

FROM ABACUS TO INTERNET

A story about the history and evolution of the computer and the many scientists who were involved in its development.

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One, two, one, two.....
Did Noah have the
earliest concept of
binary counting?



Total: 128 pages



The state of Office
Automation just over
100 years ago.



Man has been computing since time immemorial. Based on the basic tenet in mathematics that $1 + 1 = 2$, man has counted his possessions, measured time and distance, and expressed his world in numbers.

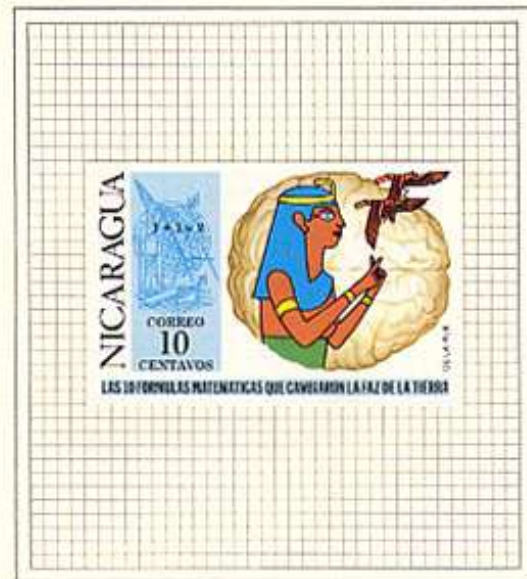


1.1.1. Counting on fingers

The first tools man used for counting were his fingers. Hence our use of the decimal system. Once learned, he never forgets it. It's a very "handy" tool indeed.



THOMAS DE LA RUE & COMPANY LIMITED, LONDON



PROOF NO. 269/43

DATE 11 2 71



Folded letter, dated 12 July 1674, from Ostend in Belgium to Amiens with manuscript fee in red of 4 Brabant sols



The earliest form of counting would be simple tallying, like this recording of the postal fee of 4 sols as 4 tallies (1674).

1.1.2. Abacus

The word *abacus* comes from the Phoenician word *abak* - meaning *dust* - as its oldest form was simply counting rows of pebbles on the sandy ground. It is a very old counting device, dating back to the Babylonians (3000 B.C.), and was widely used in Mediterranean as well as Arab and Chinese countries.

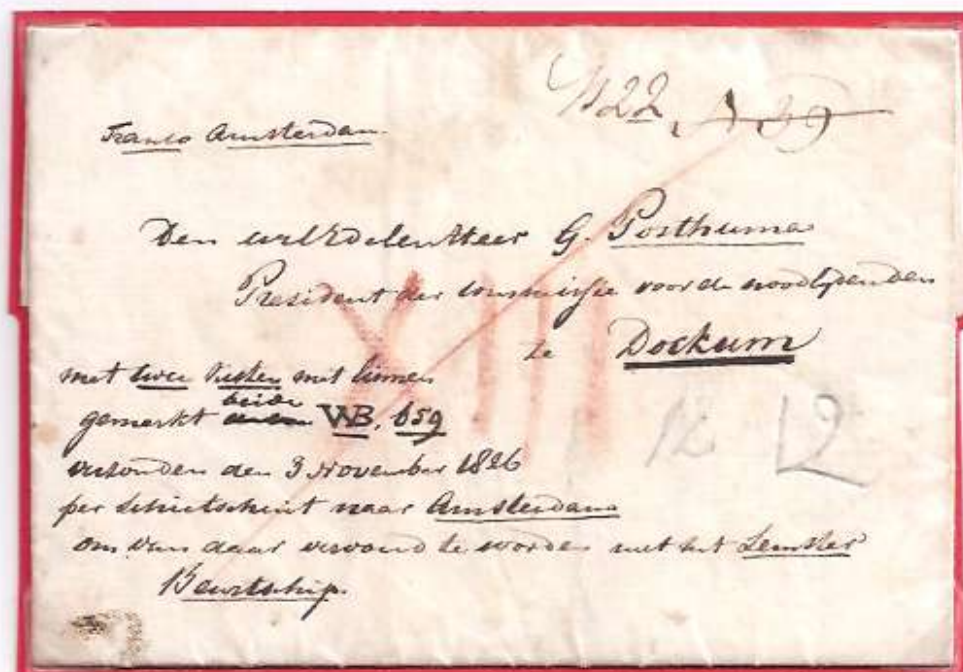


China Revenue stamp with h/stamp Hankow

The *suan pan*, as the abacus is called in China, is still widely used today to the extent that it is still a subject taught in school.



The Russian abacus - called *stchoty* - has a different layout: 10 beads on each wire, the middle two being black. The *stchoty* was invented in the 17th century.



Folded freight letter accompanying two chests with linen and clothing for the "Commission for the Poor". Sent from Utrecht via Amsterdam to Dockum (Friesland) 3 November 1826 via regular barge service. Manuscript "XIII" for barge freight fee of 13 stuivers.

During the first millennium Western Europe used the Roman notation for numbers. Although adequate for simple numbers it made calculations very difficult and only the educated few had learned to perform these computations. Although this changed around 1000 A.D., the use of Roman numerals continued for centuries.



Trial color proofs in ochre, carmine and blue

Pope Sylvester II (943-1003) was a well-known abacist who in 999 became the first French pope. By putting Arabic numbers above each abacus' column he replaced the Roman numbers by Arabic numbers in Europe - the system we currently use. This allowed people to perform calculations much faster and easier.





Japanese soroban (1936-03-01)

The Japanese abacus - the *soroban* - is still in use today and has been in use as early as the 16th century. Where the conventional abacus has two value-5 beads, the *soroban* has only one value-5 bead at the top.



Abacus Rekencentrum b.v.



1947 postal stationery Yugoslavia



Fragment of Tokoyuni Utawaga's "The Three Beauties" (1800) shows early use of the *soroban*.



The well-known children's counting-frame has its origin in the abacus.

"For it is unworthy of excellent men to lose hours like slaves in the labour of calculation which would safely be relegated to anyone else if machines were used".
Leibniz, 1685

The German philosopher and scientist Gottfried Wilhelm von Leibniz (1646-1716) invented the *Stepped Reckoner*, a machine able to perform the four basic arithmetic functions, using a hand cranked rotating drum with a stepped cylindrical gear.

PĂGINI DIN ISTORIA TEHNICII DE CALCUL





Filozoful și matematicianul german baron Von LEIBNITZ (1646 - 1716) proiectează (1671) și construiește primul multiplicator mecanic (Step Reckoner, 1694)

Expeditor:
Dan N. DOBRESCU
Sos. Ștefan cel Mare nr. 4
Bl. 14, sc. B, et. 3, ap. 47
011737 București 63

Destinatar:
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SOUTH AFRICA

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ROMANIA 5000 L

QR code

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An d. f. Herrn Ray. Landmeister
K. Rieger

Mannheim 6
195

München 8

auss. Maximilian-h. 3. III

Stroße, Hausnummer,
Gebäude teil, Stadtteil

Pneumatic Post envelope with additional 5 Pf Registration fee

Quote:

"There are 10 kind of people: those that understand binary, and those that don't."

Anon.

Leibniz went on to develop binary arithmetic. This became the basis for modern-day computing as all digital computers use the binary system internally.

Leibniz also proposed the basis of a language that would allow logical statements to be dealt with mathematically.

The essence was the use of the digits 0 for FALSE and 1 for TRUE.

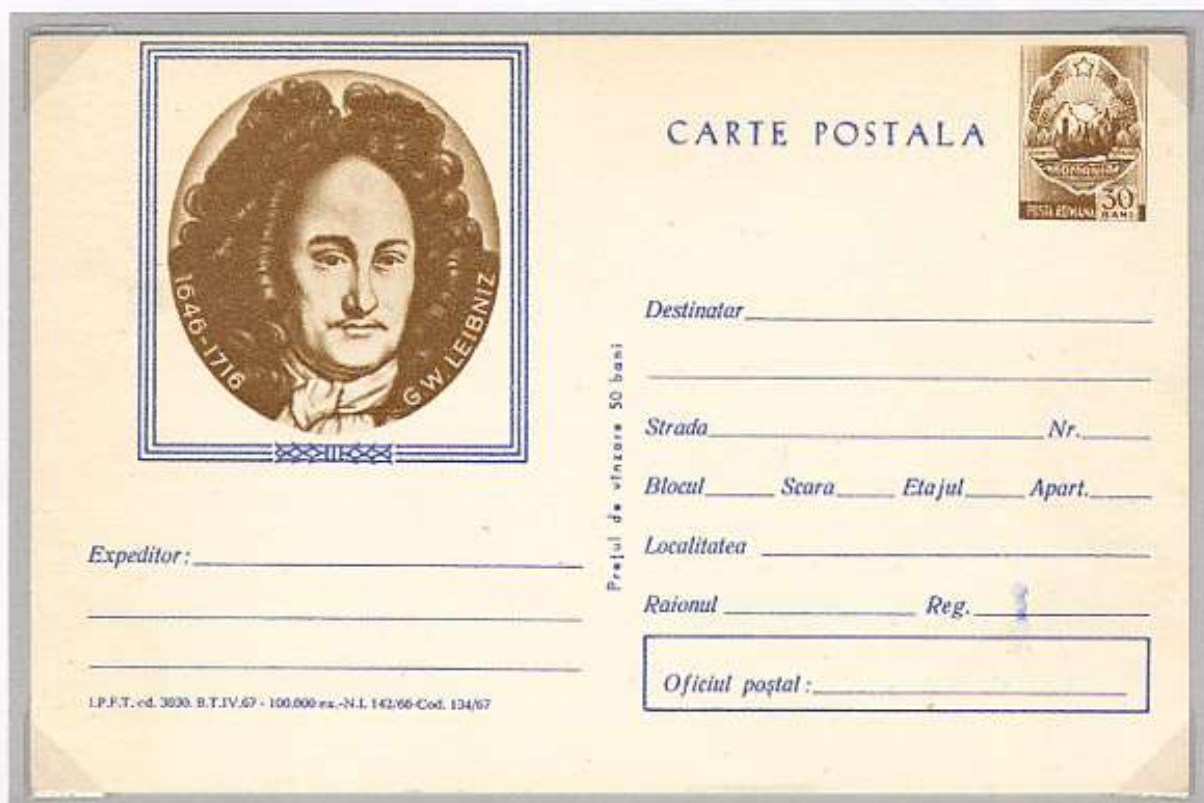


shifted green

Girl scouts in the U.S. receive a badge for computer literacy (second badge, left column) showing a string of 0 and 1 bits



bit strings



The French mathematician Blaise Pascal (1623-1662) invented a mechanical adding machine in 1642, the



Die Proof, signed by engraver Mazelin, with embossed stamp "contrôle"



The programming language "Pascal" was named after this pioneer of computing, one of the many ways in which he has been honoured.



Proof block on cardboard



Artist proof, in blue, on gummed paper with colour code in pencil





Babbage's
"Difference
Engine"



The English mathematician Charles Babbage (1791-1871) designed a "Difference Engine" in 1823, an advanced form of calculator using a large number of gears.



"Another age must be the judge"

CHARLES BABBAGE

THE ROYAL SOCIETY

Royal Mail Book of Stamps

Detail of
Babbage's
"Analytical
Engine"
(drawing of his
"Difference
Engine" in the
background)



...*'to innovate'* { Charles Babbage FRS (elected 1816)
Tim Berners-Lee FRS (elected 2001) }

THE ECCENTRIC AND "IRASCIBLE GENIUS" Charles Babbage (1791-1871) was the quintessential Victorian gentleman-scholar. Of his huge range of interests, most were underpinned by his fascination for mathematics. He was a particular connoisseur of mathematical tables – and their all-too-frequent human errors. According to legend, he was examining some astronomical tables with his friend John Herschel (also a Royal Society Fellow) when, exasperated by the mistakes in them, he exclaimed: "I wish to God these calculations had been executed by steam!" This is said to be the moment that launched an obsession which would consume most of the rest of Babbage's life.

Starting in 1821, with his famous 'Difference Engine', Babbage designed a series of machines intended to perform infallibly accurate calculations. The Society gave approving reports to the government on his proposals, and his work received funding. His later Analytical Engine, conceived in 1834, was the world's first programmable computer.

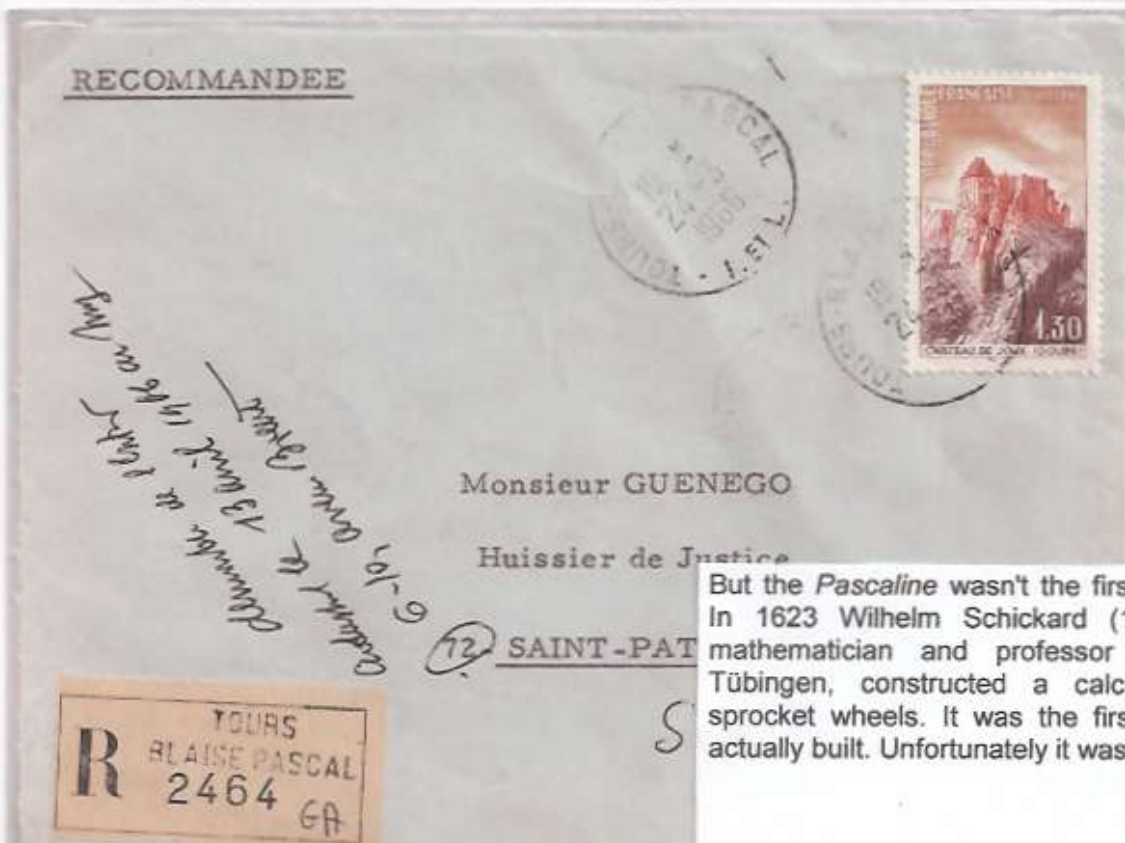
Opposite - Charles Babbage, father of machine computing, 1860.
Opposite (background) - Sketch of Babbage's decimal calculating apparatus, 1835.
Below left - Experimental assembly of Babbage's Analytical Engine, 1834-72.
Background - Drawing of Babbage's Difference Engine No. 2, 1847-49.



Pascal's *Pascaline* was a 5-digit calculator about the size of a shoebox. Its mathematical capabilities were however limited in that it could only perform additions. As it had a tendency to jam, it did not become a commercial success and only about 10 were sold.



Folded letter flown with "Le Jules Favres No.2" departing from Gare du Nord on 30 Nov 1870, landing next day on Belle-Ile-en-Mer. Cancelled with rare Star of Paris 29 combined with Rue Pascal cds. The Rue Pascal Post Office in Paris existed only for 8½ years (December 1864 - April 1873). Following its closure, the Star of Paris 29 cancel was assigned to Rue Monge.



France has honoured her famous son publicly in many ways, such as streets, schools and suburbs.



But the *Pascaline* wasn't the first mechanical calculator. In 1623 Wilhelm Schickard (1592-1635), a German mathematician and professor at the University of Tübingen, constructed a calculating machine using sprocket wheels. It was the first mechanical calculator actually built. Unfortunately it was lost in a fire at the time.

The French weaver Joseph Marie Jacquard (1752-1834) invented a loom in which changes in pattern could be controlled ("programmed") by feeding in a set of punched cards.



Artist proof, in blue, signed by Ouvré

The Jacquard loom became the first programmable device to be perfected.



The same concept is applied in the barrel organ and the Dutch street-organ: using a continuous strip of punched cards to control the music.



2350 Neumünster

Das internationale bekannte Textilmuseum zeigt die Geschichte der Spinnerei und Weberei und auch die Kleidung der Bronze- und Eisenzeit

Gabler Willi
(Absender)
Laubenbacherstr 19
(Postfach oder Straße und Hausnummer)
6682 Ottweiler 4
(Postleitzahl) (Ort)

Postkarte

Redaktionsdirektion

Postfach

(Postfach oder Straße)

4630
(Postleitzahl) (Ort)



The punched cards controlling the Jacquard loom (see above) would later be used to drive the tabulators and ultimately the first computers.

Charles Wheatstone (1802-1875) was an accomplished maker of musical and other instruments. He invented the electric telegraph in 1837.

The telegraph was enhanced by Wheatstone's invention of the automatic transmitter in 1857 where the message was first punched out in a strip of paper, thereby introducing the paper tape as medium for preparation, storage and transmission of data.



Wheatstone tape



One character on a Wheatstone tape



Baudot tape



One character on a Baudot tape



Morse tape



Wheatstone's paper tape used two perforation channels to represent Morse's dots and dashes plus a perforated transport channel to guide the tape. Multiple tracks were needed to represent one single character.



Wheatstone tape and telegraph



Teletypes or teleprinters had intricate mechanisms for reading paper tape. This enabled speeds of 500 characters per minute in 1930. By the mid sixties this had increased to 900 char/min. Discarded paper tapes were often used in the famous "ticker tape" parades in the United States.

WHEATSTONE TELEGRAM.

Station to



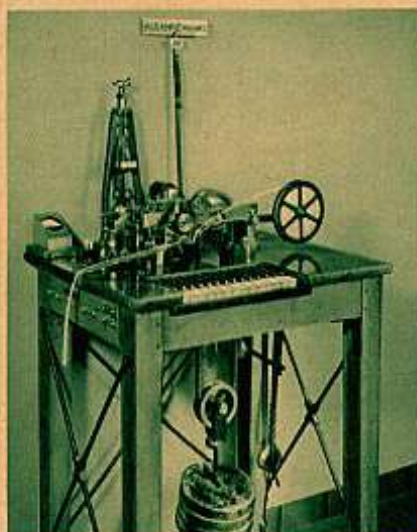
Time Sent

SCHWEIZERISCHES PTT-MUSEUM
MUSÉE DES PTT SUISSES
MUSEO PTT SVIZZERI

BERN



POSTKARTE CARTE POSTALE CARTOLINA POSTALE



HUGHES 1869-1939

Typendruck - Telegraphenapparat
Appareil télégraphique imprimeur
Apparecchio telestampante

Translation:

FI 5 L IN 76 SYDNEY
251S9 11 50 29th X BLACK
PICKLES CONTRACTORS
JUNEE X GLASS BROKEN
PAUL BLAMEY PLEASE
SEND MEASUREMENTS
YOUR PRICE FIXING
INCLUDING CARTIGE WE
TAKE RISK ALSO STATE
VALUE OF SALVAGE X
SANDY

Notice the piano-like keyboard for typing the letters.

Jean Maurice Emile Baudot (1845-1903) was a French telegraphy expert who invented a method to transmit several messages simultaneously over a line ("time-division multiplex"). He expanded the use of the paper tape by developing a five-bit code using five perforation channels. He has been honoured in having the speed for information transfer named after him: 1 Baud = 1 bit / sec.



Black Print

The paper tape made it possible to transmit messages much faster than the speed of typing. The teletype was the device used later for this purpose. Before the arrival of the computer screen, the teletype was used as a computer terminal, having both input and output facilities.

Austria's *Schwartzdrucke* were issued in limited numbers for publicity purposes from 1946 onwards.



Type I

This 1958 USSR stamp features, apart from the teletype, a number of flags. The Czechoslovakian flag on the left is upside-down. The flag shows a red strip, a white strip and a blue triangle on the right. The stamp design is incorrect in showing the red strip at the top (Type I). The stamp was re-issued six months later with the flag positioned correctly (Type II).



Type II

Most paper tapes use a 5-channel code, which is based on the 5-bit Baudot code. Each character is represented by a unique combination of holes in a row across the channels.



9-bit code

the holes in the tape spell:
MISSING LINKthe holes spell:
OTOMATIK TELEKS

Using the Baudot code one can sometimes decipher the meaningful message spelled by the holes in the paper tape.

7-bit code
paper tape

the holes spell: PRIVATE SWITCHING NETWORK



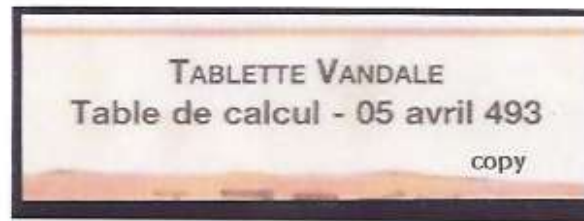
When Estonia in 1991 established its own postal rates, the USSR retaliated by no longer sending sufficient postage stamps to Estonia. To alleviate this shortage the Tartu Observatory's computer was used by Eesti Post to manufacture perforated paper tapes which could be used as stamps. White, light blue and dark blue paper coils were used, all 25 mm wide. All "stamps" received a red 30 mm h/s Tartu with date 19129100 (December 19, 1991) as proof of authenticity (applied before usage).

1. The Mechanical Age: 1.1. Early Counting Tools

1.1.3. Other early calculating mechanisms

1.1.3. Other early calculating mechanisms

Even the early societies had learned to calculate, using tools like this wooden **Calculation Tablet** from 493 AD used by the Vandals in Northern Africa.



The most ancient and complex machine is the **Antikythera Mechanism** which was built around 87 BC. Recent computer-enhanced imaging studies of the bronze artifact showed it to be an intricate gear-driven analog computing device used for calculating and displaying astronomical cycles.



The **Nebra Sky Disk** is another astronomical instrument dating back to 1600 B.C. The analog device was possibly used to compute summer and winter solstices.



only exists
with overprint

Quipu

[from the Peruvian Inca language *Quechua*, meaning "knot"]

The quipu was used by the Incas in Peru around 1500 and was based on the decimal system. It consisted of a stick or cord to which knotted strings of various colors were attached. It was used extensively for accounting purposes, like calculating crop sizes, etc.



The knots at the end of the string stood for one, while those higher up stood for ten, hundred, etc.



die proof



Special messengers carried the quipus around the country to the different cities and villages, thereby acting like early postmen.

Many scientists have looked for better and faster ways to do complex calculations. Initially the search was for a mechanical solution to the problem of adding and subtracting numbers.



The earliest form of a rudimentary adding machine is a technical drawing found in Leonardo da Vinci's (1452-1519) recently discovered papers, the *Codex Madrid I*. Obviously Da Vinci was not only a painter, but also an engineer, inventor, astronomer, architect and brilliant mechanic.



Chateau d'Amboise (where Da Vinci died in 1519) in the background

Artist proof signed by Decaris

Da Vinci's stepped gearing wheel machine was the first scientific attempt to construct a mechanical calculator. In 1968 IBM arranged a replica of Da Vinci's machine to be built.



Slide rules were used extensively right up to the seventies all over the world.



COPY of reverse
Only one exists

Francotyp specimen card for ARISTO slide rule dealer (see also page 22).

Stempelbild



7.1.59
ARISTO
ZWEISEITEN-
RECHENSCHIEBER



Francotyp: Ccm 10 266 Kennzahl:
Firma: Dennert & Pape Verkaufsgesellschaft
Post: (24a) Hamburg-Altona 1
Motor DETWE Nr. 116 995 220 Volt 1/30 PS Allstrom
Uebersetzung: Motor Masch. Riemen
Geliefert: 18. Dezember 1953
Wertkartenbetrag: DM 500,--
Postschlüssel: Permutationsnummer: K 5491
Klischee: 1 auswechselb. fest

Spezialeinrichtungen:

Merkmale: mit Stückzahl:
238.455

Stolzenberg. 3000. 6. 53

Kenner
verlangen

ARISTO

28.1.59
ausgew.
ARISTO-Scholar
in die Hand
des Schülers

John Napier (1550-1617), a Scottish mathematician and philosopher, was born at Merchiston Castle near Edinburgh. In 1614 he published his *Mirifici Logarithmorum Canonis Descriptio* in which he described the concepts of logarithms. He also published a simple way to perform multiplication, the *Rabdologiae* which became known as Napier's "Rods" or "Bones", one of the earliest attempts at a mechanical means of doing calculations.



Napier's logarithms resulted in the invention of the slide rule in 1633. This device enabled scientists to do mathematical calculations much quicker, especially multiplications, divisions and logarithmic calculations. The slide rule became obsolete when the electronic HP-35 pocket calculator arrived on the scene in 1972.

Die Rechenkunst im Geiste der Zeit! Die Stenographie des Rechnens!

Kaufleute! Rechnen mit Nestlers kaufmännischem Rechenschieber
No. 40 D. R. Patent

Preis: einfache Ausführung RM. 3.75 | einschließl. Anleitung
Präzisions- " RM. 12. |

und mit Nestlers neuer Rechenwalze

No. 45 53 cm lang D. R. Patent RM. 240.—
Sie ersparen sich dadurch eine Ansumme von Arbeit und Zeit! Erlernung spielend leicht!

Albert Nestler
Aktiengesellschaft
LAHR I. B.

copy

Genüß
die Kautipoff!

Albert Nestler was a well-known German manufacturer of slide rules and mechanical calculators. Notice this 1928 advert for his calculating drum and slide rules (perfin A.N. on private stationery, cds 17.2.28).

1.3.1. Adding Machine

The main use of the adding machine was to add up columns of figures. They were powered by electricity or, in the earlier versions, by means of a manually operated lever. The adding machine was an intermediate step in the development of the calculator.



Cylindrical adding machine made by Johann Christoph Schuster in 1820.



VICTOR
ADDING MACHINE CO.
Exclusive Manufacturer of Adding Machines
 100 NORTH ROCKWELL STREET
 CHICAGO 18, ILLINOIS



HAMANN & VICTOR



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 à
 CALCULER**
 Ultra
 modernes

**REKENING-
 MACHINEN**
 Ultra
 modern

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 SOCIÉTÉ ANONYME

8 - 10, rue Montagne-aux-Herbes-Potagères

BRUXELLES - Téléphone 17.40 46

DER CHECKS
 trassel
 DIENST
 SUTTREKSEL

Jan 21 1945.12

copy

advertising on reverse of 1936 Belgian Postal Cheques envelope

The Victor Adding Machine Co was founded in 1918. This 1935 model had a full keyboard (one key for each number in each position) and printing facilities. In 1968 Victor became part of Nixdorf.

The Cosmos Büromaschinen company was founded in 1921 in Berlin. Initially it manufactured adding machines but later it also produced calculating and bookkeeping machines.

21.8.29. Alte Wertkarte entfernt.

15.12.29. In den Zahlrädern im Drucktisch war Papier drin.

31.12.29. Feder von der Auslösung gerissen.

2.8.34. (hier) Hautschicht, Zählblech neu, Spritzgusskronen neu, Zählblech mit grossen Rissen neu, Röhre ausgebaut, Zähler überholt, Förderwalzen neu, Gummiringe und Zahnräder pos. 37/1 neu, Räderatz für Förderantrieb 3/4 neu, Förderwalze neu.

18.8.34. Maschine in Ordnung

6.3.36. Maschine gereinigt und geölt

182410/0183

Stempelbild

9042

BERLIN NW
29 4 29
21

Dr. Erich Henschke
Elektrotechn. Fabrik

DEUTSCHES REICH
000

Francotyp: C 1203 Post: Berlin NW 21 SW 68

Firma: Dr. E. Henschke Cosmos

Motor: 1/2 Nr. Volt Ps

BERLIN SW
-2 8 34
68

"Cosmos"
Addier-
Rechen und
Buchungs-
Maschinen

Verkauf! Reparaturen!
Mietweise Abgabe!

045
Deutsches Reich

gel. 29.4.29
100 -
te Nr.:
ner: 2569

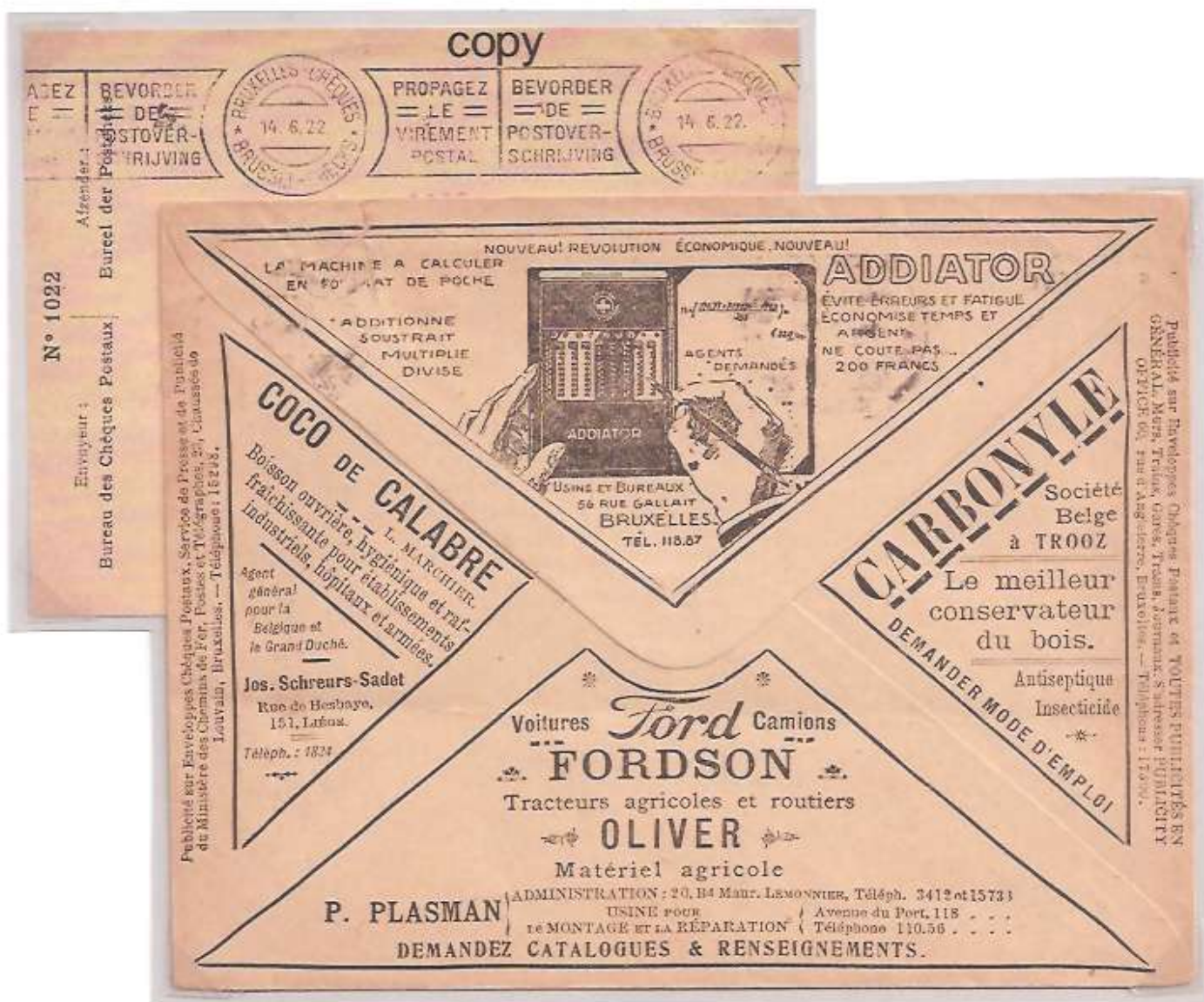
Spezialeinrichtungen: in Untergestell u. Kasten

Merkmale:

The Francotyp company used specimen cards (Musterkarte, Stammkarte) for each franking machine installed with a customer. These cards recorded the first (the oldest) metermark for that machine by glueing a strip with a sample strike of the metermark on the front of the card. This sample strip was manuscript dated. All changes and repairs done to the machine were noted on the back (see copy above). As such they show a unique record of that specific automatic franking machine. The card above shows that machine C1203 first belonged to another customer (Dr. Henschke), but was re-used for the Cosmos company.



One of the most amazing handheld adding machines/calculators was the *Curta*. This ingenious apparatus was developed by Curt Herzstark while imprisoned in Buchenwald concentration camp. The first *Curta* was produced in 1947 and has been popular ever since. Even today a *Curta* is a prized possession.



1922 Belgian Postal Cheque cover, free franking, with advertising Addiator

The *Addiator* was invented in 1889 by J.L. Troncet of France. This manually operated slide adder was sold from 1920 to 1950. As it was fairly small and light in weight, it could be handheld - an early pocket-adding-machine.

1.3.2. Calculator

Early calculators were all mechanically driven and they differed from the adding machines in that they could perform also multiplication and division operations.



PAGINI DIN ISTORIA TEHNICII DE CALCUL



Calculator mecanic Aktiebolaget Original Odhner model 7 (număr serie 130164), fabricat în Suedia, GÖTEBORG, în jurul anului 1940 (Colecția Miruna CAMINESCU)



Carte poștală

Willgodt T. Odhner (1845-1905) hand built his first pinwheel calculator in 1874. Odhners and other mechanical and electro-mechanical calculators would stay around for nearly one hundred years.

Cristalleries du Val St. Lambert



1954 Swiss Postal Cheque envelope



Hans Blättler, Zürich 7/32
Schreinerei - Ladenausbaue
Hofackerstrasse 13a
Tel. 24 67 08

Steuer-Erklärung

Steuerberatung - Steuerrekurse
Buchhaltungen - Mietsachen
Rechtsberatung - Liegenschaftsberatung

Dr. jur. P. LEUMANN
ehemal. kant. Steuerkommissär und
kant. Beamter für Mietsachen
ZÜRICH 1, Waldmannstr. 6 (bei
der Rämipost), Telefon 34 62 68
MEILEN, Raingässli, Tel. 92 75 62



Ideal für Kontrollen aller Art
RN FÄCHER-KARTEI
schnell - zuverlässig - preiswert



Odhner calculator in the centre,
electronic calculator on the left

LICHT-KRAFT TELEPHON

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E. WINKLER & CIE
ZÜRICH 1, Löwenstrasse 1
(Sihlporte) Tel. 25 86 88

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gung von Ausschussteilen u. abgenutzten
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/oredlung A.G., Zürich 11/50
aße 26 Tel. (051) 46 43 88



Die
Additions-
maschine
für alle
Ansprüche

FREI & TOBLER
Werdstrasse 56 Telefon 25 71 82

copy

Missionstrasse
ce des postes
Vero postale

In 1892 the Braunschweig company *Grimme, Natalis & Co, A.G.* acquired the patent rights from calculator builder Willgodt Odhner for Germany and surrounding countries and renamed itself *Brunsviga Maschinenwerke A.G.* In 1959 Brunsviga merged with typewriter company *Olympia* although Brunsvigas were produced up to the early seventies.



1942 German war cover to occupied country, opened by German censors



The Monroe Calculating Machine Co was founded in 1912 by Jay R. Monroe and became well known for its electro-mechanical adding machines and calculators. When the Japanese low-cost electronic calculators hit the market in the mid-seventies, the manufacturers of electro-mechanical calculators went into decline. The Monroe company, which had manufacturing plants in Orange, New Jersey and Amsterdam, Netherlands, was sold in 1984.



1937 Belgian Postal Cheques Services cover with advertising for calculators

Many companies, which were already used to producing mechanical precision instruments, started to include mechanical calculators in their offerings. Example: Singer (sewing machines), Remington (typewriters and firearms), Olivetti (typewriters), Friden (franking machines) and others. In the end, few would be successful.



The Walther Company, originally a manufacturer of guns (remember the *Walther PK* handgun used by James Bond?), started in 1924 with the manufacture of mechanical calculators. In the seventies it switched to electronic calculators but ultimately it lost the battle for survival and had to close in the early eighties.

| | | | |
|---------------------------------------|------------------|---|--------|
| | | | |
| | | Rechenmaschinen Saldiermaschinen | |
| | | WELTBEKANNTE WERTARBEIT | |
| Francotyp: C 41015 | | Kennzahl: | |
| Firma: Walther-Büromaschinen G.m.b.H. | | | |
| Post: (14a) Niederstotzingen (Württ) | | | |
| Motor: | Nr. | Volt | PS |
| Uebersetzung: | Motor | Masch. | Riemen |
| Geliefert: 1.7.1954 | | | |
| Wertkartenbetrag: DM 500.-- | | | |
| Postschlüssel: | | Permutationsnummer: B 3205 | |
| Klischee: | 1+1 auswechselb. | fest | |
| Spezialeinrichtungen: | | | |
| Merkmale: 245.758 | | | |
| | | | |
| WELTBEKANNTE WERTARBEIT | | | |

Stolzenberg. 3000. 11. 53.

1954 Francotyp specimen card for the Walther company showing the Francotype metermarks sample

In the early fifties calculations were still being done using mechanical or electro-mechanical calculators. It would take a few decades before that scenario would change. Most of the calculator manufacturers that were so successful in the fifties and sixties would not survive much beyond the seventies when the electronic calculator appeared.

FACIT-ODHNER, INC.

FACIT-ODHNER, INC., 222 E. 44 ST., N.Y., N.Y. 10017
SERVICE DEPT., 609 W. 51 ST., N. Y., N. Y. 10019



Facit-Odhner was a subsidiary of Facit. The Facit company was sold to Electrolux in 1973 following rapidly declining sales. In 1983 it was again sold to Ericsson and in 1998 Facit was finally terminated.

Wenn Facit rechnet:



Alle Operationen
mit einer Hand!

FACIT

Facit-Vertrieb AG., Zürich 1, Löwenstr. 11 Tel. 051/275814



Innen-
dekoration
Vorhänge
Polstermöbel
Tapeten
Wandstoffe

Tapeten Willy Eggersmann
USTERSTRASSE 23 ZÜRICH 1
Tel. 25 60 25



Rotag 45 Zürich Tel. (051) 23 40 57

Fahrschule und Lehrbüchlein von
W. TRACHSEL Ing.

werden auch Sie bestens befriedigen
Zürich 3, Zentralstr. 2, Tel. 33 65 44

S. Zürich 47



Fabrik + Bureau
Malzstr. 9, Zch. 3/45, Tel. 33 19 44



OETENBACHGASSE 5 - TEL. 051 / 23 30 00

Vervielfältigungs-Studio
J. OEFELI

Zürich 1/25
Niederdorfstr. 3 Tel. 245989

1954 Swiss Postal Cheque envelope with advertising on reverse

The first FACIT calculator was produced in 1918 by the Axel Wibbel firm in Stockholm. Initially hand cranked, from 1934 the calculator became electrically powered. The FACIT model ESA, shown above, was introduced in 1945 and already had automatic division and multiplication.



The Astra calculator was produced in 1922 by the Astrawerke A.G. company in Chemnitz, Germany. It was a 10-key hand-cranked machine with [00, 000] multi-zero keys.



MARCHANT
CALCULATING MACHINE COMPANY
1475 POWELL STREET
OAKLAND 8, CALIFORNIA

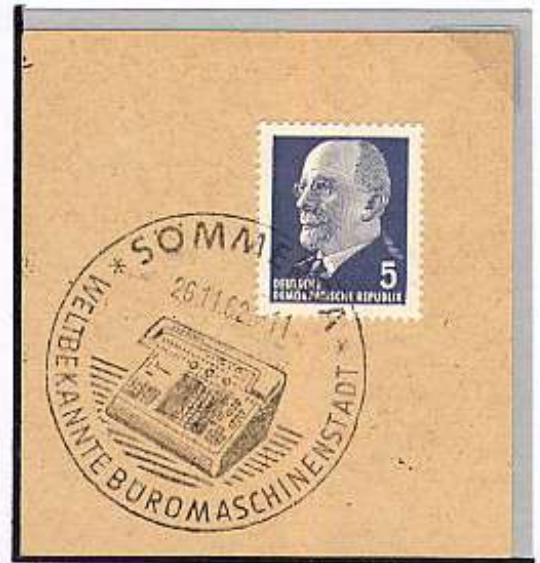


The Marchant Calculating Machine Co was founded in 1911 by Rodney and Alfred Marchant in Oakland, California.



In the forties and fifties, Marchant made electromechanical rotary calculators with a 10x10 keyboard. Then it was overtaken by electronic calculators. After being sold in 1958 it altogether ceased to exist in the eighties.

Electronic advances after World War II led to the development of the electronic calculator, and so became another step on the Information Super Highway. The increased functionality meant the demise of the slide rule as calculating tool.



Frankopost proof meter with Precisa electro-mechanical calculator



Friden was bought out by Singer in 1963 and became its Friden Division. As Friden also made franking machines (note the "FR") it used the same franking slug for the Singer company (yes, as in sewing machines).



1.3.3. Cash register



The cash register is a special-purpose calculator. It was first made in 1879 and used in retail to prevent unscrupulous sales staff not ringing up a sale. Hence the bell when a sale was rung up which could be heard over the whole sales floor.



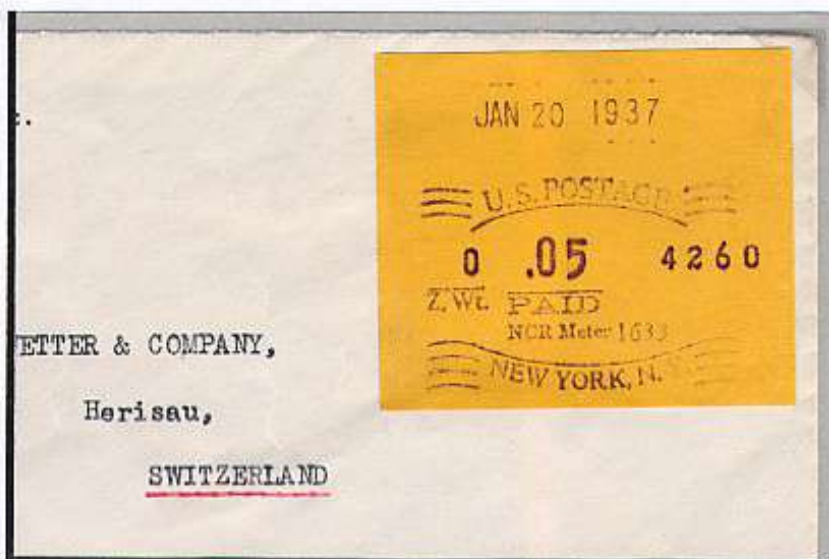
Today's point-of-sale terminals at the till are basically computerized cash registers.

NCR (National Cash Register) is one of the oldest names in the cash register industry. Founded in 1884 by John H. Patterson, it quickly rose to dominance and in the early twenties NCR already sold over 2 million units annually.

NCR cash registers have been employed by the U.S. Postal Service since 1931 to print metermarks to be used in stead of stamps.

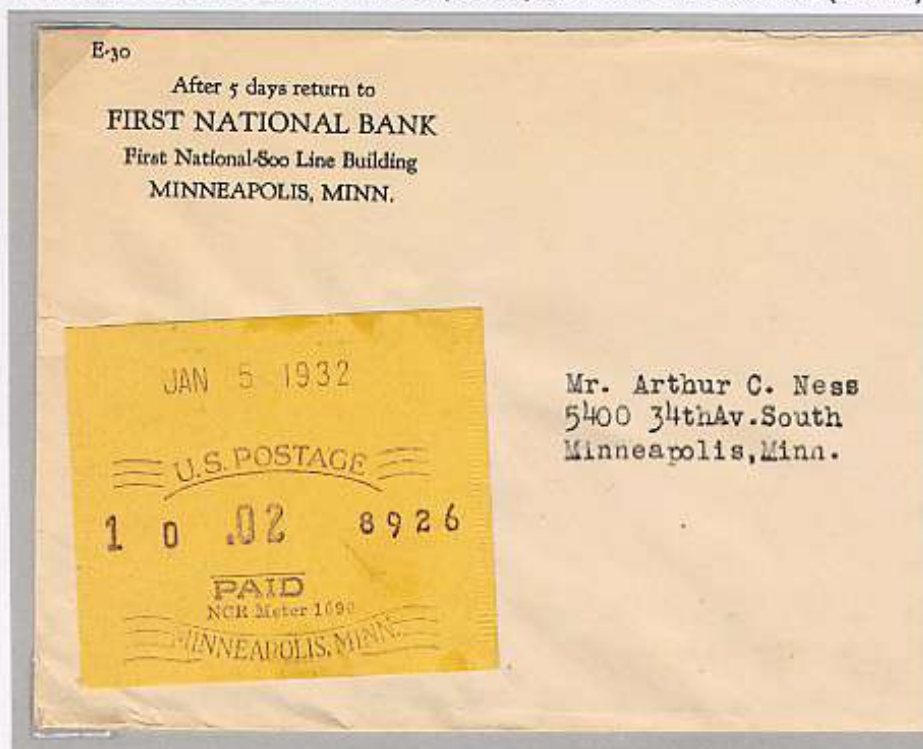


NCR perfin

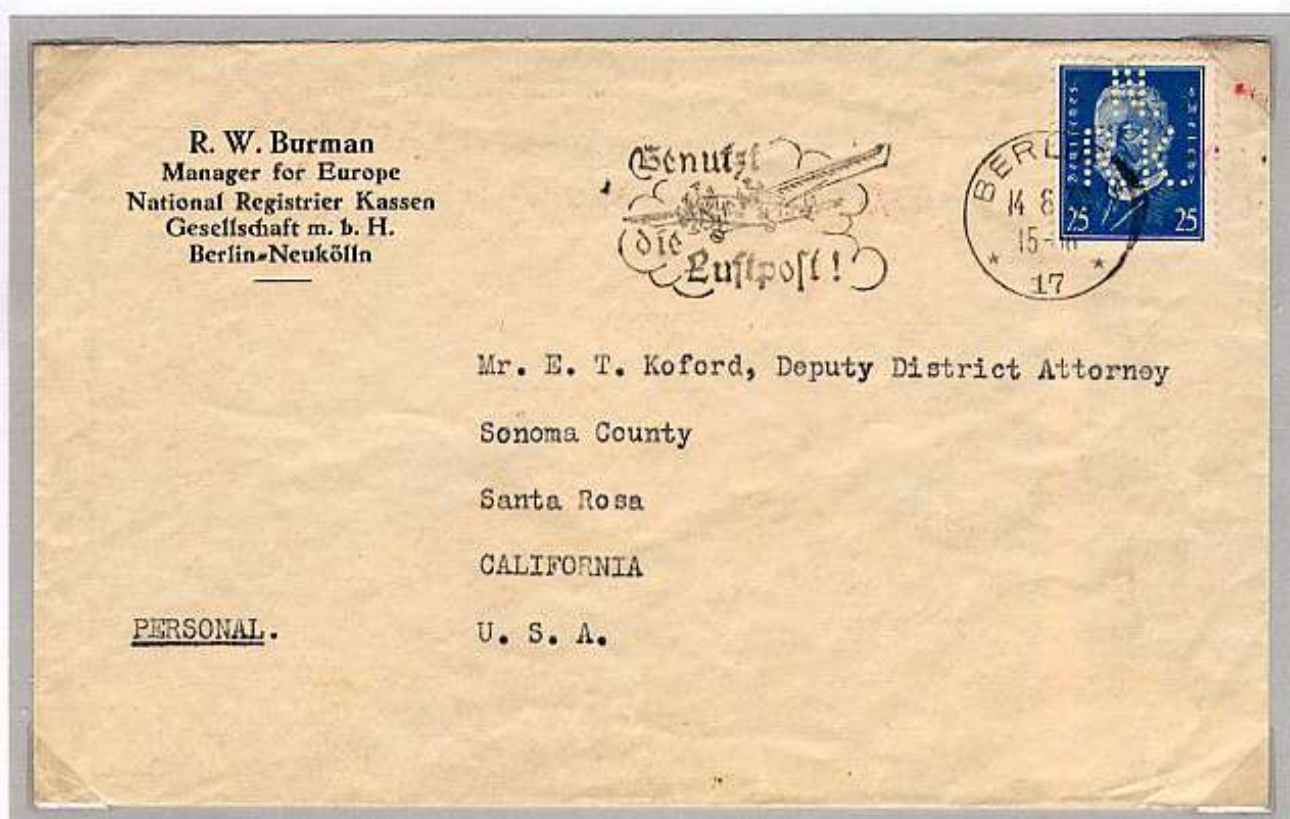
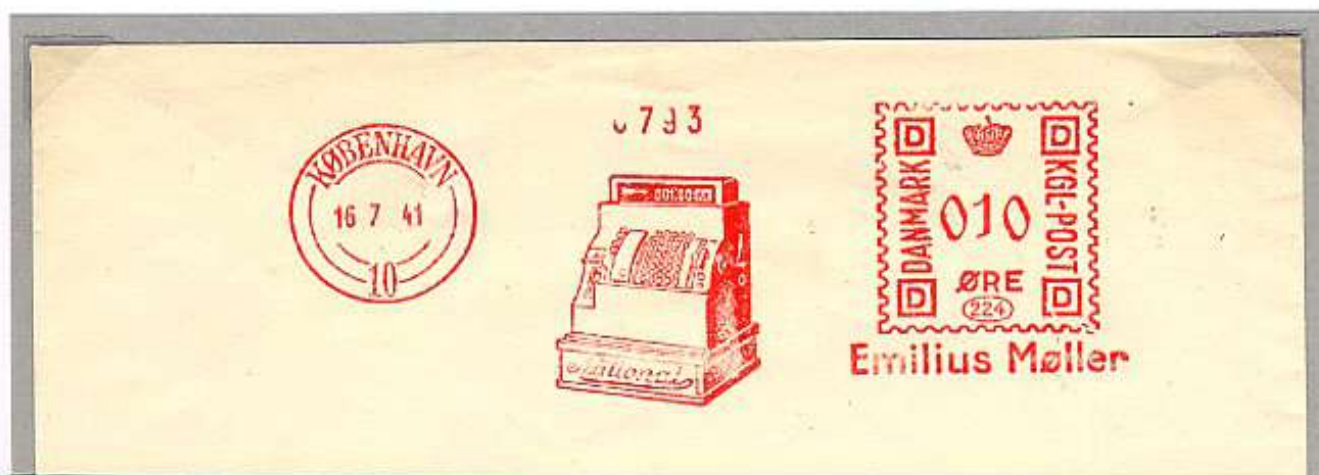


NCR metermarks could be used for local (below) and international mail (above)

even for Postage Dues



NCR changed from hand-operated to electrically driven machines from 1906 onwards and soon became the leading force in cash registers internationally. The famous bell of its cash registers could be heard all over the world. In Europe and Asia NCR often operated under its abbreviated name of just "National".





Due to its increasing competition combined with an emerging electronic computer market, NCR was keen to change its image from a manufacturer of cash registers to a manufacturer of computers worldwide.



However, its brand name was so strong that, even today, NCR is still associated with cash registers.

"Dead letter"

Although NCR had an extremely dominant position worldwide in the cash register market, it was not the only manufacturer in the world. Slowly the competition was growing.



Paying at the till
(see enlargement)



Following the arrival of electricity and advances in telegraphy, the next generation: the electro-mechanical devices started appearing. The use of the punchcard changed to become the storage medium for data. The vacuum tube (also called radio lamp) would play a large role in the development of the early computers.



As inventor of the electric light bulb, the phonograph and many other devices, Thomas Alva Edison (1847-1931) also developed a one-way valve for electric current which later resulted in the diode and the vacuum tube.



The vacuum tube has played a major role in the development of the first electronic computers. The famous ENIAC (see § 2.5) used 17,468 vacuum tubes.

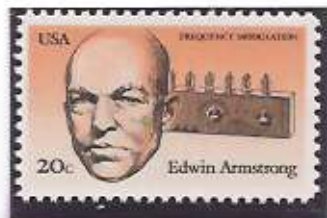
Computers using vacuum tubes as the controlling circuitry made up the first generation of computers



Tungsram, a Hungarian company founded in 1896, became a well-known manufacturer of vacuum tubes. In 1990 it was taken over by General Electric.

1927 Ottoman Turkey telegraph receipt

Vacuum tubes were also used in early radio's. This early model of the FM radio, invented by Edwin Armstrong (1890-1954) had its vacuum tubes on top to solve the heat dissipation problem



A computer's speed is measured in MHz (mega Hertz). This unit of frequency is named after Heinrich Rudolf Hertz (1857-1894), a German physicist who experimented with electromagnetic waves and who laid the foundation for wireless telegraphy and radio transmission.



Albert Abraham Michelson (1852-1931), who received the 1907 Nobel prize for his efforts in determining the speed of light, designed and built an analog computer that could add together up to 20 terms of a complex mathematical formula, the Fourier series.



Valdemar Poulsen (1869-1942), a Danish engineer, invented the telegraphone, an electromagnetic phonograph which registered information by magnetization of a copper wire. His concept was later used in the tape recorder and led to the development of the magnetic storage media, like tapes, diskettes and disks, used in computer systems.



Because tapes are a fairly cheap storage medium, they are widely used in computer systems to store large volumes of data.

diskette



magnetic tape unit

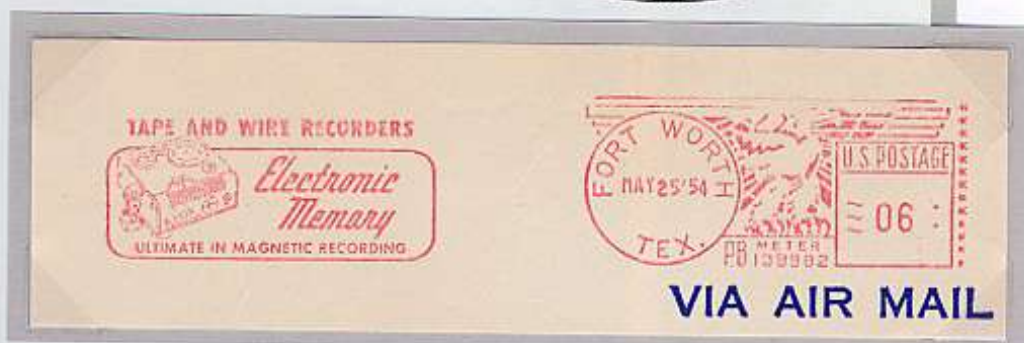


1960 Chinese Phonopost



Magnetic cassette tapes became the external storage medium for the micro and mini computers that appeared in the 70's. Special mailing envelopes were used to send the computer cassettes through the mail, a practice borrowed from earlier audio cassette mailing services.

Made in USA . . world's best buys!



AEROGRAMME • VIA AIRMAIL • PAR AVION

② Second fold



③ Seal top flap last

③ Seal top flap last

Do not use tape or stickers to seal—No enclosures permitted

← ① Fold first at notches →

This 1981 USA airmail message shows two magnetic tape reels as "Made in USA" products, made possible by Valdemar Poulsen's invention. The IBM Selectric typewriter which is shown, would soon become obsolete.

In 1888, Herman Hollerith (1860-1929) won a competition in the USA by using punched cards, pioneered earlier in the Jacquard loom, to process a census on a tabulating machine he designed himself.

PĂGINI DIN ISTORIA TEHNICII DE CALCUL



1884 - Tabulating machine, primul sistem de prelucrare de date, realizat de inginerul american Herman HÖLLERITH (1860-1929), utilizat pe scară largă la recensământul din anul 1890

Expeditor:

.....
.....
.....

Destinatar:

.....
.....
.....



Carte poştală



Translation: "1884 - Tabulating machine, the first data processing system, built by American engineer Herman Hollerith (1860-1929), used to supervise the 1890 census"



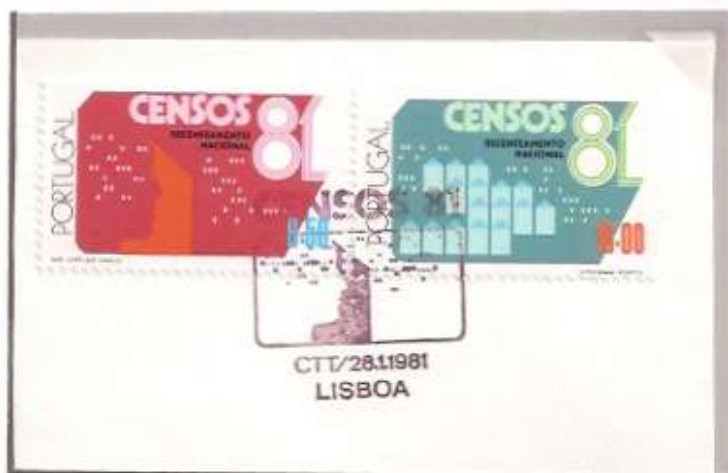
The most common punched card has 80 columns and 12 rows. Each column holds one character, represented by a unique combination of holes.



Hollerith's Tabulating Machine Company was essentially the world's first computer company.



Punched cards were used right into the 21st century. The 2000 U.S. Presidential election between George W. Bush and Al Gore was decided by only a few hundred punched card holes. Confusion reigned as the holes were manually counted and recounted.



Many countries all over the world used Hollerith's punched cards and his tabulators for their national census.





In Germany, Hollerith's company operated under the name DEHOMAG, Deutsche Hollerith Maschinen Gesellschaft m.b.H.

Stempelbild

BERLIN-LICHTERFELDE 30.9.33
18.12.32

BERLIN 35

DEHOMAG GEMAG

DEUTSCHES REICH 008

Arbeits-Zeit-Kontroll-Apparate „INTERNATIONAL“

Francotyp: 3710 Post: Berlin ~~W 35~~ Lichterfelde 1

Firma: Dehomag

Motor: ~~Lang~~ 4.4.4. Nr. ~~115243~~ 3440649 220 Volt $\sim \frac{1}{2}$ Ps

Übersetzung: Motor: 404 Masch.: 1004 Riemen R

Deliefert: 1. 11. 27

Sperrung auf: 100- 500-
angefangene Karte Nr.: 101

Permutationsnummer: 863

änderte Klischees: 2 Firmenklischees extra

für auswechs. Klisch. ~~elnger.~~ (26.9.34)

Merkmale: 1 Ecke ohne Stift, Gleitblech ohne Zacken u. Feder, Plombenein-
führung links

1927 Francotyp specimen card for DEHOMAG's meter mark machine

Only one exists

The Hollerith Tabulating Machine Company would later become part of IBM.
Sales of punched cards accounted for more than 25% of the company's profits.

BUSINESS MACHINES CORPORATION

AVE. NEW YORK, N. Y.

TAX DEPARTMENT



VIA AIR MAIL

The IBM globe-like logo has been in use from 1924 until 1946

IBM used its perforin "BIM" from 1926 to 1954

IBM ZAIRE

Plus de 25 années
IBM ZAIRE au service de
N° D'IDENT. NATIONALE
Economie Zairoise
A. 01668 N.



EGE SOCIAL, KINSHASA
P. 7563 - 6, AV. DU PORT

On January 1, 1947, Watson, Sr. decided to change the old style pre-war logo. The famous globe was replaced with the large open letters "IBM" in a font called "Beton Bold". Although superseded in 1956 by solid letters (by his son Watson, Jr.), the logo would stay around until the eighties.



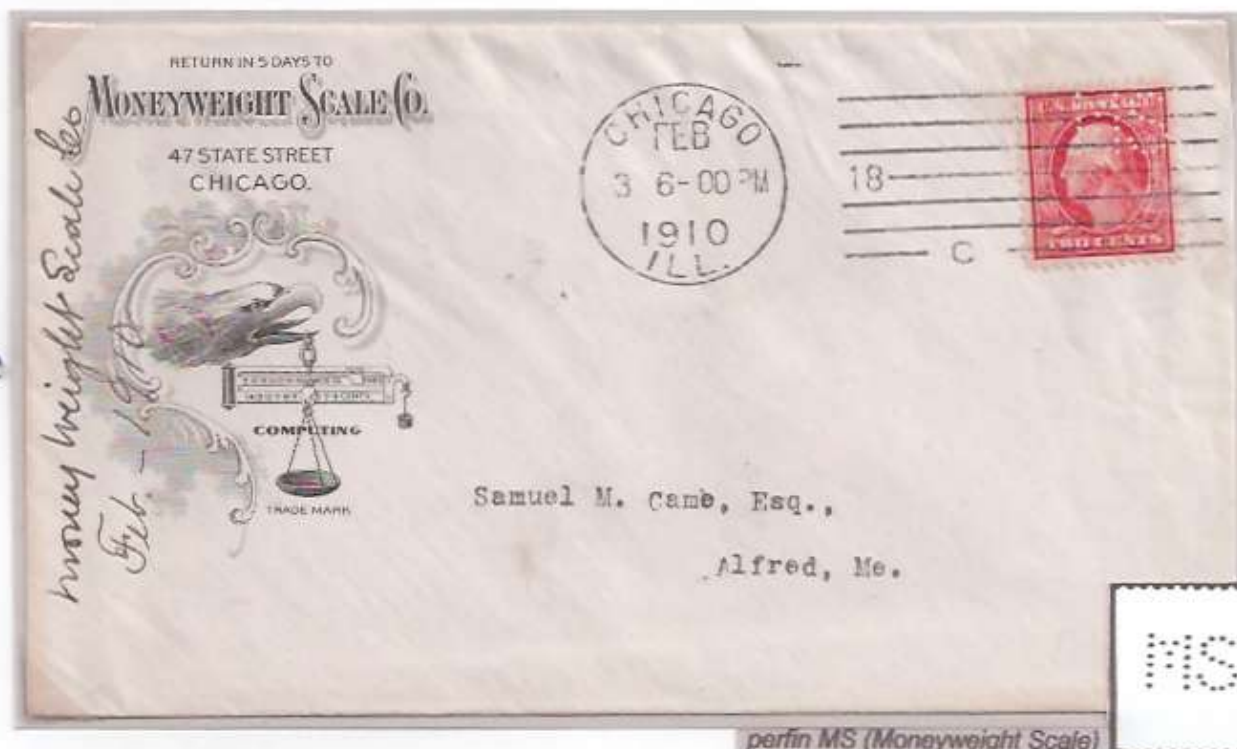
IBM
TETOJENKÄSITTELYYN
FÖR DATABEHANDLING



In 1972, after Watson, Jr. had retired, the company modernised its logo and changed it to its present version with the horizontal stripes, usually in light blue. Although the 8-stripe version was used initially, the 13-stripe version has taken precedence.



The Hollerith Tabulating Company merged in 1911 with the Moneyweight Scale company and a third company to form a new company which became International Business Machines (IBM) in 1924.



perfin MS (Moneyweight Scale)

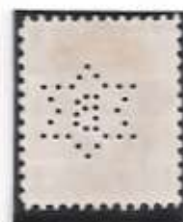
Thomas J. Watson Sr was IBM's first chairman. Although starting small, IBM soon was a fierce competitor and became one of the largest manufacturers of office equipment, punched cards and tabulating equipment.



Thomas J. Watson Sr, incorrectly identified as George W. Watson

IBM used its perfin "BIM" from 1926 to 1954

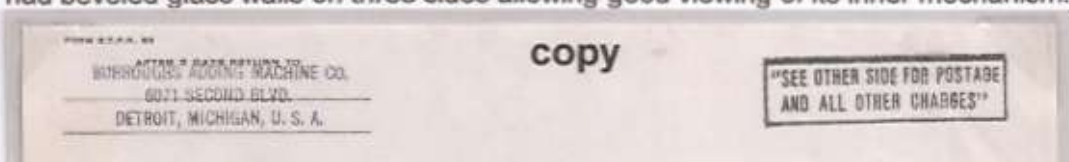
The Burroughs Adding Machine Company was founded in 1886 by William S. Burroughs and became a well-known manufacturer of adding machines and calculators.



Cover from Burroughs company, 21-11-1913, perfin B (inside star)



The famous Burroughs Class 1 adding machine (of about 1905) was a most spectacular machine. It was 19" deep, over a foot tall and weighed nearly 30 kg. It had beveled glass walls on three sides allowing good viewing of its inner mechanism.

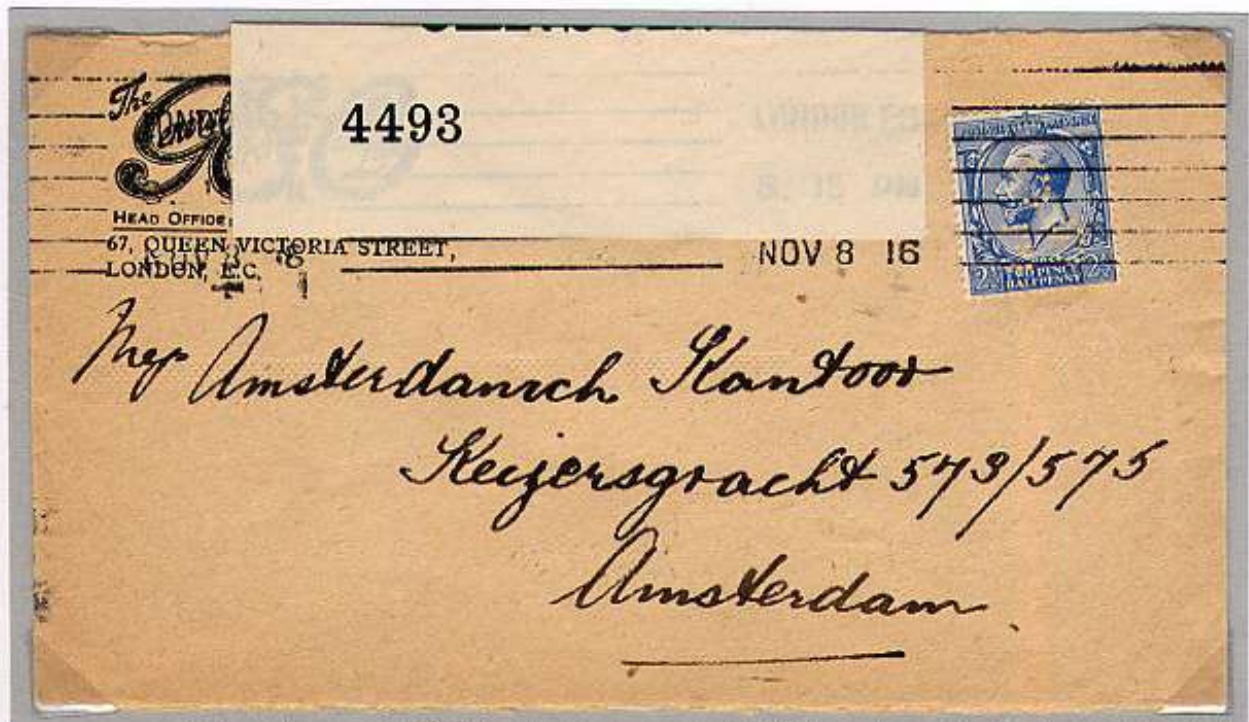


Colorado, The Colorful West at Its Best



In the second half of the 20th century Burroughs also started manufacturing computers but it never became a big player and in 1986, just after celebrating its centenary, Burroughs merged with Sperry/Univac to become Unisys.

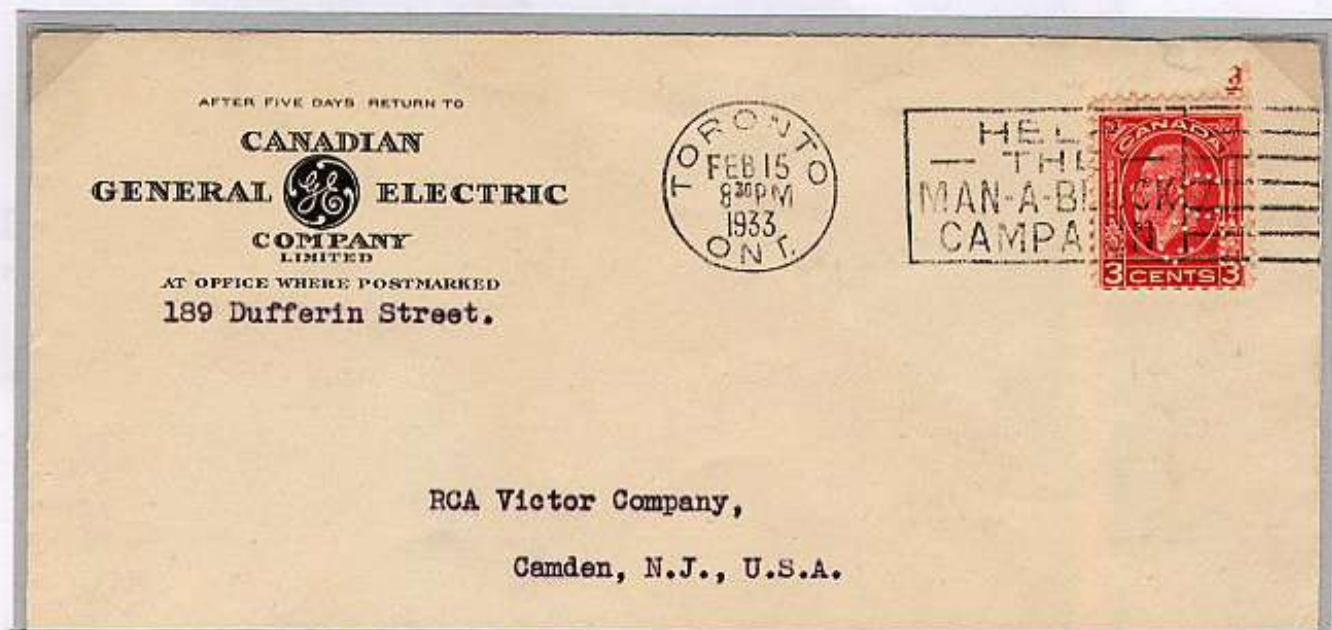




Cover (censor 4493, b/s cds Amsterdam 16.11.16) London to Amsterdam, 8 Nov 1916, inverse perfin GEC (General Electric Company)



Electricity company General Electric would also get involved in the manufacturing of computers (in 1962 GE built two computers - the GE225 and GE235 - for NASA's Apollo project), but ultimately GE could not keep up with the giants like IBM and in 1970 GE sold its computer business to Honeywell.



perfin CGE (Canadian General Electric)

2. Bridging the Gap: 2.2. Before World War II

Sperry

Elmer Ambrose Sperry (1860-1930) was an American inventor who was best known for his invention of the gyrocompass. His company, the Sperry Corporation, also manufactured tabulators before WW II. It later merged with Univac to become Sperry/Univac, a well-known brand of calculators and computers.



Elmer Sperry with son Lawrence



Sperry has been honored by having the USS Submarine Tender SPERRY AS 12 named after him. [launched 17/12/1941 (just 10 days after Pearl Harbor), decommissioned 30/09/1982]



Due to IBM's dominance, Sperry/Univac was slowly edged out and in 1986 merged with Burroughs to form Unisys.

Werner von Siemens (1816-1892), together with Johann George Halske (1814-1890), started a telegraph factory in Berlin. After Halske withdrew from the company, the firm was left in the hands of the Siemens family. In 1966 it was merged with other family owned firms to become Siemens AG, a leader in the European computer industry today.



Inventor of the electric locomotive



Siemens & Halske telephone



Siemens manufactured everything from electric trains and telephones to, later, computers and washing machines.



Airmail cover Brazil to Germany, via Morocco. Recovered from mail plane "Ville de Toulouse" which crashed 23-3-1938 at Cinq Croix (France, Pyrénées) with Nierinck h/stamp 380323a.

In the thirties Siemens had already become an important global company which was not always easy in the early days of transport. The mail plane carrying this cover crashed in France in 1938.

From "Nonnendamm" to "Siemensstadt"

Abschnitt
Coupon.
Kann vom Empfänger abgetrennt werden.
Peut être détaché par le destinataire.

Deutschland
143 * 144 * **Nonnendamm bei Berlin** 1901
Anzahl der Zoll- und Inhaltserklärungen
Nombre de déclarations en douane

Wertangabe
Valeur assurée

Nachnahme
Remboursement

An
A *Korrey*
Horodliczka, Samirouschi
Loelz
Rupland

Bestimmungsort in
(Lieu de destination) in
Wohnung
(Strasse und Hausnummer)

Postgewicht 4½ kg
Poids 4½

Zollgebühren *)
Droits de douane (*)

Postleitvermerk
Acheminement:
Skalmierzycce

*) Von der Grenz-Eingangspostanstalt des Besti
(*) Cadre à remplir par le bureau d'échange d'entrée en pay

SIEMENS-SCHUCKERT-WERK
Versandbureau
Kleinbau Nonnendamm

NONNENDAMM
19.5.08 3/4

DEUTSCHES REICH
80

Siemens' manufacturing complex in Berlin became so large that the whole area, formerly called Nonnendamm, was renamed **Siemensstadt** in 1913, the only example of a suburb named after a computer manufacturer.

Abschnitt
Coupon
Kann vom Empfänger abgetrennt werden.
Peut être détaché par le destinataire.

Deutschland
Paket 774 * **Siemensstadt bei Berlin** 1901
Anzahl der Zoll- und Inhaltserklärungen
Nombre de déclarations en douane

Wertangabe
Valeur assurée

Nachnahme
Remboursement

An
A **via Sassnitz**

Bestimmungsort in
(Lieu de destination) in
Wohnung
(Strasse und Hausnummer)

Postgewicht kg
Poids

Zollgebühren
Droits

Postleitvermerk
Acheminement:
Berlin N 4
Stettiner Bahnhof

*) Von der Grenz-Eingangspostanstalt des Besti
(*) Cadre à remplir par le bureau d'échange d'entrée en pay

SIEMENS & HALSKE
AKTIENGESELLSCHAFT
WERNERWERK
SIEMENSSTADT BEI BERLIN

0354 Kr.
frei!

SIEMENSSTADT
17.5.22.67N
* B. BERLIN

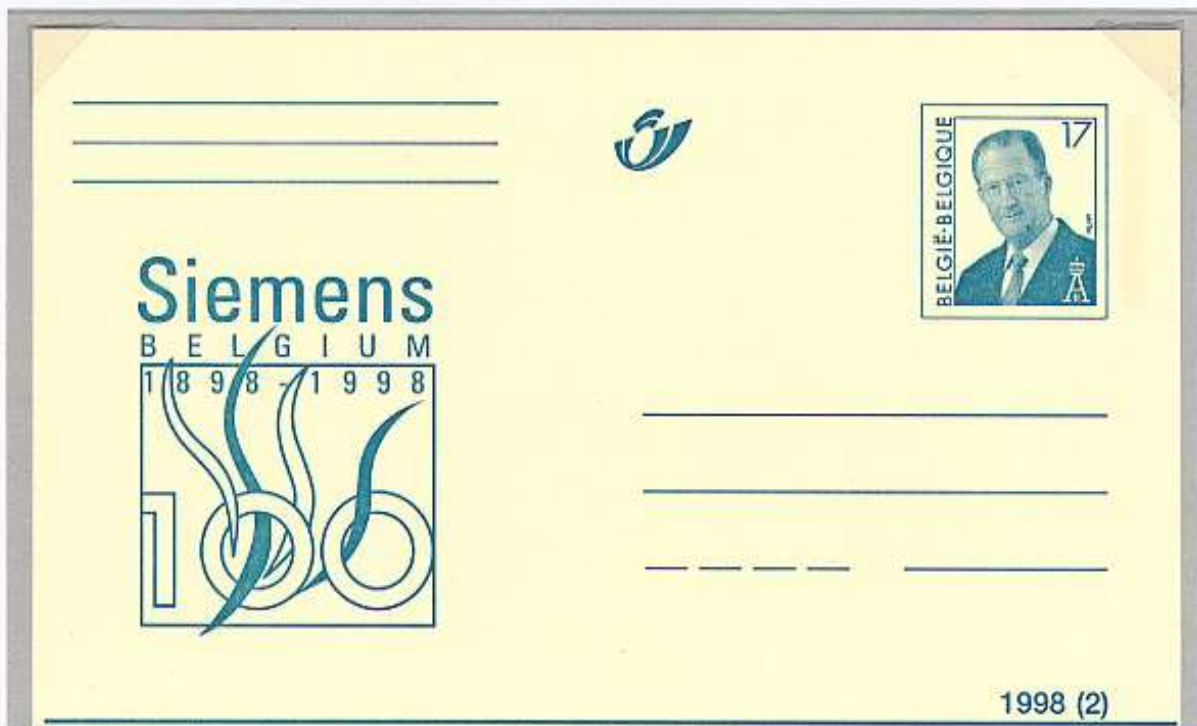
SIEMENSSTADT
17.5.22.67N



The Siemens&Halske T52 *Geheimefarschreiber* ("secret teleprinter") - better known as the *Enigma* - was a cypher machine used by the German Navy units during World War II.

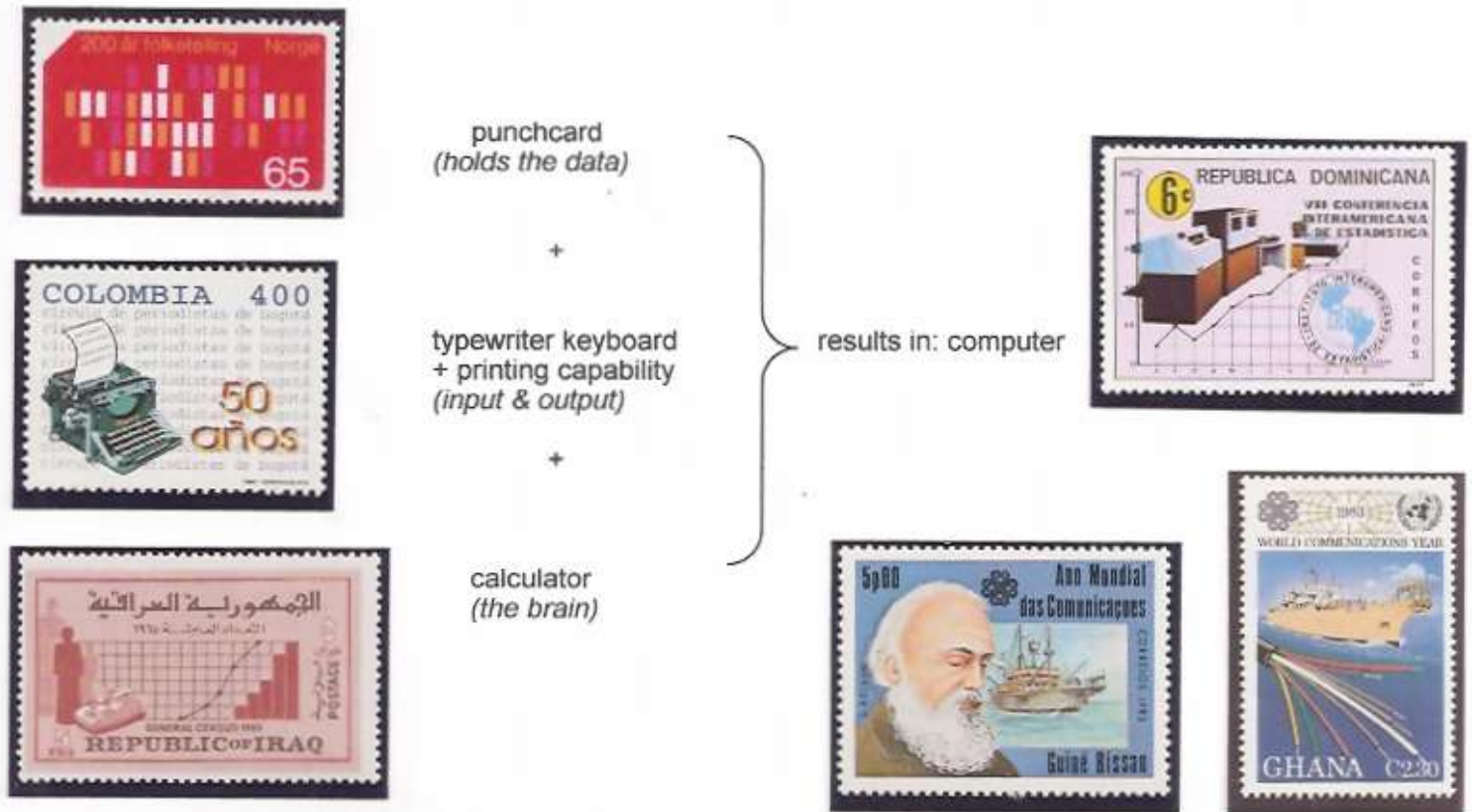


In 1965 Siemens was the first European company to mass-produce integrated circuits.



In October 1999 Siemens Computers merged with Japanese Fujitsu to form Fujitsu Siemens Computers.

The prime forces advancing technology were developments in the telegraphy and telephone world, combined with enhancements in the tabulating and calculator industry. The future computer should be able to calculate like a calculator, process punchcards like a tabulator, print like a tabulator or typewriter and use the same cables as the telephone and telegraph did, all controlled by typewriter-like keys.



The first transatlantic cable was laid by Lord Kelvin (William Thomson) in 1866. His transmission lines theory resulted in cables and circuits to be used in the first electro-mechanical computers. Kelvin built a "tide predictor", an early analog computer machine, in 1876 to calculate the tide tables for any hour, past or future.



Glasgow honored its famous son by naming a large exhibition hall after him.

Advances in calculator technology, but more important in electronics, would lead to the first electronic computer being built just before World War II.



Konrad Zuse, born in 1910, produced in 1938 the prototype of a mechanical binary programmable calculator, originally called "V-1" - later renamed as "Z-1". It used punched celluloid tape as input. Due to the war his work was hardly known outside Germany. His computers were used in the early 1940's in Germany to design aircraft. Eventually his computer company was absorbed in the Siemens Corporation where Zuse stayed on as a consultant.



Zuse spent his youth and did his early schooling in Hoyerswerda, now home to the Konrad Zuse Museum. He died in 1995. Obviously the Germans claim Zuse to be the first inventor of the modern computer.





John Vincent Atanasoff (1903-1995), together with Clifford Berry, developed the ABC - the Atanasoff-Berry Computer - in 1939, probably the earliest example of an electronic calculator. It used vacuum tubes and had a speed of 1 addition per second.



In 1973, Atanasoff was judged by the U.S. Supreme Court to be the true inventor of the electronic computer.

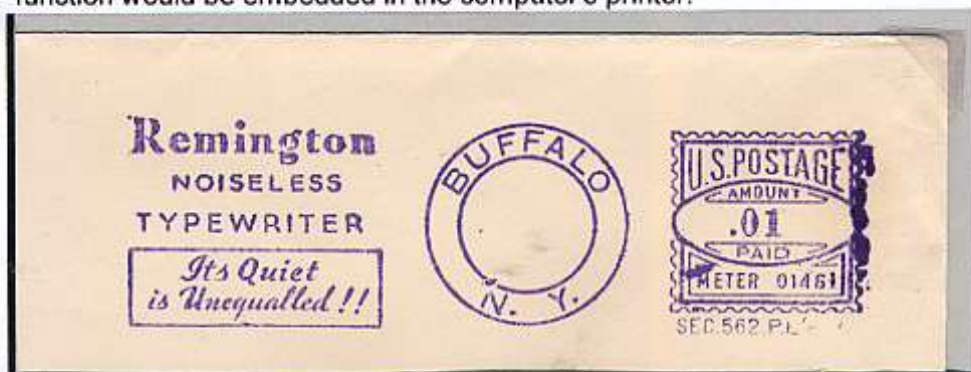


Following Atanasoff's death in 1995, Iowa State University commissioned the building of a replica of the famous ABC computer (see above). This cover's illustration has clearly been lifted from the Wikipedia site.

With the arrival of the computer later, the typewriter was destined to be split in half. Its "type" function would result in the computer's keyboard and the "write" function would be embedded in the computer's printer.



early Remington typewriter



The QWERTY keyboard (named after the first six keys on the top-left), patented in 1878, has been with us from the beginning. It was present on the very first typewriter made by Remington & Sons in 1873. The strange keyboard layout was created to enable typists to type very fast without the keys becoming entangled.



Remington was originally a manufacturer of guns. Its ability to manufacture precision instruments enabled it to produce typewriters and shavers, later tabulators, and ultimately computers, all requiring extremely fine mechanics.



1916 GRI Long Island (in the Gulf of Smyrna) type-written "stamp" issued by British troops during WW1.

Typewritten RETARDO ovpt on Panama (Scott 199) cds Ago 12, 1910, only validly used on two days: 12 and 13 August 1910, b/s arrival cds Colon next day.

Typewriters have played strange roles in the postal system too. When running out of stamps, postmasters have occasionally used typewriters to create their own stamps or to "overprint" existing stamps (see bottom left).

Olivetti, an Italian manufacturer of typewriters founded in 1908 by Camillo Olivetti, ultimately made the full transition from mechanical machine (the typewriter) to adding machine to electronic computer.



The Olivetti plant in Ivrea, near Turin, is shown in the background.

"Double Black" print

The Olivetti Summa 15 was a hand-cranked adding machine, designed in 1949 by Marcello Nizzoli. Due to its large weight (7.6 kg) it was considered a desktop machine. It measured 27x35x15 cm.

C - Tel. 63

QUORE
REGA
STIVO-DELIZIOSO
ERTI-BENEVENTO

767 TELEGRAMMA

N. di recapito - Rimesso al fattorino alle ore 1645

Nulla è dovuto al fattorino per il recapito - Il latore rimette una ricevuta stampata quando è incaricato di una riscossione.

LIZIO FIRENZE NOVE FEBBRAIO 7 +

Mod. 30 - (Ediz. 1951)

Nei telegrammi impressi a caratteri romani, il primo numero dopo il nome del luogo di origine rappresenta quello del telegramma, il secondo quello delle parole, gli altri la data, l'ora e i minuti dalla presentazione.

INDICAZIONI DI URGENZA

Ricevuto il

6 GEN 50

195

1 ore

per il circuito N.

040

RICEVENTE

DESTINAZIONE

PROVENIENZA

NUM.

PAROLE

DATA DELLA PRESENTAZIONE

Giorno e mese

Ore e minuti

VIA E INDICAZIONI EVENTUALI D'UFFICIO

269 + FIRENZE FR MILANO 13486 16 16 1345 +

(8202117) Roma, 1951 - Ist. Poligr. Stato P. V.

RISCONTRO NOSTRE 4 7 8 10 12 14 CORRENTE + PICCHETTI

bevete
MARSALA
BRIO • VIGORE • SALUTE

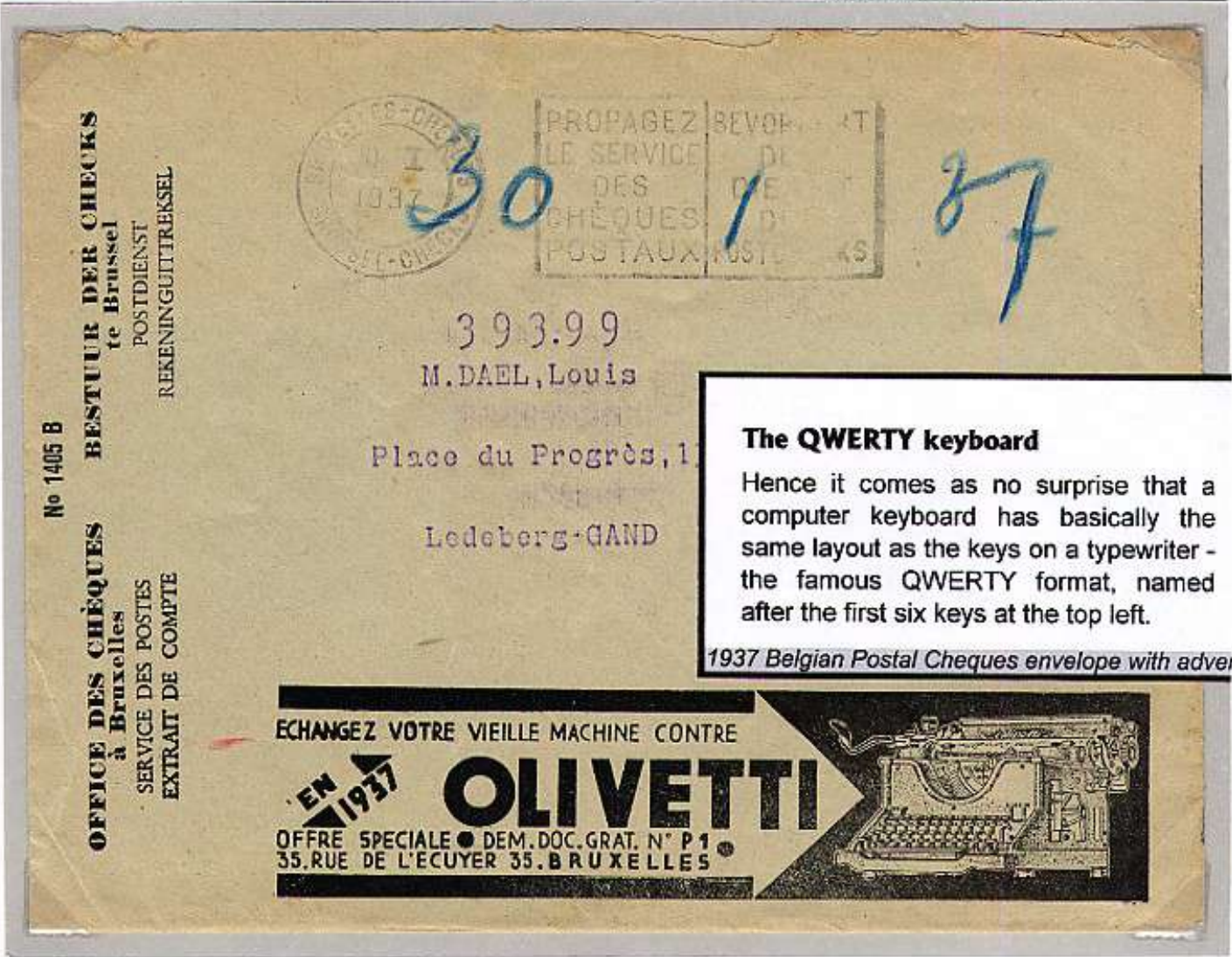


olivetti
Summa 15

"ogni calcolo alla mano"



The early mechanical calculators lacked a facility for easily entering data and many attempts were made to adapt the concept of typewriter keys as the means for entering data into a computer.



The QWERTY keyboard

Hence it comes as no surprise that a computer keyboard has basically the same layout as the keys on a typewriter - the famous QWERTY format, named after the first six keys at the top left.

1937 Belgian Postal Cheques envelope with advert



In 1984 Olivetti manufactured the first IBM-compatible Personal Computer, an achievement proudly commemorated by the Italian postal services.



the M24, first IBM-compatible PC



stamps mounted inverted



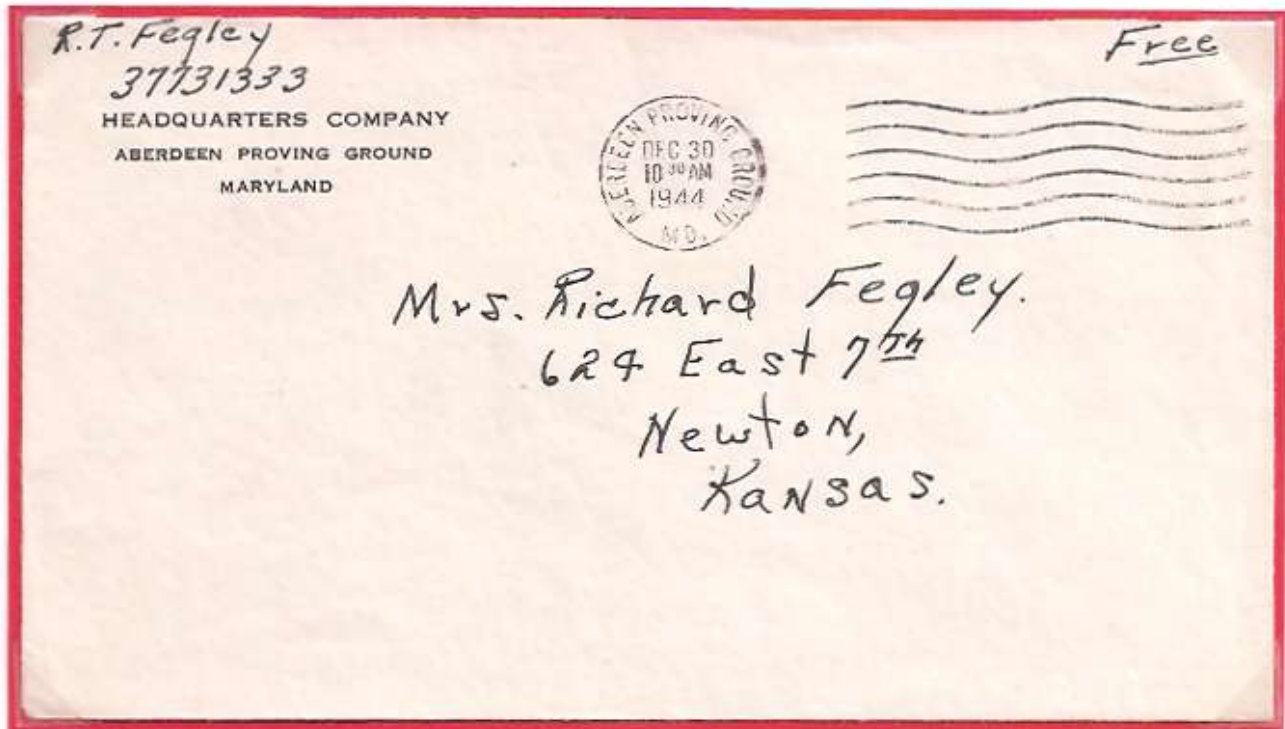
Russian Post Office automation with the typewriter (1966).



Ingenuous contraptions - with the typewriter as the central part - were constructed to do accounting, like this automatic bookkeeping machine (advert on 1937 Belgian Postal Cheques envelope). It already shows the separate feed of continuous stationery that would later become a feature of computer printers.

2.5.1. The ENIAC

Prior to World War II, the term "computer" (derived from the Latin *computare*, meaning to reckon) was primarily used for people who reckoned, i.e. did mathematical calculations. E.g. the calculations needed to produce the "firing tables" for field and naval artillery, done at the Aberdeen Proving Ground during World War II, were very complex and time consuming and were done by staff called "computers". To calculate a ballistic trajectory took a human "computer" about 20 hours. A speedier solution was urgently required.



1944 cover from Aberdeen Proving Ground. Being a military installation, its personnel enjoyed free franking privilege.

The Aberdeen Proving Ground was home to the Ballistic Research Laboratory, which developed the ENIAC, and was used for the research and development in support of the American war effort.

The ENIAC (Electronic Numerator, Integrator, Analyzer, and Computer) was completed in 1946. It was extremely large and heavy: 5.5 m (18 ft) high, 24 m (80 ft) long and weighed 30 tons.

Quote:

"Computers in the future may weigh no more than 1.5 tons."

Popular Mechanics magazine, 1949



The scientists responsible for the development of the ENIAC, were John W. Mauchly and J. Prosper Eckert.



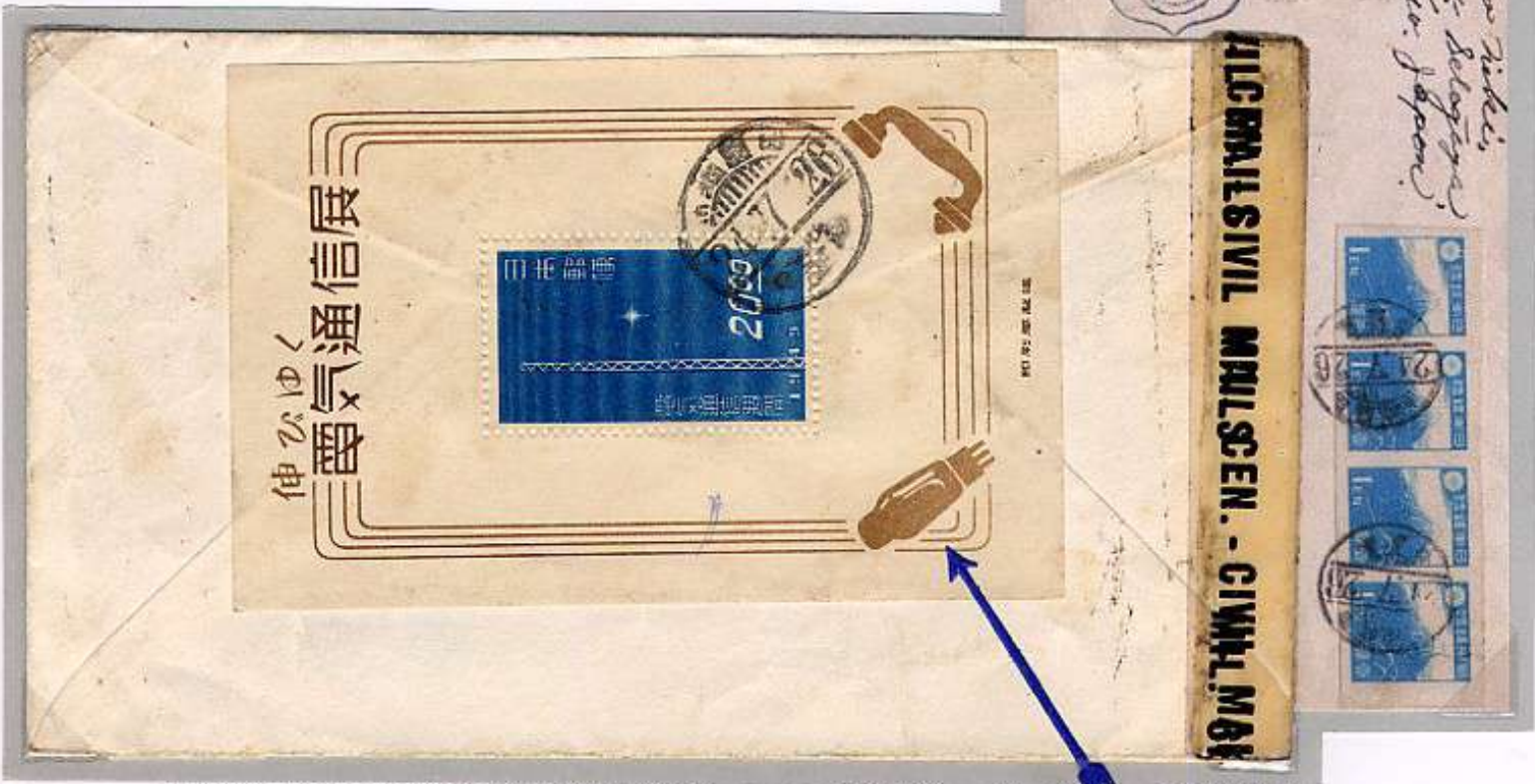
The ENIAC was able to calculate a ballistic trajectory in only 30 seconds.

Eckert & Mauchley in the foreground

2. Bridging the Gap: 2.5. The Need for Speed: World War II

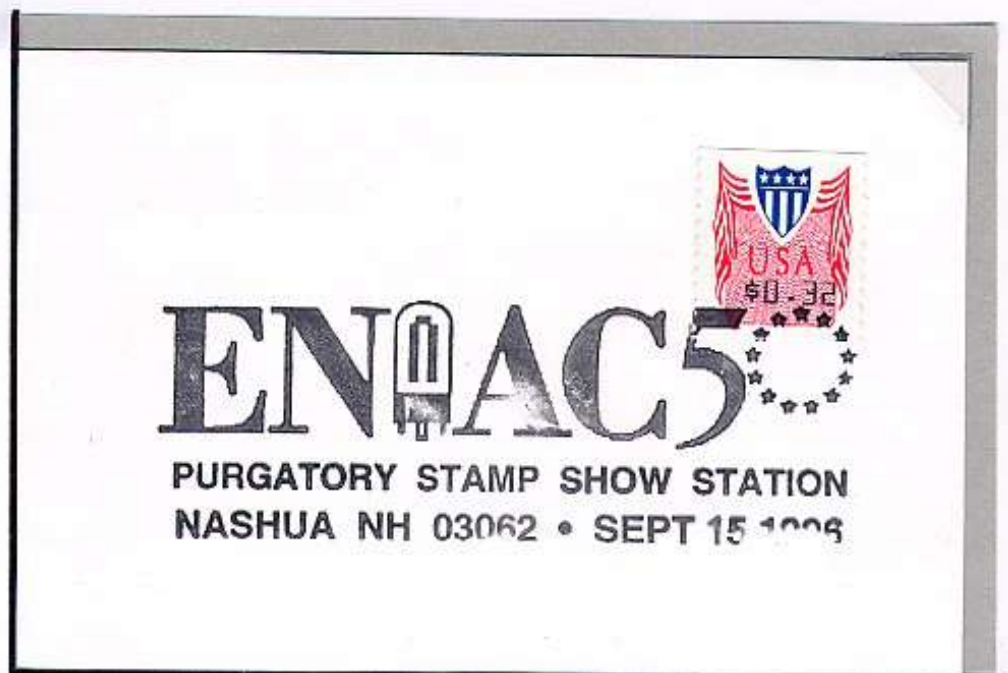
2.5.1. The ENIAC

The ENIAC was the first really large and digital computer and used 17,468 vacuum tubes. The vacuum tubes, which replaced the earlier mechanical and electro-mechanical (relay) devices, allowed much faster processing and greater reliability.



1949 Censored cover from Tokyo to South Africa, censor label "Opened by Mil. Cen.-Civil Mails".

Vacuum tubes were used till the late 50s as the controlling circuitry for storing data and instructions. Computers built with vacuum tubes (bottom left of s/s above), like the ENIAC, are considered to be the first generation of computers.



50 Years later the US commemorated the ENIAC with a special stamp dedicated to Computer Technology, its launch appropriately at the Aberdeen Proving Ground and being broadcasted live over the Internet.



"Amazing Grace" finds a bug - the story behind the term "Computer Bug"

One of the first programmers was a U.S. Navy lieutenant Grace Hopper (1906-1992) who in 1945 was working on the Mark II computer at Harvard University. While testing the Mark II a dead moth was found stuck in a computer relay causing it to malfunction, it was removed and recorded in the error log as the first computer bug. The programmer later became Rear Admiral "Amazing Grace" Hopper and was posthumously honored in 1997 when the guided missile destroyer USS HOPPER (DDG 70) was named after her.



FIRST DAY OF POSTAL SERVICE



Although the offending moth was probably a *Spodoptera litura* (or armyworm) specimen ...



1200 Started "Cosine Tape" (Sine check)
1201 Started "Health Folder Test"
1202 Relay #70 Panel F (moth) in relay.
1203 First actual case of bug being found.
1204 No. 1205 started.
1206 closed down.

MaintenanceCorporation

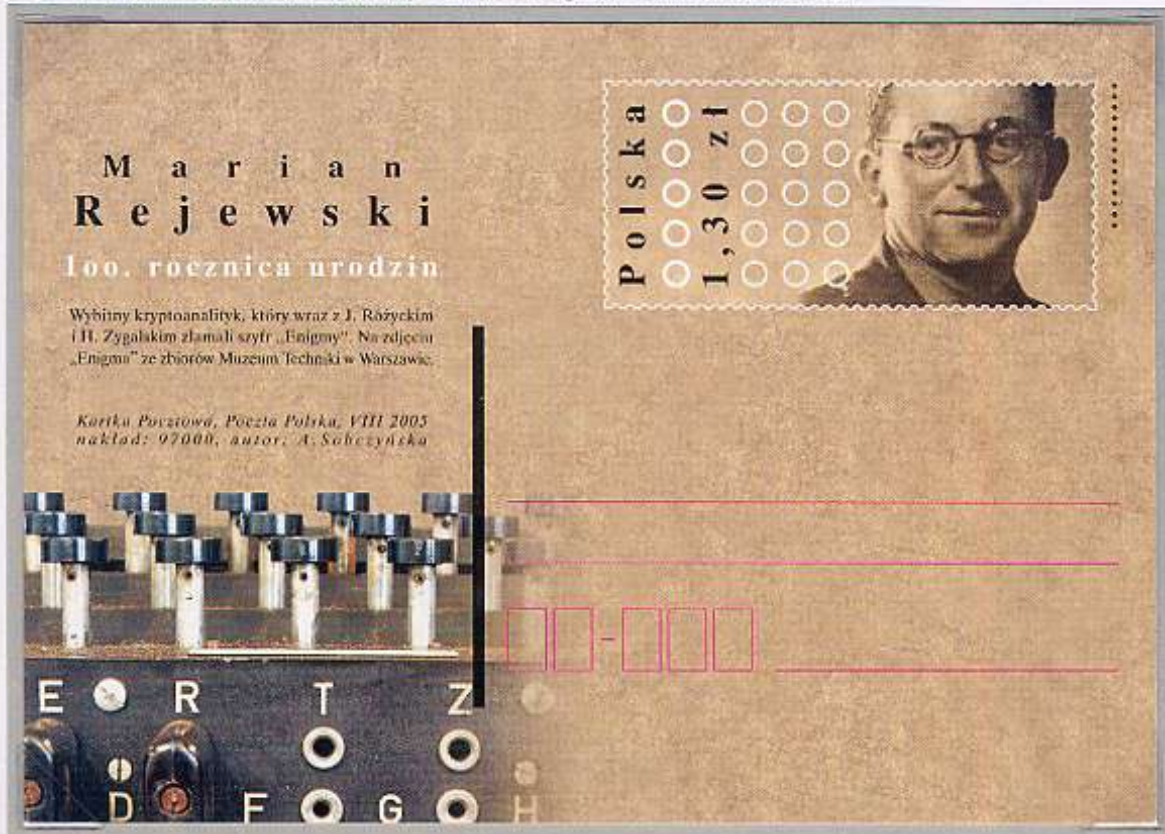
South • Secaucus, New Jersey 07094



...not everyone agreed with what type of bug had been found. Despite the different interpretations Grace Hopper's bug has been added to our computer terminology forever.

2.5.3. The Code Breakers

Before World War II the Germans were using the ultra-secret *Enigma* coding machines to encrypt their messages to their army units. Especially the U-boat commanders would use these secret codes to great effect during the war. Breaking this code would be of paramount importance to gain control of the war.



In 1932 the Polish Ciphers Office had set up a code breaking team with mathematicians Marian Rejewski, Jerzy Różycki and Henryk Zygalski, to decode the secret Enigma ciphers. Rejewski and his team achieved this by late 1933.



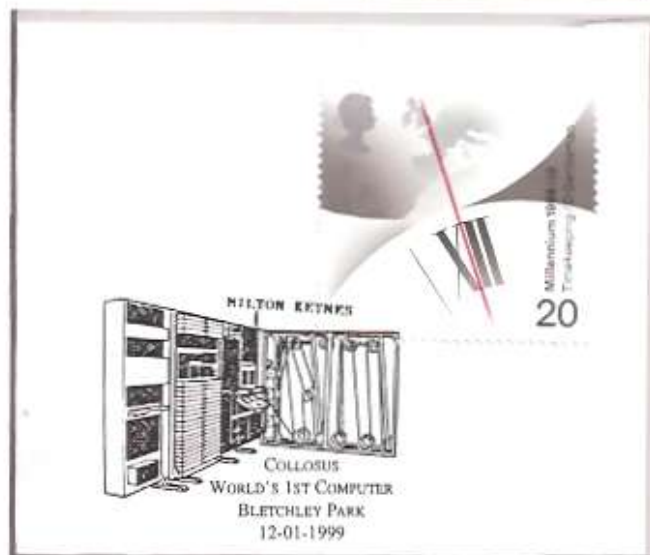
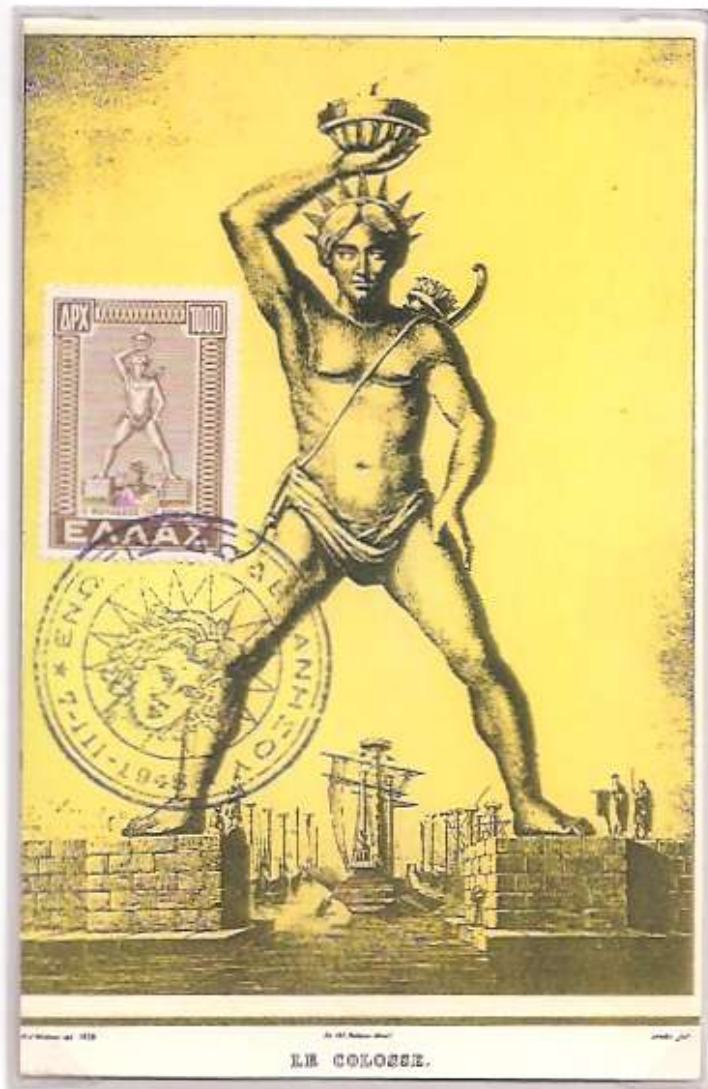
The British forces captured several *Enigma* cypher machines from the German U-boats during World War II.



The Polish text reads: 50th Anniversary break of cypher Enigma

When in 1939 Germany invaded Poland, the Polish codebreakers escaped via France to England and handed over their Enigma code breaking material to the British. This information greatly helped the Allied forces and had a significant impact on the duration of the war in Europe.

In Europe the main computer developments took place in secrecy in England at Station X, Bletchley Park. At this war-time home to the codebreakers (the secret Government Code and Cipher School), a group of scientists was working on the development of the *Colossus* (aptly named after the ancient 33m high *Colossus of Rhodes*, one of the Seven Wonders of the World).



In 1937, the mathematician Alan M. Turing of Cambridge University, England, published his paper on "computable numbers" and it was Turing who led the team that built the Colossus, a massive electronic computer using 2400 vacuum tubes for its logic. It was completed two years before the ENIAC.



The Bletchley Colossus was developed to decrypt the secret messages from the German *Enigma* coding machine.

The famous *A.M. Turing Award* for important contributions in the field of computing was named in his honour.



The Turing Bombe was used from 1939 onwards to process the *Enigma* settings. Using one drum for each *Enigma* rotor, each bombe could replicate 36 *Enigma* machines.



WRN Jean Valentine (born 1924) was a Bombe Operator at Station X, Bletchley Park. A *bombe* was the name given to the computer that was built to solve the rotor settings of the Enigma machines. The name was derived from the Polish *bomba*, the device constructed for that same purpose by the Polish code breakers. Even at age eighty Valentine was still working as a tour guide at Bletchley Park.

Each *bombe* weighed one ton, was housed in a metal cabinet of 7 ft wide, 6.6 ft tall and 2 ft deep, mounted on castors. Although the *bombe* was an electro-mechanical device, it led directly to the next generation of decoding machines, the Colossus computer.



The United States were also trying to crack the enemy's secret codes in order to reduce losses on the transatlantic fleet which supported the war-effort in Europe. For that purposes they liaised extensively with the British code breakers to crack the Enigma cyphers. The ENIAC came just too late and was primarily used in calculations for the construction of the atom bombs at the end of World War II.

So, by the end of the World War II, both the United States and Europe had electronic computers in operation.

What did the Russians do? Although there are a few early Russians involved with calculating and computing devices, their main thrust came post-World War II.

The earliest Russian in our story is Mohammad ibn Musa al-Khwarizmi, sometimes spelled as Alkarismi (ca 780-850). Born in southern Russia he worked as a math teacher in Baghdad. The word "*algorithm*" is derived from his name. The concept of algorithms is used in computer science and programming.



Pafnuty Lvovich Chebyshev (1821-1894) was professor of mathematics at the University of St Petersburg for 35 years. He designed and built several devices, including an automatic calculating machine.



Axel Ivanovitch Berg (1893 - 1979) was a former submarine commander in the Russian Navy (hence the submarine in the pre-printed stamp). In 1959 he became chairman of the Scientific Council on the Complex Problems of Cybernetics. In the sixties he also chaired the Scientific Council on Programmed Instruction.





Герой Социалистического Труда
академик В. М. ГЛУШКОВ
1923—1982



Куда _____

Кому _____

Индекс предприятия связи
и адрес отправителя



Индекс предприятия связи места назначения



Viktor Mikhailovich Glushkov (1923 - 1982) was the founder and director of the Ukrainian Institute of Cybernetics. He achieved results in digital automation, the use of computer technology in the production process and the development of small computers in engineering.



Адреса відправника, індекс



Адреса одержувача, індекс

The Russian computer scientist Sergei Alekseevich Lebedev (1902 - 1974) was responsible for the first Russian MESM digital computer, as well as the BESM series of high-speed computers.



The word "digital" is derived from the Latin *digitus* (finger), as a reference to the way man used to count. Electronic or digital computers, which use electronic pulses whereby numbers are represented in a binary format using the numbers 0 and 1, can work at a much higher speed than the slower electro-mechanical calculators.



In August 1944, the ENIAC team was joined by the Hungaro-American mathematician John von Neumann (1903-1957), who developed the concept of a stored program, where both instructions and data are stored separately in memory.

Neumann and Turing were familiar with each other's work and papers on computers. At one stage Neumann invited Turing to become his assistant which Turing declined.



Turing (L) & Neumann (R)



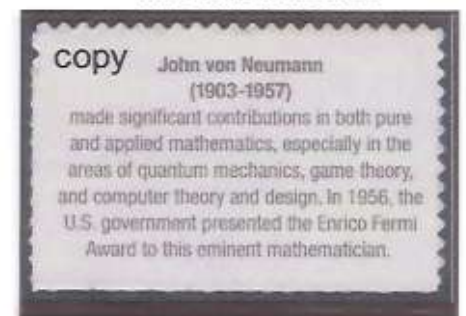
with text on reverse



János Neumann went to the United States in 1930 and was appointed Professor of Mathematics. In 1937 he became a US naturalized citizen and changed his name to John von Neumann.



ferrite-core memory



Computers in the fifties and sixties employed ferrite-core memory, which was patented in 1955 and became the standard for computer memory until the semiconductor integrated circuits arrived in the 1960s.



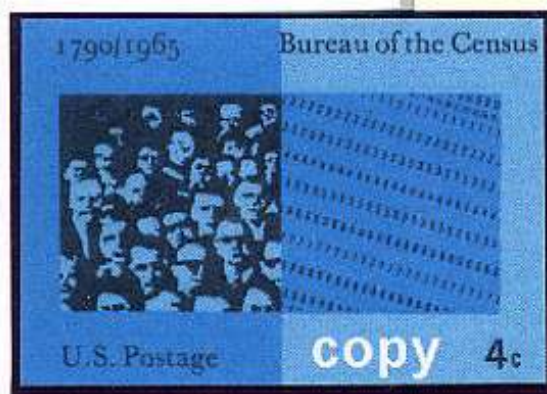
In 1945 Neumann wrote a report on the next computer, a high-speed automatic digital computer which became known as the EDVAC (Electronic Discrete Variable Automatic Computer), the first computer with an internally stored program. But the designers were already working on the next version, the UNIVAC.





Picture of first UNIVAC, taken by ENIAC designer John W. Mauchly

The EDVAC was followed by the UNIVAC (Universal Automatic Computer) in 1951 when Remington Rand delivered the first commercial digital computer, the famous UNIVAC, to the U.S. Census Bureau.



Notice the punchcard in the stamp design.

That same year, with only 7% of the votes counted in the US presidential elections, the UNIVAC computer correctly predicted a landslide victory for Eisenhower, leading to a widespread realization of the possibilities of computers.



3. The Electronic Age: 3.1. Going Digital: the 50s

Inventing the transistor

In 1947, William Shockley (1910-1989), together with Walter H. Brattain (1902-1987) and John Bardeen (1908-1991) invented the transistor, short for "transfer-resistance", which would replace the vacuum tube. In 1956, Brattain, Bardeen and Shockley jointly received the Nobel Prize in Physics for their pioneering work on transistors.



Shockley

Transistors could be manufactured by automated methods (much cheaper to produce) and were smaller and much more reliable than the vacuum tubes used previously. Transistor-driven computers would become known as the second generation of computers.



Brattain



The transistor was developed in the Bell Labs, formerly known as AT&T Bell (Telephone) Laboratories.

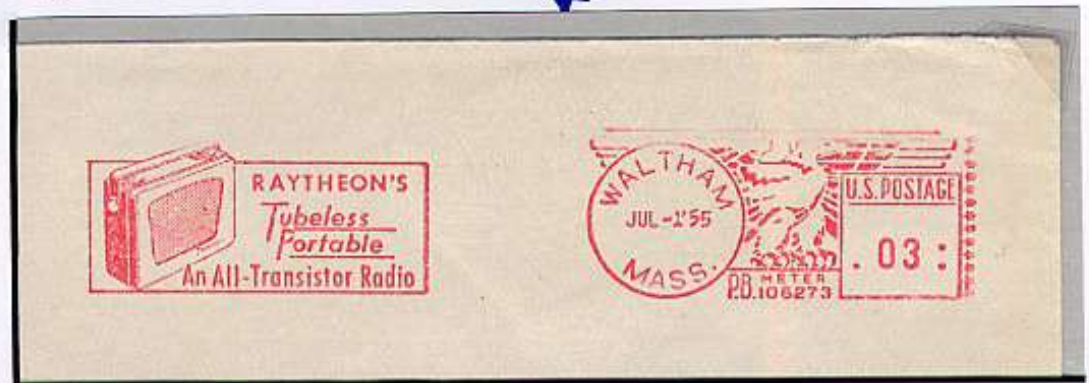


Notice transistor symbol





One of the more popular applications of the transistor was the development of the transistor radio.



3. The Electronic Age: 3.1. Going Digital: the 50s

LEO - the tearoom computer

In 1951 J.Lyons & Co - the famous teashop company - built its own computer to run its growing administration. It was named LEO for Lyons Electronic Office. The LEO was used to work out the optimum mix for their many teas and could calculate an employee's wage in 1.5 seconds. The LEO had a memory of just over 8000 bytes.



J.Lyons & Co soon formed its own company - LEO Computers Ltd - to build the LEO computers.

Perfin JL for J.Lyons



Eventually LEO Computers Ltd merged to become in 1968 International Computers Limited (ICL).

3. The Electronic Age: 3.1. Going Digital: the 50s

RCA

The Radio Corporation of America - so well-known from "His Master's Voice", the dog "Nipper" - entered the electronics industry in the early fifties. Being twice as big as IBM at that time, it announced a large-scale computer - the BIZMAC - in 1955. Not being transistor-based the machine was a commercial failure.



As computers became smaller and more accessible, scientists began to think of other applications than just computing. Could computers be used to control machines or processes? From this emerged the science of *Cybernetics*.

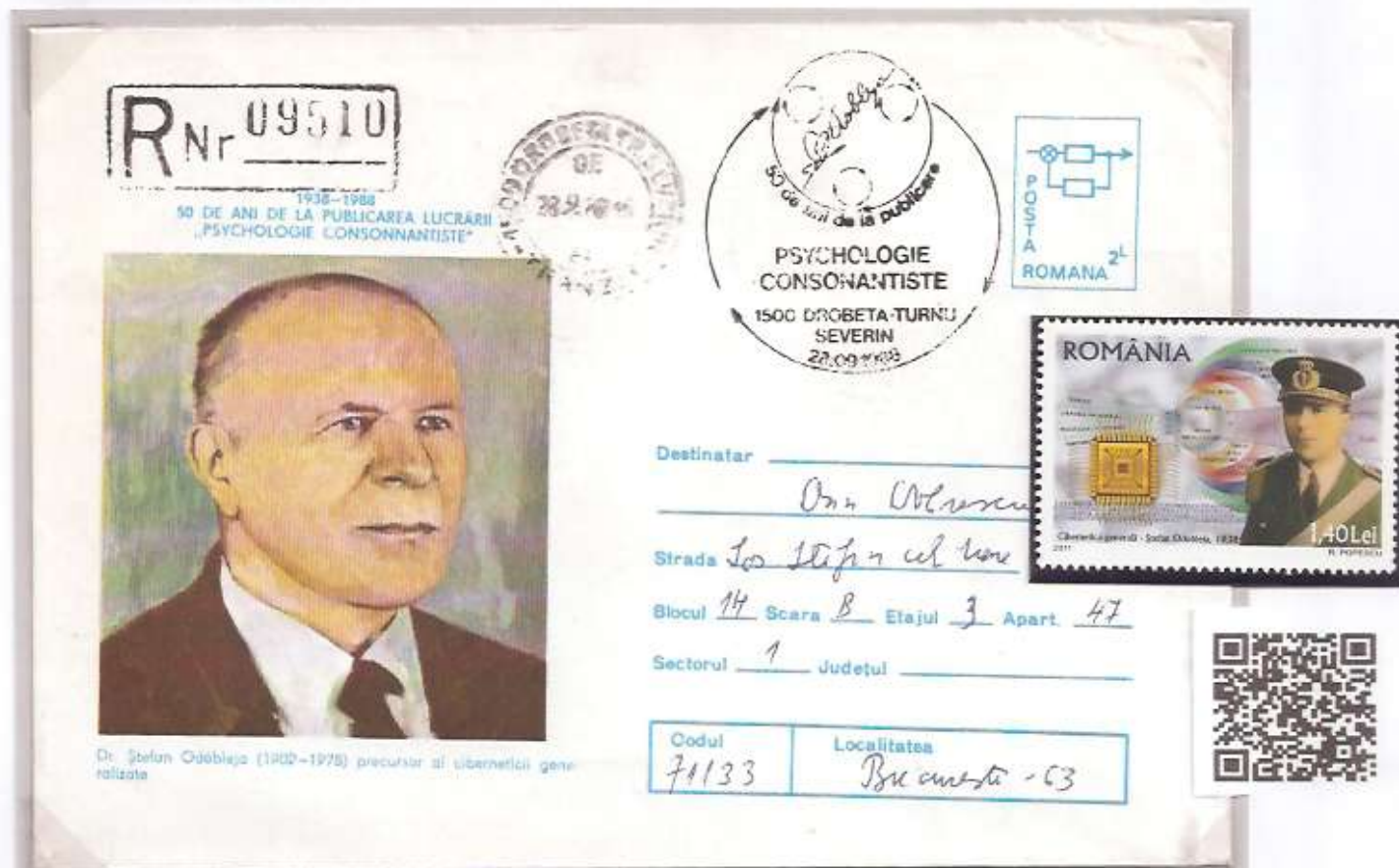


1974 Railroad Cybernetics

Norbert Wiener (1894-1964), a professor of mathematics, published his book on Cybernetics in 1948, in which he introduced the word "cybernetics" and laid the foundation for the study of the control of processes by automated machines i.e. computers.



The Romanian scientist Stefan Odobleja (1902-1978) and Norbert Wiener are considered to be the pioneers of cybernetics.





COMPUTER PIONEER

Grigore C. MOISIL (1906 - 1973)*
 08.10.1998
 70750 BUCUREȘTI - 45



Grigore C. MOISIL (1906 - 1973)
 Teoria algebrică a mecanismelor automate (1959)
 Structura algebrică a logicii polivalente
 "COMPUTER PIONEER"

Carte poștală

Destinatar:

Expeditor:



Grigore C. Moisil (1906-1973), head of the Department of Mathematics at the University of Bucharest, was well known for his work in mathematical logic and the algebraic theory of automatic devices.



Yervand Kochar's "The Muse of Cybernetics" (1972) is housed in the gardens of the Yerevan Computer Research and Development Institute in Armenia.



75 DE ANI DE LA NAȘTEREA
 ACAD. GRIGORE MOISIL
 (1906-1981)



CARTE POȘT



Expeditor _____
 Strada _____ Nr. _____
 Blocul _____ Scara _____ Etajul _____ Apart. _____
 Sectorul _____ Județul _____
 Codul _____ Localitatea _____

Prețul de vânzare 30 bani Cod 0060/81

Destinatar _____
 Strada _____ Nr. _____
 Blocul _____ Scara _____ Etajul _____ Apart. _____
 Sectorul _____ Județul _____

| | |
|-------|-------------|
| Codul | Localitatea |
|-------|-------------|

When in 1957 the USSR launched its first earth satellite *Sputnik*, the U.S. realized they were behind in the race for space and responded in 1958 by establishing ARPA (Advanced Research Project Agency) with the aim of re-establishing their lead in science and technology. It became the birth of the Internet.

ANCED RESEARCH PROJECTS AGENCY

CH AND DEVELOPMENT FIELD UNIT

APO SAN FRANCISCO, CALIFORNIA 96346

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OFFICIAL BUSINESS

Mr. G. H. Ulrich Jr.
Link-Belt Company
Woolworth Bldg.
233 Broadway
New York N. Y. 10007



Air Mail



Vint Cerf



Bob Kahn



One of the ARPA projects was to establish a link between different computers in case of a nuclear war. Vinton Gray Cerf (1943 -) and Bob Kahn (1938 -) were involved in defining the protocol (TCP/IP) for this network.



35 years of Internet

The first four computers were linked in 1969, called ARPAnet – the embryonic version of the Internet.

3. The Electronic Age: 3.1. Going Digital: the 50s

The chip that changed the world



resistor

The electronic components – transistors, resistors and the like – were soldered together on circuit boards, interconnected by thin copper wires. This process was greatly improved when printed circuit boards were introduced in the 1950s.



black shifted downwards



shifted black touching frame



black shifted into frame line

One small error in printing these circuit boards meant the whole circuit board ...



black shifted upwards



... had become useless, as it was cheaper to replace it than to locate the error.

(e)



missing black

(e)



missing tan and lilac



shifted tan and lilac 1.5mm



shifted tan and lilac 6.5mm



Jack Kilby (1923 - 2005) was an electrical engineer who worked for Texas Instruments. In 1958 he invented the integrated circuit. Kilby's chip would become known as **"the chip that changed the world"** and would replace the hundreds of electronic components soldered/printed onto circuit boards. His invention revolutionized the computer industry.



(TI = Texas Instruments)

ENGINEERING SUPPLY COMPANY

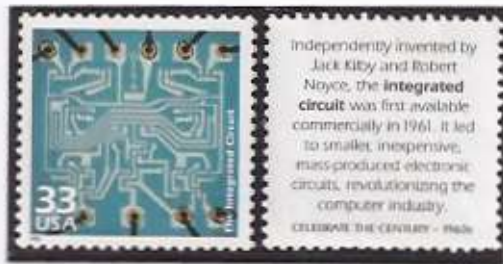
CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED
DENTON DRIVE DALLAS 35, TEXAS

the first
silicon
transistor
manufacturer ... TI



3. The Electronic Age: 3.1. Going Digital: the 50s

The chip that changed the world



Independently invented by Jack Kilby and Robert Noyce, the **integrated circuit** was first available commercially in 1961. It led to smaller, inexpensive, mass-produced electronic circuits, revolutionizing the computer industry. CELEBRATE THE CENTURY - MADE IN THE USA

Kilby's chip would soon be implemented in computers worldwide.



Unadopted essay (from a set of 6) painted by Andrew Restall for 1966 GB issue "Computers"



Bull S.A. was a French computer manufacturer which later merged with Honeywell.

But not everyone was convinced that computers were a good thing.

Quote:

"Data Processing is a fad that won't last out the year."

The editor in charge of business books for Prentice Hall, 1957



The modern microchip allows more than



42 million transistors

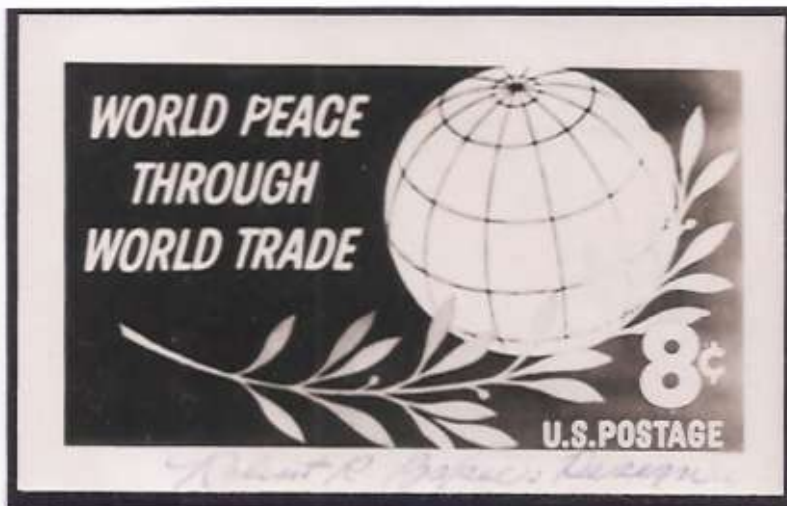


Photo Essay of approved design, signed by designer Robert R. Baker



In 1959 IBM managed to get its company sales slogan "World Peace Through World Trade" (a phrase coined by IBM's President T.J. Watson) accepted by the US Postal Service and incorporated in a stamp.



The sales slogan had been used for decades by IBM worldwide since 1937.



U.S. President John F. Kennedy's single statement in 1962 to "land a man on the moon by the end of this decade", gave an enormous impetus and million dollar budgets to the development of faster computers.



The race with the Russians for superiority in space was on.



A typical computer of the 60s, with separate units for input, output, central processor, memory control, etc.



Bulgarian EC 10XX mainframe

Quote:
"But what is it good for?"
IBM Advanced Computing Systems Engineer, 1968,
commenting on the microchip



Unadopted essay (from a set of 6) painted by Andrew Restall for 1966 GB issue "Computers"

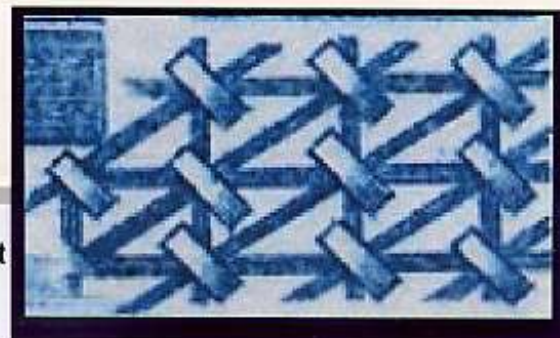
The integrated circuit, also called "microchip", is a multi-layered version of the printed circuit board, made of silicon wafers. They vary in from one inch to a few inches long and about one inch wide. This small size resulted in computers becoming smaller and smaller without compromising power.



At the end of the 60's all computers used integrated circuits. The third generation of computers had arrived.

In 1964, IBM launched its highly successful *System/360* series of mainframe computers which would replace the old punchcard computers, with the new concept of easy upgrading to a more powerful model within the S/360 family.

IBM's
S/360



Artist
proof

Notice the ferrite core memory in the bottom-right



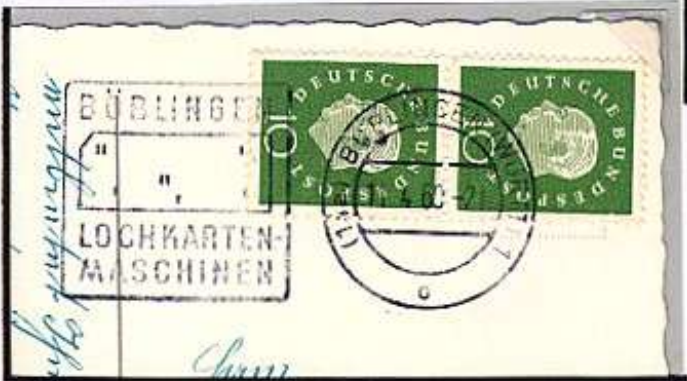
IBM held annual conferences for its worldwide sales staff. Only those achieving 100% of their sales target were invited to attend.



Notice the tabulator equipment in the cancel



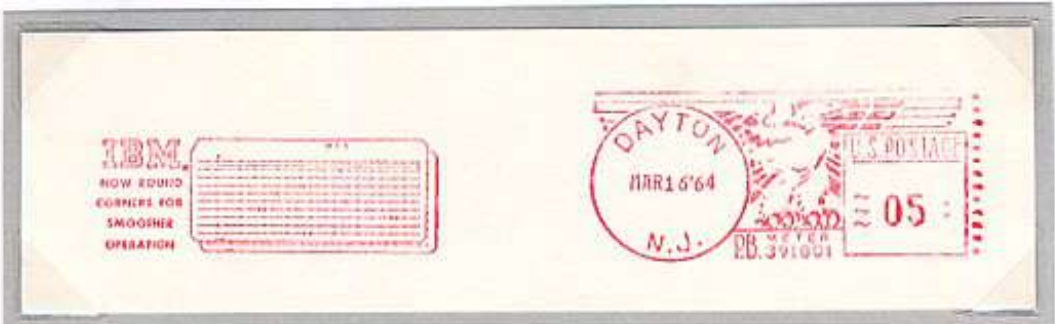
The concept of the S/360 mainframe computers was quickly copied in other countries. The East-German Robotron EC 2040 looked remarkably similar to the IBM S/360-40.



The IBM plant in Böblingen, Germany, was opened in 1953 for the manufacture of punch card machines.



In Romania the I.C.E. Felix company produced the Felix C-256 mainframe computer



Even the smallest change is marketed as innovation

The late sixties and early seventies also saw the start of Women's Lib and an increasing number of women found employment in the computer industry.



(background, top left)

Although initially often as data capture operators, they soon became involved as programmers and technicians.



Romania postal stationery cover (Cod 0337/75) with additional franking for Registration (1976)
Female technician at work repairing large mainframe computer.

100. výročí narození

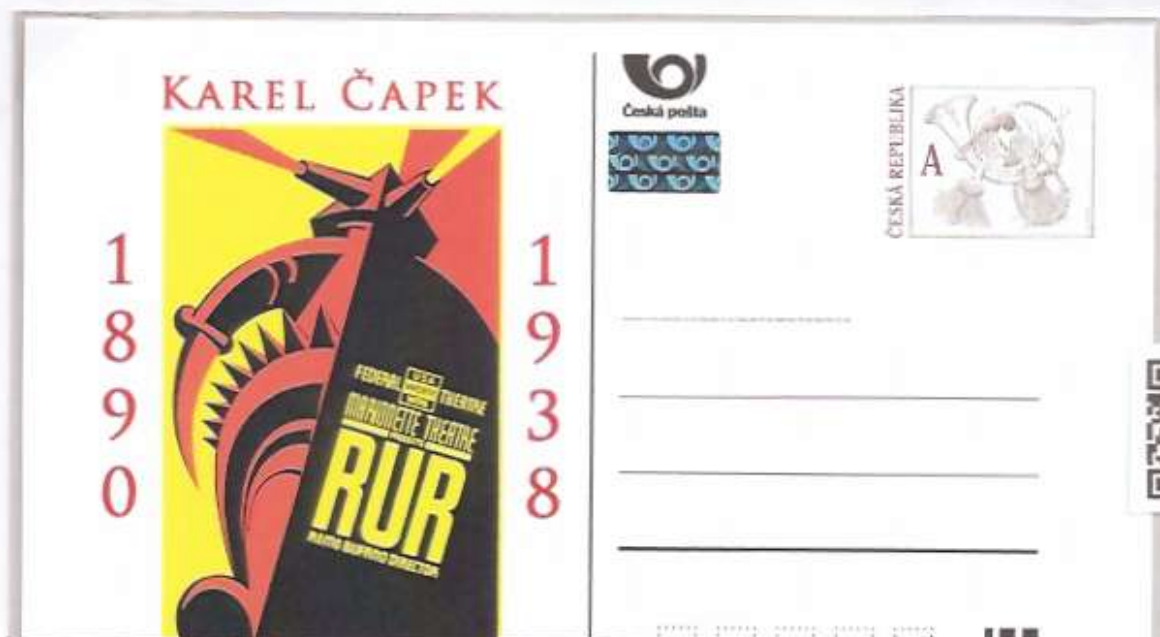
Karel Čapek

1890 – 9. 1. – 1990

The word "robot" was first coined by Karel Čapek (1890 - 1938), a Czechoslovakian writer of science-fiction.



Isaac Asimov's
robot Positronic



Karel Čapek wrote the satirical play *Rossum's Universal Robots* or *RUR* in 1921 in which he used the word "robot". The word was derived from the Czech words "*robota*" (drudgery) and "*robotník*" (serf).



Although Karel Čapek's "robot" was not a computer-controlled machine, the word soon got this meaning. Where robots were initially portrayed as crude humanlike figures ...



the ultimate dream would be to create a computer-controlled machine that looked and behaved like a human being.





Robotics is used widely in the manufacturing process.



With the developments in robotics the first robotic lunar vehicles arrived, like this Russian Lunokhod.



imperforate progressive proofs



In 1969 Neil Armstrong stepped on the moon. JFK's vision had come true (booklet pane with MICR letters)

Stanford University in Palo Alto, California, was founded in 1891 and would gain its place in the annals of history of computing by producing a steady stream of computer technology entrepreneurs, including the founders of Hewlett Packard, Cisco, 3Com, Yahoo!, Sun, etc. The father of the Internet, Vint Cerf, also graduated from Stanford University as did Doug Engelbart, the inventor of the *mouse*.



Return to E. Hewlett
 STANFORD UNIVERSITY,
 Santa Clara County, Calif.,
 If not delivered within 10 days.



Jerry Yang & David Filo, both Stanford graduates, founded Internet search engine Yahoo! in 1995.

The birth of Silicon Valley

Palo Alto acquired its official pseudonym *Silicon Valley* in 1971 after a series of articles in the *Electronic News* entitled "Silicon Valley USA". The word "silicon" referred to the material the electronic chips were made of.



A surprising number of Silicon Valley's cyber geniuses started their company in a very small way, in a garage. Hewlett Packard started in 1939 with their headquarter in Hewlett's Palo Alto garage. It has been declared a State Historical Landmark as being the birthplace of Silicon Valley.



Trial color plate
 proof pair

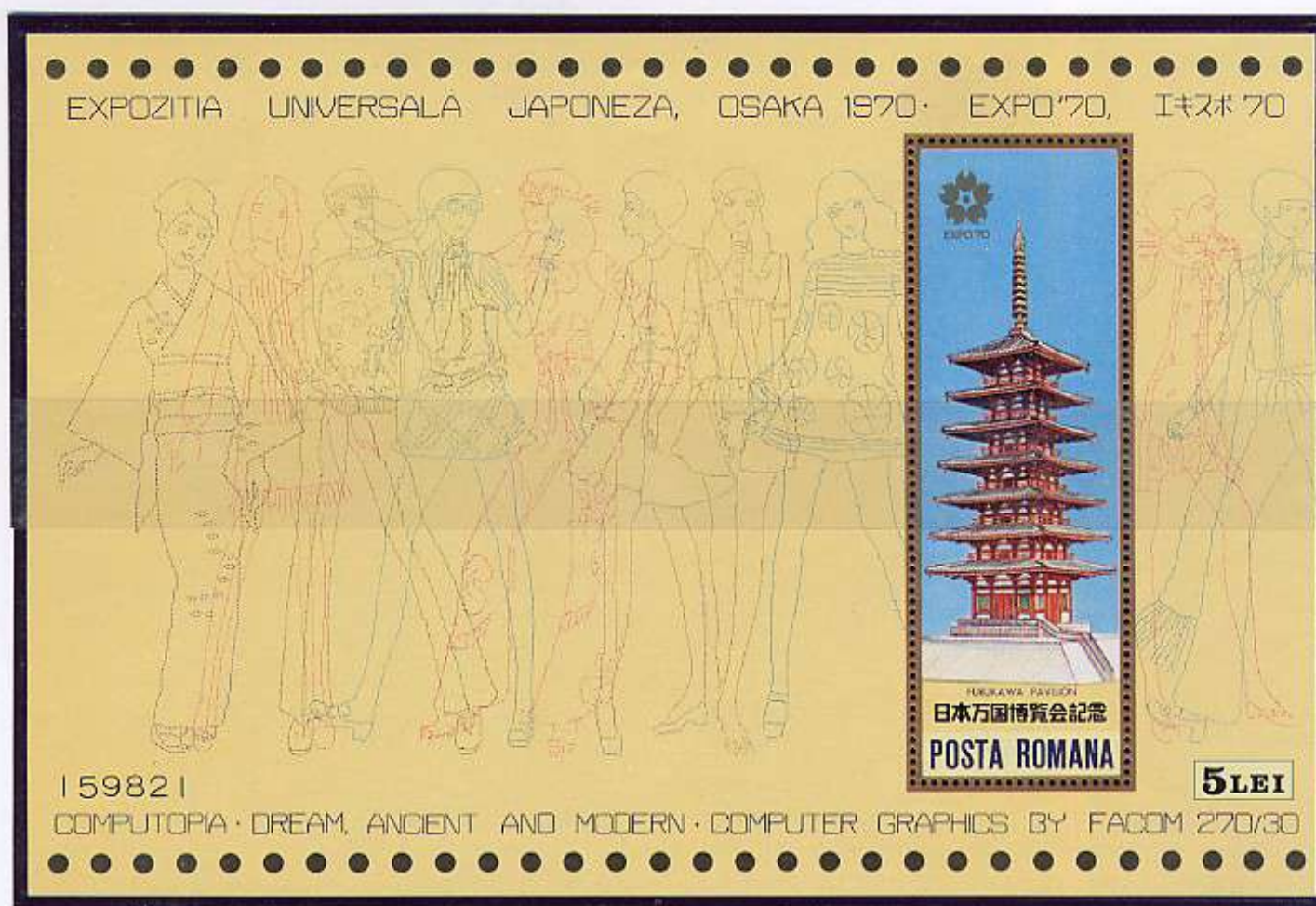


The sixties and seventies saw the development of high level computer programming languages like *Pascal*, which was developed by Niklaus Wirth in 1971. The language was named in honour of Blaise Pascal.

The Netherlands issued the first set of stamps completely designed by a computer in 1970.



The laser printer (invented in 1969) would enable easier printing of computer graphics.



Early graphics on plotter FACOM 270/30 (1970). Simulated sprocket holes make it look like a computer printed sheet.

In 1975 Ed Roberts coined the term "*personal computer*" and offered the first micro computer for sale: the Altair.



Other micro computers soon arrived but their functionality was still fairly limited.



1971 - Romania's first micro-processor



The Commodore Amiga was one of the earliest game computers in the late sixties - early seventies.

EXPEDITEUR

CARTE POSTALE

XXXIV^{ème} EXPOSITION NATIONALE
DES CHEMINOTS PHILATÉLISTES
5 au 7 Février 1977 - PARIS

DESTINATAIRE



Réservation électronique des places



Using the new online airline reservation system one could book one's seat through a computer.



Some of the earliest games one could play on a small computer were PAC-MAN and Space Invaders. They had a universal appeal to both adults and children, and became classics.



First Apple computer (with logo)

In 1976 Steve Jobs and Steve Wozniak founded the famous Apple Computers, starting in Jobs' parents' garage. The Apple soon became a worldwide success with its impressive graphics capabilities.



Also in 1976 Bill Gates started his little company Micro-Soft (the hyphen would be dropped soon) in his parents' garage. IBM was about to launch its new PC and asked the tiny company to write an operating system for it. Gates agreed to the deal and produced MS-DOS (Micro-Soft Dirty Operating System). IBM soon realised its mistake but it was too late to stop the birth of a giant.



1971 saw the 8" floppy disk being invented (by Alan Shugart). The 3½" stiffy diskette has a capacity of 1.4 million characters of information. The traditional large filing cabinet in the office would soon be replaced with a small box of diskettes.



In 1979, the International Broadcasting Exhibition in Berlin demonstrated the use of "Videotex", an early interactive information service using computers and modified TV sets.

There is very little difference between a TV screen and a computer screen. Both use a series of lines against which the cathode ray bounces, thus creating the individual pixels that make up a picture.



In the mid seventies the first electronic hand calculators appeared. The integrated circuits had become so small that calculators were reduced to a size that would fit in one's hand or pocket. They displayed their results on small LCD or LED screens.



electronic calculator with LED screen



LED/LCD characters have a very distinct form and shape.

By using these easily recognizable characters on a stamp, a more modern image is projected.



LCD (Liquid Crystal Display) screens use a black on grey color.



The same technology is used today in the screens found in cellphones, VCRs, etc.



LED (Light Emitting Diode) is a very similar technology, but uses blue, green or red colors.



With the emergence of the micro computers in the seventies the criterion for deciding if a machine could be called a *computer* was the game of Chess. If the machine could play chess, it was deemed to be a computer. The relationship between chess and computers has a long history.



*) Gary Kasparoff vs IBM's chess computer *Deep Blue*

The first chess playing automaton, *The Turk*, was based on a fraud. The machine was built by Wolfgang von Kempelen in 1769 and was supposed to play chess. However, its cabinet hid a small person moving the pieces.



In 1912 Leonardo Torres y Quevedo (1852-1936) developed the first real chess machine which played the king-with-rook vs king endgame.

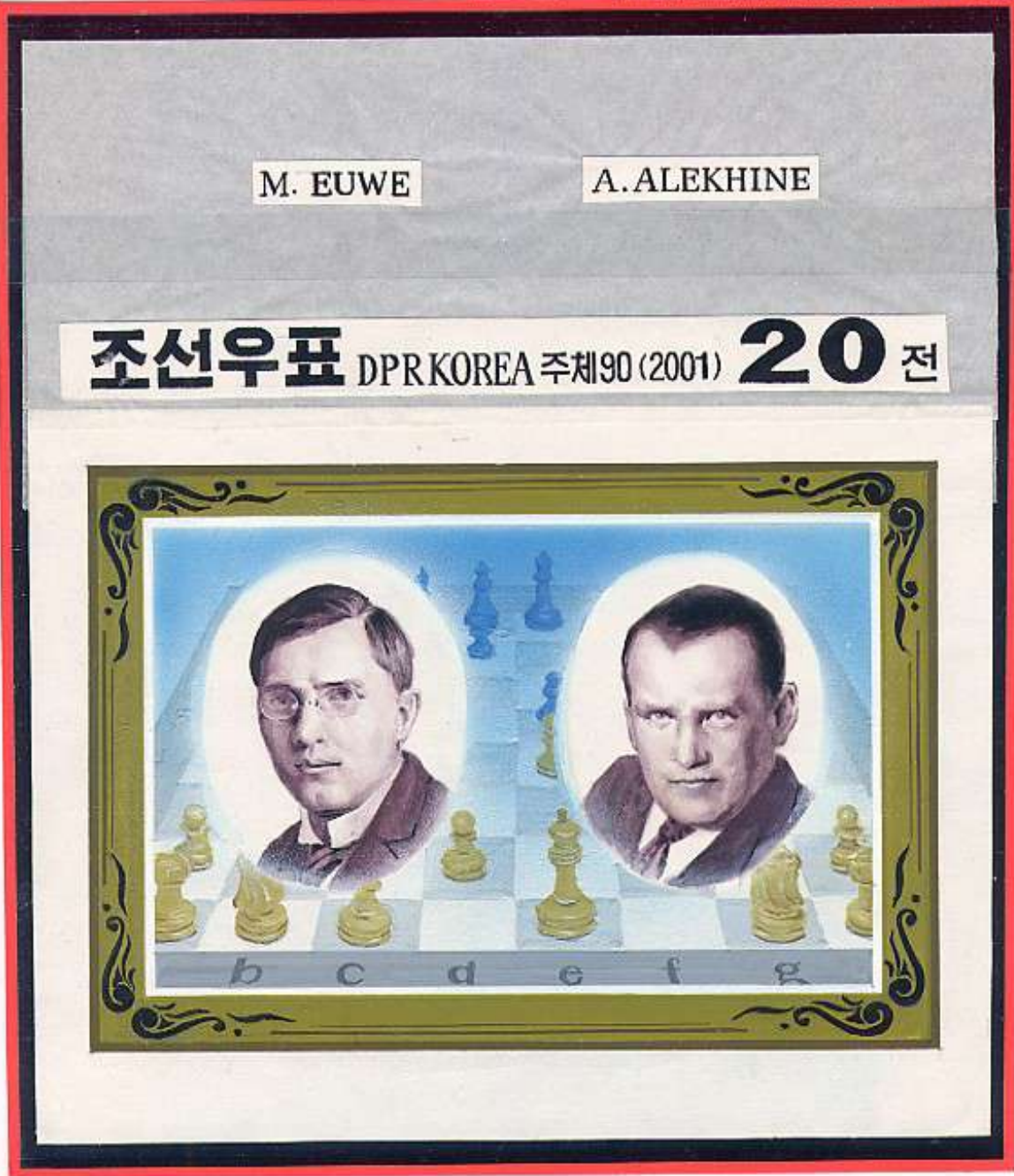


In 1920 Quevedo demonstrated an electro-mechanical calculating machine that was program controlled. The machine performed the four arithmetic operations and was wired to a typewriter which was used as its input/output device.

One of chess' Grandmasters, Dr Max Euwe (1901-1981), not only was World Champion in 1935-1937, but also had a distinguished career as professor in mathematics and computer science. He was the first Grandmaster to research the feasibility of computer programs playing *chess* in the early sixties.



misperf'ed sheetlet



Adopted essay (watercolor) with glassine overlay for lettering (N.Korea 2001)

3. The Electronic Age: 3.4. If it can play Chess it must be a computer

IBM's "Deep Blue"

"Deep Blue"

IBM built the most powerful chess-computer, *Deep Blue*, to prove that a computer thinks better than man.



Deep Blue had always been beaten by the world's chess grandmasters, until 1997 when *Deep Blue* defeated world champion Gary Kasparoff in a tournament. Following this, IBM dismantled its legendary *Deep Blue* computer.



Fidelity chess computer



In 2002 a German company built another powerful chess computer and aptly named it *Deep Fritz*. The match against Vladimir Kramnik in 2003 ended in a draw.



On 12 August 1981 IBM joined the foray when it launched its own Personal Computer. Until then considered immature technology, IBM's decision immediately gave the PC standing and reputation. The PC had arrived and everyone else had to become IBM-compatible.



The first IBM PCs had a single or dual floppy (360 Kb) disk drives. Its memory size was usually 640 Kb or less.



(reverse of stamp on the right)



Patricia Roberts Harris (1924-1985) was the first black woman to become a Director of IBM in 1971.





IBM introduced its second generation of PCs, the PS/2 (Personal System/2), in 1987 (see above). This was a commercial disaster due to its incompatibility and would cause IBM to lose its dominance as PC manufacturer.



color proof



IBM used every trick in the book, including references to the ENIAC, in its advertising campaigns although it had nothing to do with the development of the ENIAC.

Eniac haalt méér uit uw IBM-computer

Capelle a/d IJssel -3.7.86 IJssdams 1 2907 AZ

NEDERLAND 0000 CENT FR 24836

| | | | |
|--|-----------------------------|---------------|--|
| FRANCOTYP G M B H B E R L I N | DATUM Date 28.04.86 | 000140 | Stamp Printing / Empreinte |
| KONTROLLKARTE Control Card / Carte de contrôle | MASCHINE Unit Elément | Typ Modèle | MASCHINEN-NR. Machine No. No. de fabrication |
| WERKS-KONTROLLE NAME Factory Check Name Nom contrôle usine | PROFFELD Inspection | 575764 | 60.9500 4002 |
| FR 24836 | 0000 | 28.7.86 | 0000 |

370-001 b



Not surprisingly, the small computers that fitted on a desk, had quite a few side effects. One of them was the ease with which the disabled fraternity took to it. The whole field of Information Technology was opened up to this community worldwide.



monochrome proof



Essay by Walsall Security Printers' in-house artist. The right half of the essay was adopted, after being enlarged, for the issued stamp.



New words emerged, like *mouse*, *email* and *spreadsheet* and computer literacy became an issue in order to understand the new technobabble.

But not everyone understood the significance of what was happening.

Quote:

"There is no reason anyone would want a computer in their home"

Ken Olsen, CEO and founder of Digital Equipment, 1980



Even Bill Gates made some famous predictions.

"A computer memory of 640 Kb ought to be enough for anybody."

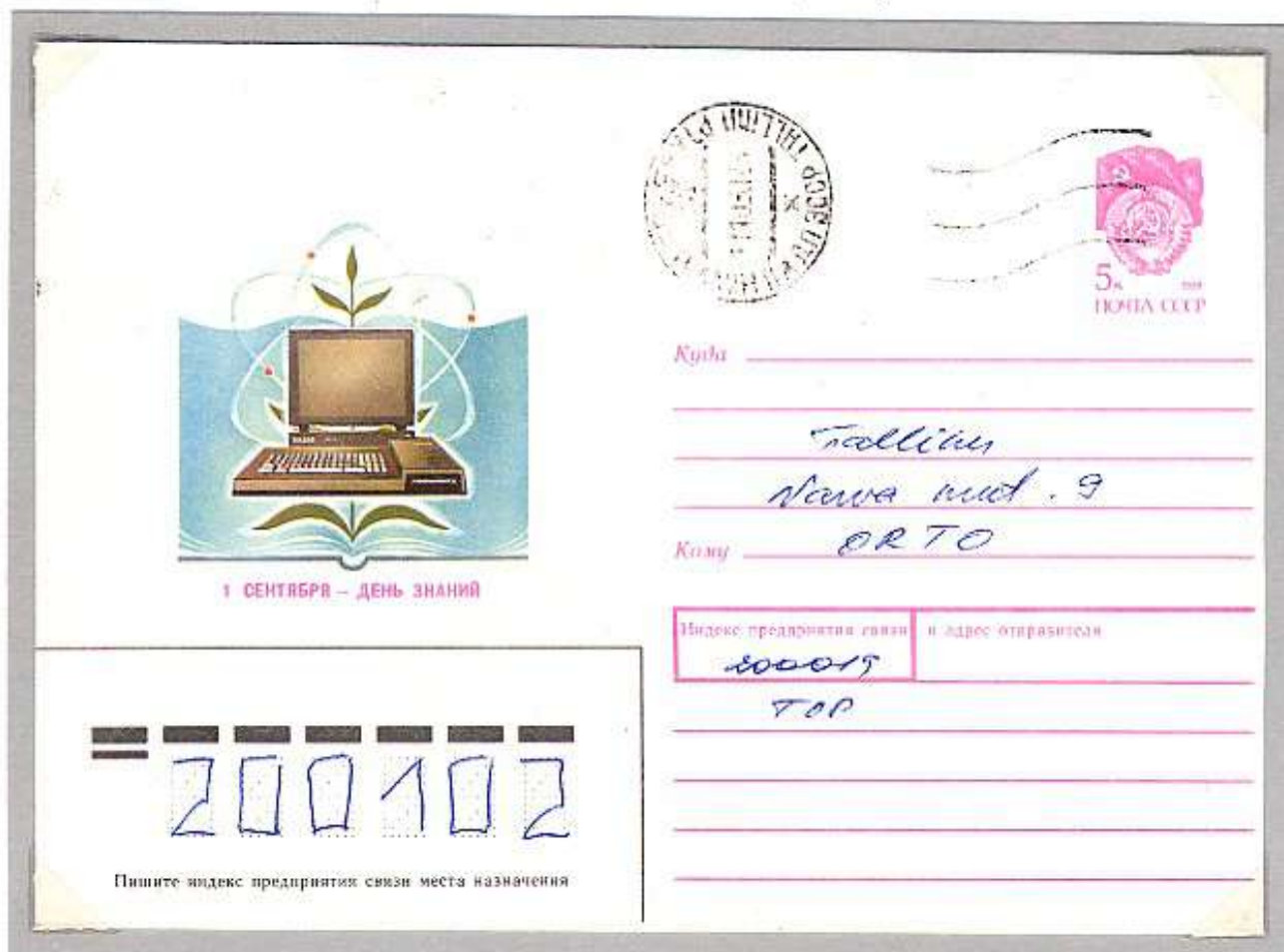
Bill Gates, Founder Microsoft, 1981

In 1983 Mitch Kapor introduced *Lotus 1-2-3*, the revolutionary spreadsheet concept.

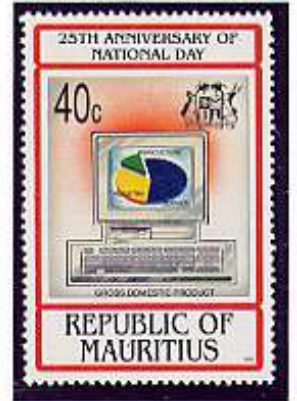
This killer application (it killed every other application in the same market) made it essential for every business to start buying the small computers.



Local Area Networks (LANs) were introduced to connect computers and printers within a few hundred meter radius. Technology would quickly expand this to Wide Area Networks (WANs).



Russian Personal Computer from the late eighties



In November 1985 Microsoft launched its "Windows" operating system with its familiar screen layout (see above) and soon more and more sophisticated graphics software landed on the desktop.



With "windows" came the mouse, an invention from 1964 (by Douglas C. Engelbart), which enabled the PC user to control the actions on his screen by moving a cursor (a pointed arrow on the screen).



"cursor"



"mouse" surcharge



中国邮政
贺年(有奖)明信片
Post of China



领奖人填写内容
姓名 地址或单位名称
证件名称 证件号码

禮賀新禧

金长城



中国长城计算机集团桂林软件技术公司
热线 | 5816992 5810632 2836865 5818151 2824398 2809685 2862008
电话 | 5817666 5812126 0771-5315195 0771-5330743 0775 2832102

2000年(BN)-054

The Microsoft Windows logo became famous worldwide and well-known among its competitors

Initially data was stored on removable floppy (capacity 360 Kb) or stiffy disks (cap. 1.4 Mb)



Artist's proof
in black, signed

The Compact Disc was introduced in 1985 for recording music. Since then it has also been used for recording digital data for computer systems. It has a storage capacity of more than 600 million characters.





The floppy disk was the first removable disk storage medium of the new PC. Due to its severe capacity constraints it did not outlast the eighties (except in this metermark).



It was soon replaced by the stiffy disk which had four times the capacity. As requirements grew the need for a larger external, portable storage medium grew - hence the CD-ROM.



A CD-Rom can also be mailed across the world, provided it's packaged carefully. This New Caledonia postal stationery was used for shipping a Screen Saver CD. Today most people use a USB flash drive, a 1999 Israeli invention.

In a few decades a completely new industry had emerged: the Information Technology (IT) industry. With it came a plethora of regulatory bodies, conferences and product fairs.



The first congress of the International Federation of Automation Control (IFAC) was held in Moscow in 1960. Clearly too early for the stamp to show a computer.



European Data Processing Congress (Austria, 1966)

The European Technology Conference held in France, in 1966, was sponsored by IBM.

The International Federation for Information Processing (IFIP) was established in 1960 as the IT industry's controlling body.



IFIP's world conference Amsterdam 1970



America's National Computer Conference in 1979



Medical congress (1980) under IFIP auspices



IFIP's 1980 world congress was held in Hungary



In the eighties the term "DP" (Data Processing) was replaced with "IT" (Information Technology).

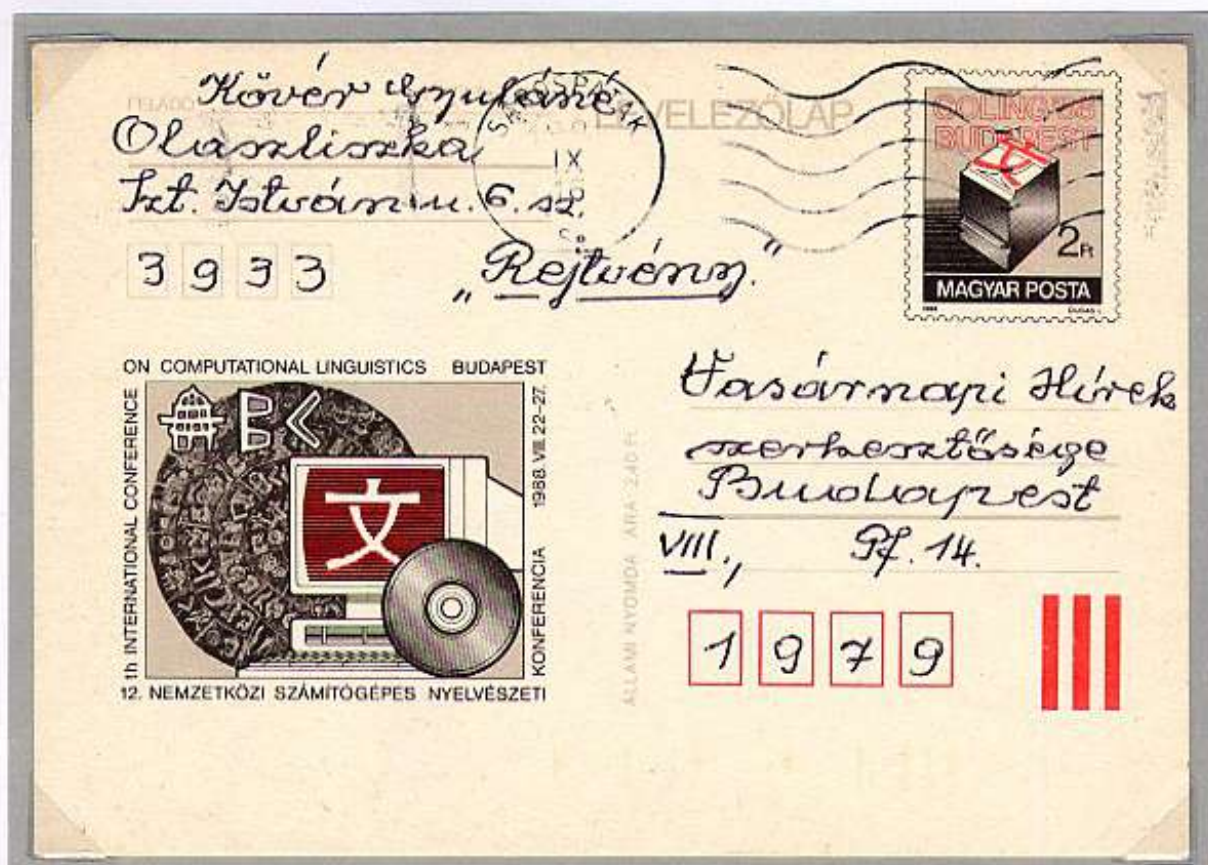




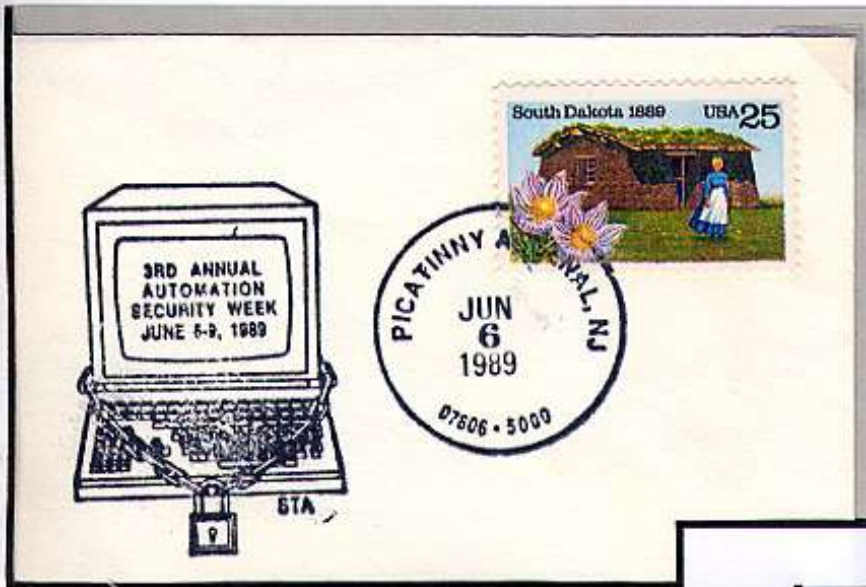
Computer Science had become a popular subject at universities and colleges.



German computer fair CeBIT held in 1993



Conferences became more and more specialized, like this Computational Linguistics conference in 1988



How to secure your PC?

Many technology conferences tried to deal with this new technical wizardry.

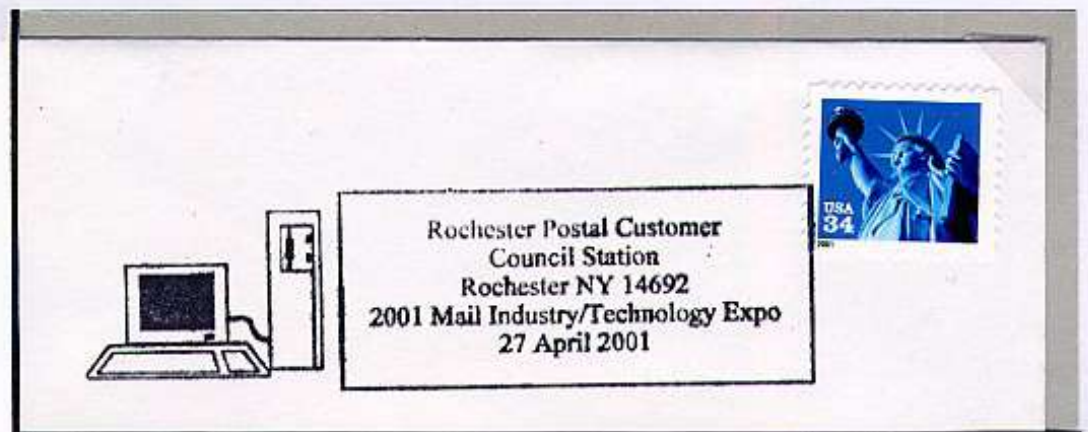


1992 International Conference on Surveying/Mapping (Iran)



International Computer Show, Germany, 1985

2001 Conference on mail technology industry in U.S.A.



The 20th International Conference on Data Bases (VLDB = Very Large Data Base) was held in 1994 in Chile. Oracle is one of the world's largest database companies.

Information Technology (IT) has become a major influence in all spheres of science and industry and today computers play an important role in many commercial fields, from accounting to zoology.



"missing red"



Accounting

Computerized auction
for flowers, bulbs, etc.

Astronomy

SPECIMEN



Dairy farming



IBM Deutschland.



Export of electronic equipment



"thin paper" variety

Many scientific achievements have only been made possible through the sometimes ingenious use of computers.

Retail



The retail sector uses electronic scanning of products to monitor the levels of stock on the shop floor. This is made possible through the use of barcodes on products.



barcode for meat in bulk?



Electronic scales

Even a stamp is considered a product
and needs to be barcoded.



NYSE



The SEM is located in Port Louis, Mauritius.



Amsterdam Stock Exchange

Where the Stock Exchanges of yesteryear did their bidding on the floor by shouting out orders and prices, the modern stock exchange does its business through a multitude of computers on (usually) that same floor.

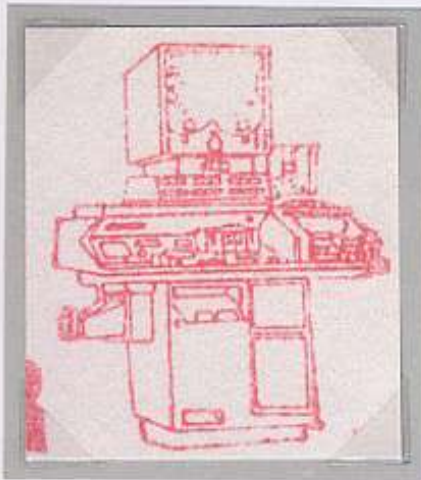


Shanghai Stock Exchange



The buying and selling of stock is mainly done through banks and other financial institutions although these days one can also deal directly from one's home PC.

Computers play an ever increasing role in determining weather patterns and long-term weather forecasting.



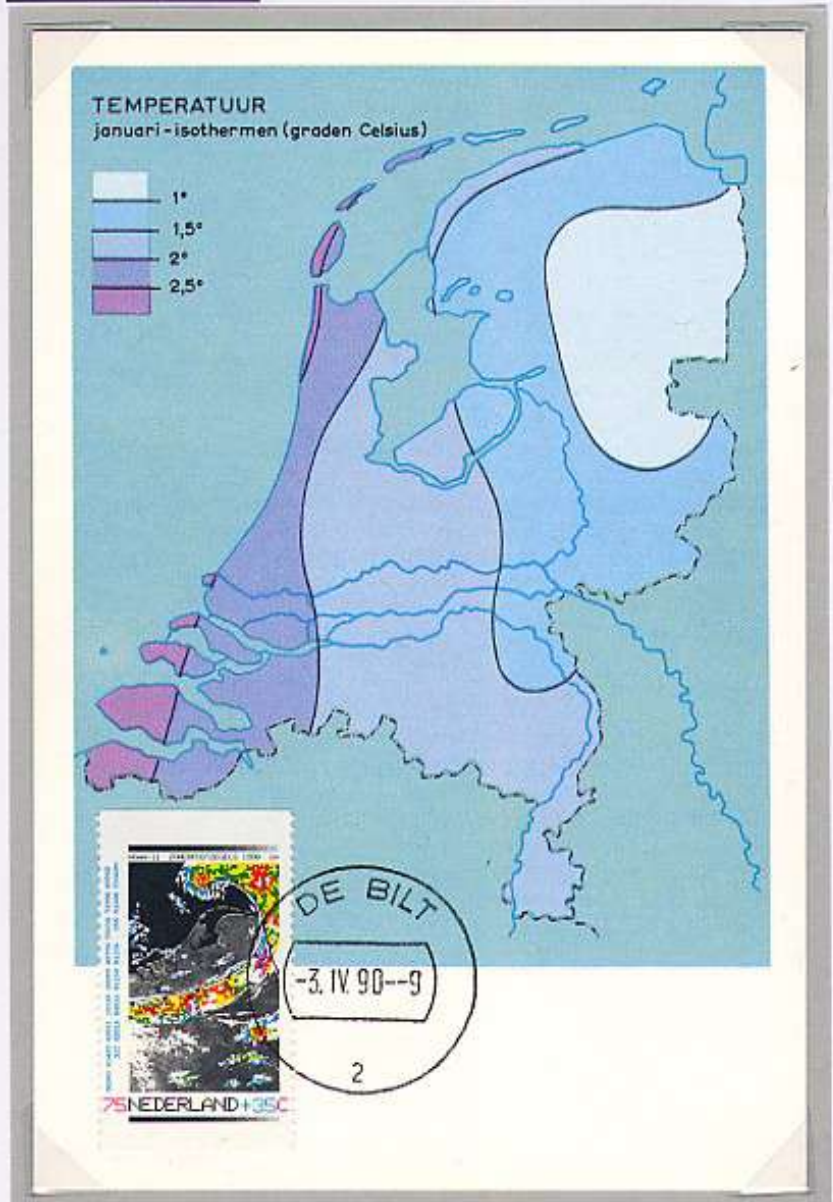
Horace was an early special-purpose computer for atmospheric research



Hurricane season in the West-Indies



Big Brother watches over all of us



De Bilt is home to the Royal Dutch Meteorological Institute

Health

The health industry also uses computerized scanning equipment to have an inside look at the human body.



A scintigram shows the presence of cancer



rare spelling error :
"In cancer is detected"



Magnetic Resonance Imaging scanner (left) and its resultant picture (above).



Computerized Axial Tomography (called CAT scan) with its result.



Computer with magnetic tape drive (top left) used by medical doctor

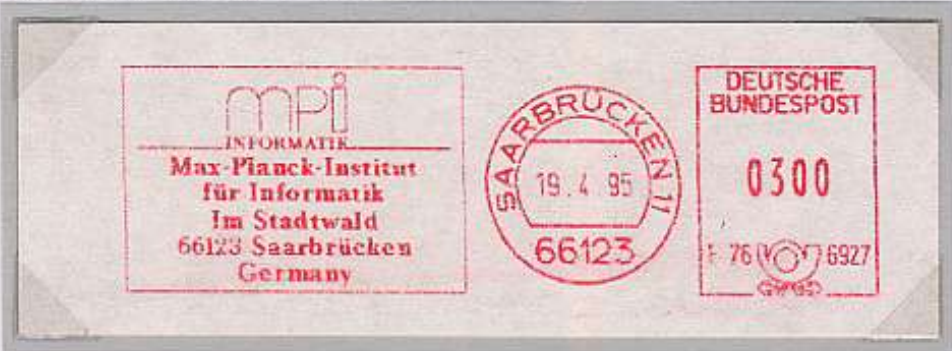
PR China Postal Card (1985)

Science

Due to its computational power, its speed, as well its ability to produce sophisticated graphics, the computer has become an indispensable tool in the field of mathematics and other exact sciences.



Muster (=specimen)



Germany's scientific Institute for Informatics Max Planck



Computerized map of the Alps



The Antarctic ice sheet



Muster



Complex mathematics, like this fractal, can only be done on computers.

Computers used color plotters to draw 3-dimensional pictures of an area which made it easier to visualize. Today's PC printers have that same functionality.



Computerized picture of the ozone hole above the Antarctic



Underwater cartography

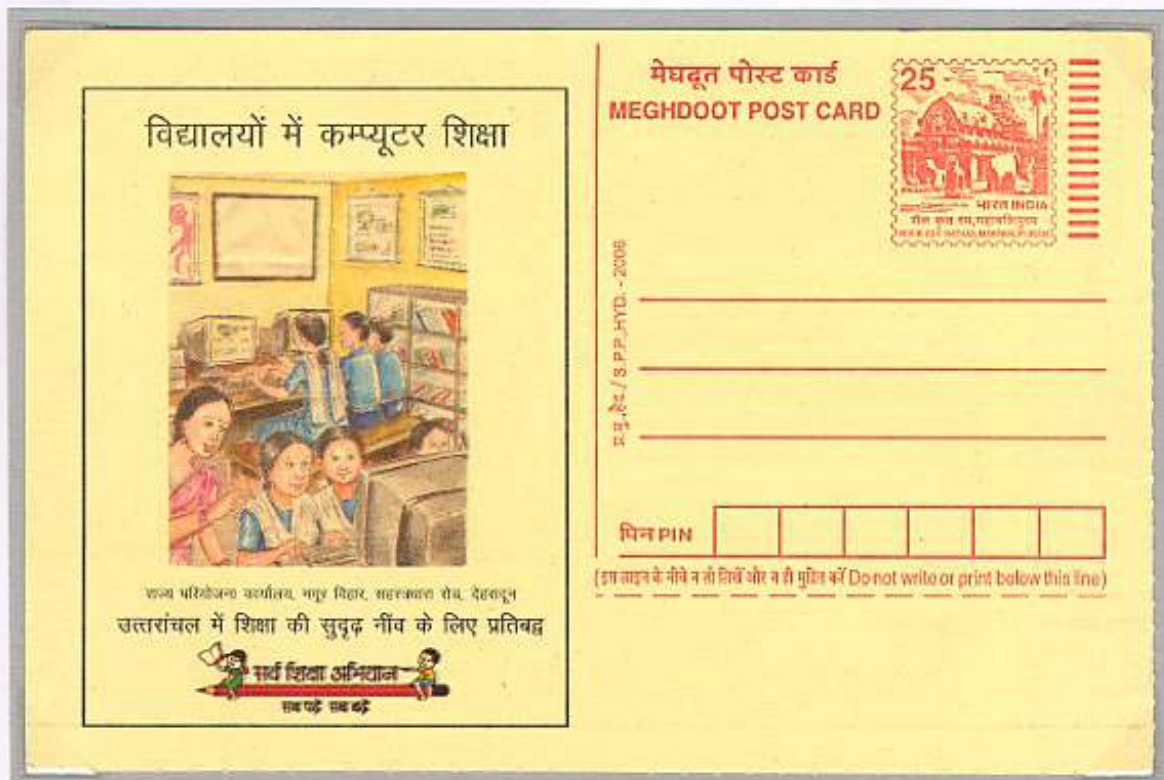


Education

In our primary schools there is an ever increasing use of computers, Slowly the chalkboard is augmented and replaced with computer keyboard and mouse.



The classroom of the future



Education

At tertiary education the computer is not only a tool used in the educational process, but every university has its own Department of Computer Science to educate their students and to perform the necessary research to develop this important branch of science.



Technical education



First DP conference in Colombia's National University



The Media

Newspapers use computerized type setting and news agencies stress the importance of freedom of the press



while journalists and reporters replace their notepads with computer keyboards and electronic notepads.

Sport



Computer technology is widely used in sports, not only to record split-second timings, but also to develop and monitor training programs and to manage complex projects like the Olympic Games.

Transport

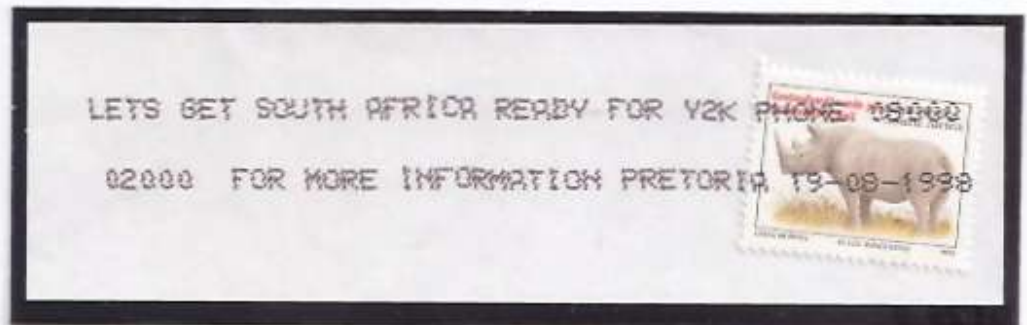


In the aviation industry, flight reservation systems, airport control of arrivals and departures, and instrument landing systems are all totally dependent on computers. We've come a long way since the Wright brothers.

Due to the very limited capacity of computer memory and of the punchcard in the sixties, computers were programmed to record dates without the century component. This resulted in the Y2K problem in the late nineties.

**Y2K bug****Y** = Year**K** = kilo = 1000**Y2K** = Year 2000**Bug** = computer jargon meaning "error"

Millions were spent by the IT industry to correct the problem and an enormous hype developed during 1999.



IT personnel were on standby watching their computers at the stroke of midnight, one of the many preparations.



Would the elusive bug be destroyed or would our world descend into digital darkness?



Many countries organized big parties to celebrate the new millennium



while in others the world just kept turning.



color proof (imperf pair) in yellow & blue



Everyone prepared himself for the new year.

imperf proof, signed for approval



Approved
 Jakir Hossain
 2.11.1999
 Director (Stamp)
 Bangladesh Post Office
 D. G. Office, Dhaka-1000
 Bangladesh.

Despite what some American cities believed, New Zealand was the first large country to experience the new dawn.

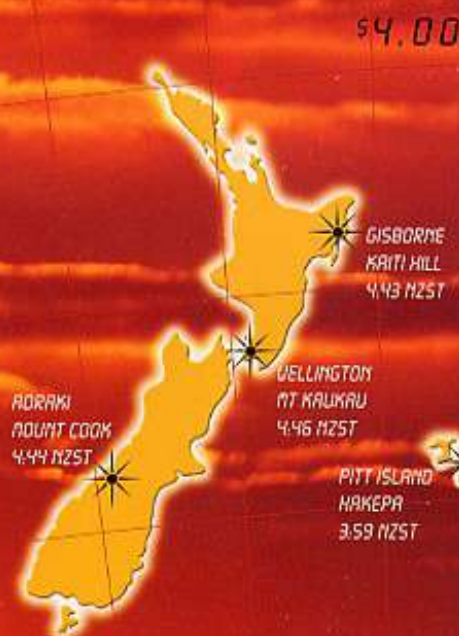


See the self-explanatory description of this "new dawn" in the bottom right



"missing country" variety
Notice the LED char's
in the stamp design

(The actual time of the sunrise could differ from the calculated times by up to 3 or 4 minutes due to atmospheric conditions)



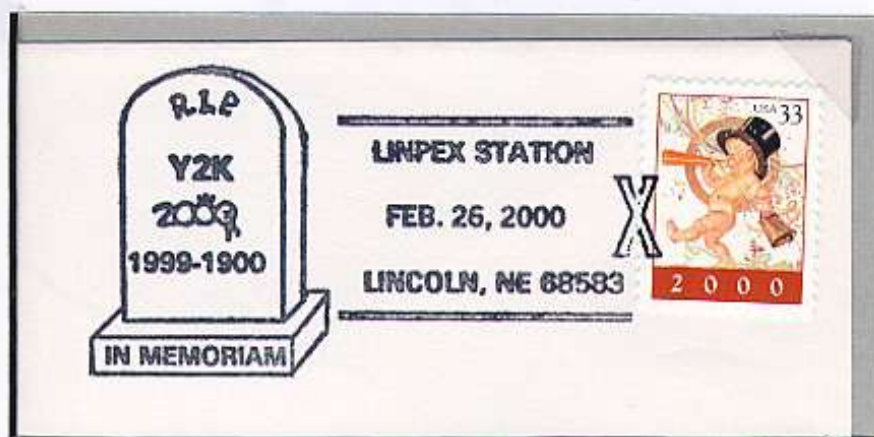
New Zealand was the first country in the world to see the new dawn in the year 2000. For those waiting to see the sun come over the horizon on the morning of 1 January 2000, it was an experience filled with wonder and expectation. Even for those who didn't see the actual dawn, it is a day few will ever forget – a day this issue celebrates.

But when 2000 arrived, apart from a few minor hiccups, life carried on. The Y2K bug had been killed.



Some countries used extreme force in their attack well after the critical date.

Y2K died a quiet death



Had it all been a massive hoax? Or did the new millennium only begin in 2001?



By the nineties the original ARPAnet (see § 3.1) had grown to incorporate a network of millions of host computers which became collectively known as the World Wide Web.



Web addresses quickly found their way onto stamps and other postal material.



Quote:
"I took the initiative in creating the Internet, I can take it away as well."
Al Gore, Vice-president USA, 9-3-1999

Inhabitants of the global village are connected through cables, usually optical fibre.



Via these cables one can transmit data, text, graphics and voice signals, this is called **ISDN** = Integrated Services Digital Network.



specimen



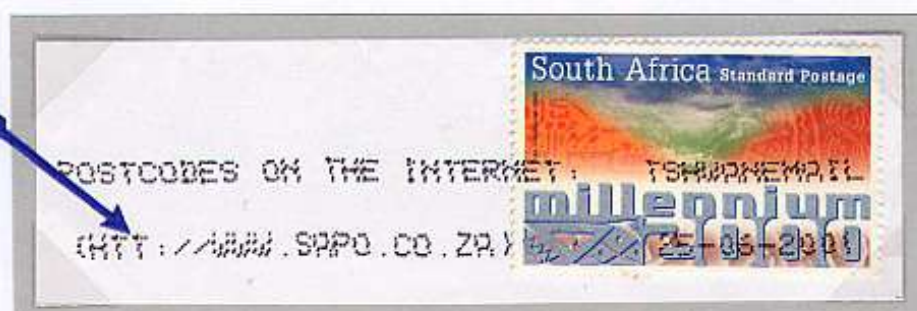
The latest communication in the global village happens not through cables but through the use of satellites.



Through a simple click of the mouse we now have access to knowledge on a global scale



Notice missing "p" in internet address, which was printed by an inkjet printer.



Internet addresses usually end in a 2-character country identifier.



Supplementary stamp to make up shortfall in franking at the Post Office counter

.at is the internet suffix for Austria.



.be = Belgium



Many commercial TV-stations showed interest when Tuvalu put its .tv suffix up for auction. It was sold for \$50 million in April 2000.

Exponential growth of WWW:

1969: at birth, 4 computers
 1984: 1,000 hosts
 1987: 10,000 hosts
 1989: 100,000 hosts
 1992: 1,000,000 hosts
 1995: 10,000,000 hosts
 2000: 100,000,000 hosts
 2003: 200,000,000 hosts
 2007: 500,000,000 hosts
 2013: 1 Billion hosts

With all that global knowledge online, it's easier to search electronically for documentation on the web than in a library.



Your local library will be replaced by Wikipedia - just ask your kids.



J. Combet

Proof in black, signed by designer J. Combet

The new world wide web resulted in many new companies who operated predominantly on the internet. They became part of the "dotcom" industry - named after the ".com" suffix in their internet address. Existing organisations soon felt the need to have a presence on the net too.



Well-known internet search engine Google was founded in 1998 by Larry Page and Sergey Brin.



Hotmail.com was founded in 1996 by Sabeer Bhatia and Jack Smith.

Amazon.com - initially an online bookshop - was founded in 1996 by Jeff Bezos.

South African Mark Shuttleworth founded software company Thawte in 1995. In 2000 he sold his company for US\$560m. This enabled him to buy a \$20m ticket to become the second space tourist to visit the international space station on 25 April 2002.

Launch cover for launch of Soyuz TM-34 to MIR, launched from Baikonur on 25 April 2002



As more and more companies, including most postal organizations, found their way slowly to the internet ...



... the modern shopper started *surfing the net* to do his electronic purchasing.



4. The Internet: 4.2. E-mail: The Electronic Letter

E-mail becomes Snail-mail

In the early days of e-mail not every individual had his own e-mail address. In England, e-mails could be sent to a central facility, where they were printed out and forwarded to the recipient that same day using this special envelope.



A similar system was introduced in China PR in 2001.

Letter sent from Amoy to Macao, but as nobody retrieved it, it was returned. In the process it was damaged (see red h/s "Damaged upon arrival") and resealed.

4 1 0 0 0 0

收信人地址:

值此2003年春节大年初一之即向你拜年了! 祝你春节快乐, 合家团圆, 万事如意喜气洋洋 澳门邮政总署

存局候领洪佳丽(无人领取请退回) 收

寄信人地址:

中国福建省厦门市开元区湖光路23号602室陈志明祝你一帆风顺两全其美三羊开泰四季平安五福临门六六大顺

姓名: 陈志明 八面威风九九鸿福十分美 邮编: 361004 电话: 00856-0592-88888888 传真: 0592-8888888888

PC-LETTER

收到时已破损



Computers have had an enormous impact on the world's Post Office organizations. Although initially this meant mechanization of the postal services, ultimately it became full computerization. This section looks at four areas where IT has had an impact on the postal system.

1. Sorting the Mail
2. Barcodes
3. Computer Vended Postage
4. E-stamps



4.3.1. Sorting the Mail



Reverse of USA
Sc 1495 (30/4/73)



Use the postal code !



The encoder types in this code which is encoded in bars on the postal item.



The bars are read by the electronic eye of the sorting machine where the mail items are sorted on postal code.



The luminescent barcodes in the top line at the bottom were put on in Epinal, France. The bottom barcode (postal code) was printed on arrival in South Africa.

0 7 5 3 0 Bellville - AFRIQUE du SUD

4. The Internet: 4.3. IT's Impact on the Postal System

4.3.1. Sorting the Mail

The large mail distribution centres (called "hubs") in South Africa, like Witspos in Johannesburg and Capemail in Goodwood, use OCR-readers (Optical Character Recognition) for processing the mail.

The OCR-reader "reads" the postal code in the address and encodes this code in vertical bars at the bottom of the envelope and time/date stamps the envelope.



Cover sent from UNDP offices in Malabo, Equatorial Guinea by UN Pouch to UN offices in New York, where it was franked with 20c UN New York stamp and entered the US Postal System on Oct 26, 1982. When going through the computerized letter sorting equipment, it became damaged (see handstamp). It arrived in San Francisco on Nov 1, 1982.

4.3.2. Barcodes

Barcodes originate from the Universal Product Code which is used to uniquely identify each product. They consist of a series of vertical stripes which can be read by a scanner.

There are five types of barcodes when relating barcodes to stamps and mail items:



a. Barcodes used to reflect technology

Barcodes forming part of the design of the stamp to portray a modern image.



b. Barcodes to identify types of mail

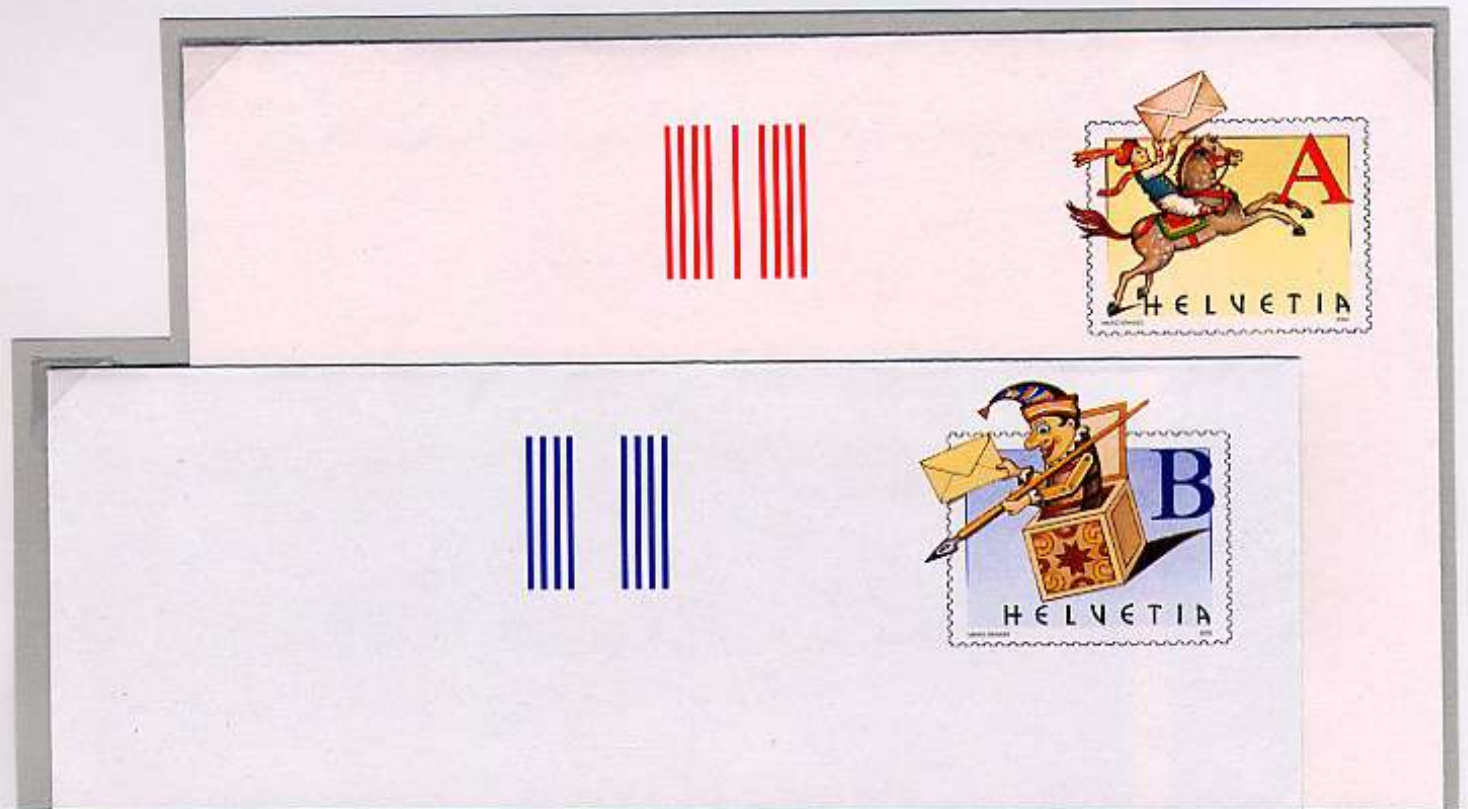
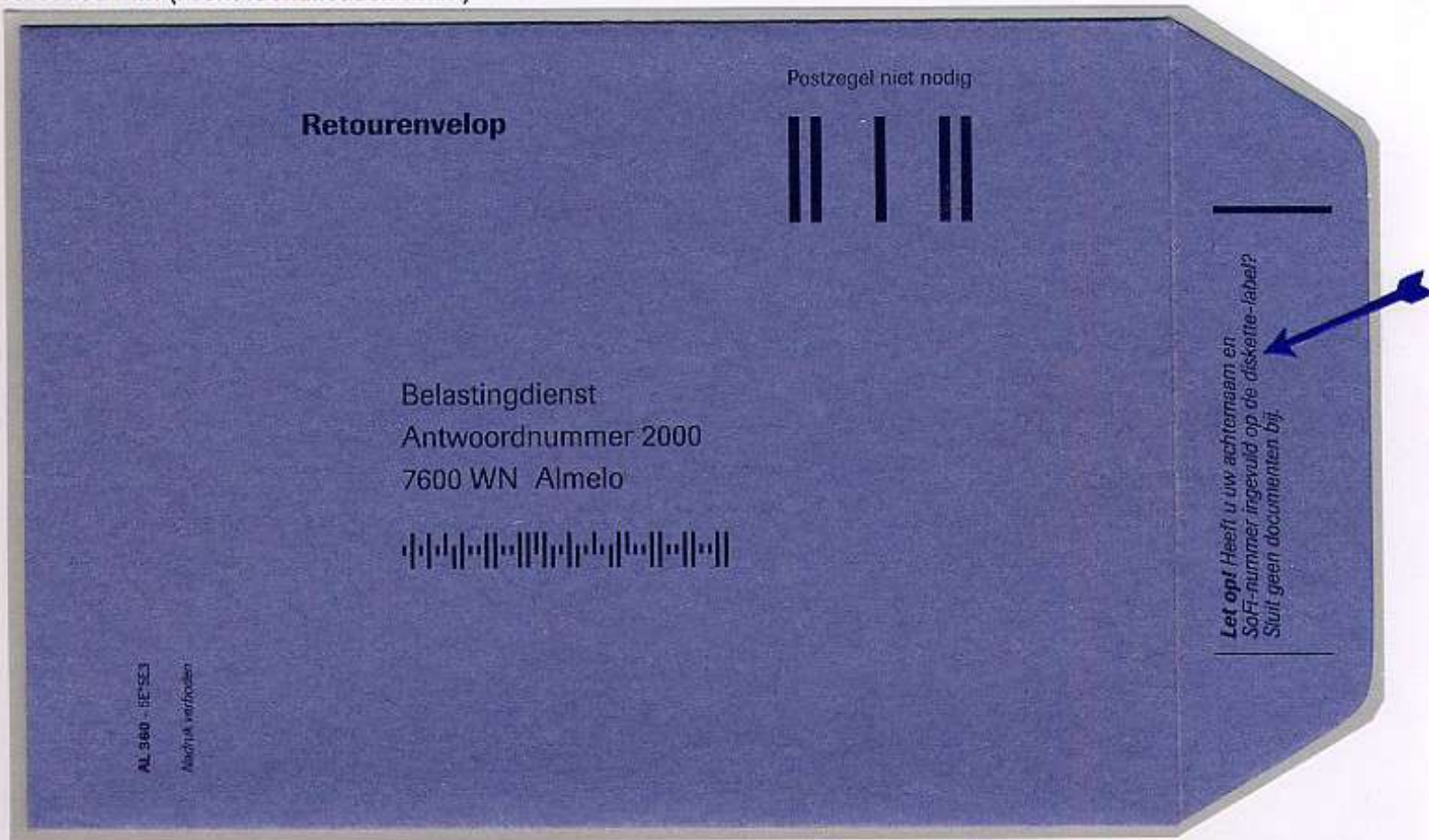
In 1986, Canada introduced the first Christmas stamp with a barcode incorporated in the design which enabled sorting machines to identify this type of mail.



Switzerland used the same concept in 1993 to distinguish first class "A" mail from second class mail by printing barcodes as tiny stripes on the side of the stamp. So did India in 2003.



The Netherlands Revenue Service did away with the stamp altogether in 1996 when it introduced diskette mailers for the return of a diskette containing an electronic tax return document. The stamp (top right) has been replaced by a barcoded FIM (Front Identification Mark).



Switzerland introduced the barcoded FIM in 1998 but left the imprint of the stamp.

c. Barcoded postal codes

The postal code on the envelope is encoded electronically in a series of vertical stripes (see 4.3.1) usually printed below the address. Sometimes the stripes are printed in luminescent ink.

d. Barcodes as product identifier

The stamp is a product in itself. Adding a barcode to the selvedge enables computerized stock control.



South Africa introduced this technology in 2000, but inexplicably used the same barcode on the first two stamps with the new feature.



A variation of this application is used on "tracking labels" enabling the computer to track the location of the item in the postal system.

e. BeeTagging (mobile tagging)



The latest technology is the system of mobile tagging. The 2D data matrix barcode can be read by the tag reader software on your mobile phone (using its camera lens). The software then connects your mobile phone to the website encoded in the tag. Using the BeeTagg on the Swiss stamp on the left directs you to the Swiss Tourism website.

A similar system used in Finland goes under the name Upcode.

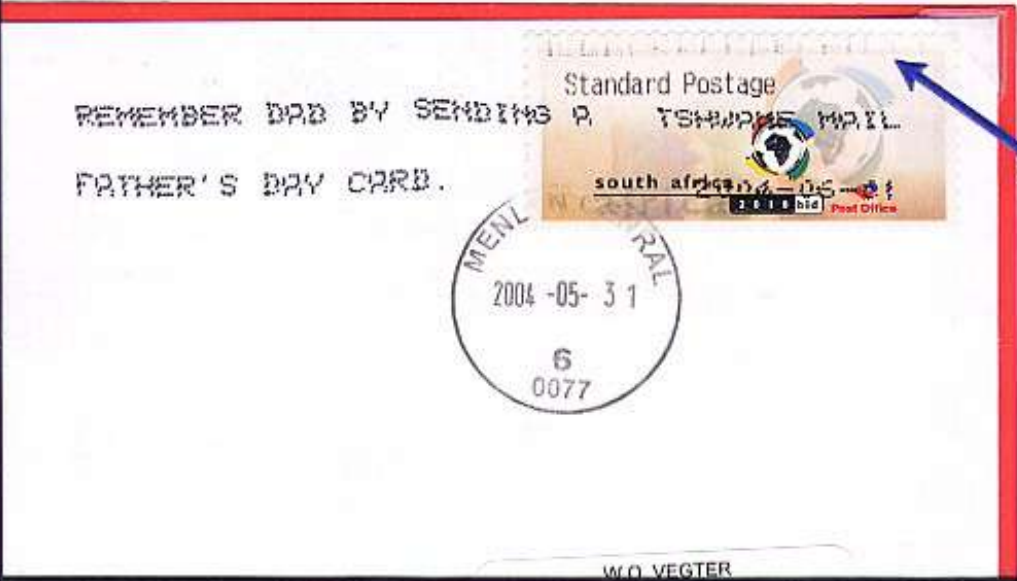


4.3.3. Computer Vended Postage

In the 80's and 90's many countries introduced so-called "Computer Vended Postage" (CVP) labels where the computer printed the postage value on the "stamp".



They became known as Framas, Naglers and Klüssendorfs, named after the manufacturer of the CVP equipment.

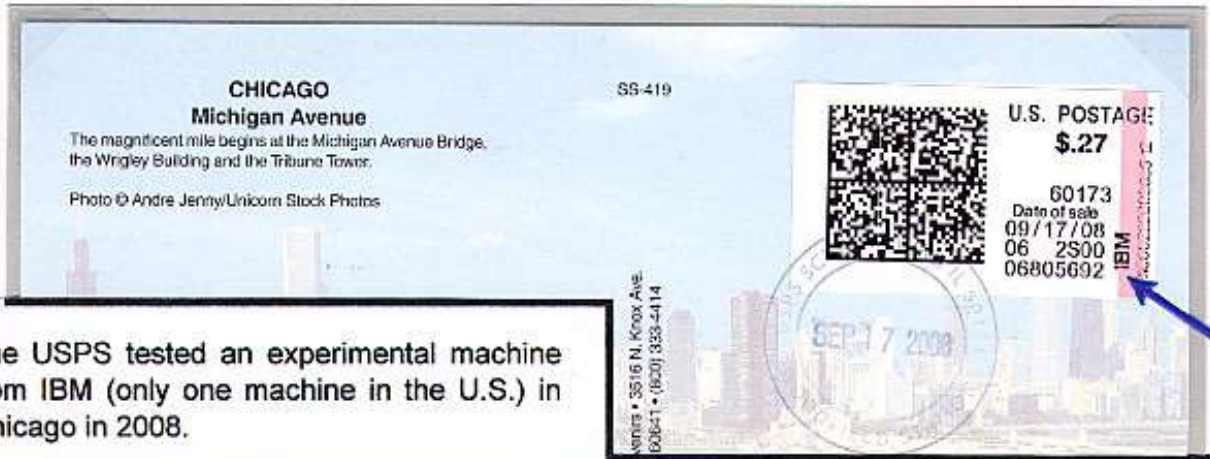


South Africa ran a trial in 2004 with a bar-coded computer vended postage label, calling it a "virtual stamp". The trial was unsuccessful as the barcode (at the top) was unreadable. As the stamps came from a roll, multiples were issued as a strip.

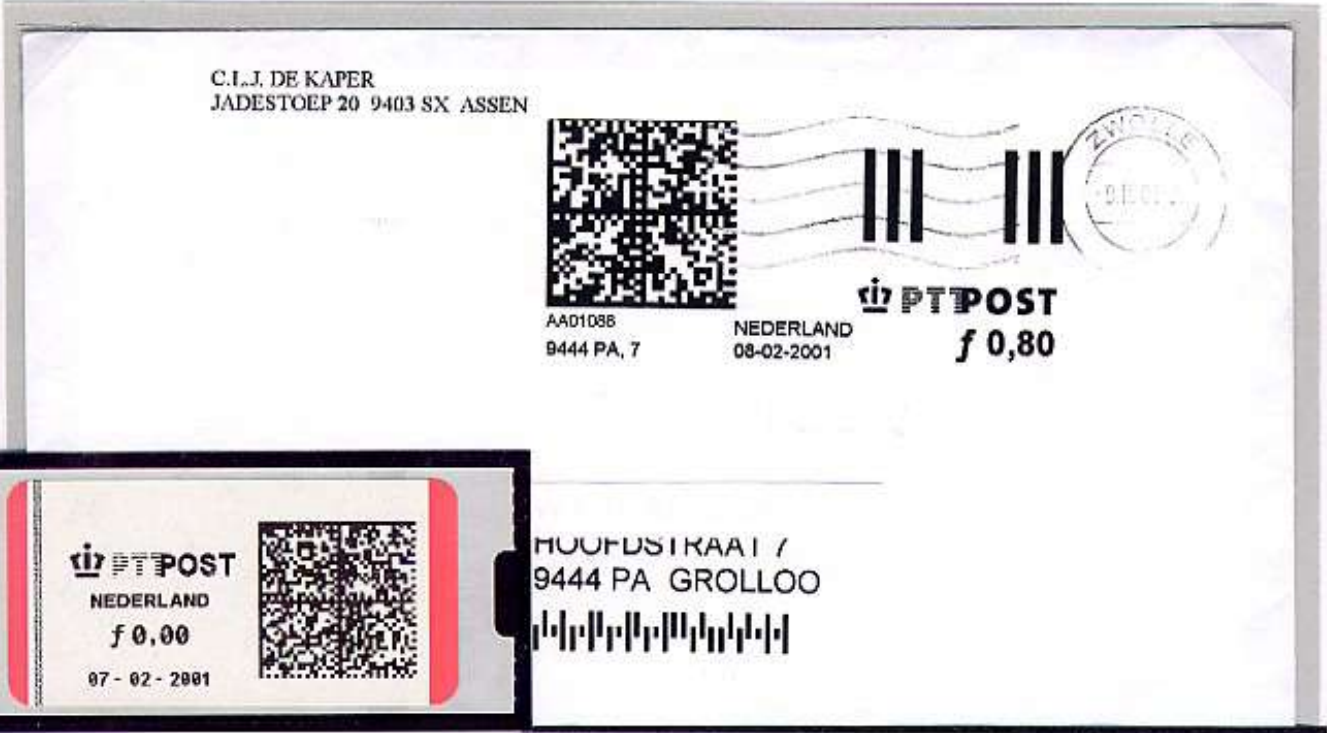
4.3.4. E-stamps

The latest development in stamp computerization is the "no licking, but clicking" e-stamp ("electronic stamp") technology. The United States Postal Service (USPS) started field trials for the e-stamp in 1998 whereby a customer could print an electronic "stamp" label on his home PC, with postage being charged against his USPS account. A fully electronic process, that was soon followed in other countries, but it has had limited success.

The chessboard-like image is a matrix of horizontal and vertical barcodes which contain a so-called "digital signature". It incorporates information identifying the sender, date, address, postage, etc.



The USPS tested an experimental machine from IBM (only one machine in the U.S.) in Chicago in 2008.



e-stamp test specimen from the Netherlands (trial run 2001) dated 07-02-2001, with a postally used example from the next day 08-02-2001.

The earliest form of the electronic stamp obviously is the stamp that has been produced by the computer itself.



Following the USSR's break-up in 1991 Ukraine became an independent state. As no new stamps were available at that time, several local post offices printed their own stamps, the so-called Ukraine provisionals. Some of these were surcharges of Russian stamps but others were produced on photo-copiers. In Mykolaiv, stamp designs were created by computer and printing took place on the computer printer, printing on grey or yellow-grey paper. The practice of using provisionals ended mostly by 1994 when the postal system had more or less stabilized.

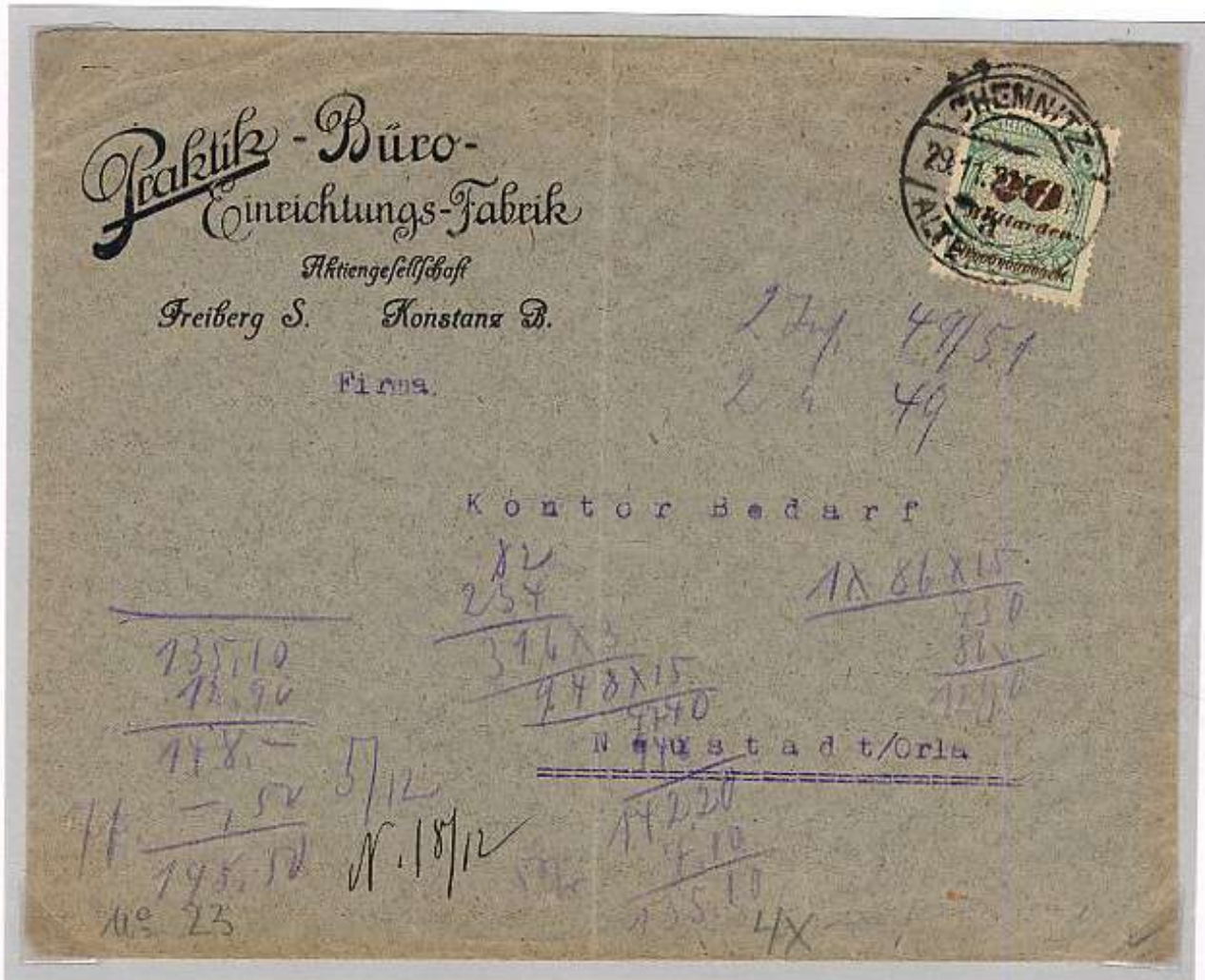


Although modern printers connected to PC's print on single sheets of paper, large mainframe printers print on continuous stationery which is zig-zag folded and has sprocket holes on both sides.

American coil stamps often receive a computer-printed number on the back every 10th or 20th stamp. It is a count of how many stamps are left on the roll.



IBM's next super computer, *ASCI Purple* (announced in 2002) can do 500 trillion calculations per second. Compare that to Atanasoff's ABC computer (1939) capable of 1 addition per second.



This 1923 German hyper inflation cover needed a franking of 20 Billion Mark to go through the mail. That is 20,000,000,000 Mark for postage. If you put 25,000 of these stamps together, *ASCI Purple* will be able to count each one of the 500,000,000,000,000 Marks individually in one second. Like the recipient of this letter, one needs a calculator to work this out.



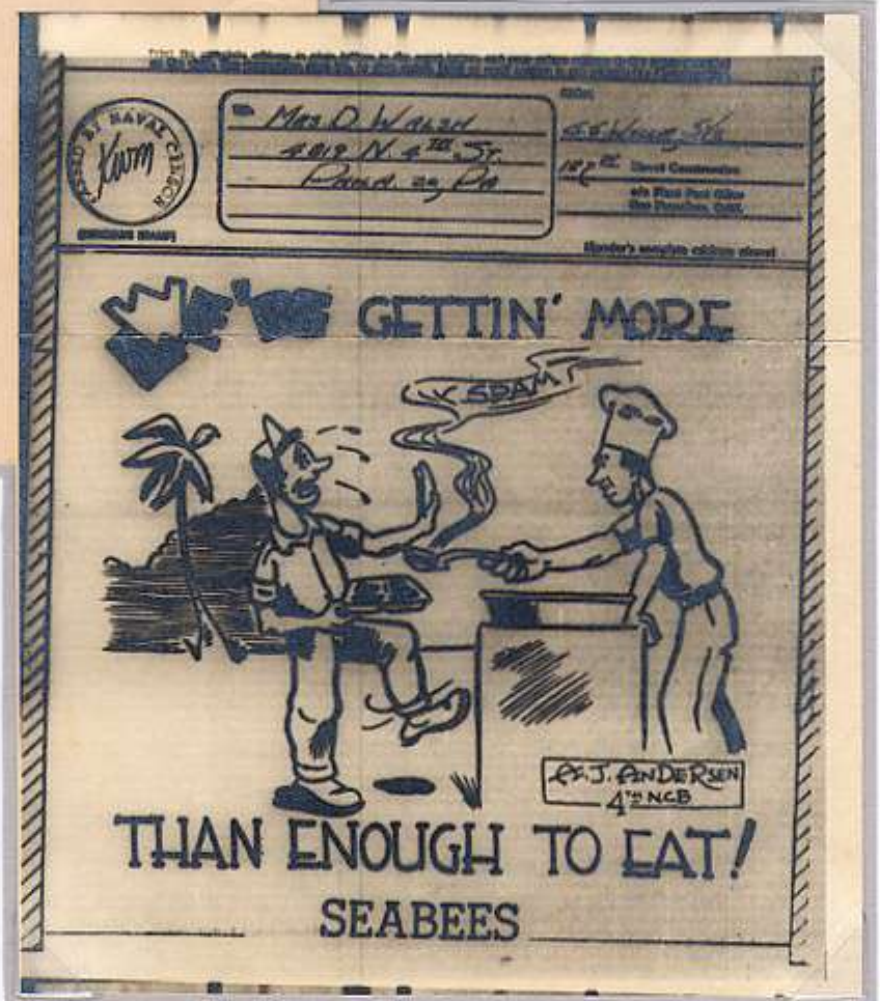
The stampless letter will return (in electronic format) and stamps will ultimately cease to be used for franking purposes. These stampless letters, including their colourful pictures, can be sent or received via a small cellphone with the functionality of a powerful PC, digital camera, TV, GPS and satellite receiver, to put you in contact with the world.

With the increasing number of users on the internet, unwelcome usage also surfaced: *Spam* is the term used for unsolicited electronic messages (via email or cell phone).



The term *Spam* derived from a 1970 Monty Python sketch where all menu items changed into Spam canned meat.

V-Mail was the US Army system during World War II for transmitting large volumes of mail between the troops and home. The mail was photographed and reduced to thumbnail size on microfilm. The reel of microfilm was shipped by air priority and printed out at receiving stations on lightweight photo paper.



Nigerian criminals introduced the 419-scam: offering you millions of dollars provided you sent them your bank details.

Others aimed their nefarious activities at children surfing the net, resulting in action groups for the protection of children in cyber space.



With virtually every computer in the world connected to every other computer at the click of a button, the world has become a global village. Its inhabitants communicate with each other via electronic messages: e-mail.



1831 folded letter from Edinburgh to Hamilton, manuscript "8" with h/s black Scottish Additional Halfpenny Mail Tax (group 2, frameless "Addl" above 1/2), b/s red cds Aug 19, 1831, with red wax seal.

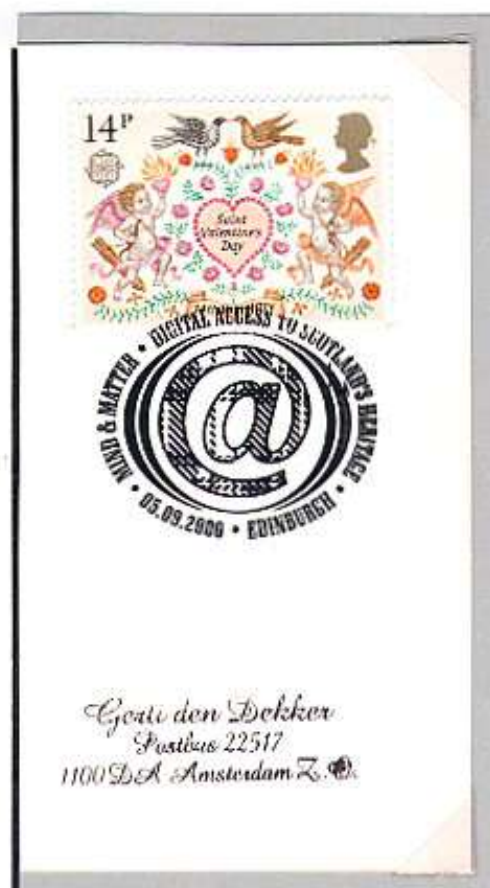
1831 Letter from the pre-stamp era. In today's electronic equivalent, the word "AT" would be replaced with the "@" symbol ("@" is pronounced as "at"): JamesDouglas@LanarkshireMilitia.gov.uk. The e-mailed letter would be stampless too and transmitted electronically in seconds rather than days.



The character "@" becomes the new symbol to reflect information technology.



Electronic Mail
Advances in technology are bringing new opportunities in communication.



One of the effects of e-mail is the drastic reduction in the number of "snail-mail" letters being written or received. With that goes a steep decline in the number of stamps being used for postage



Even the older generation starts using PCs.



and electronic mail (e-mail) becomes the preferred method of communication.



The anomaly: an electronic mail postage stamp used on "snail-mail".

Newspapers will be replaced by an electronic rewritable medium that will look and read like a normal newspaper, but will be freshly reloaded each day.



Transport, be it by train, air or car, will be increasingly computer-controlled, and the far more accurate computer will replace its driver. Our GPS already tells us how to get from A to B.



Our social interaction becomes increasingly digital. We already carry one or more smart phones, talking to other people through *skype*, *facebook* and *twitter*, all from the comfort of our arm chair. And we use the same device for doing shopping, surfing the net, taking pictures, checking the weather, paying our bills and watching TV.



We'll have wireless connection (*wifi*) to the net for free and available everywhere so we can fully enjoy our social media.

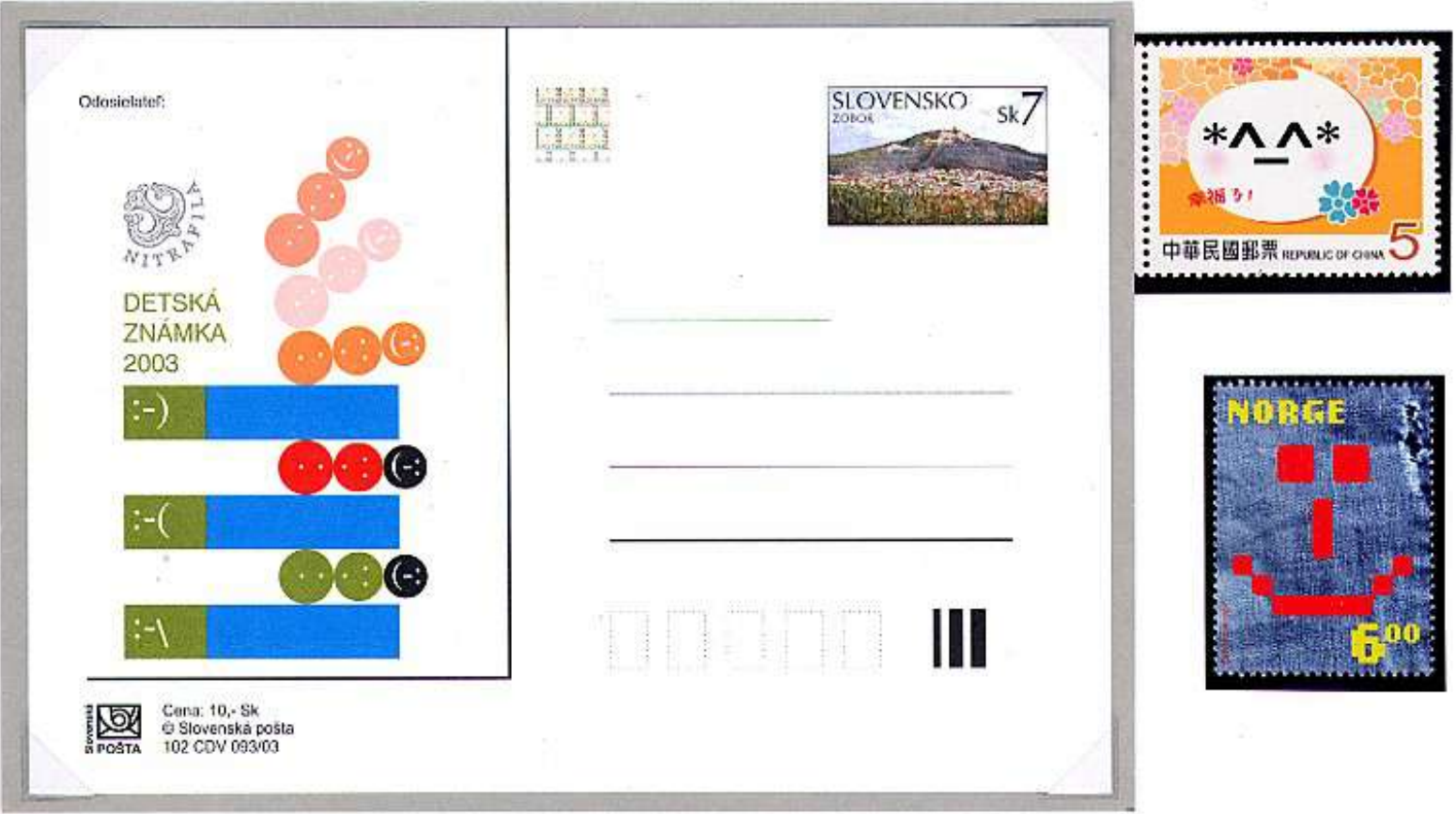


Complex surgery will be done by robots, remotely controlled by a transcontinental surgeon. Parts of the human brain will be controlled and replaced by microchips.

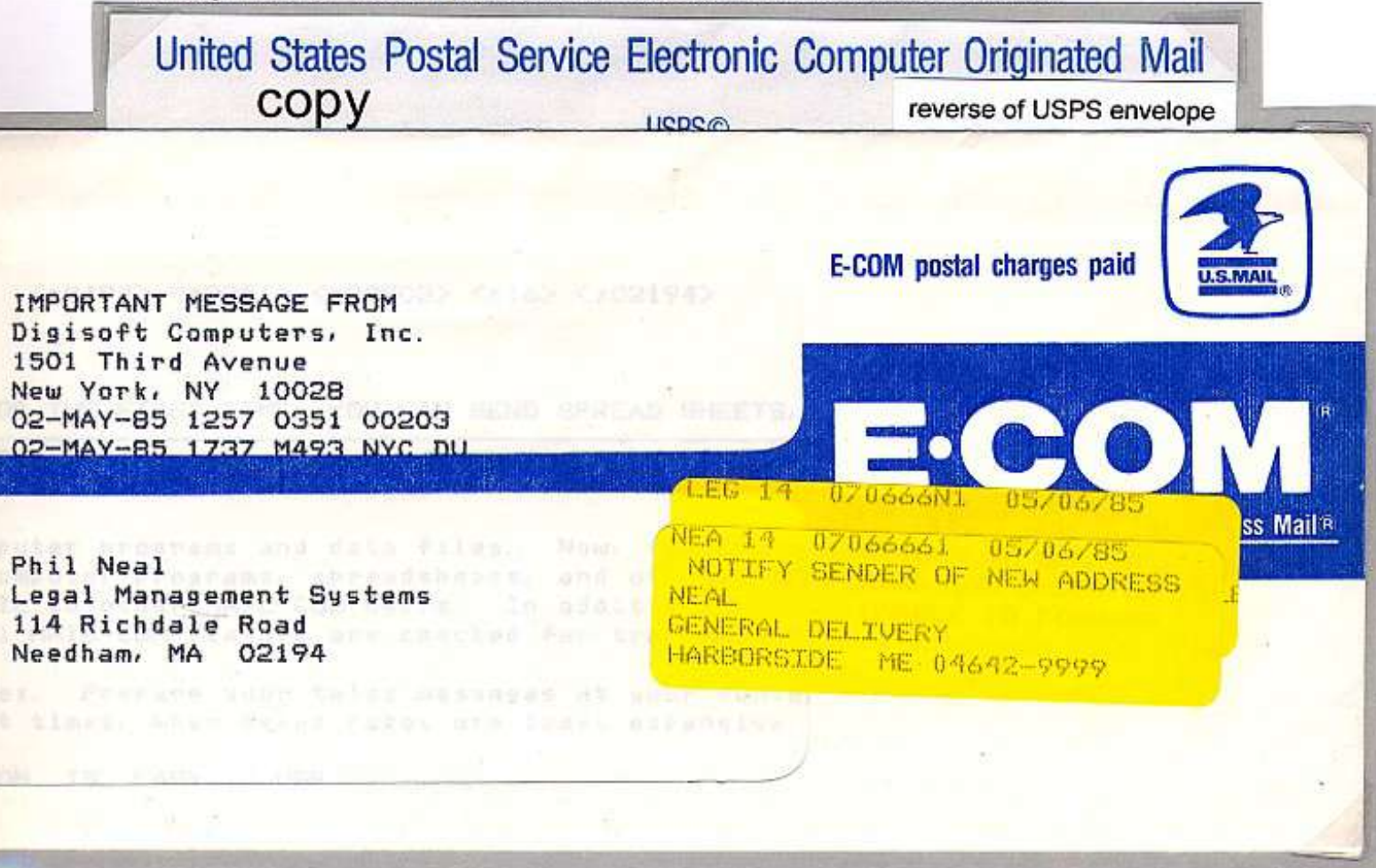


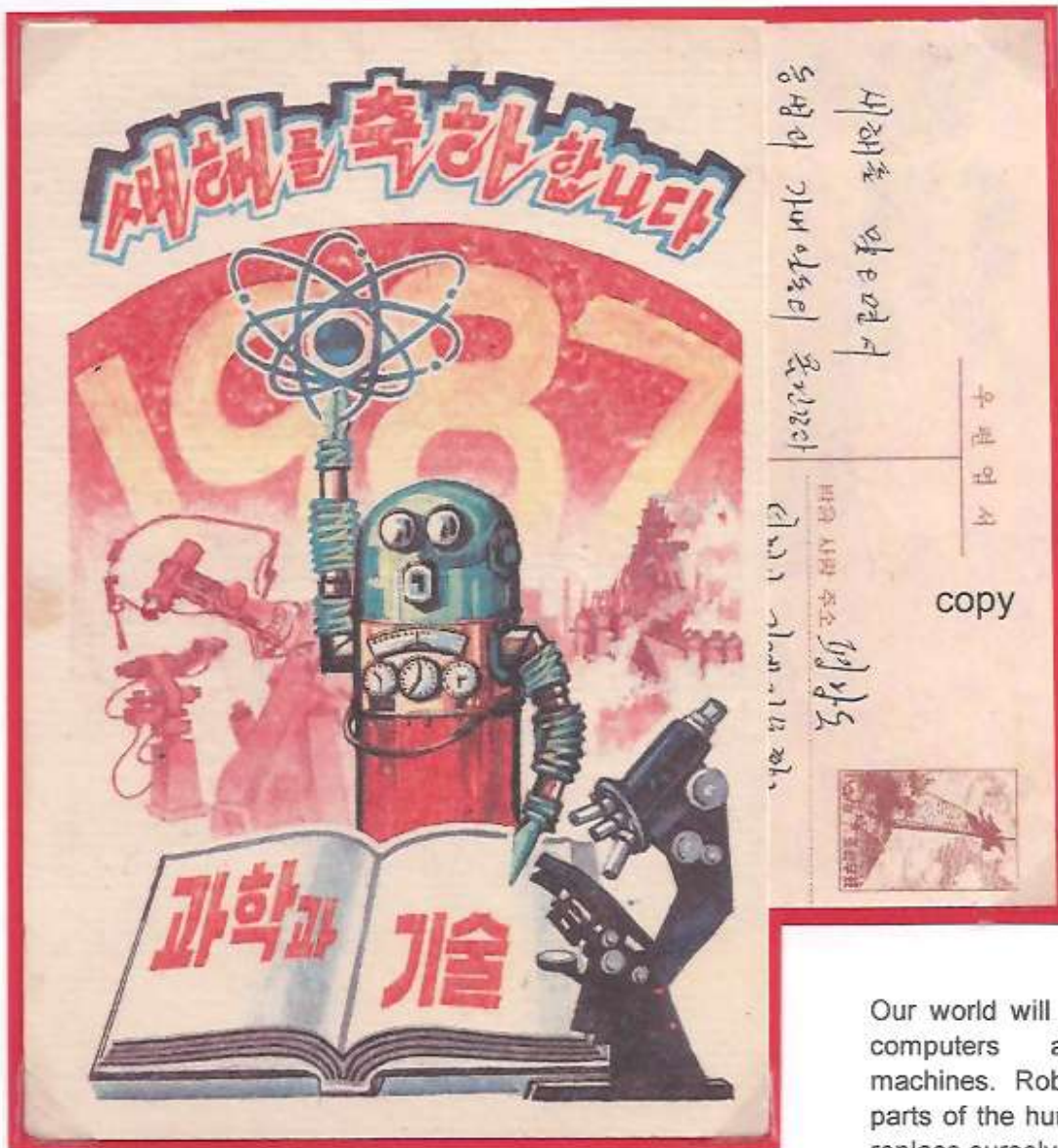
Modern warfare will be computer controlled and will be conducted from behind a computer screen.

Email-writers started using a new form of shorthand and managed to express their emotional status through the use of *emoticons*: :-) meant happiness, :-(being unhappy, etc.



Although this mail was computer-produced (1985), it is still considered snail-mail.





Our world will increasingly be controlled by computers and computer controlled machines. Robotics already have replaced parts of the human body. Will they ultimately replace ourselves?

After the industrial age came the information age. Cyber world has arrived.
Still scared of computers?
Still wondering if pressing the wrong key will release the frightening cyber ghost?



If you consider these predictions far fetched, put your mind at ease. The scenarios mentioned here, already exist or have been demonstrated as being technologically feasible. Fortunately the electronic brain still can not take over from the human brain.

or as John F. Kennedy put it in 1963:

"Man is still the most extraordinary computer of all."

