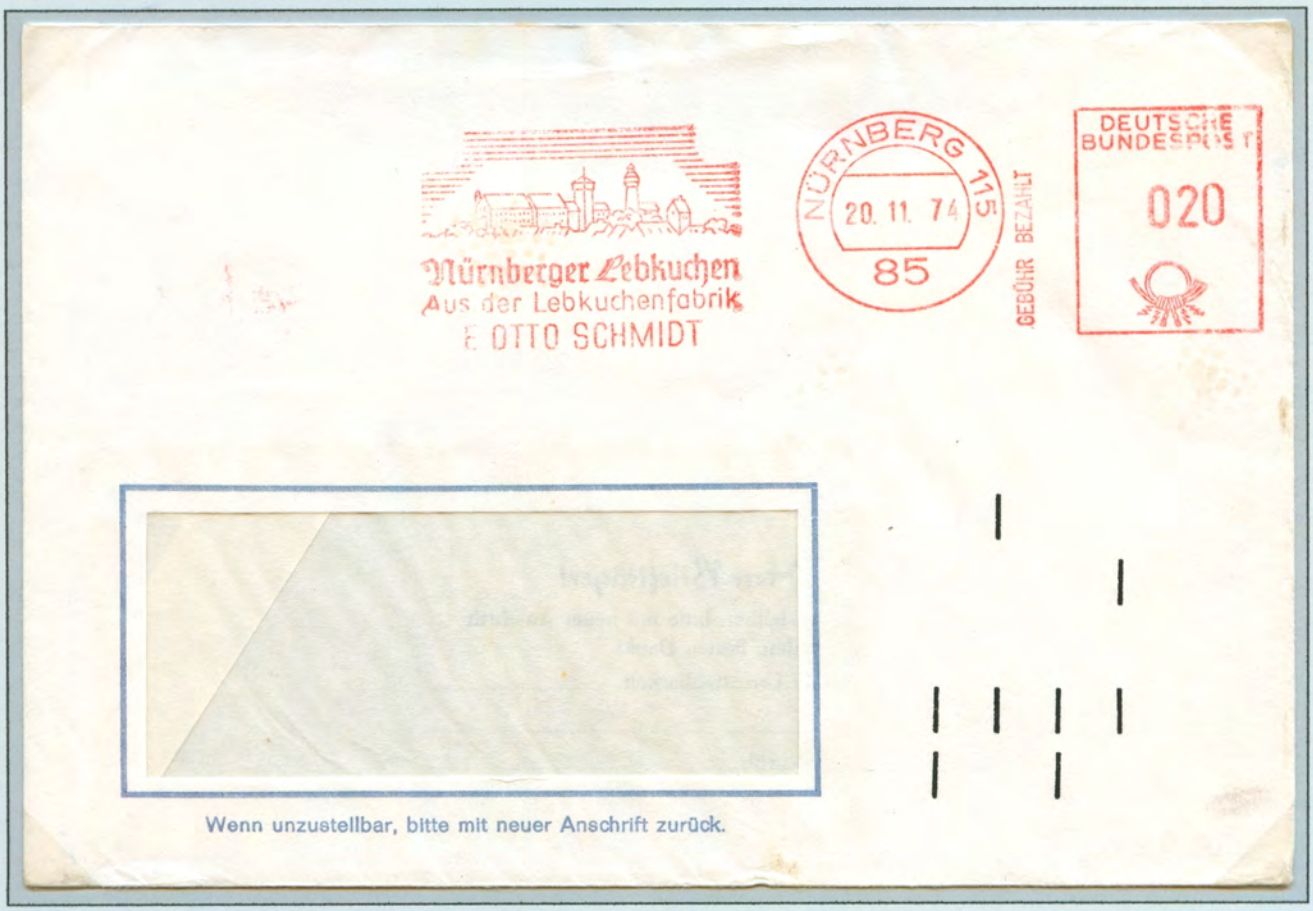
German postal letter sorting using the "Matrix Code II" came into general operation in 1965. The letters were provided for the preparation of the mechanical sorting with the coding set by the staff up to 5000 letters per hour.



Stationary issued for "Commissioning of the first automatic / letter-sorting of the German Post / Manufactured by the company Siemens & Halske", 31.05.1965 in Pforzheim illustrated with a stylized model of a spiral and a wrong Matrix Code II encoding avoiding mismatching with real coding.

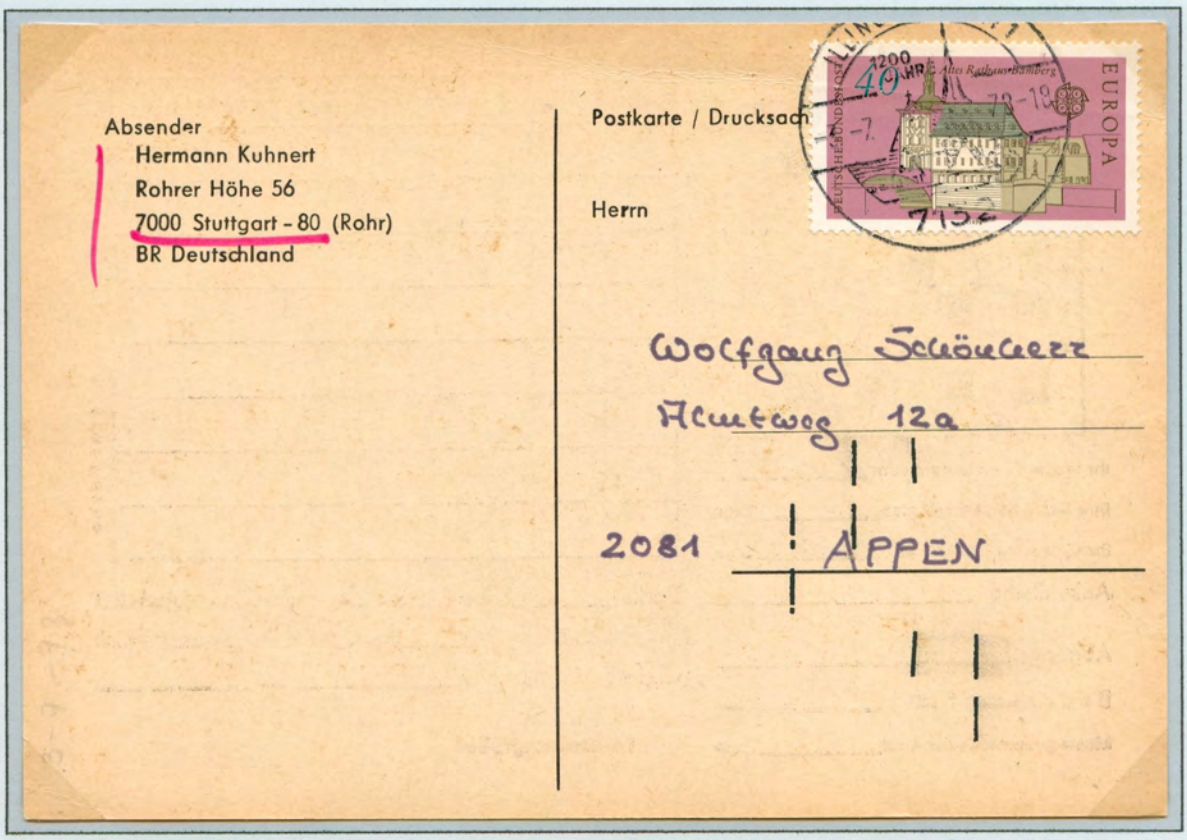


The code consists of lines in four columns (from left to right four digits of ZIP code) with 8 mm spacing of five lines (top to bottom), the values 0, 1, 2, 4 , 7 In each column , two lines must exist (more or less printing error) and it is the sum of the values. For example: 0 +1 = 1, 2 +4 = 6, 1 +7 = 8, etc. 4 +7 = 11 is regarded as zero.



Letter send from Nürnburg: code representing 0405 or 5040, which point to internal tray of the sorting machine.

The wet printed film was made of magnetizable or luminescent paint for automatic recognition, printing color (black, white) bars as a barcode on the address field of the letter. The barcode inkt was secured by a 160°C heat.



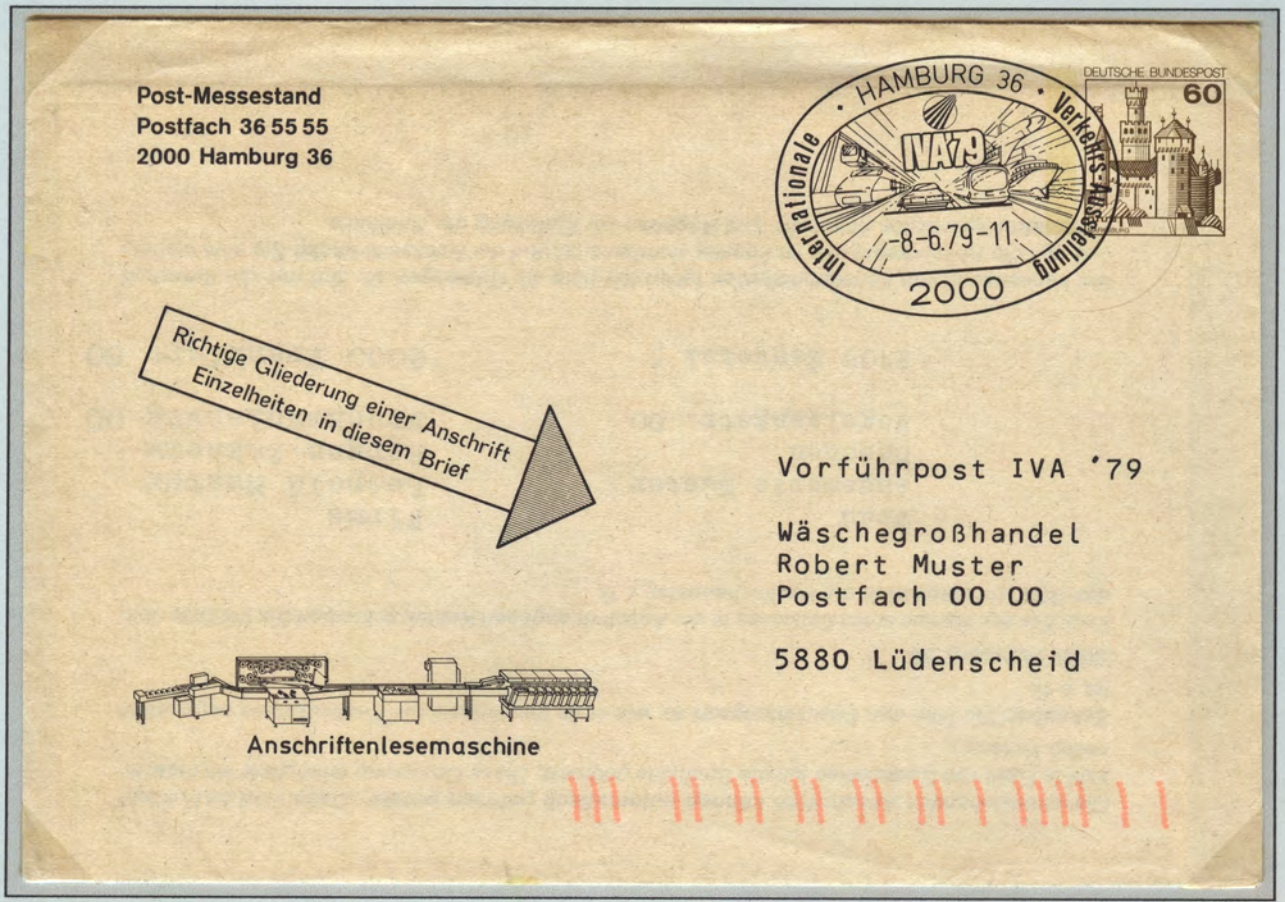
Letter send from Stuttgart: code representing 3140, which point to internal tray of the sorting machine.

Often the matrix code on the lettre represented internal trays of corresponding city parts or even streets.

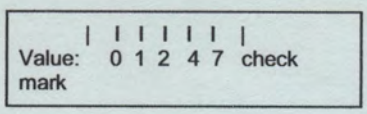


Letter from Stockholm to Älvängen (Sweden): bar code printed in white representing 5-digit 44600, small 0 next to code represents de code place.

Other countries like Sweden took over de same techniques. Also in Germany codes were printed in white sometimes.

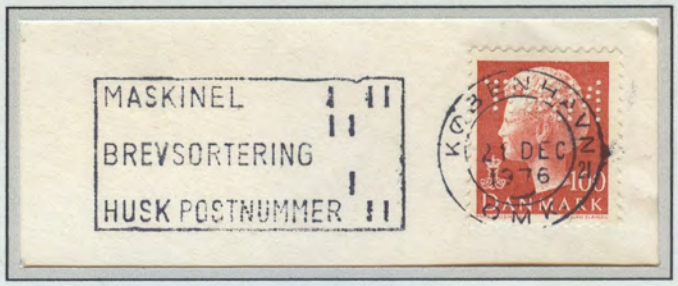


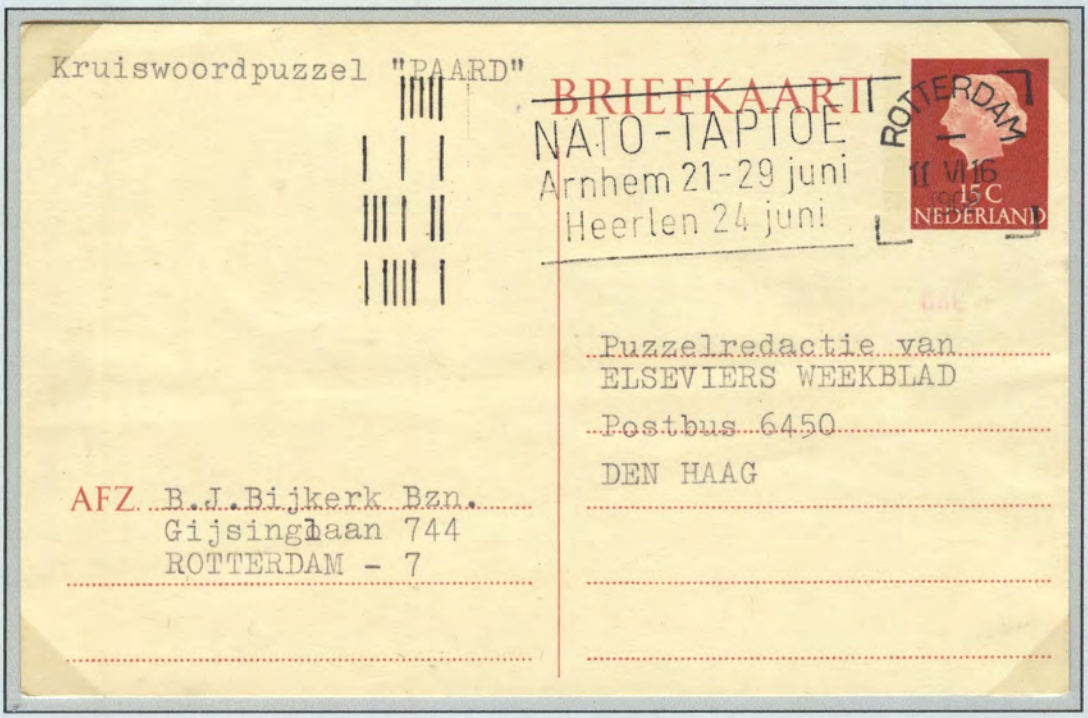
Printed to order (Germany) from Hamburg to Lüdenscheid: code representing 0885 9, left to right code reading. Value 9 points to internal tray or city area. Code gaps represent the value eg: IIIxx = 4+7 =0 ; IxIIx = 7+1 =8



From 1976 the "linear screening" was introduced, and first printed by mechanical printing units of ribbons, later with inkjet printers were applied. There are about a dozen linear code formats.

First-generation machines read the city/ZIP Code of typed addresses to sort letters. Mechanization increased productivity. By the mid-1970s, more efficient methods and equipment were needed if a postal service was to offset rising costs associated with growing mail volume. By end 1970s development of better OCR and expanded ZIP Code was introduced to reduce the number of manual mail piece handlings.





◄ *Barcode (Netherlands - 1968); from 1961 till 1981 a barcode next to the main cancellation was used for mail from Rotterdam to 64 main cities. There are 4 code blocks; lowest 2 code blocks contain the city, the uppermost 2 code blocks contain the code machine. The coding in the code blocks changed a few times in all those years. From 1977 the city code expanded so that the Netherlands could be completely served. In May 1981 the system was stopped and replaced by CMC-7 coding systems.*







2 stamps and a stationary with integrated barcodes (Switzerland); issued on 19 January 1993, to improve the mechanical sorting of letters. The barcodes are constructed with 16 to 34 colored bars over 2 cm on the right side of the stamp. The barcode reader BML4/BR, delivered by Schrack Aerospace of Vienna, recognizes the 60 Rappen (B-post) stamp on its 16 bars/2 cm and the 80 Rappen (A-post) on its 18 bars/2 cm.



Test letter used in the CFC (culler-facer-canceller) installed in Tours Centre de Tri in the period October 1982. Fuzzy cancellation caused by multiple use of the training post. Cancel of first generation with Toshiba logo. Number 850: 8 stand for country France, 50 represents type of envelope and paper used. Stamps pre-printed vertical for testing this type of sorting machines.

In 1973 the company Toshiba (**TO**kyo **SHIBA**uda limited - Japan) delivered sorting devices to the French post administration; 77 installation as a start. In 1991 all sorting centres were equipped and were able to sort 25.000 items per hour.



Test mail from the company TOSHIBA, passed in Rennes Centre de Tri for testing purposes. Number 813: 8 stand for country France, 13 represents type of envelope and paper used. For simulating real mail sorting, all kind of sizes, colours, and different paper quality was tested. Stamps are specially pre-cancelled with phosphorescent bar for use in this type of sorting machine. This enables that the letter is always presented in the same disposition. Stamps pre-printed vertical for testing this type of sorting machines.

2.7 Coding with bars.

The barcode (type CMC7) at the bottom of a letter is generated and printed automatically and is a translation of the postcode on the letter.









Small grey circular or diamond shaped spots on Machin (Great Britain); Mail-test markings that are applied to the faces of envelopes in tracking mail pieces during a mail test. Some of them happened to fall on the stamps affixed.





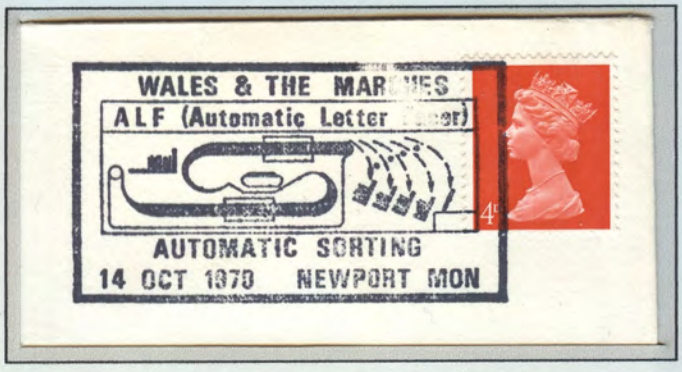
In most of the cases handwritten or printed zip codes can be read automatically by sophisticated OCR-software available in powerful sorting systems. An operator will handle zip codes that couldn't be validated. But sometimes it can go wrong…



*The zip code on the letter was misinterpreted by the OCR-system of the sorting machine and translated into a wrong bar code. Due to that the letter was sent to the wrong destination (St. Sauveur en Puisaye). The letter was sent to the correct city after marking it with the postmarks **FD** (Fausse Direction). It was canceled again by the receiving post office and the bar code was canceled*

2.7 Coding with bars.

Once a letter has a corresponding bar code, the letter is transported to the sorting machine, where it can be sorted very quickly by that bar code.

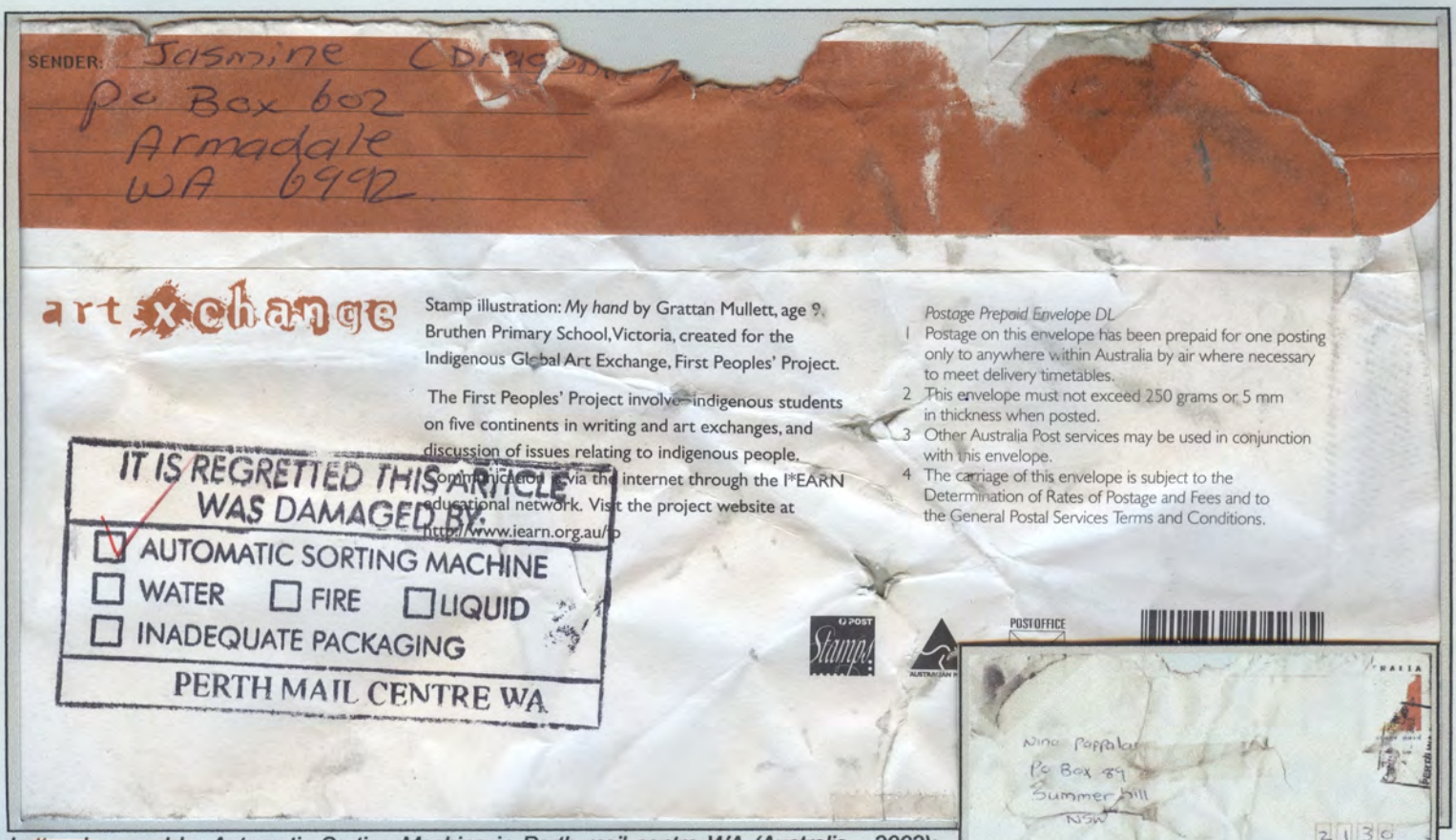




Nowadays 39.000 letters per hour at peak can be sorted and canceled. To drop a letter into the right bin it need OCR software and mechanical transporting process supervised with lots of electronics.



But a letter can get stuck, and jams and stops the whole chain.



Letter damaged by Automatic Sorting Machine in Perth mail centre WA (Australia - 2002); returned with apologies.

2.8 Point, touch or read your input.

use the mouse, pen or finger







◄ *Overprint (Rumania) 300L on 90L dark green PC mouse symbol.*



The best-known input device, after the traditional keyboard, is the "pointing device" - "mouse in computer slang - and creating input by clicking selections on the screen. The motion of the pointer on a display can be any symbol like an arrow or a hand.



Light pen



Hasler 'Smile' (Switserland): early Logimouse from Logitech

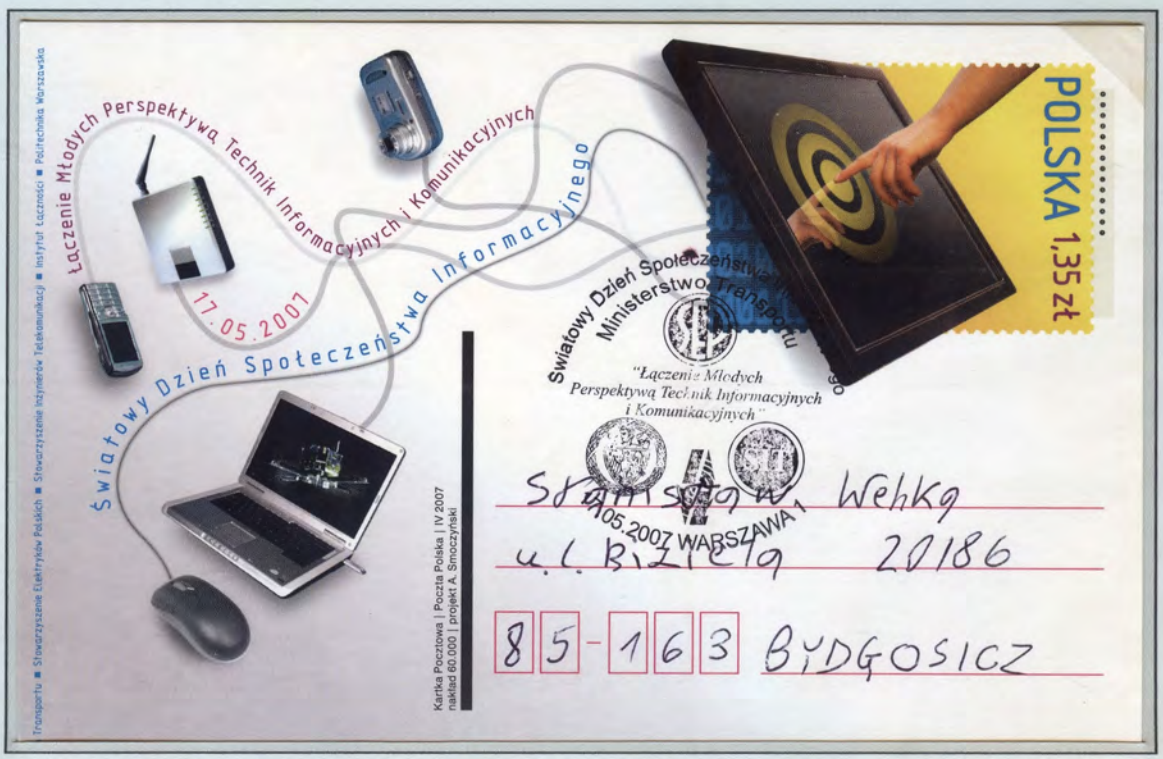


The first pointing devices had a hidden rolling ball on the bottom side of the mouse, later technology detects the two-dimensional motion by infra-red light.

A light pen is an input device in the form of a light-sensitive wand used in conjunction with a computer's CRT display. It allows the user to point to displayed objects or draw on the screen in a similar way to a touchscreen but with greater positional accuracy.

◄ *pointing stick*







A touchscreen contains an invisible internal circuit which reacts when touching with a finger or pointing stick. In this manner the position on the screen is known and the chosen item, task or application can be processed. Thanks to smartphones and tablets/pablets more touch screens entered the PC market.

2.9 The Input/Output on the terminal.

Today each computer is equipped with a screen, where request and answer are instantaneously seen. This is called data communication. Such equipment is called a '**terminal**'. In the very beginning everything was printed out on a printer or punch tape or punch card.
After the successful use of the terminal in the Apollo space project in the sixties, it became a common tool for real-time processing.

It all started by showing results via the cathode tube about measurements of the Saturn-V rocket. Specialists in that area were RCA (Radio Communications of America) and General Electric; they combined their telemetry knowledge with computers and developed it in practice at NASA for the Apollo-project.




RADIOGRAM

WORLD WIDE WIRELESS

CONTINENT TO CONTINENT — SHORE TO SHIP — SHIP TO SHIP

"Via RCA" RADIO CORPORATION OF AMERICA "Via RCA

RM 112 R.

ECEIVED AT NEW YORK, AT M. DATE JUN 3 1929 11 43 AM

LX36 XG ORU96

BRUSSELS 14 3 1648

Radiogram via RCA; The RCA110A computer was an important phase in telemetry and real-time data display.



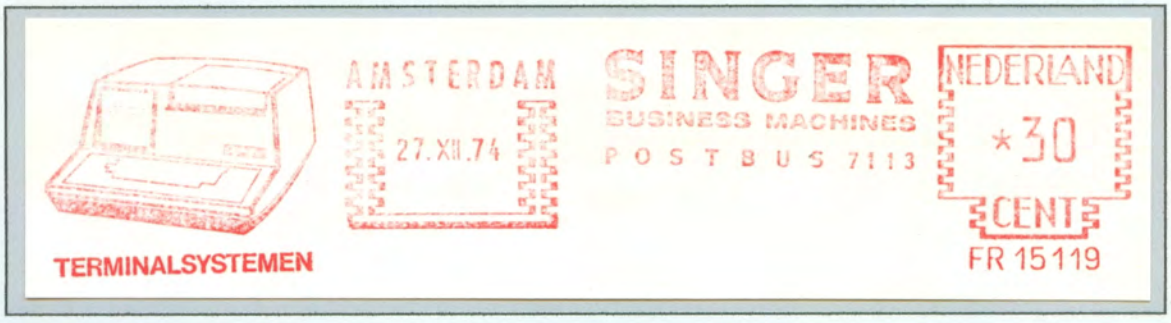
Censured letter with perfin stamps (RLGEC). The General Electric Company got in 1962 the task from NASA to automate the whole Apollo project and build two computers, GE225 and GE235, which were able to display measured data from the Saturn-V-rocket instantaneously on a screen in the control centers in Houston and Cape Canaveral.

2.9 The Input/Output on the terminal.

A terminal (dumb workstation) connected to a mainframe, does not have the same capabilities (only data communication) as a PC, because there is no processor inside, a feature that makes a PC so multi functional. PCs can communicate with mainframes using an emulator build on the Asynchrony Transfer Mode Protocol.

The evolution of the cathode-ray tube to plasma (flat) screens, that are only a few centimeters thick and light weight, saved an enormous amount of space on every desk and consumes remarkably less power due to employing liquid crystals and electro luminescence.







a flat-panel display of a Laptop



Communicating via Asynchrony Transfer Mode



Terminal of DIGITAL

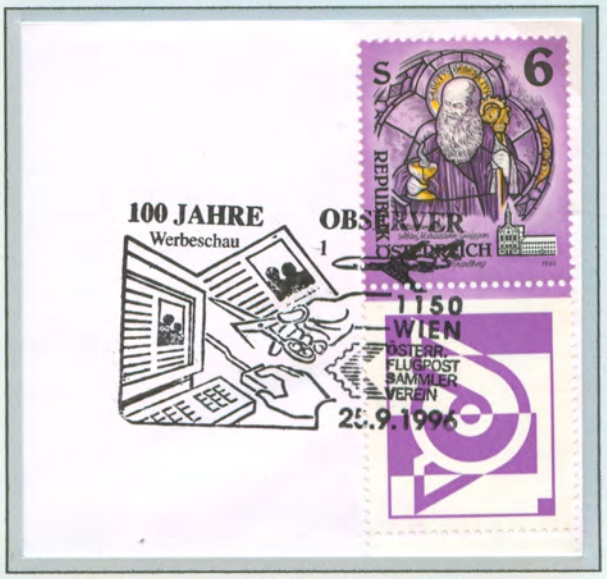


Flat-panel display more and more integrated at the office or at home



Specimen
IBM 3270 terminal





WYSIWYG "**W**hat **Y**ou **S**ee **I**s **W**hat **Y**ou **G**et"

Graphical interfaces showed documents, as they would be printed later on a printer. This is a big advantage compared to he old fashion non-graphical screens. More and more applications are implemented as **WYSIWYG** output devices.



The marvels of modern technology. On the left the screen of a VDU; on the right another issue, with more flexibility of type and layout than ever before. Below the hands of the recording angel pasting up

Non-graphical printing instructions on a green terminal screen. Example printed output at right.



Telegram (China) with local characters manually translated in DBCS code by clerk before trans-mitted to recipient, where again manually translated to readable Chinese characters.

Double-byte character set (DBCS) enables application software to display and process ideographic languages including Japanese, Korean, Simplified Chinese and Traditional Chinese. Conventional single-byte code pages of 255 characters are inadequate to store the thousands of characters that these languages require.



Stationery (South Korea): ill. PC screen with Asian double-byte characters



Missing color magenta ►

◄ Misperforation (Nord Korea): ill. research and education screen usage



Displaying data is important, data has to be checked. Results and logs for verification increase the quality and quantity of decisions.







Many different screens were developed and introduced at places where a lot of information must be processed, such as air/space traffic centers, nuclear power manufacturing, research centers, internet, support services and so on.





Pane Prestige Booklet (Great-Britain): BBC expertise in multimedia.



Multimedia is without doubt one of the most important technology evolutions since the 90s. The audiovisual interactive capacities are moving images, spoken comments and music.





Basic equipment is a powerful PC or handheld with a lot of RAM, graphical interface, CD or DVD-player, loudspeaker system, keyboard and mouse or/and joystick.

3

The invisible intelligence, the software.

3.1 From mechanical thinking to...

Automating by algorithm

Algorithm is derived from an Arabian mathematician's name Abu Ja'far Mohammed Ben Musa al-Khowarazmi, spelled closely to the term ***algorism***. Around 820 AD he wrote treatises as ***al-jabrawa al-maqàbala*** on Hindu arithmetic and algebra, which is taken as the source for the term ***algebra.*** Algebra and algorism is key in automating processes.







Watermark (China-1897) small dragon: yin and yang symbol



CityPost local postal service (Germany): Leibniz binary code



The mathematician and philosopher ***Leibniz*** demonstrated in a paper the binary system. He proved that all figures and characters could be represented as 0 and 1. It was based on his findings found in a Chinese document about yin and yang dualistic philosophy.



Jacquard's loom



Musical Box



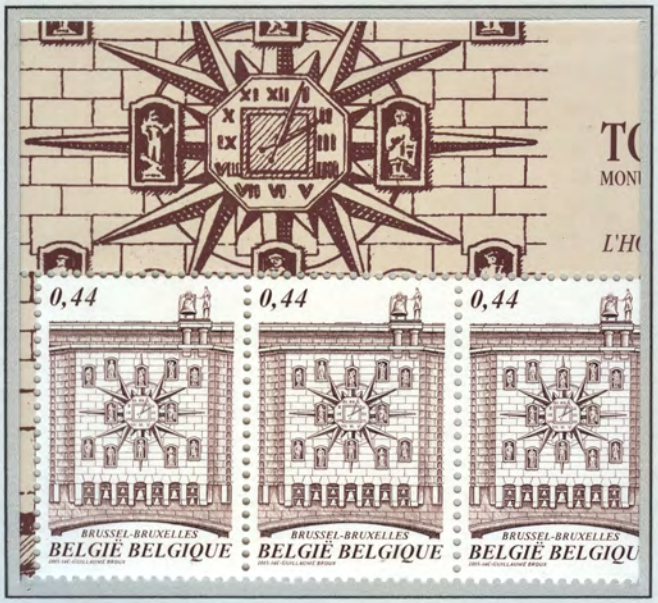
Artist proof in blue designed by A.Ouvré based on painting of C. Bonnefond ►

The Jacquard's weaving loom technology was the first system (punch cards) corresponding to the programs of today. The holes in the punch card or punched wheels (musical boxes) were the ones, no hole was a zero. The series of holes became the program steering the device and the punch cards or punch wheels were replaceable by other ones.

Punch holes, gears or toothed-wheels were the first machine programming tools.



meterstamp (Germany - 1941) KomusinaT&N type A; red meters were considered as advertisement; black meterstamps with a stamp looked more personalized. This experiment didn't last long (period 1935-1944) Advert: Company Otto F. Champion ▶





Stationery (Germany) printed to order; Electric automated art nouveau restaurant in Berlin center. ▶

The start of automation by scanning and programming to control automated repeatable movements. Precise work is way to success and…

5 ring gear cancel 87-Mannheim (Baden - 1860) ▼



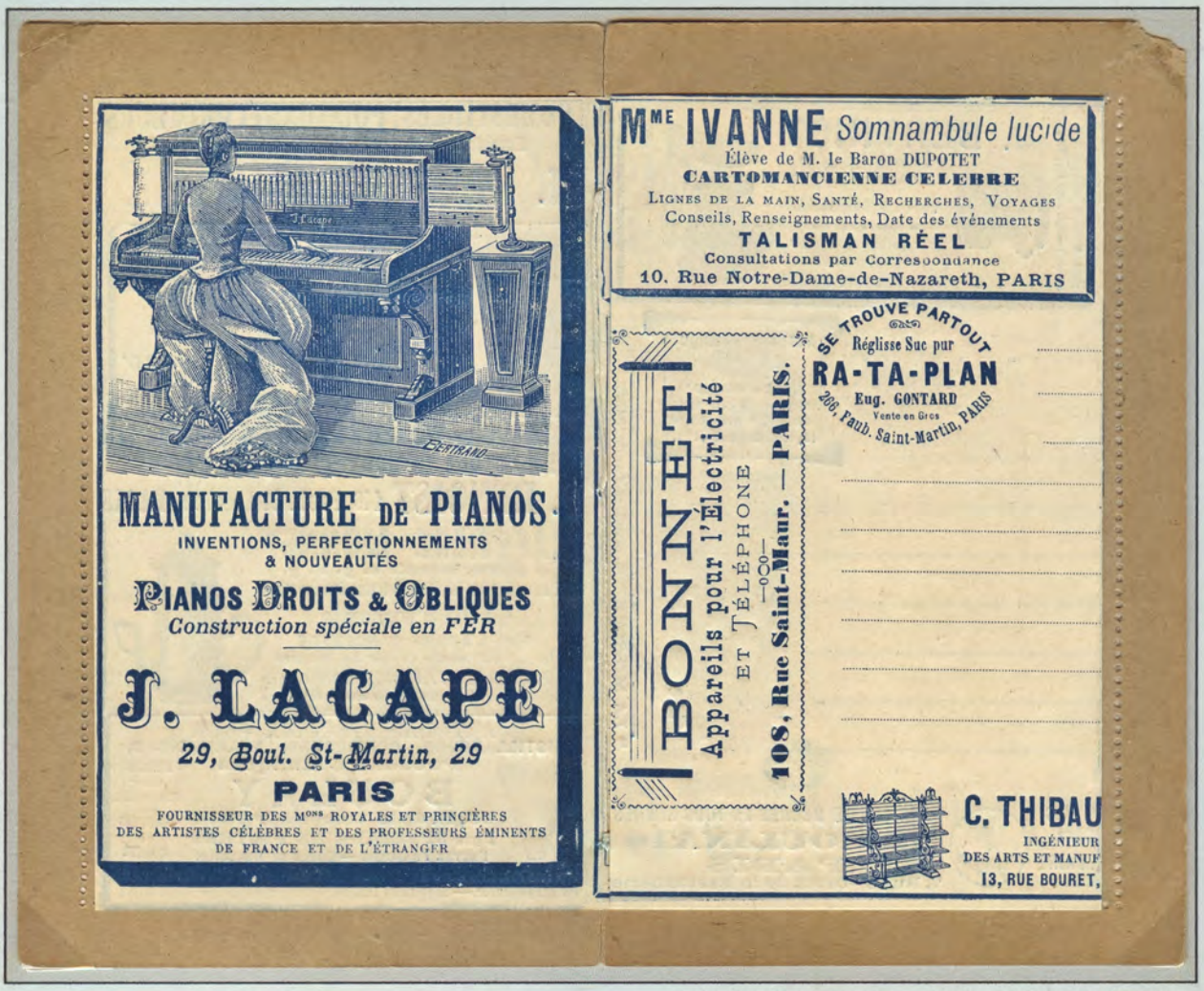


▲*variety: EURQPA (Q i/o O)*



▲*black shifted*

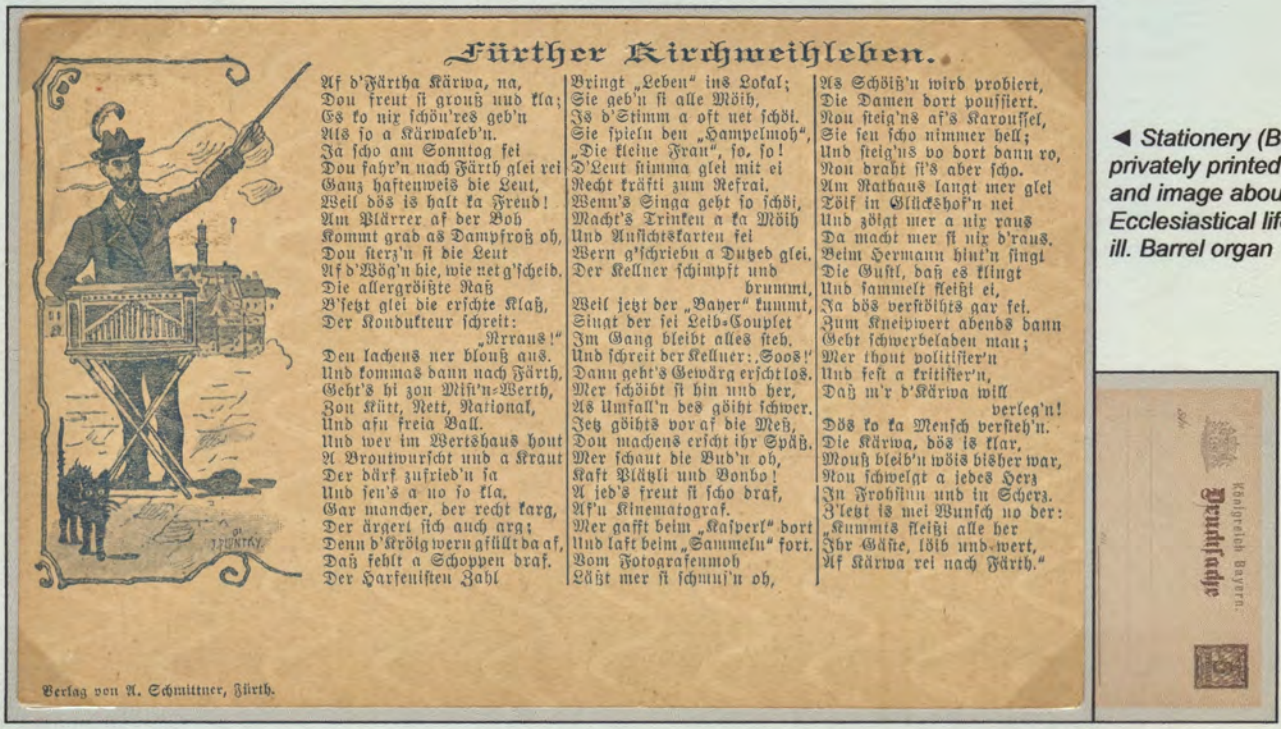
… no errors are allowed.



▲ *Letter Card (France - 1889 - 291e ed.): ill. Piano music is recorded (punched) on a strip of paper.*



Inventions such as a musical box, barrel organ or automated and animated mechanized metal figures are the first machine programming events. Punched medium is the most used media in the beginning.



◄ *Stationery (Bavaria) privately printed text and image about Ecclesiastical life: ill. Barrel organ*

3.2 Hello, robot.

Already very early men always tried to build automates that have its own capabilities of thinking and in function of working for mankind. In 1921, the Czech author **Karel Capek** produced his best-known work, the play *R.U.R. (Rossum's Universal Robots)*, which featured machines (ROBOTs) created to simulate human beings. The Czech word "robota" refers still today to work that's boring or uninteresting and someone is obliged to do and not voluntarily or for fun.



Karel Capek



◄ *Specimen*



Von Kempelen

In 1769 a chess playing automaton known as 'The Turk', was invented by the Hungarian baron **Wolfgang von Kempelen**. It was in fact a trick. The automaton was big enough to hide somebody small inside who operated it.

Torres Y Quevedo introduced cybernetics, known from his chess automaton. This relatively simple end game was seen as a clever accomplishment in classical mechanics.



Torres Y Quevedo



▲ *chess automaton*





A robot is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by computer programs stored on ICs or chips or electronic circuitry.

◄ *Stationary (Noord-Korea)*

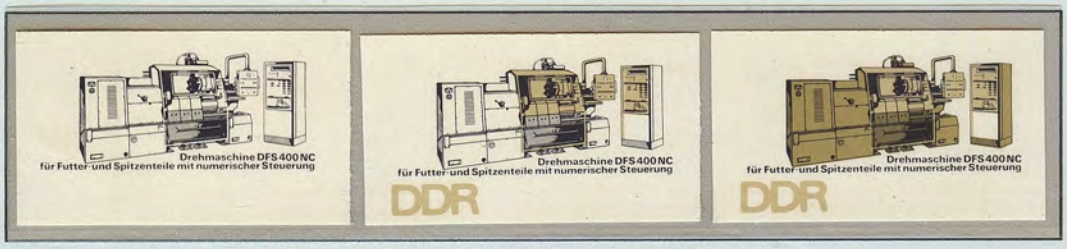






Specimen meterstamp (Great Britain): model Neopost with prefix N; Automatics

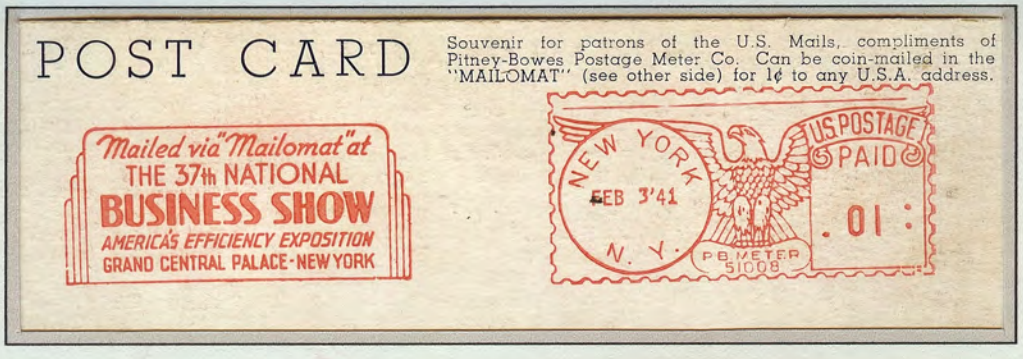
Automates or robots perform mathematical operations on continuous measurements, such as temperature, pressure, time, etc... . and are controlled by instruction sets on punch tape, punch cards, or ICs or connected to a computer.



Progression proofs (East-Germany): numeric steering lathe machine







Automates perform tasks fast and continuously needing a lot of concentration or are too repetitive, consuming time and energy.

◄ *Pitney Bowes "Mailomat" (USA - 1941); 51000 series are from self-service automates; 72 letters/min.*





The ICs or chips are developed and designed with computers and produced with fully integrated automates or robots with high efficiency and perfect results.



Conclusion: robots are making robots.

Real robots are not yet a fact! But since the invention of the computer and a miniaturization of computer parts, many attempts have been taken place with partial successes. From the very beginning men have been trying to replicate parts of the human body.



In the early 1970s the Russian space organization put an unmanned spacecraft on the moon to collect stones and dust and brought it back to the earth with success. The whole automated operation was directed from earth in combination with pre-programmed procedures.





Publibel (Belgium): A juke-box is a nice example of a robot.



Japan and South-Korea are far ahead in developing robot technology. In 1980 laboratories of the Waseda University started the WABOT-2 project. This is an anthropomorphic intelligent robot WABOT (WAseda roBOT) playing a keyboard instrument and was set up as an intelligent task that the WABOT-2 aimed to accomplish. An artistic activity, such as this, would require human-like intelligence and dexterity. The robot was shown on the Tokyo Expo in 1985.



Regional stationery (Japan): Wabot-2 active at Tokyo Expo 85





Binary: 0 and 1
IIIO IOIII = 471

Electronic calculators or computers are programmed to work with 1 or 0; it is the only thing they know by default; something is switched off or on. In the beginning programmers used machine language to program their computers and stored (wrote) them on punch cards.



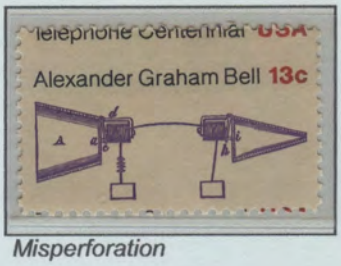
Trial Color Proofs (Monaco): The programming language PASCAL is an ode to Blaise Pascal.

Later specific high(er)-level programming languages simplified their task. Some programming languages were specially developed for specific environments to ease the task of the programmer for that specific application, like ASSEMBLER, COBOL, PASCAL, C and many others.



Letter sent from New York on 3.03.1866 to Cognac, France arrived on 3.04.1866 per ship called 'Java'





Misperforation

The labs of **Graham Bell** the programming language "C" was developed to control their telephone exchange systems.



Encaged postage stamp (Denmark) pre-WWII: to resolve coinage shortage

Even for the internet world the language JAVA was invented and named after the famous coffee brand "Java", because it was consumed in large quantities by the language's creators. The coffee brand "Java" comes from the Island of Java, name first given by the Dutch.



3.3 Electronic intelligence using machine languages

As human beings are involved in engineering software or using tools and data, they quickly learned to work together and share their knowledge. The development of the profession and image of software engineering gained popularity through scholarships, research and international forums.



Free Post (Great-Britain) as Member of Parliament from Earl of Horrowby: was president of the organization 'Royal Statistic Society' from 1842 till 1843.





*The Royal Statistics Society had members as **Charles Babbage** and Belgian statistician **Adolphe Quetelet**.*

Already very soon organizations and groups were started up to closely aligned in philosophy, strategic directions (promotion), applied for the public good, and values.



Cancel 06.06.1900 Torino (Italy) COMPUTISTERIA: Early naming accounting department.

In the 18th century bookkeeping and statistics became a common profession already using calculators and archiving tools. Today IT people such as system engineers, network specialists, programmers, operators, analysts and helpdesk support are in every company.

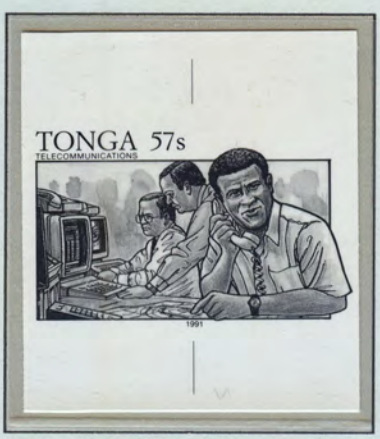


Photo Proof (Tonga): support network specialists



operator



programmer

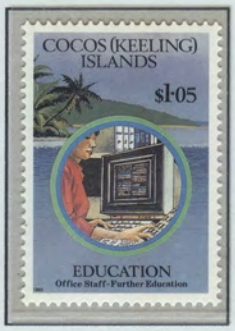


systems engineering symposium



Children gain computer skills at very young age by playing on the computer at home or by using it in school in a very basic and easy way.







Computer education is learning or teaching about computers, including practical techniques for developing and implementation of computer systems and applications.



Computer scientists invent algorithmic processes that create, describe, and transform information and formulate suitable abstractions to design and model complex systems.

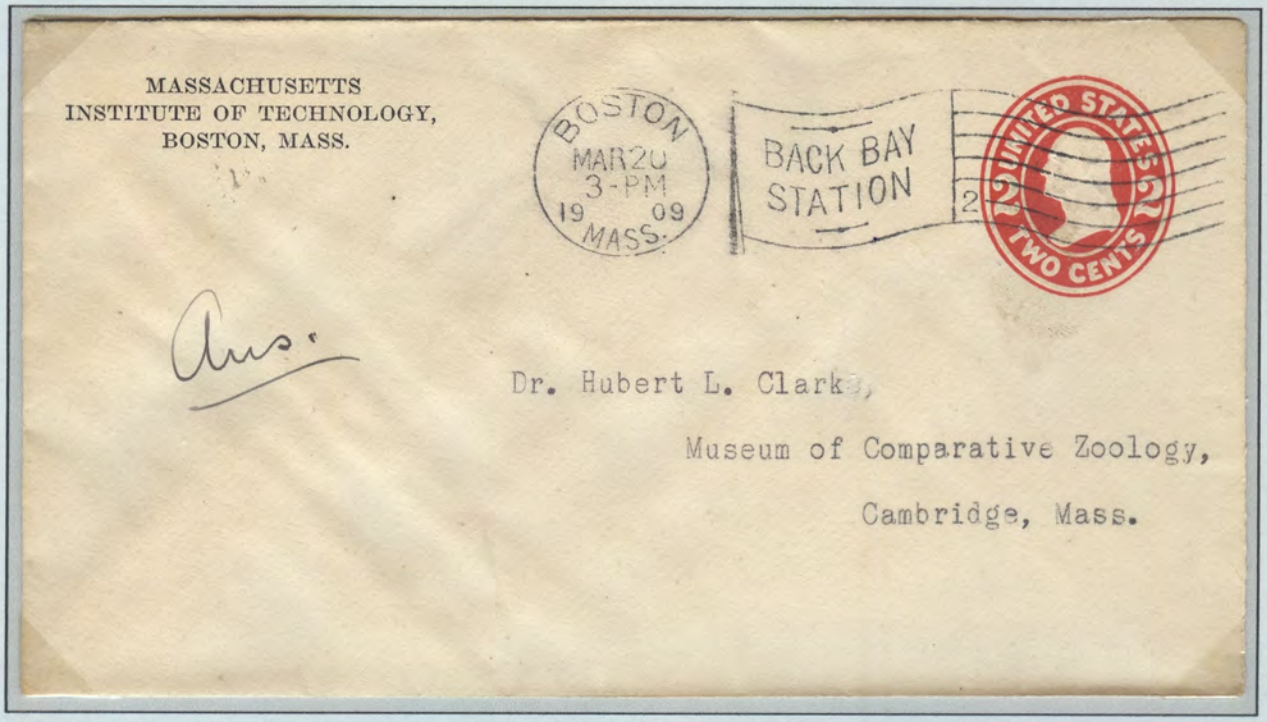
Technologies are rapidly changing in a constantly-changing world. Computer specialists have to accept a long life of "learning never ends".



The **Massachusetts Institute of Technology** (MIT) is very well known for its research and education in information technology engineering. MIT researchers made fundamental contributions to cybernetics, artificial intelligence, many computer languages, network technologies, machine learning, robotics, and cryptography.



Harvard University in Boston close neighbor of Massachusetts Institute of Technology (M.I.T.): both most famous universities helped to advance the digital age.



Preprinted MIT return address on stationery (US – 1909); Post administration provided printing services



Meterstamp (Netherlands) type Francotype CC: amusement automate



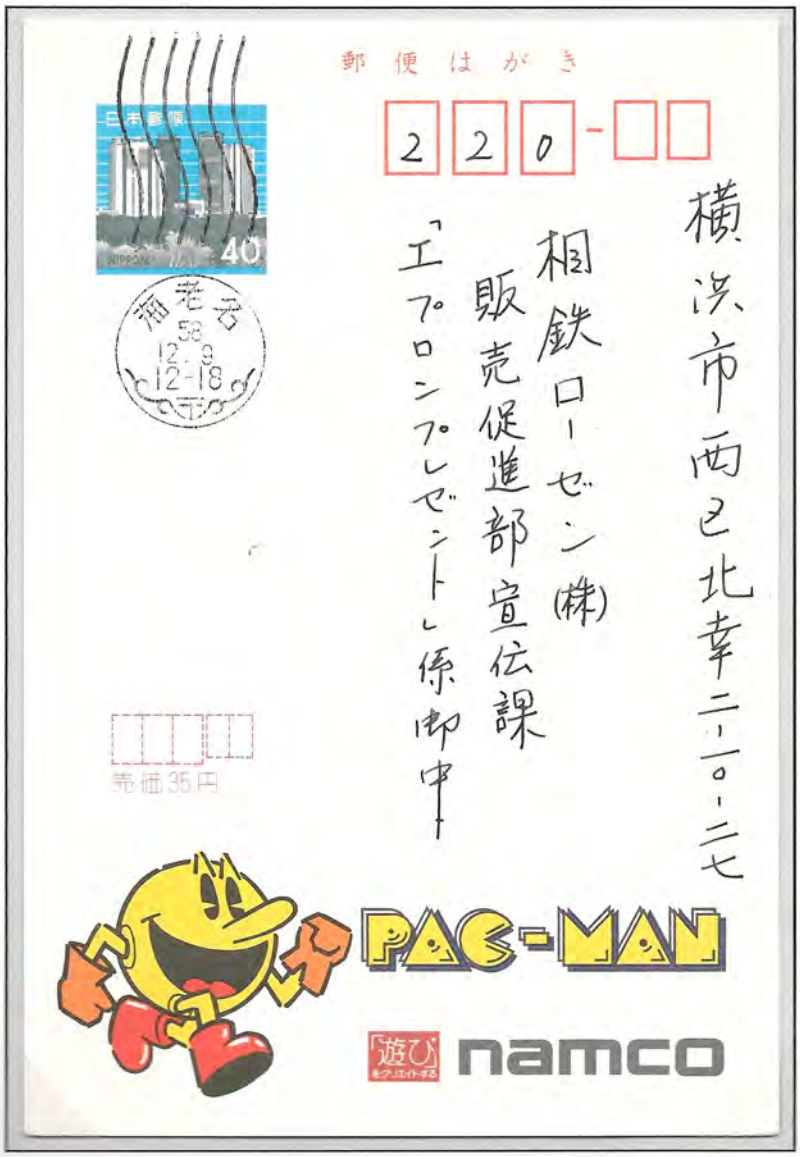
What started with electromechanical amusement automates, are today almost-human intelligent computer games equipped with artificial intelligence (AI) technology using more and more processor power, and which can defate most of the human players.

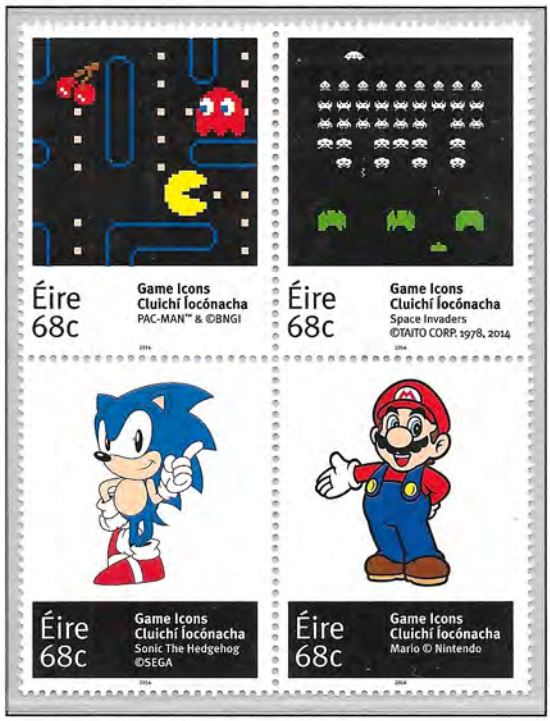






The first popular games were Pac-Man, Space Invaders, chess and basketball. Most games had many levels that players could increasingly select.





Special play consoles and PCs are available with high resolution graphics, stereo-sound and high performing interactive games with the ability to play different games on a single system.





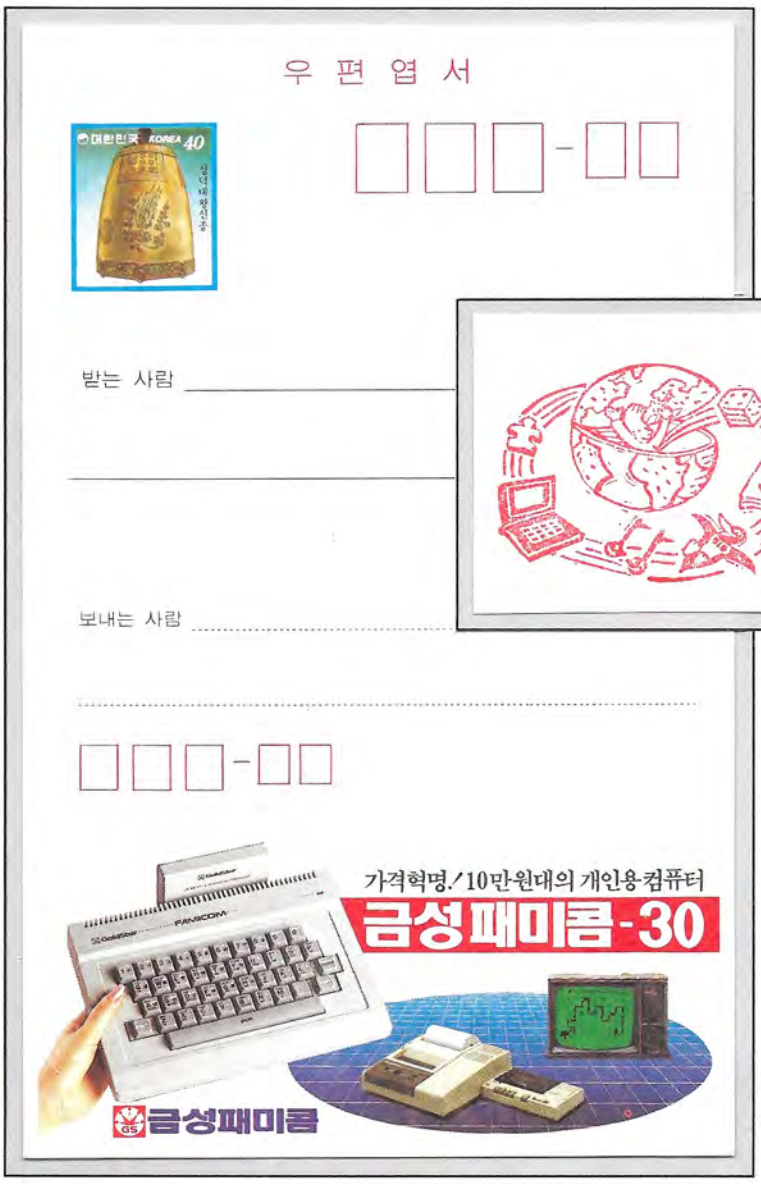
Telegram ▶
(Brazil)



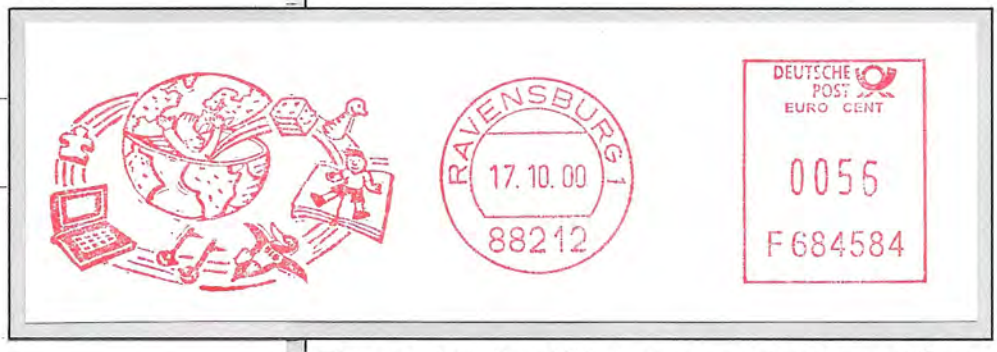
All computer games are available on Personal Computers, playing devices, play stations or video games.... And get addicted to gaming.



Addiction



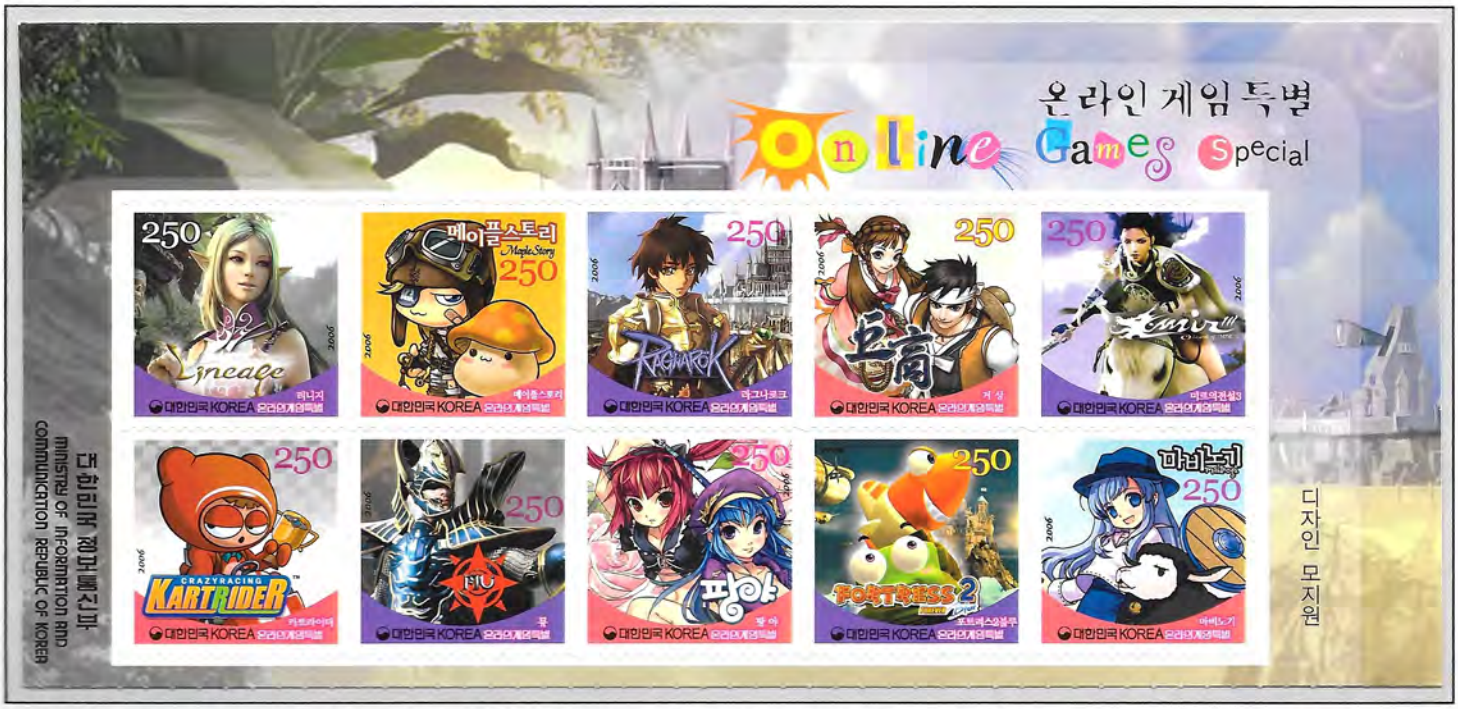




The new toys for children are computer games with a wide range of experience and skills.



Several Virtual Reality gloves and head mounted displays were released for gaming during the mid-1990s and give the player an experience difficult to explain. You have to feel it, do it and live it!



With the increased popularity of the Internet, online distribution of game content has become more common as well gaming with others over the internet in the same game.

3.4 Serving the business world

manual actions

The need to implement automated processes is because companies have a lot of different obligations and tasks. Therefore applications are built on computers by which manual actions can be limited to the minimum. But it started all manually…



One-penny MULREADY envelope; used in 1840 from London to Margate, cancelled with red Maltese cross. Ill. left; clerks writing down commercial transactions

In the beginning clerks made notes of their sales transactions in special books that need to be kept in a safe place for years.



Stationery (Russia); a classic card-index box with separators

Later the card-index cabinet was introduced. Written or typed cards were classified in different ascending or descending ways, so that finding certain information was much easier.

With growing amount of data on cards and punch cards the need for microfilm was rising. Also microphoto-graphy was first suggested as a document presservation method in 1851.


409 424

Pigeongramme on film: pigeon flight organized by 'telegraphes et postes' 10-20 jan 1871
2e serie pages 409-424

But it first saw military use during the Franco-Prussian War of 1870–71. During the Siege of Paris, the only way for the provincial government in Tours to communicate with Paris was by pigeon post. As the pigeons could not carry letters, the Tours government turned to microfilm.

Using a microphotography unit clerks in Tours photographed paper dis-patches and compressed them to microfilm, which were carried by homing pigeons into Paris and projected by magic lantern while clerks copied the dispatches onto paper.


Write address in large BLOCK letters wholly within this panel

The address must NOT be typewritten.

TO:- MISS. G. WEBB, P.O. BOX 867. MIDLAND, ONT. CANADA.

976462

Write the message very plainly below this line.

The proprietors and Editor of "The Aero Field" send their greetings for Christmas and the New Year by the 72 years old method that has been revived in the present emergency.

These illustrations of the 1870 service transmitted by the new method are an interesting souvenir of both events.

Sender's Address: Sutton Coldfield, England.

Date: 16th. November 1942.

OPEN LETTERS for PARIS.

Transmission of by Carrier Pigeons.

THE Director-General of the French Post Office has informed this Department that a special Despatch, by means of Carrier Pigeons, of correspondence addressed to Paris has been established at Tours, and that such Despatch may be made use of for brief letters, or notes, originating in the United Kingdom, and forwarded by post to Tours

Persons desirous of availing themselves of this mode of transmission must observe the following conditions:—

Every letter must be posted open, that is, without any cover or envelope, and without any seal, and it must be registered

No letter must consist of more than twenty words, including the address and the signature of the sender but the name of the address, the place of his abode, and the name of the sender—although composed of more than one word—will each be counted as one word only

No figures must be used, the number of the hoops of the addresses must be given in words

Combined words joined together by hyphens or apostrophes will be counted according to the number of words making up the combined word

The letters must be written entirely in French, in clear, intelligible language. They must relate solely to private affairs, and no political allusion or reference to the War will be permitted.

The charge for these letters is five-pence for every word, and this charge must be prepaid, in addition to the postage of sixpence for a single registered letter addressed to France

The Director-General of the French Post Office, in notifying this arrangement, has stated that his office cannot guarantee the safe delivery of this correspondence, and will not be in any way responsible for it.

By Command of the Postmaster-General.

GENERAL POST OFFICE, 16th November, 1870.

(British P. O. Notice of 1870.)

Inflating the balloons by which pigeons for flying the micro-photographic messages into the city were carried from Paris.

On arrival in Paris the pigeon post "Air-graphs" were enlarged by a lantern for transcription.

This space should not be used.

MAKE SURE THAT THE ADDRESS IS WRITTEN IN LARGE BLOCK LETTERS IN THE PANEL ABOVE

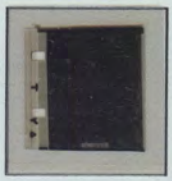
▲ *Airgraph (Great Britain) (12 XI 1942) with censor mark (Sutton Coldfield - Birmingham) to home. Ill. Unclear dark image bottom same as image in Prestige booklet below. Text: transmission of by carrier pigeons celebrated 72 years later using same technology.*



In 1870 during the Franco-Prussian War, the Siege of Paris cut communications for The Times. Above: *dispatches and personal advertisements for the Agony Column were flown out by balloon.* Below: *microscopically reduced messages were carried in and out by pigeon, and magnified by electric light*

▲ *Prestige stamp booklet "The story of the times" (Great Britain): text and ill.; microscopically reduced messages were carried in and out by pigeons, and magnified by electric light.*

The US Victory Mail and the British "Airgraph" system were based on microfilm technology, and were used for delivering mail between those at home and troops serving overseas during World War II. The systems worked by photographing large amounts of censored mail reduced to thumb-nail size onto reels of microfilm, which weighted much less than the originals would have.



▲ *Original piece of microfilm of a V-mail.*

V-Mail Service provides the most expeditious dispatch and reduces the weight of mail to and from personnel of our Armed Forces outside the continental United States. When addressed to points where micro-film equipment is operated, a miniature photographic negative of the message will be made and sent by the most expeditious transportation available for reproduction and delivery. The original message will be destroyed after the reproduction has been delivered. Messages addressed to or from points where micro-film equipment is not operated will be transmitted in their original form by the most expeditious means available.

INSTRUCTIONS

(1) Write the entire message plainly on the other side within marginal lines.
(2) PRINT the name and address in the two p
of the Armed Forces should include r
which attached, and APO or Naval ad
(3) Fold, seal, and deposit in any post-office letter drop or street letter box.
(4) Enclosures must not be placed in this envelope and a separate V-Mail letter must be sent if you desire to write more than one sheet.
(5) V-Mail letters may be sent free of postage by members of the Armed Forces. When sent by others, postage must be prepaid at domestic rates (3c ordinary mail, 6c if air mail is desired).

☆ GPO 16—28143-3

MAIL

See Instruction No. 5

▲ *Original unused V-mail (USA): text: explanation how the message will be processed and send to the addressee.*

Write the address in large
The address must NOT be typewritten.

28443

MR. TO:— C.U. DOWNES,
AHIARUHE,
CARTERTON,
NEW ZEALAND

Write the message very plainly below this line.

"THE AERO FIELD" SUTTON COLDFIELD, ENGLAND

To Commemorate
The Last Airgraph Despatch, July, 1945



A Page from the "H. Crabtree" Collection

The film reels were shipped by priority air freight to and from the home fronts, sent to their prescribed destinations for enlarging at receiving stations near the recipients, and printed out on lightweight photo paper.

▲ *Last day Airgraph (Great Britain) (31 JUL 45) with censor mark (Sutton Coldfield - Birmingham) to New Zealand. Ill. Showing Airgraph procedure.*

Write the address in large BLOCK letters in the panel below.
The address must NOT be typewritten.

TO:—

DATE STAMP

Write the message very plainly below this line.

Sender's Name & Address "THE AERO FIELD" SUTTON COLDFIELD, ENGLAND

To Commemorate
The Last Airgraph Despatch, July, 1945

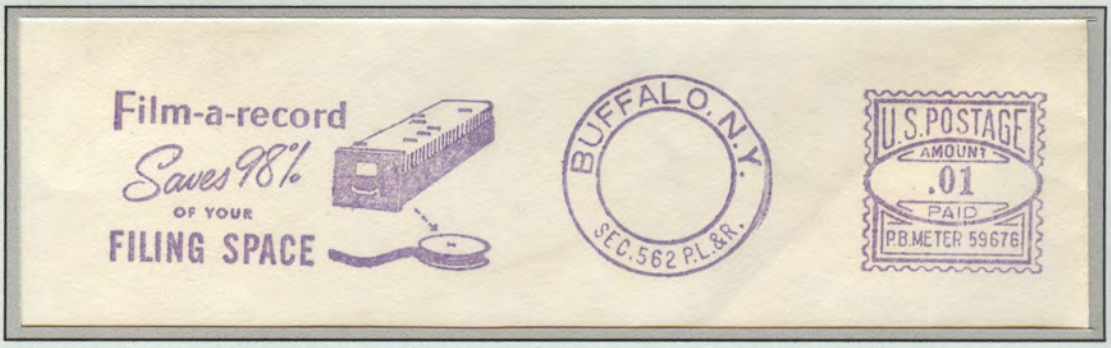


Prussian aggression has been directly responsible for the introduction, by its victims, of many novel methods of conveying messages, such as the Balloon and Pigeon Posts of Paris in 1870-71. With the Airgraph service, special forms are provided measuring 11" by 8". The letter sheet is then photographed on a film negative measuring ½" by ⅝" On arrival at the destination the negatives are passed through a continuous enlarger which produces a photograph measuring 5" by 4". These are dried on a wheel at the rate of 40 letters a minute, after which the copies are folded and placed in a special window envelope which bears the word "Airgraph" like illustrations above.

A Page from the "H. Crabtree" Collection

▲ *Last Airgraph despatch original unused sheet (Great Britain) (JUL 45): ill. and text: started in 1941and ended July 1945. Explaining the whole procedure; photographing the sheet, enlarged printing, drying 40 letters/min. folding into 'Airgraph' envelope*

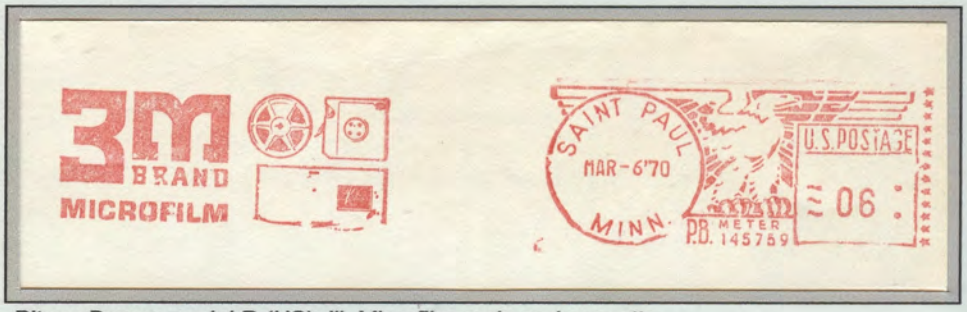




Pitney Bowes model CV (US) type printed matter; text: saves 98% of filling space

Microfilm is compact, with far smaller storage costs than paper documents. Normally 98 document size pages fit on one fiche, reducing to about 0.25% original material. When compared to filing paper, microforms can reduce space storage requirements by up to 98%. Desktop readers are boxes with a translucent screen at the front on to which is projected an image from a microform or film.





Pitney Bowes model R (US); ill. Microfilm reels and cassette

Microfilm as office automation technology played a strong supporting role in the paperless and automated office. Today more and more replaced by image databases, scanned by OCR readers.

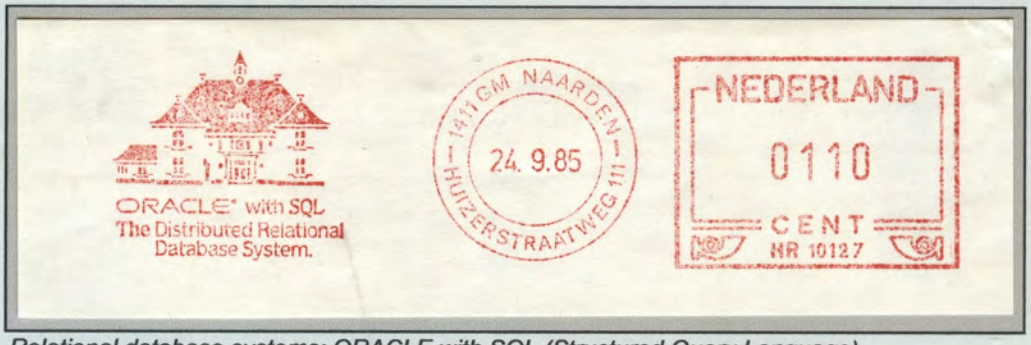


Missing perforation



***Index** refers to post office (open 1902-1915) at Index Knitting Mills a hamlet in town Middlefield, in state NY. Word index refers to directing and pointing to, useful when searching in databases or a book.*

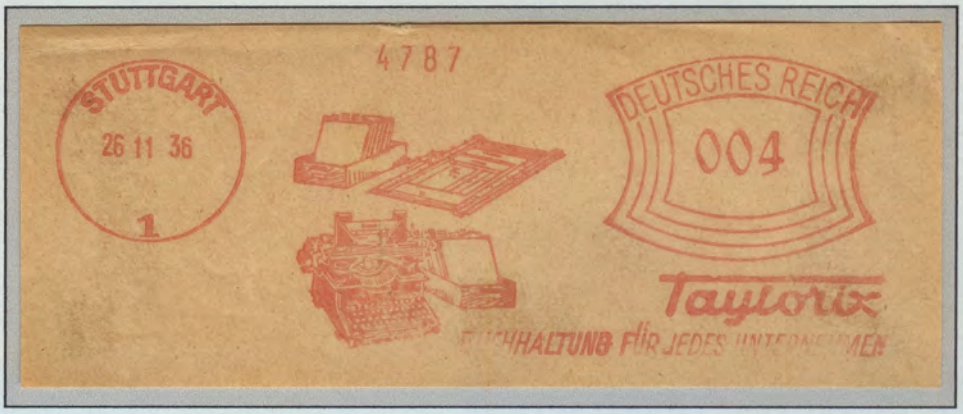
Microfilm was in the mid-1900s a preservation strategy for libraries for deteriorating newspaper collections. Books and newspapers that were deemed in danger of decay could be preserved that way and even increase usability without destroying them more and more.



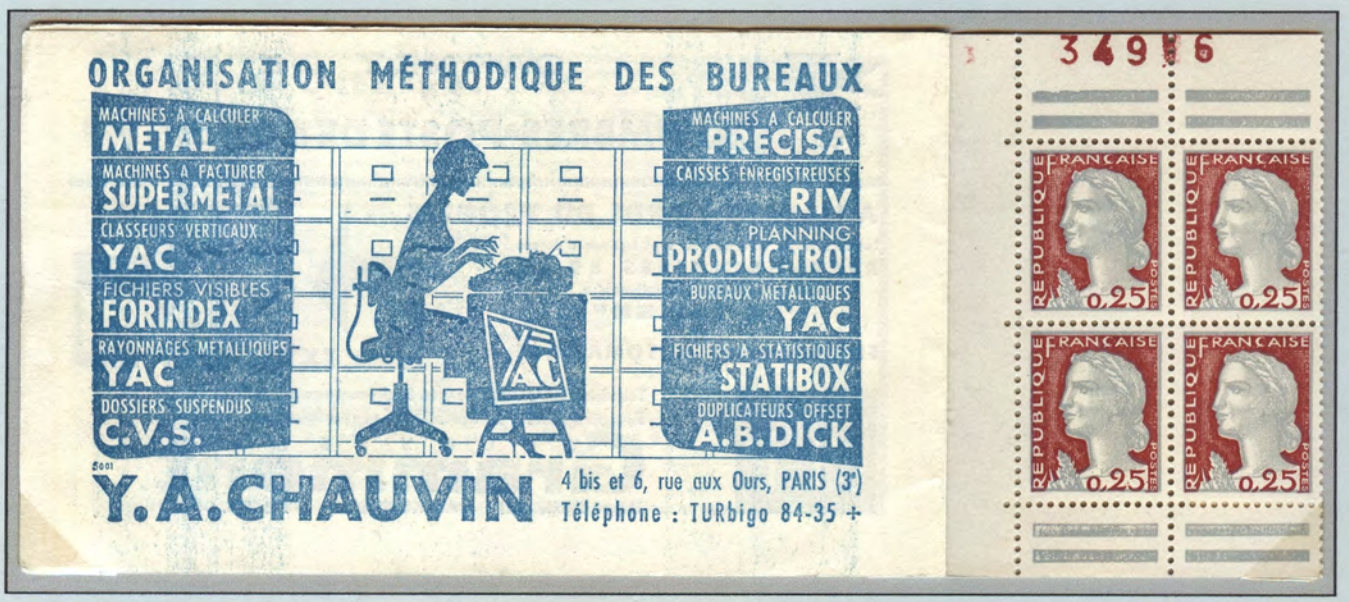
Relational database systems: ORACLE with SQL (Structured Query Language)

Providing quick response times and solid applications (especially database systems) to do business with customers is a main goal. For this reason index systems help queries on databases to reply quickly.



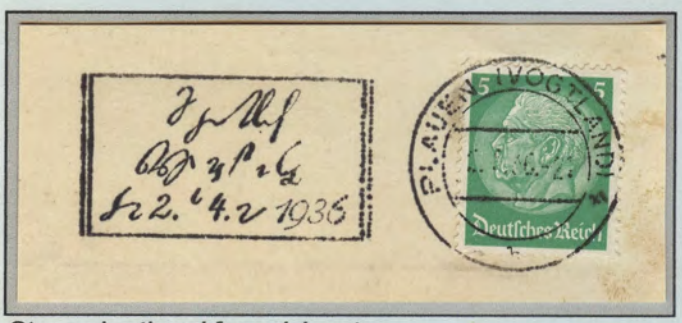


Calculators, bookkeeping machines, file cabinets, card-index boxes, planning, typewriters, etc., are tasks that can all be done a lot more and much quicker today by specific application software on an ordinary PC.





Misperforated (Great-Britain) 'two in one' divided design: Steno shorthand and typewriter keys



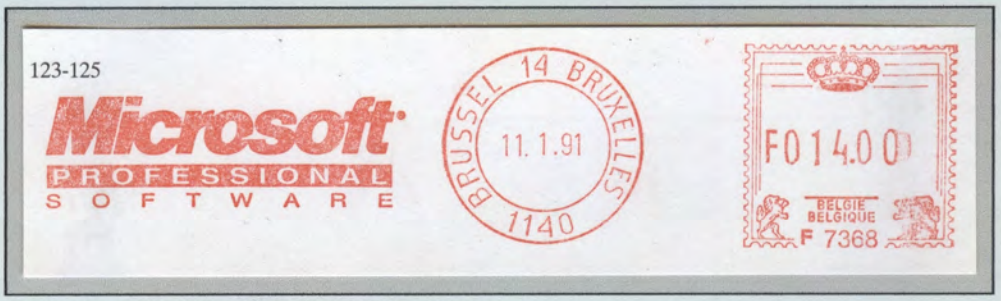
Steno shorthand for quick notes

Since late 1800s typing and shorthand (an abbreviated symbolic writing method) increased speed and brevity of writing. Later dictation machines, special secretarial training and powerful word processors replaced those processes and speeded it up with even higher quality.



Hasler model mailmaster (Belgium)





Francotyp-Postalia "MS5/WK4" (Belgium)

Bill Gates and his friend Paul Allen founded Microsoft in 1975. Their first product was the program language BASIC. In 1980 IBM chose Microsoft to supply the operating system DOS for the IBM PC.



▲ *OS/2*



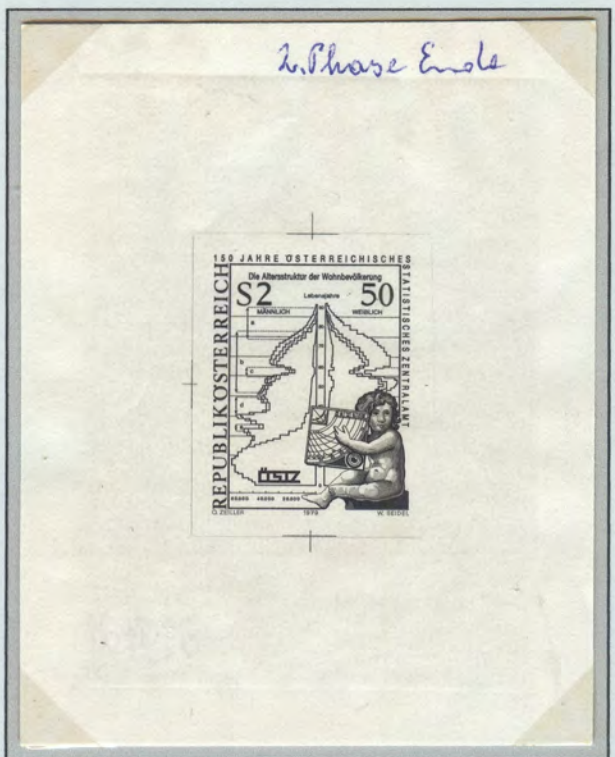
SECAP "N" (France); text: 2 seconds response time for air flight reservation

When the powerful graphical user interface (GUI) of the Apple computers became popular, IBM and Microsoft developed together the very stable operating system OS/2.

However, later on, Microsoft broke with IBM and developed their own Windows operations systems and many graphical products with easy to use interface.

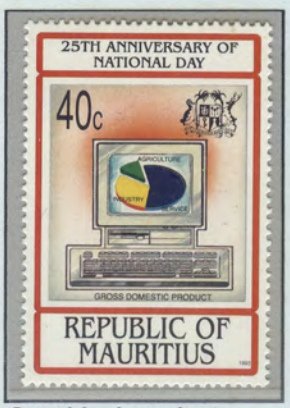


Windows platform (colors red, yellow and black missing)



Die proof 2nd phase End (Austria): Statistics

Users need tools ready to reply on various business questions and certainly quick response times.



Graphical products



Analytical products

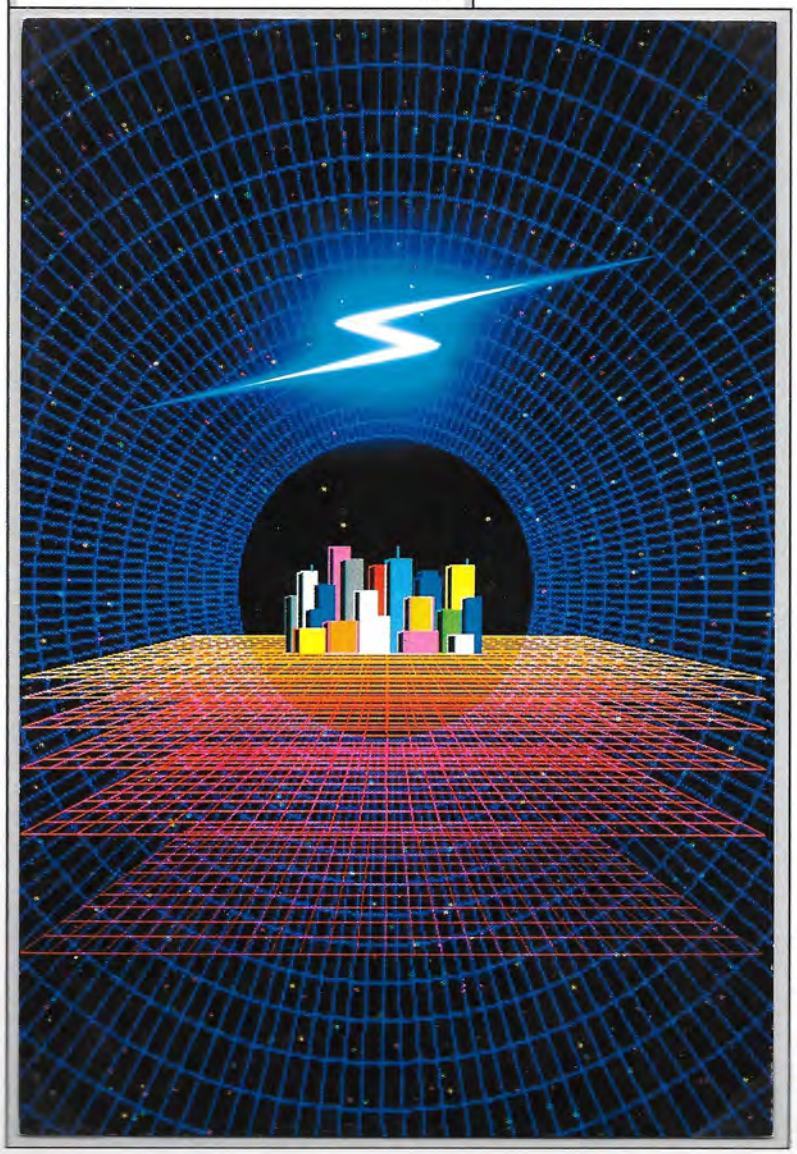




'Kinderpostzegels' (Netherlands); look-a-like early version paint software of Windows

The graphical capabilities of a computer we learned to know in drawing tools such as Paint or Photoshop programs. Graphic design tools are very useful for visual communication and effects, as well in problem-solving research and developments. Julia set fractal visualization is for example very much used in chaos theory and generation of various models.







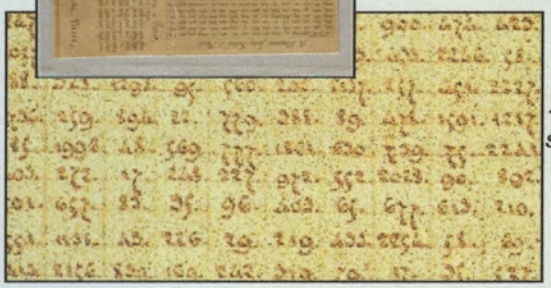


The commercial industry and the film industry deliver spectacular generated images. 'Toy Story' is the very first full length film where all characters and environments are completely developed by computers. Only a few manual interventions were needed, like mud on a car, spot on a wall, scratches on the parquet floor, etc.

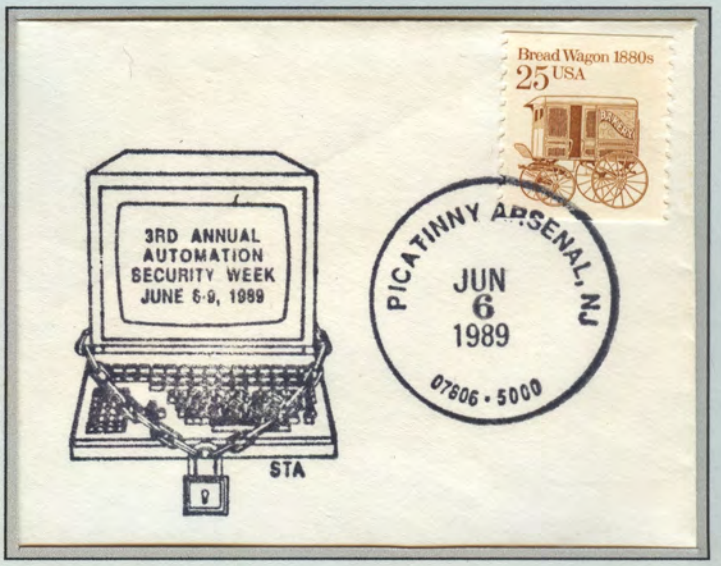


Computer security and protection of information became one of the hottest issues the last years.

◀ *Pigeongramme on photo paper: governmental flight done by Steenackers on 19 Oct 1870 to Jules Favre, French vice-president and minister of foreign affairs.*



◀ *Detail of pigeongramme: showing coded messages*



Already during the Franco-Prussian war in 1870 and the Siege of Paris coding governmental messages was introduced to protect the French pigeon post communication when pigeon felt in Prussian hands.

Also the Germans introduced network security during World War II. To protect their communications they used the Enigma, which was a machine capable to secure sending and receiving message, by using a primitive form of encryption.



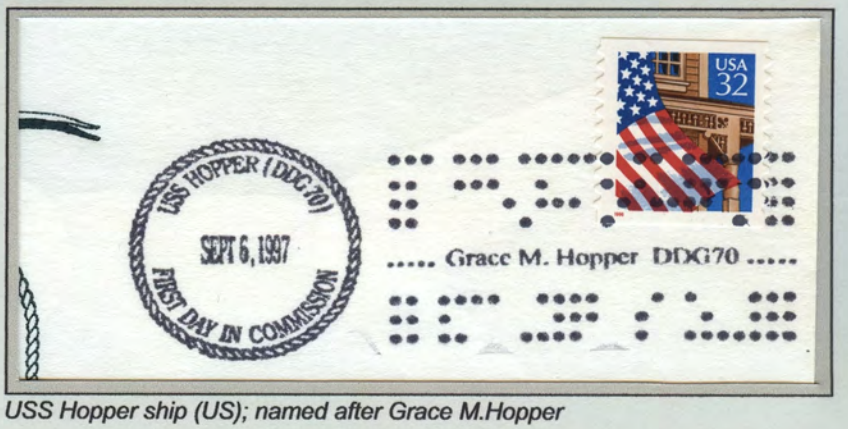


US 6813th Signal Security Detachment APO 527 war cover sent from Bletchley Park: their task was more related to traffic analysis and cryptanalysis of their sources in the field like Enigma, Morse and radio messages. Sgt. Earl W. Swanson was hosted in Hut Six in the log reading section dealing with all incoming messages.

British mathematicians, like Turing, and with the help of Polish resistance, French and Americans were able to break the code rapidly. This makes encryption one of the weakest links in a fully secured chain.

A computer can only do the tasks for which it is programmed. When errors are detected, they are usually programming errors, "a bug".





USS Hopper ship (US); named after Grace M.Hopper

During the Mark-II programming project (1947) a maintenance engineer, named **Grace M. Hopper**, defined a "bug" in a maintenance log. The little creature (moth) that got stuck in the relay and prevented working correctly, got its immortality with its death.





'no' to copying



Computer security is implemented in various ways since the mid-1960s: data needed more protection, regulations installed against copying and distributing software. The Data Protection Act (DPA) now replaced by GDPR, is a law passed first by the British government and later European Commission, that sets out rules for those who use or store data about living people and gives rights to those people whose data has been collected.

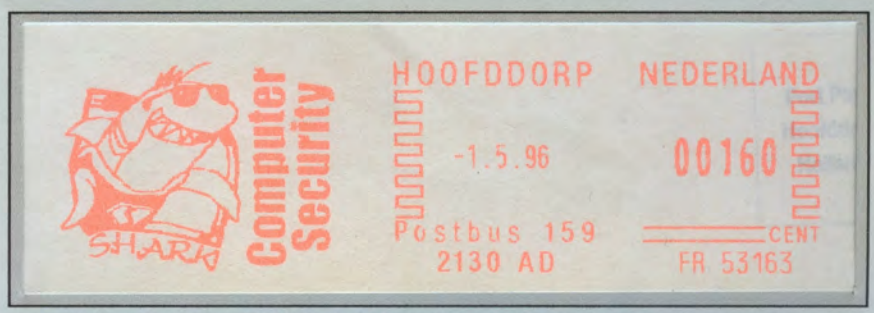


Postage due envelope (Netherlands - 1917): when a postcard was insufficient prepaid, it was presented to addressee in this envelope to pay the postage due. It prevented a common habit to read the message on the card and then refuse the card and this way to avoid paying for the postage. People are always in search of avoid paying for services.

Since the introduction of the PC at home, people were keen in finding free software, often illegal, as they always have tried to do. Still today video and music illegal downloads are a major problem.



Fingerprint protection



Francoptyp-Postalia "T1000" digital (Netherlands): text: computer security

During the past years computer users throughout the world have fallen victim to a series of attacks (like sharks); hit by viruses or spoof mails, flooding computer systems with incoming messages, destroy systems or grab passwords. Therefore computer systems and Internet are since a long time protected by passwords, or since recently replaced with fingerprint protection or encryption of data.



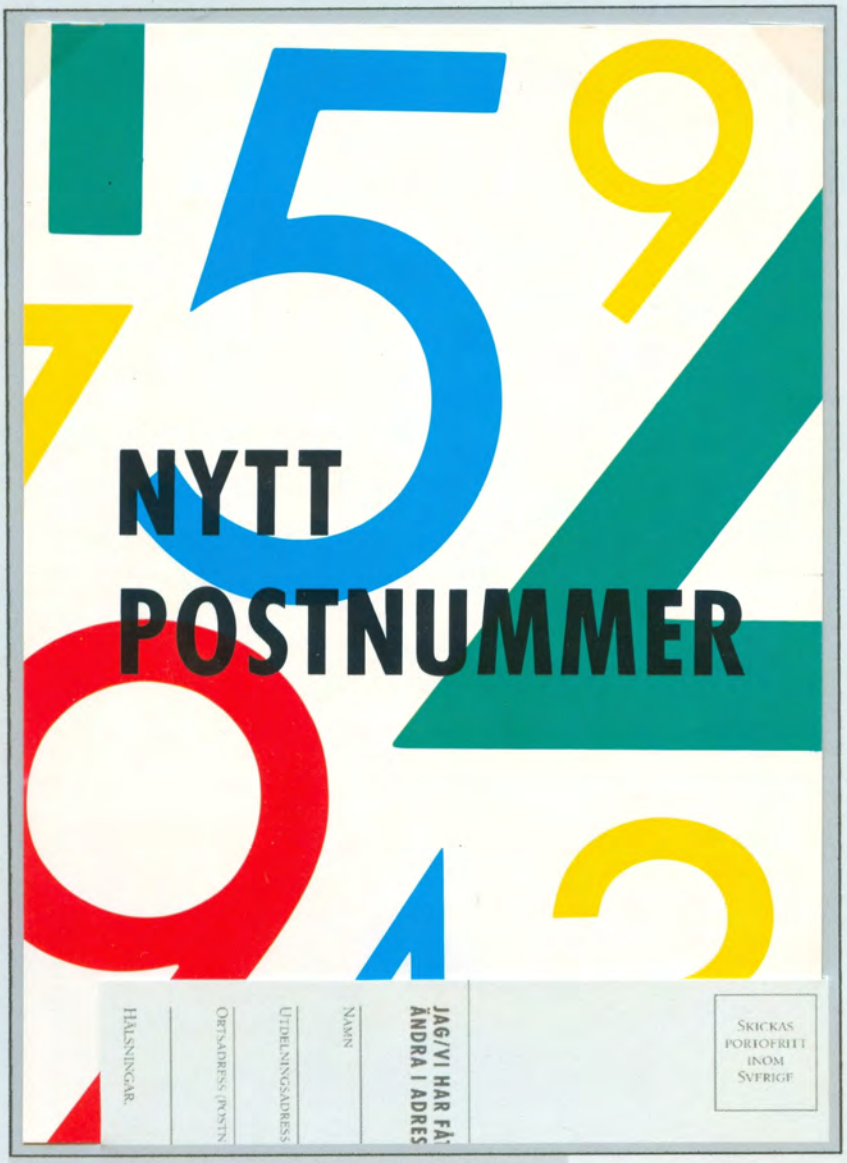
Booklet (France): 6 of 20 stamps Marianne de Béquet 80c: partial printer quality. "Mot de passe"= password

Internet represents an insecure channel for exchanging information therefor Internet security is most wanted and checking transferred data will ensure the integrity.



Letter sent as "PD" from Christiania, Norway on 04.04.1874 to St-Brieue, France and arrived on 09.07.1874. 4 different values 1 sk (green), 2 sk (blue), 4 sk (brown) en 8 sk (red;) representing of the algorithm of Hamming code the bit positions that are a power of 2; 2^0=1, 2^1=2, 2^2=4 and 2^3=8.

One of the most used algorithms is the algorithm of Hamming code. It is simply the use of extra parity bits to allow the identification of an error and even repair it. The bit positions that are a power of 2 are marked as parity bits (1, 2, 4, 8, etc). Each data bit is included in a unique set of parity bits, as determined its bit position in binary form.



Postage free: Zip code change in Sweden

Whenever external rules are changing, such as zip code, telephone numbers, bank numbers, Euro currency, and year 2000, they have a big impact on written programs that need to be changed. It can be very time consuming and expensive for companies.

Zip code change





Telephone number change







In 1998 Belgian Railway stamps had as first the Euro currency. They are wrongly converted as 40 Bfr for 1 €, later 1€ was equal to 40,3399 Bfr.



The implementation of the Euro in 11 countries of the EEC caused many computer software changes and price conversions in databases. Regulations about currency calculations and rounding says that amounts to be paid or accounted may be shown rounded to 2 decimals, currency rates may not be rounded; amounts must be stored with 4 decimals and calculations must be done with 6 decimals.





In the beginning people chose for a readable two-digit year date format when dates were stored on punch cards. With the year 2000, billion lines of code needed to be tested and corrected when date calculations turned out to be wrong. 'Year 2000 (**Y2K**) ready' means that a computer program performs date calculations correctly.





◄ *copy of backside of stationery printed to order (Germany): postmarks on 31.12.99 and 1.1.00 with no century notification.*

Computers can't interpret automatically when a date is 100 years older. Above two-digit year date postmarks prove that only a human brain is able to detect the difference between 31.12.99 and 01.01.00. Computers can only interpret a four-digit year date format correctly.



Occasional postmark (Germany): 5.9.1990.
4-digit year date format causes no misinterpretation.

A millennium bug could have caused chaos and by missing vital elements such as energy and products, business could have come to a halt.



4
Communicating in one big world.

4.1 The first telecom moguls.



Set-off print; reversed print on another sheet



Cavallini (Kingdom of Sardinia - 1819); pre-paid tax (15c - short distance) cancel on paper that allow pass through private post - ill. post courier on horse ►

To deliver messages within a certain area for a set length of time a courier network was set up but not solely used for government traffic, private use of this service required in many cases licence from the State. Postmen on horses were till 1800s the quickest way to send mail.

Die proof (Monaco) designed by Bétemps; ill. Roman signal towers (left) and Chappe telegraph tower (right).





Till the French inventor **Claude Chappe** (1763-1805) demonstrated a practical semaphore message system in 1793. By 1846 it spanned all of France with 556 stations and 5000 km of lines. This was the first practical mechanical 'internet' and was based on the Roman signal towers and practical use of a telescope.







Chefoo Local Post - 1895: ill. Smoke tower transformed ▶

An electric version was put in place quickly after, and in 1855 transformed to an electric telegraph network. The first 'electronical mail messages' was a fact and the race for faster and very broad network started.



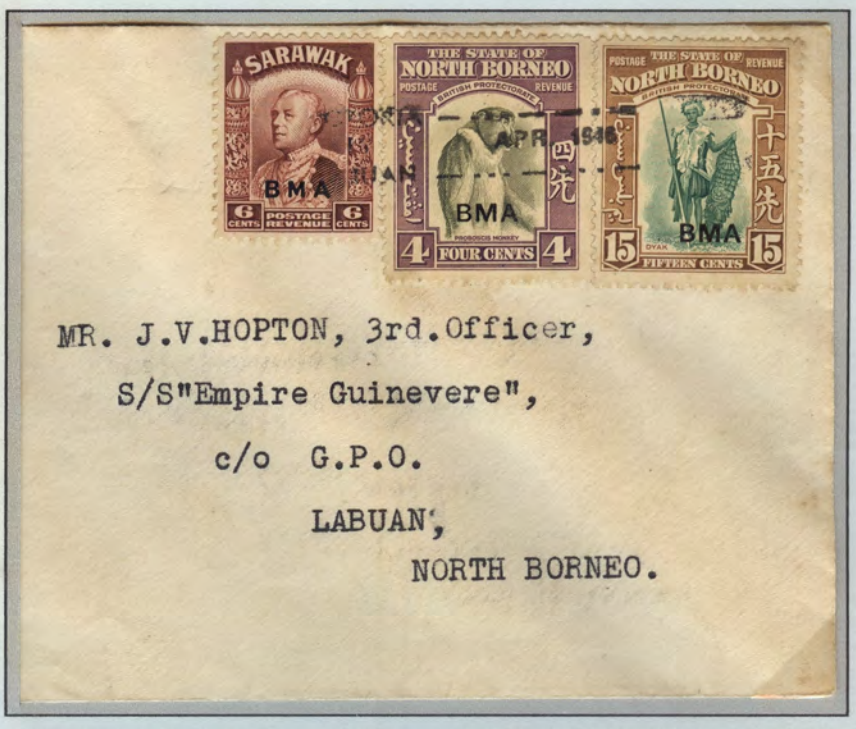
Morse code ··· – = V ▶



Morse code, invented in 1836 by **S. Morse** (1791-1872), was used in wireless telegraph messages transmissions via airways, a solution adapted from submarine communications.



Color proof (New Caledonia): ill. Morse code receiver



Letter (British North Borneo - 1946); cancel VICTORIA/16 APR 1946/LABUAN text in Morse code: –··· – – ·– = BMA





shifted perforation



Meterstamp (France): type SECAP "N" with prefix N; tele printer company

All across the country those long-distance telegraphs were once carried on bare copper wires strung on wood poles with glass insulators. The telegraphs messages were printed by a tele printer interpreting the pulses sent.



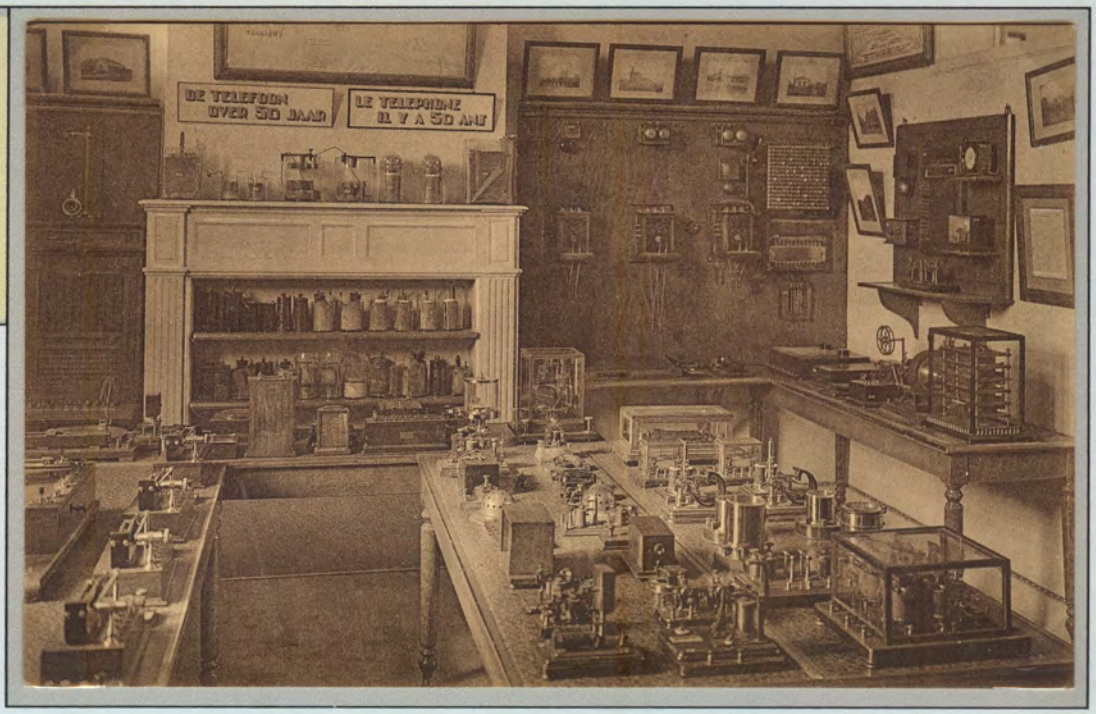




◄ *Pneumatic telegramme (Paris, France - 1895)*

Another major network of tubes in Paris was able to deliver **pneumatic mail;** a system to deliver letters through pressurized air tubes. It was in use since 1866.





Change after change came rapidly and expansion of the wired network grew fast and gained economic importance.

ill. Telegraphing and Morse code reception equipment displayed in Brussels Post Museum (1880-1913) ►



*Inflation letter (Germany) sent in 1923 from Siemensstadt to Duisburg (city nearby Berlin named after Von Siemens' company). Perfin SSW (**S**iemens-**S**chuckert **W**erke)*





Proof of studio (Paraguay): ill. first telegraph lines in 1860.

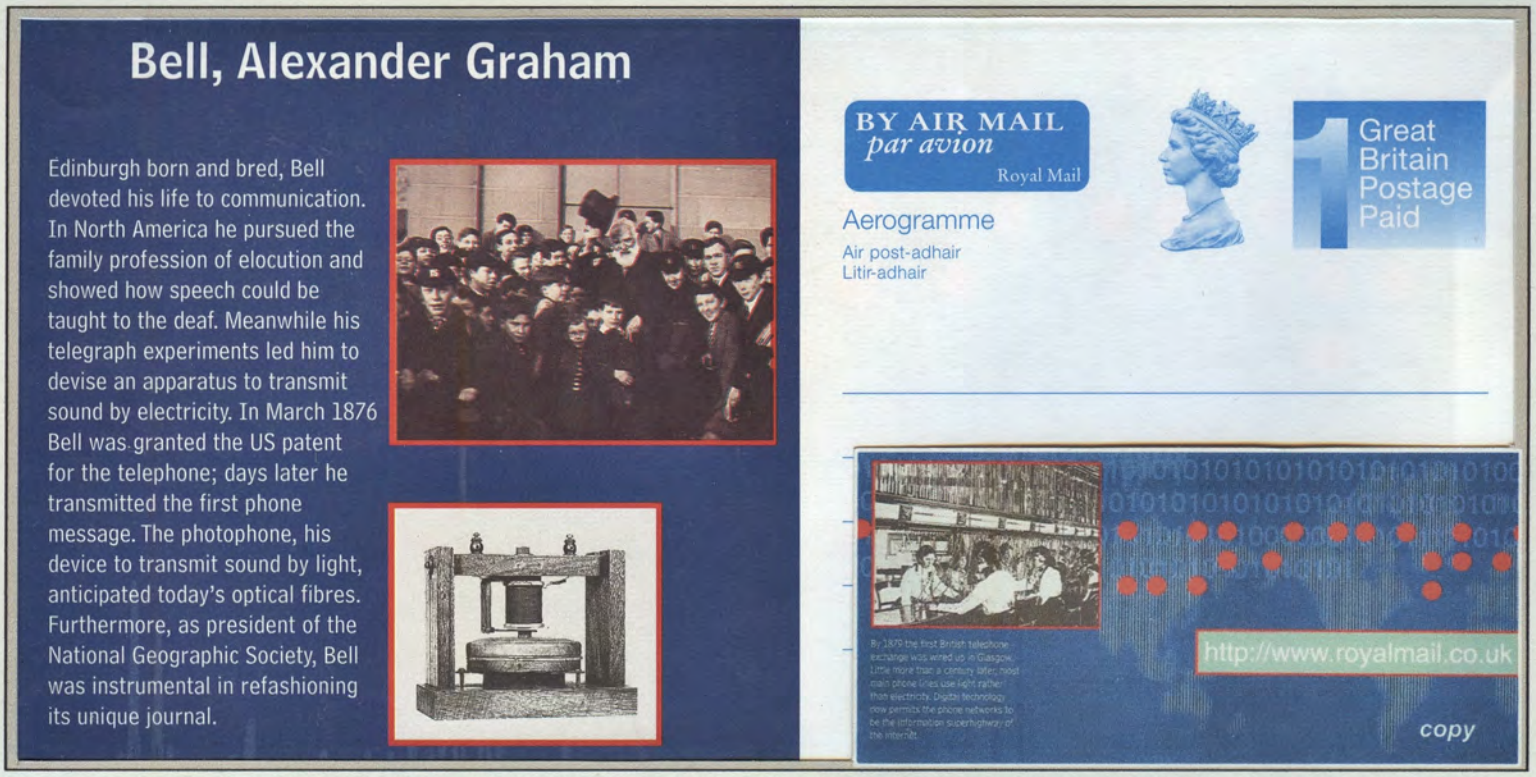
Werner Von Siemens (1816-1892) installed the first telegraph lines between Frankfurt and Berlin in 1848, and in Russia in 1850. With his brothers he went on to install lines between India and Europe, as well as across the Atlantic. Not only the Siemens company is named after him but also a whole city was named after him; ***Siemensstadt***.



Émile Baudot (1845-1903), French telegraph engineer and inventor of the multiplexed telegraph system, which means that multiple transmissions could be sent over a single line.

Alexander Graham Bell (1847-1922) was an eminent scientist, inventor, engineer and innovator, known for inventing the first practical telephone, by sending multiple tones on a telegraph wire. He also made groundbreaking work in optical telecommunications.





Aerogramme (Great-Britain) - Graham Bell stating; "The photo phone, his device to transmit sound by light. … a century later, most main phone lines use light rather than electricity. Digital technology now permits phone networks to be the information superhighway of the internet".



Telegram (Polish) 21.10.1927: Publicity Ericsson telephone and cable

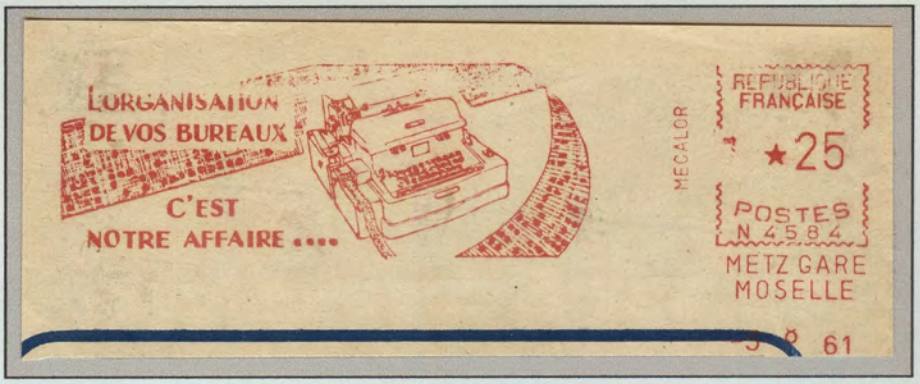
Ericsson's company history dates back to 1876 when the founder, **Lars Magnus Ericsson** (1846-1926), opened a repair shop for telegraph equipment. Realizing that there was a need for improvements in the telephone instruments available at that time, he started his own production. He invented a switchboard to handle the growing number of telephones and lines. They also tried a few years in 1980-90 to sell PC's, but found out that their core business was selling telephones.





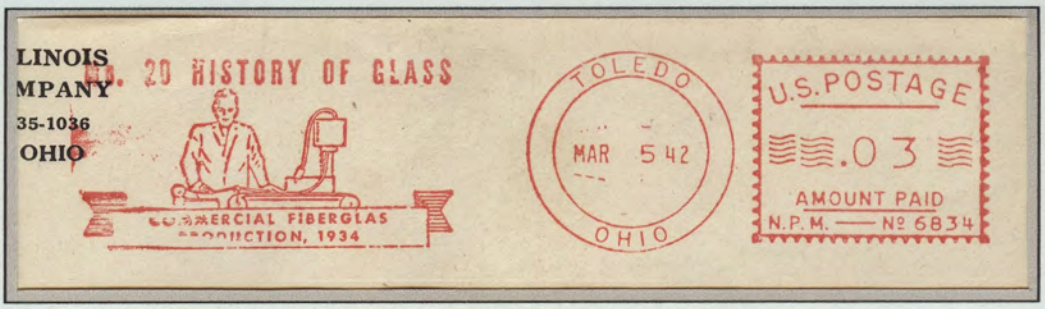
Telegram (Czech): Central equipped with telephone switchboard based on Ericsson model.





The telex network used the telephone network was extensively used worldwide by companies from the mid-1920s till the end-1980s. Telex machines could connect with and communicate with any other telex machines on a global scale and was also relatively secure in sending and receiving messages.





National Postal Meter multi-value (U.S.): early Fiberglass production



Until 1980s the entire telephone, telegraph and telex network was analogue. Today it is fully digital thanks to fiberglass, a product invented in 1932 for producing glass wool. The digital network protocol ISDN (Integrated Services Digital Network) became the standard allowing a copper wire or optical fiberglass (wire of glass) to carry fast and error-free voice, video and many other digital network services.



Telex punched stamp (Estonia-1991); Shortly after Estonia gained full independence, many post offices ran out of stamps. The city Tartu issued local provisional stamps on telex punch paper on 19 December 1991 only. They are never sold in mint condition and exist in sets of 16 stamps in three colours (white, light blue and dark blue).

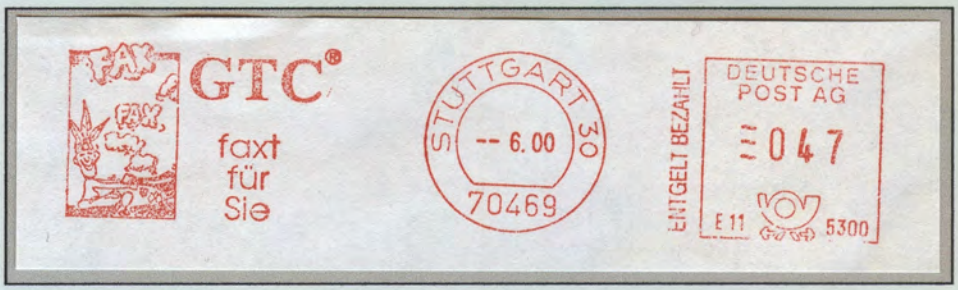
4.2 Replacing the old copper network by fiber.





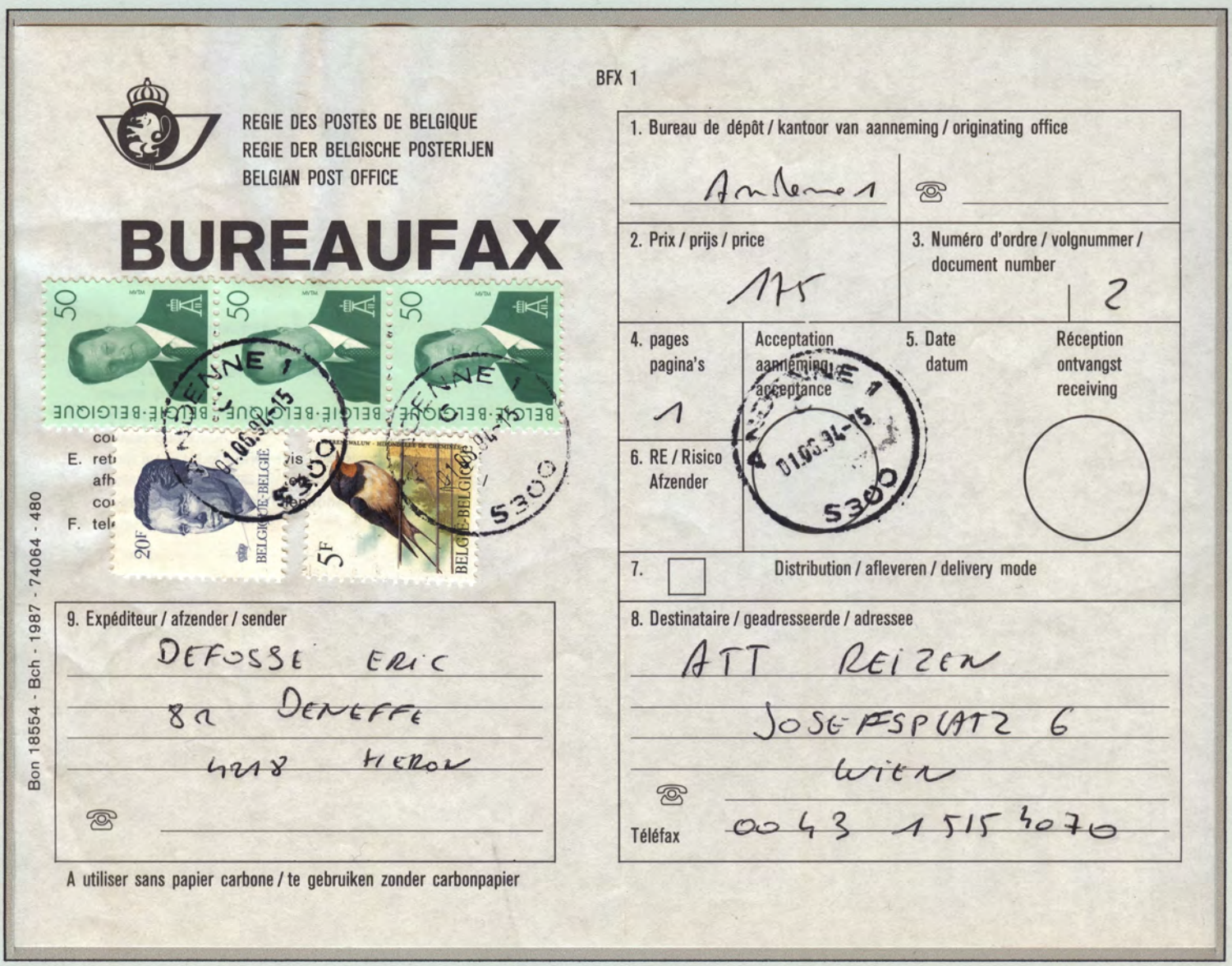




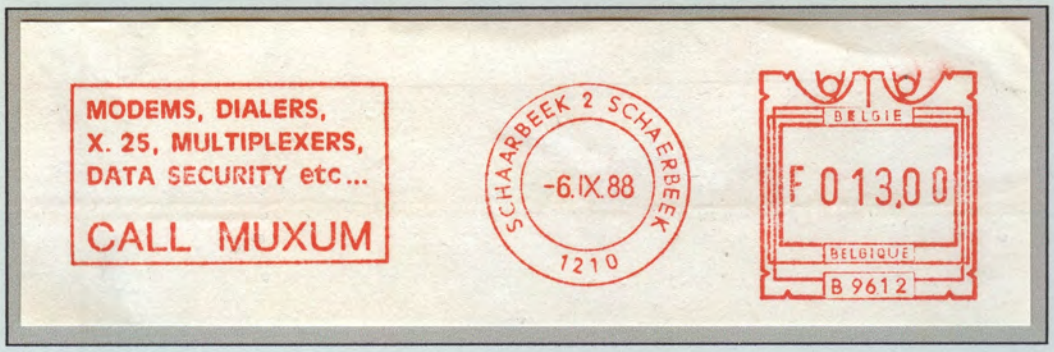


Pitney Bowes "6300" series (Germany): text: Fax messages

A fax machine makes a tele copy by scanning graphical pages including images and text, and converts the information into digital signals, transmitted via fast fiber lines to produce a paper copy of the graphics on the receiving fax machine. The growth in the market was prompted in Asian region by the pictorial nature of their language.



Telematic Fax service (Belgium) bureaufax document BFX1: serviced from 1 jan 1994 till 31 dec 1998 (national) – 31 aug 2001 (international). One page fax international sent (175BEF=4.33€) on 01.06.1994 from Andenne to Vienna (Austria).





The goal of a **modem** (constructed from ***mo***dulator and ***dem***odulator) is to (re)produce a signal containing data that can be transmitted fast. Different transmission protocols (shapes of packages sending a stream of bits) guarantees higher speed, availability, secured and quantity of bytes.





Cyan color proof ▶



For long distance communications applications a satellite in a geostationary orbit appears the fastest way. Since 1964 hundreds of communication satellites are in use worldwide.



Artwork (North Korea): satellite, satellite dish and man checking a terminal.



Satellites were introduced where wires weren't easy to place or to get. With satellite dishes pointing to a satellite easy transmission can be established served by radio waves over long distance without limits on capacity.



Specimen ►

◄ *Artwork (Tonga): telecommunication*



Die proof in black

Modern communications satellites provide a technology complementary to communication cables. They are the ultimate solution for mobile applications in transport area such as: trucks, ships, planes or rockets. A cable is just impractical or impossible.



LGRAM SERVICE CENTER
IIDDLETOWN, VA. 22645

POSTAGE PAID BY SENDER

stern union **Mailgram**

UNITED STATES POSTAL SERVICE
U.S.MAIL

MAILGRAM WAS TRANSMITTED ELECTRONICALLY BY WESTERN UNION SATELLITE

WILFORD WATSON
106 SIXTH AVE APT 4
MENOMINEE MI 49858



FIRST MAILGRAM TRANSMISSION VIA WESTAR,
FIRST DOMESTIC U.S. COMMUNICATIONS SATELLITE,
SEPTEMBER 6, 1974

*A **mailgram** is a type of telegraphic message which is transmitted electronically from the sender to a post office and then printed and delivered to the recipient via postal means, usually the next day. In the United States, the Western Union Com-pany started mailgram service in 1970. This service via Satellite was introduced in 1974 and stopped as of August 17th, 2006.*



Photo proof; design Bonnevalle



Francotyp "Cc/Ccm" (Spain): ill. Pabx of ITT company



Historically we may not forget the **PABX** (**P**rivate **A**utomatic **B**ranch e**X**change), an automatic telephone switching system within a private enterprise. Such devices were used to establish early telephone networks and switch digital information among computers and office devices.



Local area network



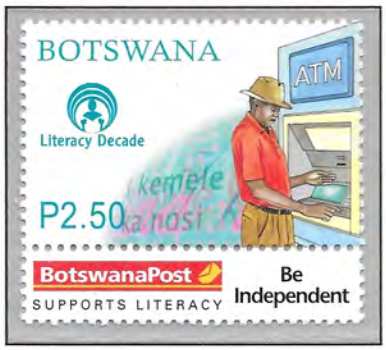
Hasler "Mailmaster" (Germany): ill. Local area network

A LAN (local area network) connects workstations and personal computers and allows users to share devices, such as laser printers and storage. Users can also execute programs any-where on the network and communicate with others by sending e-mails or engaging chat sessions.



During the World Stamp Exhibition PhilexFrance '89 in Paris a network of 50 terminals and 2 central printers was set up. A pre-printed postal card was sent after printing the typed in address, chosen preferred message out of 4 standard ones, paying the calculated rate depending on the address and the date time stamp.

An **automated teller machine** (**ATM**), also known as Cash Machine, or Cash point, is a computerized telecommunications device that provides the clients of a financial institution with access to financial transactions in a public space without the need for a cashier, human clerk or bank teller.







ATMs are connected to interbank networks, typically connected directly to their host or ATM Controller via either ADSL or dial-up modem over a telephone line or directly via a leased line.

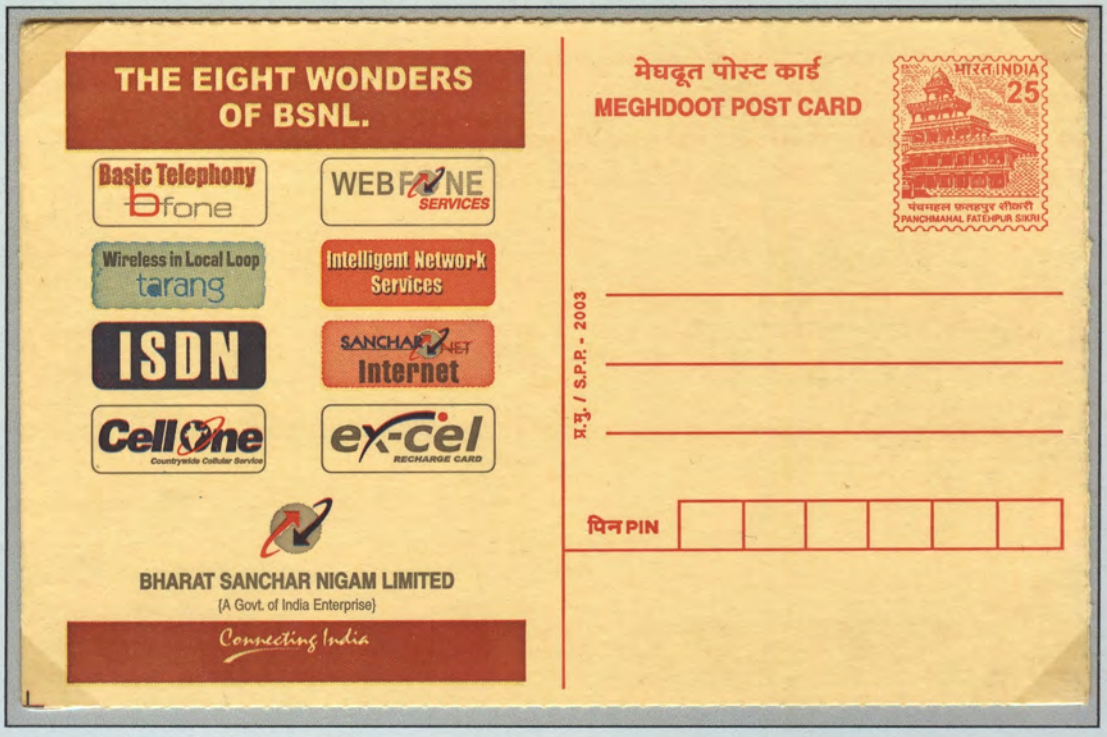




On most modern ATMs, the customer is identified by inserting a plastic ATM card with a magnetic stripe or a plastic smart card with a chip.

Every bank is providing their customer bankcards with a chip build in, in order to be able to do banking transfers without the need of intervention of the bank itself. These cards have multiple functionalities: ATM card, credit card, debit card and often also cash card (e.g. in Belgium called proton).





◄ *Meghdoot (India)*

While lines for telephone are less in use due to mobile telephony, those lines are now in use for ISDN and DSL activity that allows the user to access the Internet at home.



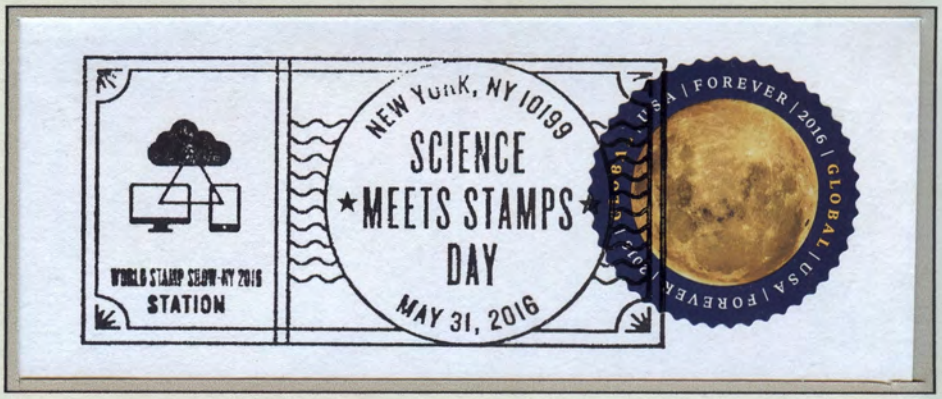
Connectors



Wi-Fi connection





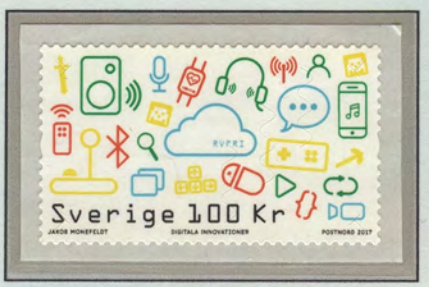


Wi-Fi and mobile connectivity thru wireless access introduced internet access in the Cloud; being "Cloud computing" and sharing data and software provided by service providers.



Bluetooth is summed up by this runic inscription from the Jelling stone.

Bluetooth is a wireless technology standard for exchanging data over short distances using short-wavelength and allow mobiles to link easily.
Bluetooth is an invention of Ericsson Company and gave it the name of a King called Blåtand who lived in the 10th century and united the Nordic countries.



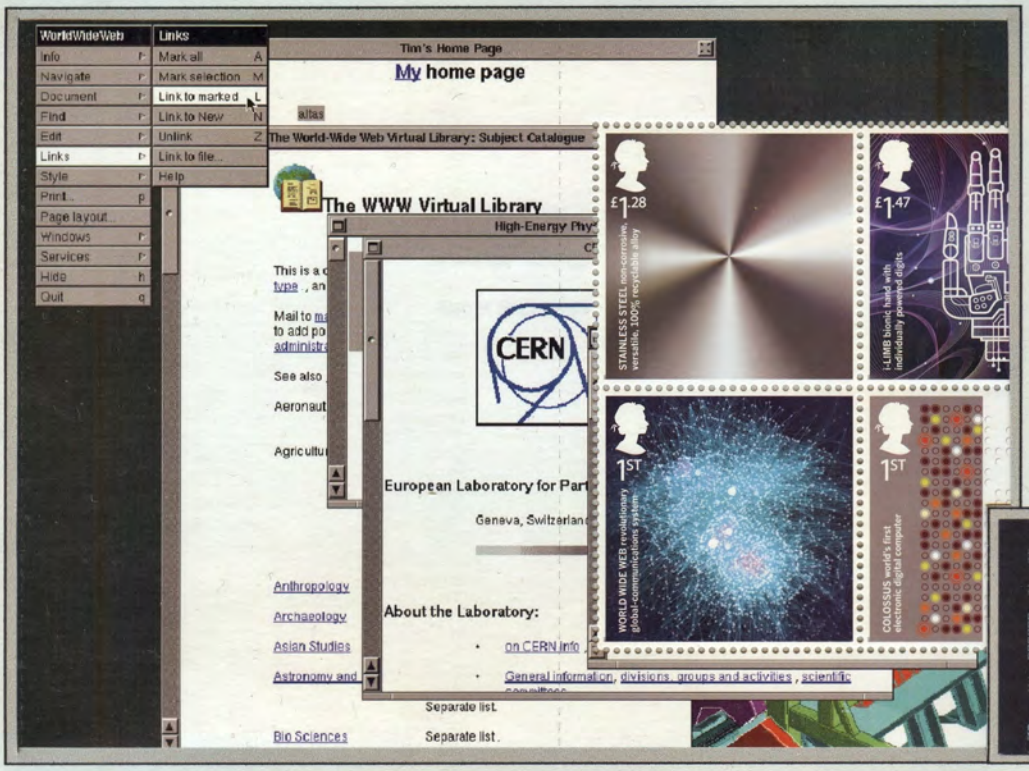
Bluetooth symbol

4.5 Internet, one big world!

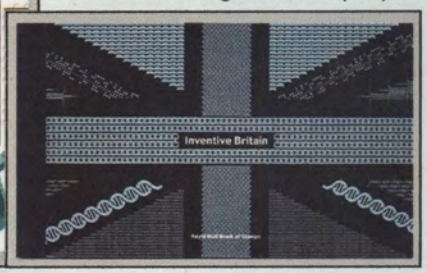
Invented by Barners Lee

The current global Internet was developed for the US Department of Defense as a reply to the atomic threat of the 70s. The goal was to build a global communication network based on TCP/IP (Transmission Control Protocol / Internet Protocol) to connect for non-commercial use.





◀ *Pane Prestige Booklet (GB)*



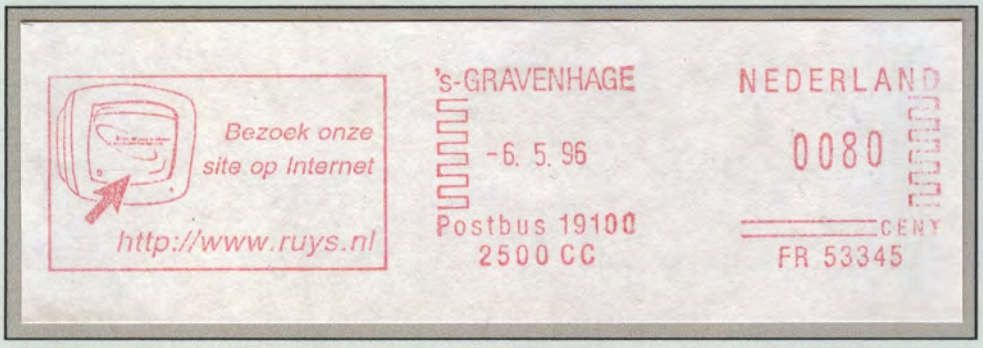
Barners Lee invented the WWW (World Wide Web) by using the HTTP (Hypertext Transfer Protocol) client en server via the internet. The first successful communication was in Christmas 1990 while he was working at CERN. The language developed for this is called HTML (HyperText Markup Language) using hypertext and hyperlinks (link or URL; Uniform Resource Locator) for immediate access via displayable links.

Internet became commercial and caused a drastic impact on culture and commerce.





"Surfing the Internet" is a common expression; exploring the internet by following one interesting link after another, usually without a definite objective or search strategy.



Francotyp-Postalia "EFS3000" (Netherlands): URL with text: visit our site on Internet



An Internet café

The Internet, the worldwide web, became available everywhere in the world, both thru privately or company connectivity. It became popular due to the published information and advertisements against payment, the start of first commercial use and need, in an easy way.


: 10 centimes.

UOTIDIEN Vendredi 4 Mars 1881

URRIER

-ET-LOIRE

PRIX DES ANNONCES

La ligne d'environ 35 lettres . . . . . 20 cent.
Annonces répétées . . . . . 15 —
Réclames à la troisième page . . . . . 25 —

BUREAUX

1, rue Fructidor,

CHALON-SUR-SAÔNE

Typographic cancellation (France - 1881): commercial advert against payment (text: Prix des announces) comparable with the first commercial use against payment on the internet



Every country and global network groups got their own extension (top-level domain like .com).

◄ *as an exception television channels wanted to have their own extension; they offered in 1998 the small country Tuvalu $50 million for using the* ***.tv*** *extension until 2048.*



Internet URL from Vietnam government http://www.thudo.gov.vn



◄ *Francotyp-Postalia "T1000" (Germany); http:// protocol header, www. public prefix and extension .de for German URL*





▲ *Electronic mail (E-mail)*



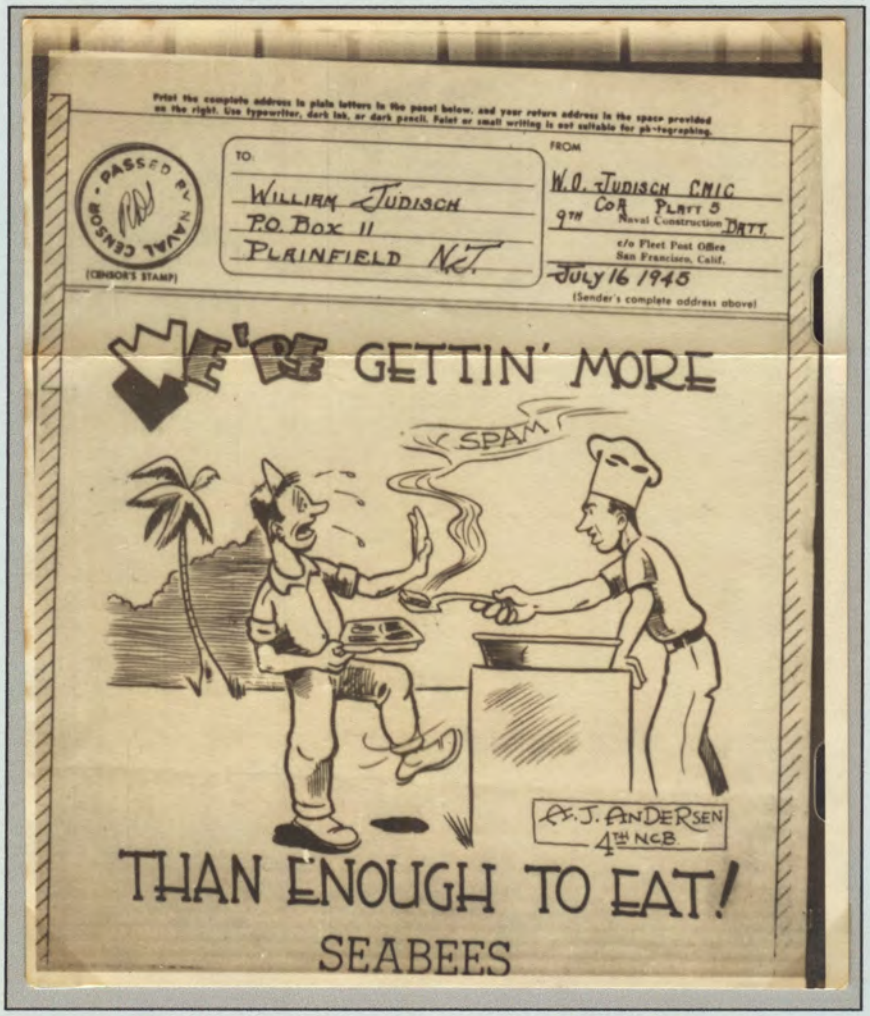
Now the world is fully connected to each other by all kinds of technology we can have the pleasure of sending E-mail (**Electronic mail**) automatically.



emoji's

Billions of messages are sent every day and some Internet slang and symbols has been introduced like: BTW, kr, ;-), *^_^*, ^3^, etc.... ***emoji's*** and shortcuts save time for the writer.





Seabees V-Mail (US): Naval Construction Battalions (CB): ill. Spam meat



You want to kiss someone



Spam was often misused to describe any canned meat product containing pork tasting horrible, all-over and inevitable, characteristics which led to its name being borrowed for unsolicited electronic messages, especially spam email.

It can be even quicker by using Instant messaging software which is a type of short message (chat), which offers real-time (online) text transmission over the Internet.







The internet gives quite some possibilities to all of us such as; online shopping, e-business or e-commerce and all kinds of e-governance (government online services),.







: e-business or e-commerce sign



Today e-commerce trading (shopping) is recognized for its ability to allow business to communicate and to form transaction anytime and anyplace, where buyers or sellers rely on Internet-based technology.



Booklet (France) Phil@poste version: miscut (découpé à cheval)-: Web Shop for stamps: text: Buy your stamps and other products online and receive it at your place. Address: www.laposte.fr/timbres



◄ *Port freedom - Red Cross - free Search Service for prisoners of war (Germany – 1949); if you wanted to know what happened to your relatives it took ages and it went by mail. Today they stay in touch thru Internet and Social Networks.*

Billions of Internet pages, millions of websites and hundreds of social media make it accessible and useful for all…



Icons social media for Twitter, YouTube, Facebook, rss feed, photo



…searching for information.

Social media are computer-mediated tools that allow users or companies to create, share experiences, or exchange information, about interests, ideas, with or without pictures or videos in virtual communities and networks.





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