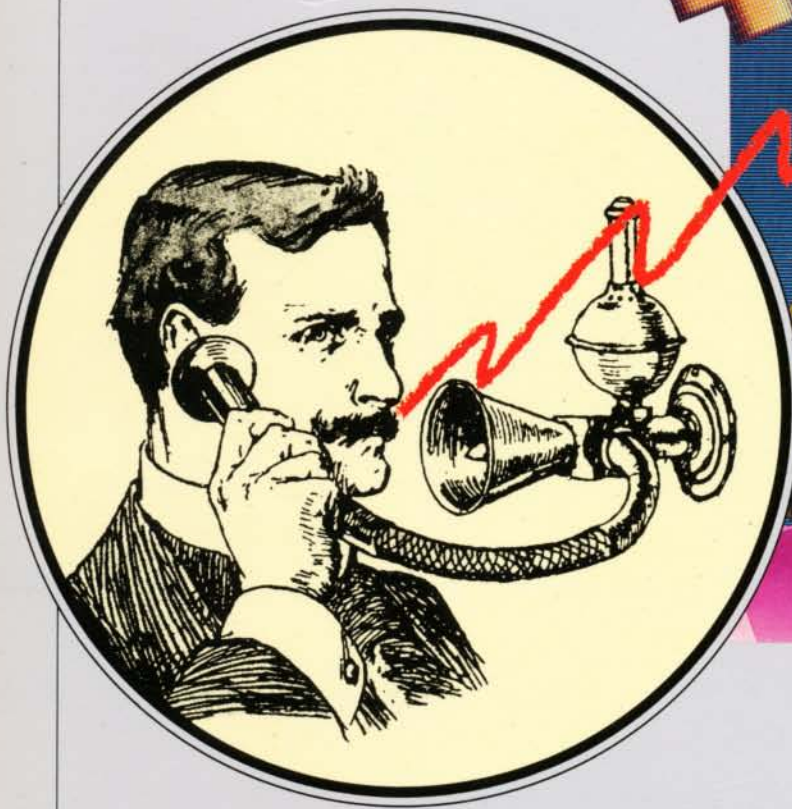
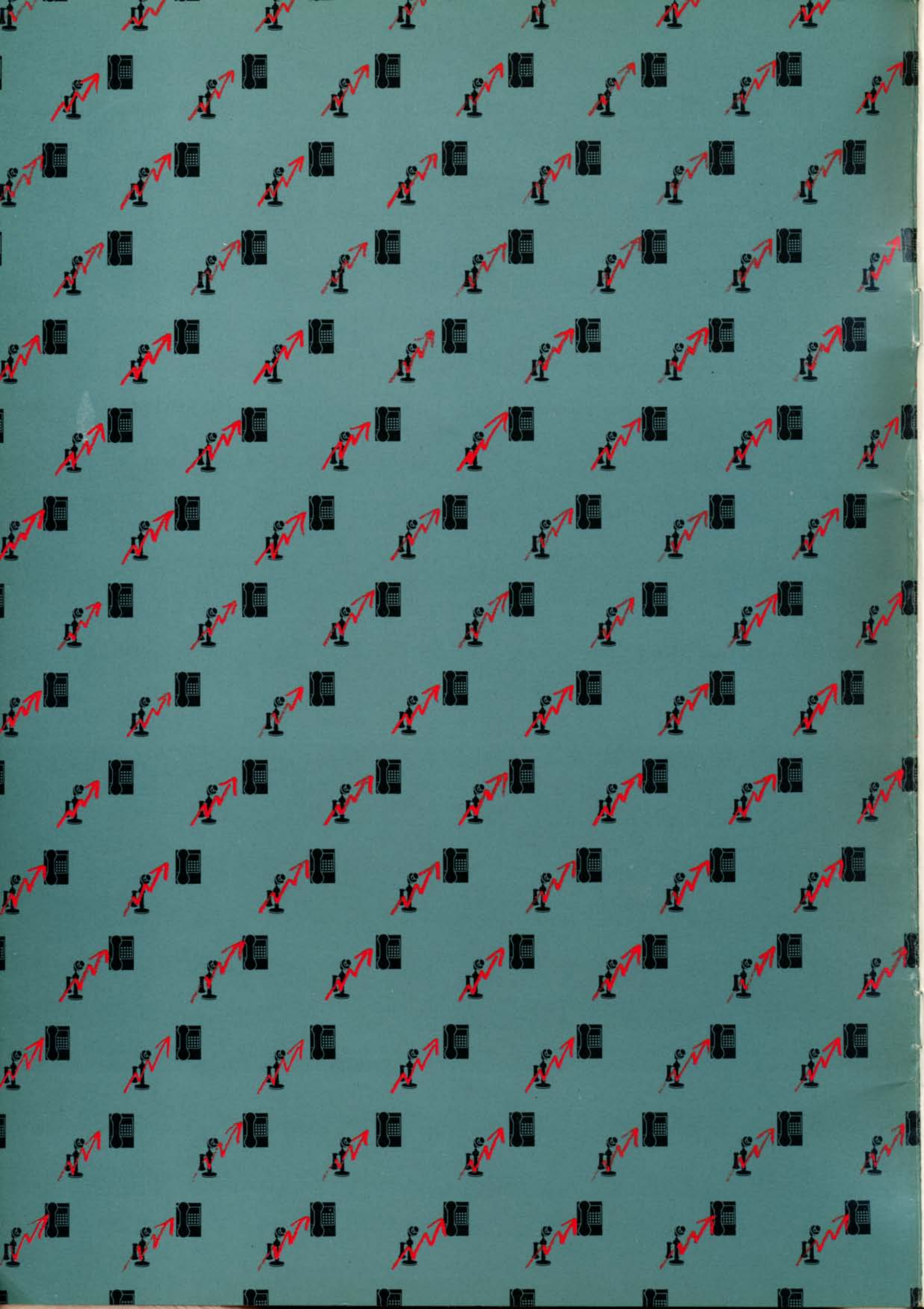


NAMES & DATES

FOR STUDENTS



British
TELECOM
TELECOMMUNICATIONS
PROJECTS



NAMES & DATES

FOR STUDENTS

Telecommunications – A definition by the International Telecommunication Union

'any transmission, emission or reception of signs, signals, writings, images and sounds, or intelligence of any nature by wire, radio, visual or other electromagnetic systems.'

Telecommunications is a fascinating subject. Interwoven in the fabric of daily life, it caters for the country's social, commercial and industrial needs. Whether it is radio or television, telephony or telegraphy, telex or data transmission, or satellite communication, there is no aspect in which British Telecom does not play a vital part.

Many students undertake communications projects making telecommunications the focus of their study.

If you wish to do so, the names, dates, and information we give you will help. However, *you* will have to do the work to provide the detail to the information we supply.

Because the subject is such a wide one you may like to pursue one particular line of enquiry, such as the development of the telephone system or the life and work of one man. We are sure, however, you will realise that, in a publication of this size, we cannot include all the aspects of telecommunications given in the ITU definition quoted above.

To assist you, we have included a 'Further Sources of Information' section.

TELECOMMUNICATIONS
PROJECTS

1500

PIONEERS & INVENTORS

The names of a few of the men of many nations who, by their research, inventions or work made possible today's telecommunications.

Du Fay. Charles Francois 1698-1739

Gilbert. William 1540-1603

Gray. Stephen c.1670-1736

Hauksbee. Francis -d.c.1713



Benjamin Franklin

1700

Franklin. Benjamin 1706-1790

Galvani. Luigi 1737-1798

Nollet. Jean Antoine 1700-1770

Volta. Alessandro 1745-1827

Thomas Edison



1750

Davy. Humphrey 1778-1829

Faraday. Michael 1791-1867

Gauss. Johann Carl Friedrich 1777-1855

Henry. Joseph 1797-1878

Morse. Samuel Finley Breeze 1791-1872

Oersted. Hans Christian 1777-1851

Ronalds. Francis 1788-1873

Schilling. Pavel Lvovitch c.1780-1836

Soemmerring. S T von 1755-1830

Sturgeon. William 1783-1850



Samuel Morse

Samuel Morse

1800

Baudot. Jean Maurice Emile 1845-1903

Bell. Alexander Graham 1847-1922

Branly. Edouard 1844-1940

Brett. Jacob 1808-1898

Brett. John Watkins 1805-1863

Clark. Latimer 1820-1898

Cooke. William Fothergill 1806-1879

Edison. Thomas Alva 1847-1931

Field. Cyrus W 1819-1892

Fleming. John Ambrose 1849-1945

Gray. Elisha 1835-1901

Hughes. David Edward 1831-1900

Kelvin. William Thomson 1824-1907

Maxwell. James Clerk 1831-1879

Reis. Philipp 1834-1874

Senlecq. Constantin 1842-1934

Siemens. Ernst Werner von 1816-1892

Strowger. Almon Brown 1839-1902

Varley. Cromwell Fleetwood 1828-1883

Hughes. David Edward 1831-1900

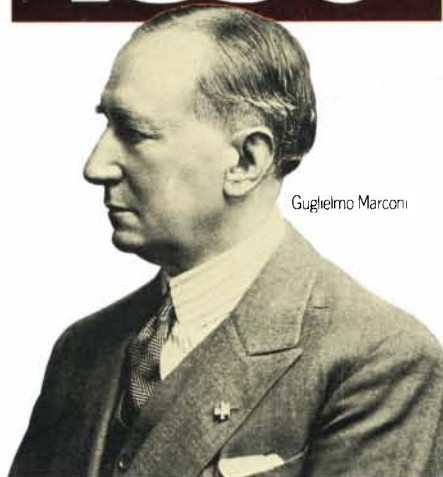
Weber. Wilhelm Eduard 1804-1891

Wheatstone. Charles 1802-1875



Charles Wheatstone

1850



Guglielmo Marconi

Betulander. Gotthelf Ansgarius 1872-1941

Braun. Carl Ferdinand 1850-1918

De Forest. Lee 1873-1961

Erlang. Anger Krarup 1878-1929

Heaviside. Oliver 1850-1925

Hertz. Heinrich Rudolf 1857-1894

Lodge. Oliver Joseph 1851-1940

Marconi. Guglielmo 1874-1937

Molina. E C 1877-1964

Palmgren. Nils Gunner 1887-1975

Popoff. Alexander Stepanovitch 1859-1905

Pupin. Michael Idvorsky 1858-1935

Righi. Augusto 1850-1920

Watson. Thomas A 1854-1934



1900

Bardeen. John 1908

Beales. Keith 1940

Brattain. W. H. 1902

Flowers. Thomas Harold 1905

Kao. Charles K 1933

Newns. George R 1936

Reeves. Alec Harvey 1902-1971

Shockley. William 1910

This list is not comprehensive



Alec Reeves (STC)















Keith Beales

George Newnes

KEY TO SYMBOLS

If you are doing a project on a particular aspect of telecommunications you might find it helpful to refer to the symbol which appears before each entry. The symbols cover the following areas in telecommunications:

-  Electricity – as used in telecommunications.
-  Telegraph communications.
-  Submarine cables – the laying, location and construction of cables and underwater transmission.
-  The telephone instrument.
-  Radio – applications in telecommunications.
-  Exchanges – the switching of telephone calls.
-  Transmission – overland.
-  Unions and conferences in telecommunications.
-  Telex – the teletypewriter exchange service.
-  Electronics in telecommunications.
-  Data transmission.
-  Satellite communications.

Some of the entries may cover more than just one area. Where this occurs the most relevant symbol is shown.

1700

NAMES & DATES

1753 Charles Morrison sent a letter to the Scots Magazine which was published on 17th February. The letter predicted the electric telegraph and suggested a way in which such a telegraph might be worked.

1786 Luigi Galvani, professor of anatomy at the University of Bologna in Italy, observed convulsions in dead frogs' legs caused by electricity.

1793 Ignace Chappe, a Frenchman, (a brother of Claude Chappe who invented a system of semaphore) first used the word 'telegraph' in April 1793. The word is derived from the two Greek words 'tele' meaning 'far' and 'graph' meaning 'to write.' The name was later applied to the electric telegraph.

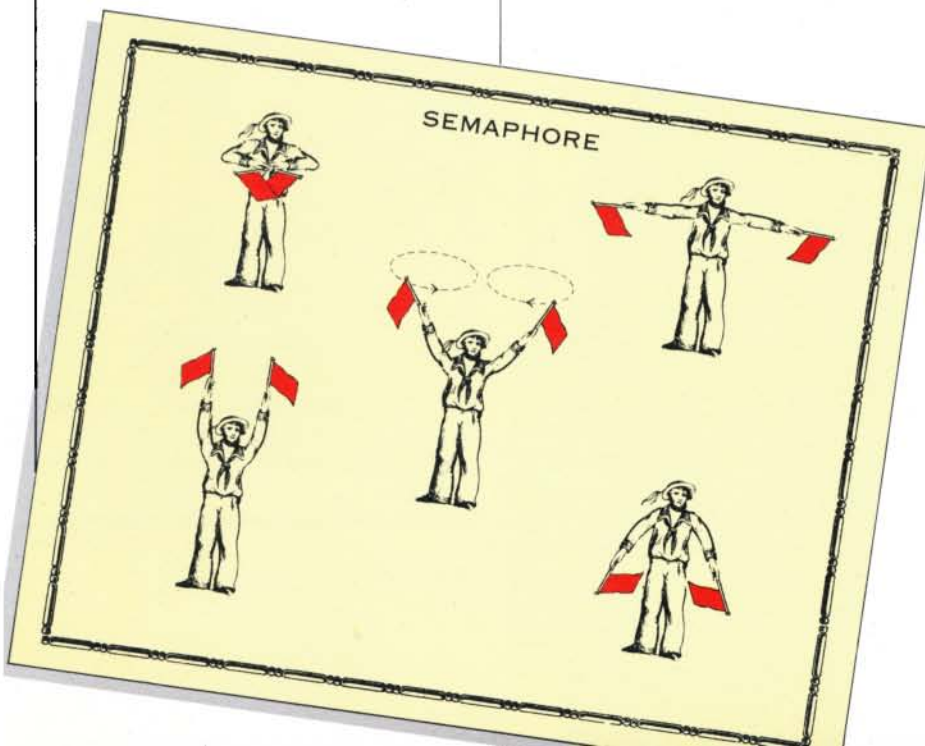
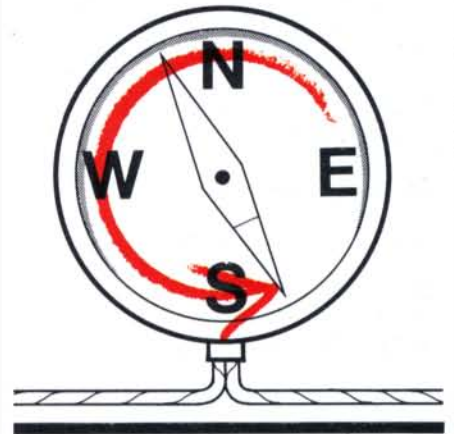
1800



1800 Alessandro Volta, professor of the University of Pavia in Italy, announced his invention of the Voltaic Pile, the first electrical battery.

1810

1819 Hans Christian Oersted of Copenhagen, showed that a wire carrying an electric current would deflect a magnetic compass needle.



1820

■ 1825 The electro-magnet was invented by Sturgeon.

1830

■ 1837 Cooke and Wheatstone patented and successfully demonstrated their 5 needle, electric telegraph.

■ 1839 The world's first commercial telegraph line using the 5 needle system was built between Paddington and West Drayton. It was working to Hanwell by 6th April and was completed to West Drayton on 9th July. This was also the first commercial use of electricity.

1840

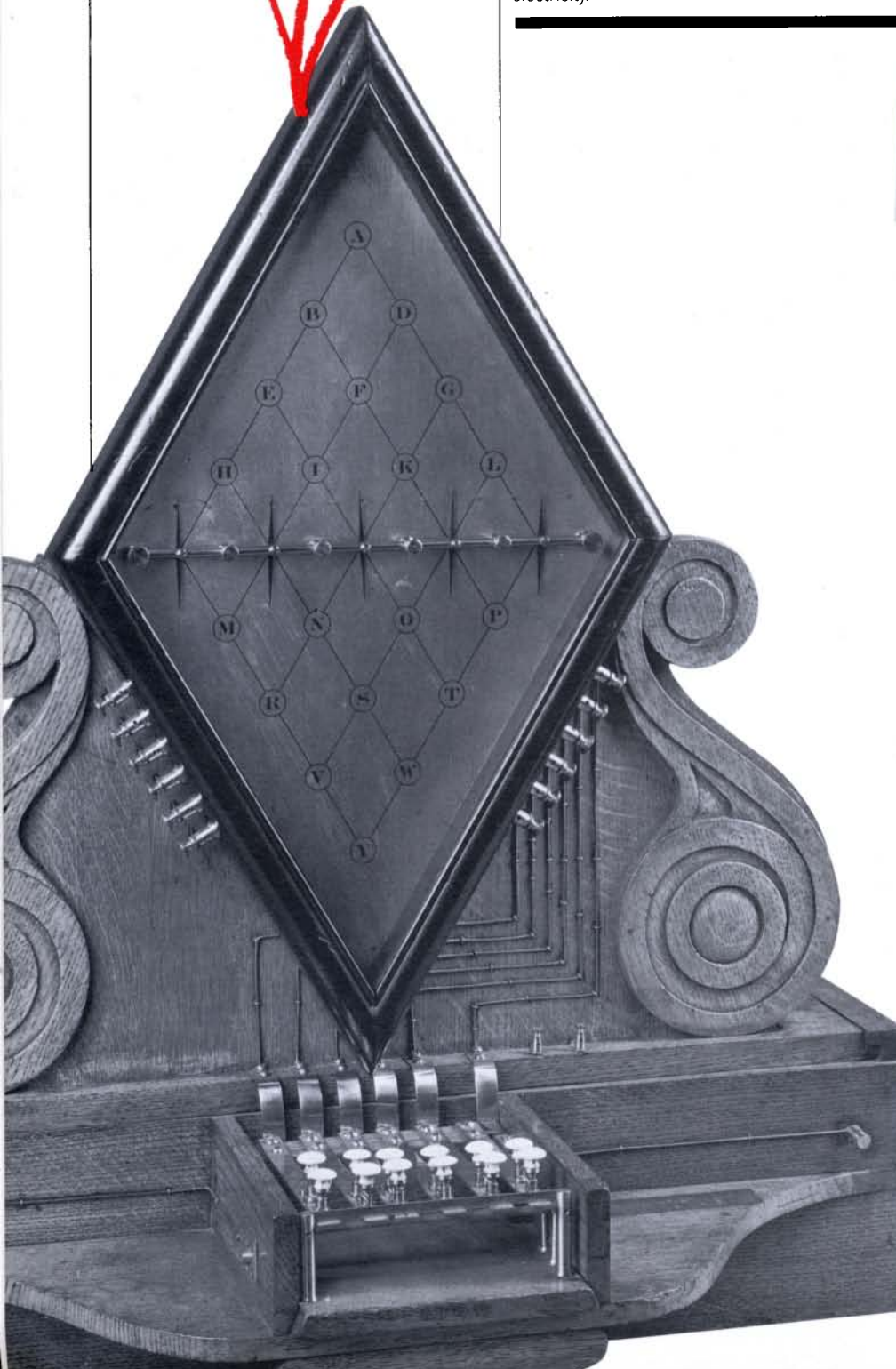


■ 1841 Charles Wheatstone invented the first type printing telegraph.

■ 1843 A message was sent by telegraph (the first telegraph line in the USA) from Washington to Baltimore by Samuel Morse. Morse used equipment of his own invention which was totally different from that of Cooke and Wheatstone. (He also used what became known as 'Morse Code'.)
The line was not fully operational until 1st January 1845.

MORSE CODE		
A · —	J · — — —	S · · ·
B — · · ·	K — — —	T —
C — · — ·	L — · · ·	U · · —
D — · ·	M — —	V · · · —
E ·	N — ·	W · — —
F · · · ·	O — — —	X — · · —
G — — ·	P · — — ·	Y — · — ·
H · · · ·	Q — — — ·	Z — — · ·
I · ·	R · — ·	

■ 1849-1850 The world's first central telegraph station was opened by the Electric Telegraph Company in Founders' Court, Lothbury, in the City of London.



1850



1850 The first telegraph cable was laid between England and France. This was the first telegraph cable laid in the open sea and was laid by H.M. Tug 'Goliath' accompanied by H.M. Packet 'Widgeon'. It failed after only a few messages, but a successful cable was laid the following year.

1851 An Englishman, Thomas Russell Crompton, devised the first armoured submarine cable which was laid between England and France.

1858 The first trans-Atlantic telegraph cable was laid between Valentia Island, County Kerry, Ireland and Trinity Bay, Newfoundland. The cable was laid by HMS 'Agamemnon' and the USNS 'Niagara'. The first messages were sent on 5th August.

1860

1865 On 17th May, twenty countries formed the International Telegraph Union, the object being to achieve international co-operation in the field of telegraph communication. (This ultimately became today's International Telecommunication Union.)

1867 The Scottish physicist James Clerk Maxwell proved mathematically that in certain circumstances it would be possible to produce electro-magnetic waves, that is, radio waves, and that these waves would travel with the speed of light.



1868 An Act of Parliament gave the Postmaster-General the exclusive right to set up and operate inland telegraphs.

A second Act of Parliament allowed the Postmaster-General to take over the telegraphs from the private companies operating in the United Kingdom.



1870



1870 The transfer of telegraphs from the private companies operating in the United Kingdom took place on 28th January. Some 60,000 miles of aerial line, 2,800 telegraph offices were taken over and £10,948,173 was paid in compensation.

Great Britain was admitted to the membership of the International Telegraph Union.

1874 Emile Baudot invented the Baudot printing telegraph system using the multiplex principle suggested by Wheatstone. The Baudot system was the first to use a code consisting of five units of equal length. Five unit codes of this type were later adopted for use with teleprinters.

1875 Alexander Graham Bell constructed his first experimental telephone.

1876 Alexander Graham Bell applied for a patent for the telephone on the 14th February; this was granted on the 7th March. The first recognisable sentence, 'Mr. Watson come here I want to see you,' was transmitted by telephone on the 10th March.

1877 Thomas Alva Edison invented the carbon transmitter for telephones.

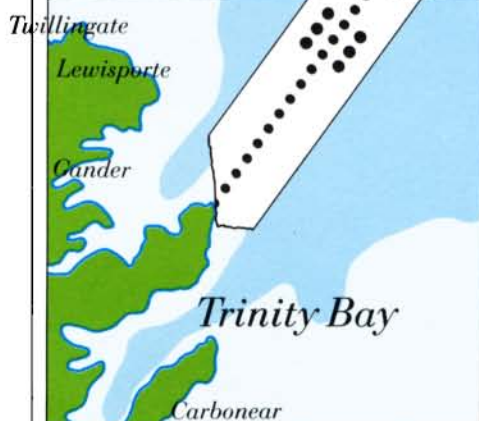
1878 In January, Alexander Graham Bell demonstrated the telephone before Queen Victoria at Osborne House on the Isle of Wight.

The Telephone Co Ltd was registered on 14th June with a capital of £100,000 to work the Bell patents in Britain.

1879 The Edison Telephone Co. of London Ltd. was floated on 2nd August with a capital of £200,000 to work the Edison telephone patents.

Daniel Connolly, T.A. Connolly and T.J. McTighe patented the automatic telephone exchange and exhibited an eight line automatic exchange in Paris.

The Telephone Co. Ltd., opened Britain's first public telephone exchange at 36 Coleman Street, London. The same year the rival Edison Telephone Co. of London Ltd. started to operate with exchanges in Lombard Street and Queen Victoria Street.



Charles Wheatstone patented the automatic telegraph system in which the message is first transposed into the form of perforations in a paper tape, and then transmitted and received at high speed. This was the forerunner of modern systems using punched tape.

1880



☎ 1880 On 13th May the Telephone Co. Ltd. and the Edison Telephone Co. of London Ltd. were amalgamated to form the United Telephone Co.

☎ 1881 The Government authorised the Post Office to offer the public a telephone as well as telegraph service.

☎ The first Post Office Telephone Exchange was opened at Swansea on 23rd March.

☎ 1882 G. L. Anders of London patented a central battery system by which telephones could be supplied with electrical power from the exchange thereby making batteries at the telephone unnecessary.

☎ 1884 L. M. Ericsson of Sweden combined the transmitter and receiver to form the earliest telephone handset.

✉ 1885 The Post Office reduced the charge for telegrams to sixpence for twelve words and embarked on a vast programme of expansion. In this year 50 million telegrams were sent compared with 33 million the previous year.

☎ 1886 Dane Sinclair invented an automatic line selector which was installed at Coatbridge near Glasgow.

☎ 1887 An Englishman, Oliver Heaviside, proposed a means by which the distance telephone signals could travel without fading could be increased.

☎ 1888 Heinrich Hertz, a German, successfully transmitted electro-magnetic waves, that is, radio waves, proving that they could be reflected and refracted, thus confirming the mathematical theory of James Clerk Maxwell.

☎ Almon Brown Strowger, an undertaker of Kansas City USA, built the first automatic telephone selector capable of making the connection to the desired destination automatically without the aid of the operator. It worked directly by pulses of electric current produced by the subscriber.

☎ 1889 The United Telephone Co. and its subsidiaries were amalgamated to form the National Telephone Co.

1890

☎ 1891 The first telephone cable was laid by HMTS 'Monarch' (No 1) between England and France enabling telephone conversations to be made between London and Paris.

☎ 1894 Oliver Lodge, an Englishman, transmitted wireless signals a distance of 150 yards.

☎ 1896 The Post Office took over the trunk telephone lines of the United Kingdom in accordance with a government decision of 1892. £459,114.3s.7d. was paid in compensation.

☎ The telephone dial was invented by the Americans E. A. Keith, C. J. Erickson and John Erickson.

☎ 1897-1898 Britain's first long-distance cable was laid between London and Birmingham. This cable was normally used for telegraphy but was also used experimentally for telephony.

1900

☎ 1900 The first large central battery type exchange in Europe was installed in Bristol.

☎ 1901 On 12th December, Guglielmo Marconi, an Italian, transmitted the first radio signals across the Atlantic from Poldhu in Cornwall to Signal Hill, Newfoundland.

☎ Induction coils were added experimentally every few miles to the London – Birmingham cable laid in 1897-1898, applying the theory of Oliver Heaviside 1887.

☎ F. G. Creed (founder of the firm of Creed and Co. of Croydon), developed a receiving reperforator enabling incoming signals to be recorded in the form of perforations in a paper tape at speeds of up to 200 words in a minute.

☎ 1904 John Ambrose Fleming, an Englishman, invented the thermionic valve, one of the first true electronic components. It was used both as a radio wave detector and a power supply rectifier, converting alternating current into steady direct current.



1905

1906 Twenty-nine countries formed the International Radiotelegraph Convention. (Later known as the International Radiotelegraph Union.)

1907 Lee de Forest of the USA added a grid to the Fleming valve and showed how it could be used for amplification.

Charles L. Krumm and his son H. Krumm introduced the first stop-start type of telegraph. This instrument known as the 'teletype' used a typewriter keyboard for direct sending and a 5-unit code with stop-start signals, as used by modern teleprinters.

1908 The Post Office opened its first ship-to-shore radio station at Bolt Head in Devon.



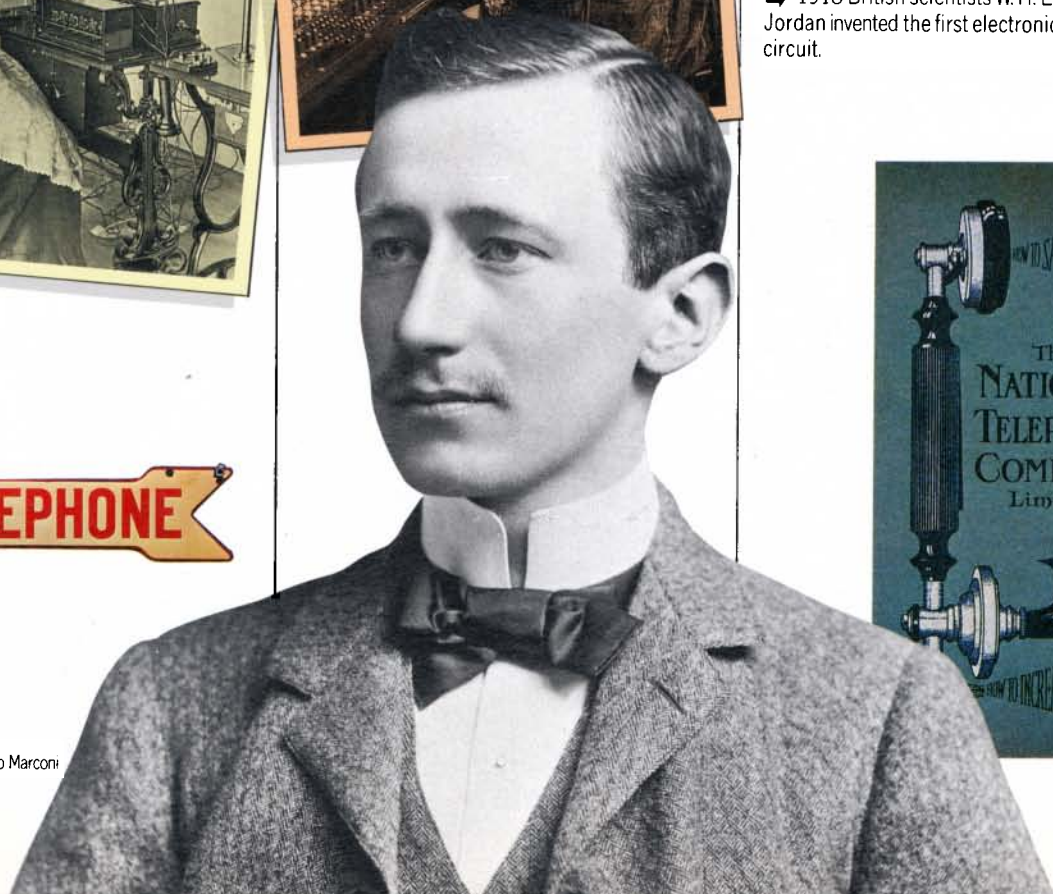
Guglielmo Marconi

1910

1912 On the 1st January the Postmaster-General took over the National Telephone Co. and for the first time a unified telephone system was available throughout most of Britain. 1,565 exchanges were transferred of which 231 had more than 300 subscribers each; 68 were of the central battery type, most of the rest were of the *magneto* type.

There followed a period of rapid expansion. In the next three years, no fewer than 450 new exchanges were opened in places with no previous telephone service.

On the 13th March, the Post Office opened Britain's first public automatic telephone exchange in Epsom.



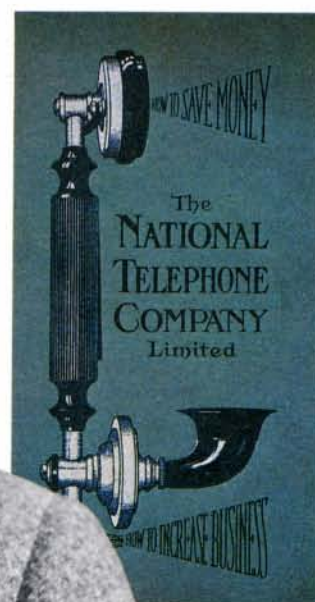
1915



1913 The first long-distance telephone cable in Europe was laid between Leeds and Hull.

1916 The Post Office made the first effective use of *amplifiers* on telephone circuits when their research staff installed experimental *repeaters* in the London to Belfast and London to Dublin circuits at Liverpool. A few weeks later, the first permanent *repeaters* were installed in the London to Liverpool cable at Birmingham.

1918 British scientists W. H. Eccles and F. W. Jordan invented the first electronic switching circuit.



1920



1920 G. A. Campbell, an American invented the anti-sidetone telephone circuit. In the older type of telephone circuit the power from the transmitter was divided between the line and the local receiver, so that the caller heard his own voice. This is called 'sidetone'. In the circuit which G. A. Campbell devised, this unwanted current is considerably reduced, leading to greater efficiency.

The Post Office commenced their long-distance radio-telegraph service to ships.

1921 The first of the 'rural automatic exchanges', which were intended to give automatic telephone service to sparsely populated areas, was opened at Ramsey in the Peterborough Area. The name 'rural automatic exchange' was later changed to 'unit automatic exchange'.

1922 After a series of full scale experiments in which six different automatic telephone systems were tried, the Post Office decided to adopt the Strowger system as its standard. It had been thought that there might be difficulties using the Strowger system in very large cities such as London, but this problem was solved when the Automatic Telephone Manufacturing Co. Ltd. of Liverpool, working in conjunction with the Post Office developed the 'director'. This was a piece of equipment designed to 'direct' telephone calls through the complex network of circuits linking telephone exchanges in large cities.



1925

1927 Regular telephone service between Britain and the USA began on 7th January using radio.

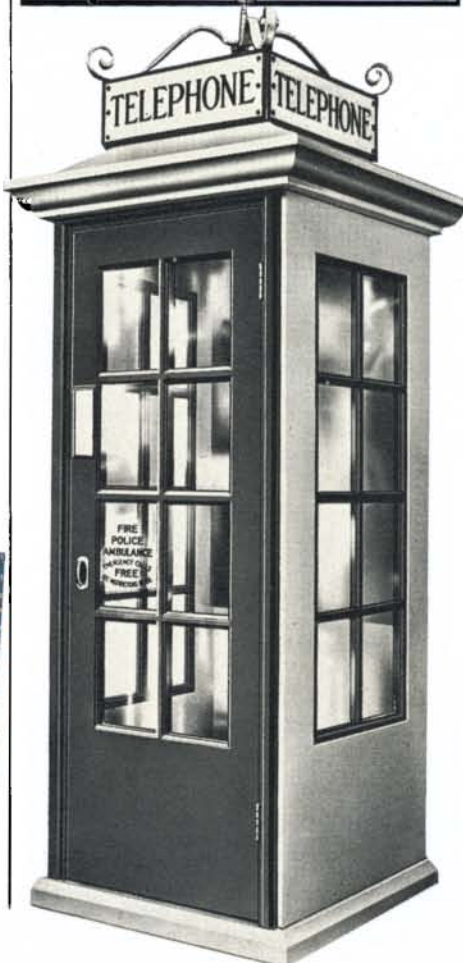


The first director exchange was used at Holborn, London.

1928 The first high-frequency radio telephone link between Britain and the USA opened in June.

1929 The Post Office introduced a new telephone with a plastic case and a handset suitable for all types of exchange.

The Post Office decided to adopt the teleprinter as the standard instrument for inland telegraph circuits.



1930

1930 The radio-telephone service was opened to Australia, Buenos Aires and Capetown.

1931 The page printing teleprinter (the teleprinter 7B) was introduced by Creed.

The first voice frequency telegraph system with 12 carrier channels was installed between London and Dundee.

1932 The International Telecommunication Union (the oldest of the inter-governmental organisations which form the specialised agencies of the United Nations) was created from the International Telegraph Union and the International Radiotelegraph Union.

The Post Office introduced the Telex Printergram service.

The first ultra-short-wave radio telephone link, used as part of the inland telephone network, was set up across the Bristol Channel, over a distance of 13 miles.

The first submarine cable for carrier working was laid from Britain to La Panne in Belgium. It contained 120 wires arranged as 4-wire circuits and provided ninety telephone circuits using one-plus-two carrier equipment.

The Post Office introduced trunk service on demand, relieving telephone users of the need to book trunk calls in advance.

The Post Office introduced telephones with the anti-sidetone induction coil (see 1920 entry).

The first British experiments in carrier telephony were carried out using the London-Derby cable.

1933 Imperial Chemical Industries Ltd. discovered Polyethylene, or Polythene, as it has become known. This material is non-conductive and so it became widely used for submarine cable insulation and for many other purposes in telecommunications.

1934 On the 1st October, the Post Office introduced cheap night rates for trunk telephone calls as part of the Kingsley Wood (the then Postmaster-General) plan for advertising and popularising the telephone.



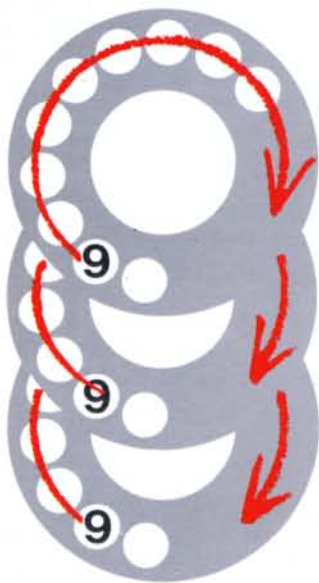
1935

➡ 1936 A specially designed 12-channel *carrier* cable between Bristol and Plymouth was laid by the Post Office.

➡ The Post Office laid the world's first coaxial telephone cable between London and Birmingham.

📠 The Post Office extended the Telex service to give a limited service to the Continent.

📞 TIM, the speaking clock service, was made available to London customers.



📞 1937 The '999' emergency telephone service was introduced in London and later extended throughout the country.

🚢 A pair of coaxial submarine cables was laid between Britain and Holland.

📺 The Post Office installed the world's first underground cable for television, linking Alexandra Palace with Broadcasting House and other places in central London.

📠 1938 The first Administrative Telegraph and Telephone and Radio Conferences of the new International Telecommunication Union were held in Cairo.

➡ *Pulse Code Modulation* (a digital telephone transmission system) was invented by an Englishman, A. H. Reeves.



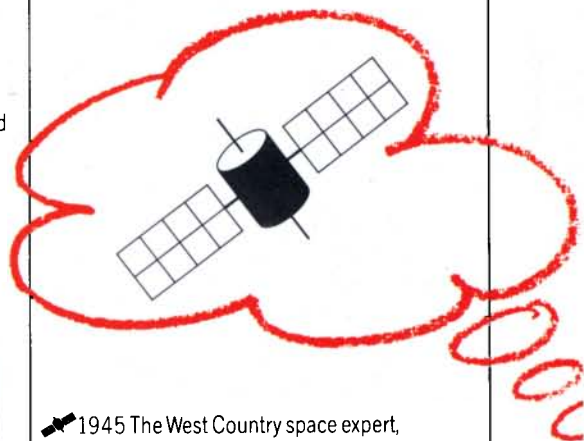
1940

📠 1943 A Post Office Research Branch team led by Thomas Harold Flowers, designed and constructed 'Colossus' the world's first programmable electronic computer. It contained 1,500 electronic valves.

🚢 The first submerged repeater was laid. It was inserted in a submarine coaxial cable between Anglesey and the Isle of Man.



1945



🚀 1945 The West Country space expert, Mr. Arthur C. Clarke, in an article in the 'Wireless World' was the first to suggest using *geo-stationary* satellites for communication.

📠 1948 The Bell Telephone Laboratories, USA, announced the invention of the transistor.



1950

1950 The first long-distance television cable was brought into service in October between London and Sutton Coldfield.

1951 Post Office research engineers evolved an entirely new type of deep sea telephone cable. Known as lightweight submarine cable, it had a steel strand in the centre instead of the conventional layer of steel armour wires on the outside. This lightweight type of cable was both cheaper and easier to lay.

1953 Agreements were signed on 1st December between the British Post Office, the American Telephone and Telegraph Company, the Canadian Overseas Telecommunication Corporation and the Eastern Telephone and Telegraph Company for the provision of the Transatlantic Telephone Cable.

1954 A new inland Telex service was established using a separate network integrated with international Telex circuits.

A submarine telephone cable was laid between Aberdeen and Bergen, Norway. This cable, 300 nautical miles in length was, at the time it was laid, the longest telephone submarine cable in the world. The cable was laid by the Post Office cable ship HMTS 'Monarch' (No 4).

1955



1956 The first transatlantic telephone cable between Oban in Scotland and Clarenville in Newfoundland, a distance of 2,240 miles, was laid by the Post Office cable ship HMTS 'Monarch' (No 4). After crossing Newfoundland, a further submarine cable was used to complete the connection to the mainland of North America, some of the circuits terminating in Canada and some in the USA.

1958 On 5th December, Her Majesty the Queen inaugurated the Subscriber Trunk Dialling service by making a call from Bristol Central telephone exchange, the first to have STD facilities.

The first automatic Telex exchanges were opened at Shoreditch in London and Leeds.

1959 The trans-Atlantic telephone cable (TAT 2) was laid by the Post Office cable ship HMTS 'Monarch' (No 4).

1960

1960 The conversion of the inland Telex service to automatic working was completed.

1961 The Anglo-Canadian cable (CANTAT 1) was laid by the Post Office cable ship HMTS 'Monarch' (No 4), as the first section of a submarine telephone cable network linking the Commonwealth. This was the first time that the lightweight submarine cable, developed by the Post Office in 1951, was brought into service.

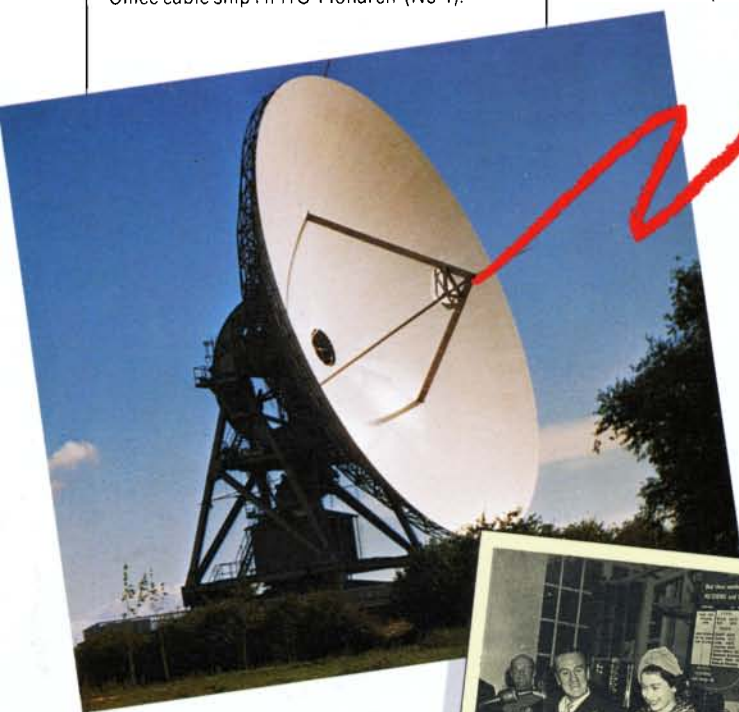
1962 The Post Office Satellite Communications Station at Goonhilly Downs began working. The station was designed to track communication satellites and, through them, transmit and receive telephone, telegraph and television signals. The station used a British designed dish-type aerial which was the first of its type. Dish-type aerals were later adopted throughout the world for satellite communication. The station took part in the first trans-Atlantic television transmission made via an artificial satellite - Telstar.

Telstar was the first broad-band active communications satellite and was launched into orbit from Cape Canaveral on 10th July. It circled the earth once every 158 minutes at a height of between 600 and 3,500 miles. The day after it was launched, Telstar was used to transmit the first high-definition television pictures across the Atlantic.

An experimental electronic telephone exchange was opened at Highgate Wood in London.

1963 On 8th March, International Subscriber Trunk Dialling (ISD) was inaugurated allowing London subscribers to dial Paris numbers. Now called International Direct Dialling (IDD).

The Commonwealth trans-Pacific cable (COMPAC) was laid between Canada and Australia. The Post Office cable ship HMTS 'Monarch' (No 4) participated in the lay.



First STD telephone call



1965

✈ 1965 INTELSAT 1 (Early Bird) the first commercial communications satellite was launched into a *geo-stationary* orbit on 6th April.

📠 The Post Office introduced the Datal services.

📡 The Prime Minister, Mr. Harold Wilson, opened the Post Office Tower in London, then Britain's highest building. The Tower was designed to carry aerials for the Post Office *micro-wave* network covering some 130 stations throughout the country including the Post Office satellite earth station at Goonhilly; the Tower is the focal point of this network.

The Tower and the four storey building below are equipped to handle 150,000 simultaneous telephone connections and provide 40 channels for black and white or colour television.

📠 1966 The first fully-operational production electronic telephone exchange in Europe (the first small-to-medium sized one in the world) was opened at Ambergate, Derbyshire. This was a TXE2 *reed relay* exchange.

📡 1967 The final section of the South East Asia Commonwealth (SEACOM) cable linking Australia, Hong Kong and Singapore became operational.

📡 1968 Europe's first *Pulse Code Modulation* transmission system, in which calls are carried in *digital* form, was installed between London and Sunbury-on-Thames, Middlesex.

📡 Empress telephone exchange, the world's first *Pulse Code Modulation (digital)* exchange, was opened in London.

📡 1969 The Post Office ceased to be a Government Department and became a Corporation on 1st October.

✈ A second aerial at the Post Office Satellite Communications Station, Goonhilly Downs, was completed.

The station could then communicate simultaneously with satellites over the Atlantic and the Indian Oceans. In July, Goonhilly was the European terminal for the television coverage of Man's first steps on the moon at the time of the Apollo 11 moon landing.

1970

📠 1970 The World's first telephone directories produced by a fully integrated computer printing process, were completed for the Post Office in January.

Confravision

📡 The International Subscriber Trunk Dialling service was extended to allow London subscribers to dial New York numbers – the World's first major inter-Continental subscriber dialling service.

📠 The 100th electronic telephone exchange (TXE2) was opened at Bawtry near Doncaster.

📡 1971 Trans-Atlantic dialling was extended. Six British cities: Birmingham, Edinburgh, Glasgow, Liverpool, London and Manchester were able to dial direct to the whole of the mainland of the USA by dialling 0101 followed by the USA area code and local number.

📡 In July the Post Office announced the development of the one-plus-one subscribers *carrier* system by means of which two subscribers can speak simultaneously on one line.

📡 Confravision, the World's first public bothway television system giving conference facilities to groups of people in different cities, was made available by the Post Office at its studios in Birmingham, Bristol, Glasgow, London and Manchester.

1972

✈ 1972 A third aerial was completed at the Post Office Satellite Communications Station at Goonhilly Downs, making the station the largest in Europe and the first in the world to operate simultaneous commercial services through three satellites.

📠 The ten millionth telephone exchange line was installed in the United Kingdom.

📡 1973 The Post Office adapted the application of the hovercraft principle for moving pre-packed containers of submarine cable weighing up to seventy tons at their new Southampton cableship depot.

📡 The World's first experimental international Confravision link was set up by the Post Office between London and Sydney, Australia.

📡 1974 The World's first commercial international Confravision service was opened between the United Kingdom and Sweden.

📡 International Subscriber Trunk Dialling (ISD) was extended to additional countries including New Zealand making UK subscribers the first in the World able to dial their Antipodes.

London Telecom Tower

1975

✈ 1975 Two new Post Office cables, the 'Monarch' (No 5) and the 'Iris' were launched. These were the first cables in the World to be designed for rapid cable loading using the 'pan loading' system developed by the Post Office.

📠 1976 The Post Office opened the World's largest international exchange at Stag Lane, Edgware. The first production TXE4, Britain's large-size Reed electronic telephone exchange, was opened at Sutton Coldfield, Birmingham. The last manual telephone exchange in the United Kingdom at Portree, Isle of Skye, was closed.



1978



Optical fibre

➡ 1978 The first optical cable system in Europe to form part of the public telephone network was installed between the Post Office Research Centre, Martlesham, and Ipswich telephone exchange. Optical cables contain glass fibres along which telecommunication signals can be transmitted using light.

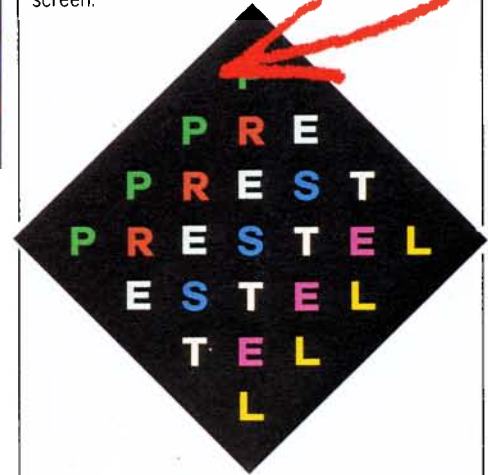
✈ After a design study in which British Post Office staff participated, the Orbital Test Satellite of the European Space Agency (of which Britain is a member) was launched from Cape Canaveral. Its purpose was to test the feasibility of satellite communication between the countries of Europe.

✈ A fourth aerial was completed at the Post Office Satellite Communications Station at Goonhilly for use with the Orbital Test Satellite. The Post Office opened its second satellite communications station at Madley, Hereford.

📠 One of the World's largest all-electronic telex exchanges, and the first in Britain to use stored programme computer control, was brought into service in London.

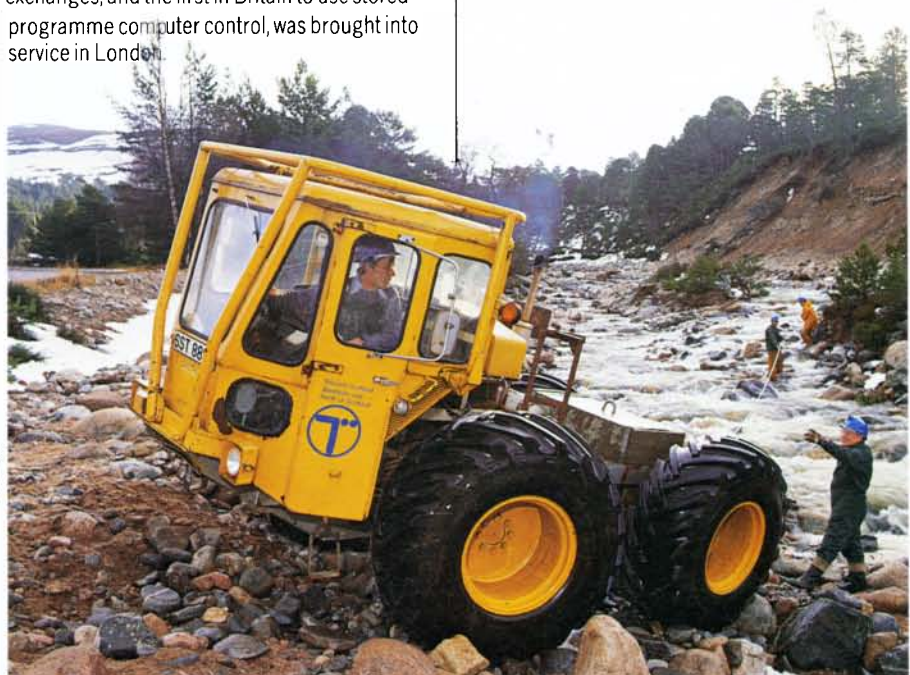
1979

➡ 1979 Prestel, the World's first public viewdata service, was opened in London and extended progressively to other centres. It was invented by the Post Office and enables information held in computers to be transmitted via an ordinary telephone line and displayed on a television screen.



📠 A *Digital* telephone exchange opened in Glenkindie, Aberdeenshire, making Glenkindie subscribers the first to be connected directly to a *digital* exchange.

📠 The STD system, commenced in 1958, was completed allowing direct dialling between all United Kingdom subscribers.



Cable laying

1980

1980 The World's first purpose designed optical fibre submarine cable was laid in Loch Fyne, Scotland.

The first of the British designed, *processor controlled digital* switching systems designated 'System X' was installed in Baynard House, London, to carry tandem calls between London exchanges.

1981 The first System X exchange to which subscribers were directly connected was opened at Woodbridge, Suffolk. This was also the first exchange to have 'voice guidance,' that is, verbal announcements to help subscribers use the exchange.

Under the British Telecommunications Act of 1981 the Telecommunications services provided by the British Post Office were formed into a separate organisation on 1st October. The new public corporation was called British Telecommunications and for trading purposes was shortened to British Telecom.

Microfiche system introduced in Inland Directory Enquiry Centres.

1982 The World's longest optical fibre telephone cable was brought into service, between London and Birmingham.

International Direct Dialling facility was made available to all remaining parts of the UK.

The Inland telegram service was superseded by the Telemessage service (overnight delivery).

System X circuit

1983

1983 Britain's first operational undersea optical fibre cable ordered to carry telephone calls across the Solent.

British Telecom's first satellite coast earth station opened, enabling ships to dial direct telephone and telex calls to almost anywhere in the world via Britain.

The transatlantic submarine cable TAT 7 came into operation. It handles computer data and telex messages as well as telephone calls between Europe and the USA and Canada.

1984 British Telecom International's satellite earth station in London's dockland came into operation. It will transmit television programmes to cable TV systems in the UK and in Europe and provide the capital's businesses with advanced telecommunications services.

1988



London docklands Earth Station

1988 The first transatlantic optical fibre submarine cable is due to become operational. It will be called TAT 8.



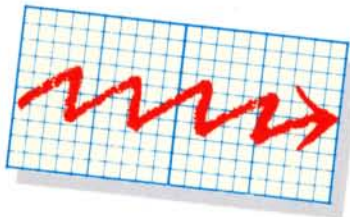


GLOSSARY OF TERMS

Amplify – To increase the strength of an electrical signal.

Carrier – When more than one telephone conversation is carried down a telephone wire each call is mixed with a different "carrier" frequency. This enables the full frequency width of the cable to be used. Each conversation occupies 0-4000 hertz, but its frequency is shifted before it is carried along the wire – this is called "Modulation." The call is returned to the normal 4000 hertz range at the destination before being sent to the other telephone.

Digital – Information carried by pulses – Information is converted into binary digits 1 or 0 which correspond with "on", "off" pulses by which the information is transmitted.

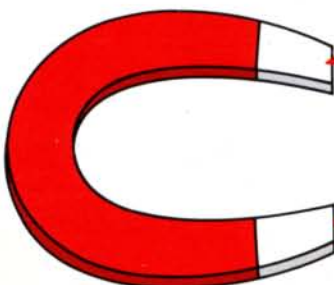


Frequency – With reference to radiowaves – the rate at which a signal fluctuates, usually measured in cycles per second or "Hertz."

Geo-stationary – Most modern satellites orbit the earth at a height of 35780km (22240 miles) from the surface. At this height the satellite takes 24 hours to complete its orbit and so it appears to remain above the same point on the earth's surface. Such satellites are described as being "geo-stationary."

Hertz – A unit of frequency, named after Heinrich Hertz.

Induction Coil – A simple electrical component consisting of a coil of wire. Careful use of these in telephone lines extends the distance over which signals can be transmitted without amplification.



Strowger Selector

Magneto – An electric generator using rotating magnets.

Microwave – A part of the radio spectrum which can accommodate a great number of telephone channels. At these frequencies it is necessary to have a "line of sight" path between stations – since the range of microwaves is restricted by the curvature of the earth.

Processor – In a computer system, the unit which interprets and executes instructions.

Pulse Code Modulation – Speech is converted into a series of pulses of electricity in *digital* form. Portions of conversations can be slotted in a series along a single circuit.

Reed Relay – A compact type of relay in which the switching contacts are small gold plated "reeds" housed in sealed tubes, these being placed inside the relay coil. They are very reliable and form the heart of many modern "electronic" exchanges.

Relay – In its most simple form a relay is a switch which is turned on or off by an electrical current. They are often constructed to switch several electrical circuits at once and can be interconnected so as to perform extremely complex functions. In their various forms they are an essential part of almost all telecommunications equipment.

Repeater – A unit used in telecommunications lines to amplify signals in order to offset the electrical losses along them.



READING LIST

Further sources of information

There are wider benefits to be gained from doing project work quite apart from the knowledge you acquire about the specific subject you are studying. You add to your experience by undertaking your own research; by learning to be selective about the material at your disposal; by attempting to achieve a high degree of accuracy. You learn too, to familiarize yourself with the resources of libraries, museums and other institutions.

Here is a bibliography and a list of some places we suggest you visit to further your knowledge of telecommunications.

Some books to read

Do not be discouraged because you find that many of the books on telecommunications subjects are very technical. These are intended for engineers.

Below is a section of books. There are, of course, many others.

Biographies

Sir William Preece – Victorian Engineer
Extraordinary
Baker, E C
Hutchinson 1976

Sir Charles Wheatstone
Bowers, B
HMSO 1975

Alexander Graham Bell & the Conquest of Solitude
Bruce, R V
Gollancz 1973

Famous Names in Engineering
Carvill, J
Butterworths 1981

Guglielmo Marconi 1874-1937
Geddes, K
HMSO 1979

A Biographical Dictionary of Scientists
Edited – Williams, T I
A & C Black 1974

Chambers Biographical Dictionary
Thorne, J O & Collocott, T C
Chambers 1974

History of Communications

The Story of Communications
Clarke, J & Hanson, D
Ginn 1971

The Semaphore
Holmes, T W
Arthur H Stockwell Ltd 1983

The Electric Telegraph
Kieve, J L
David S Charles 1973

Marconi & Wireless
Vyvyan, R N
E P Publishing Ltd 1974

The Old Telegraphs
Wilson, G
Phillimore & Co Ltd 1976

Power of Speech – A History of Standard Telephone Cables 1883-1983
Young, P
George Allen & Unwin 1983

A History of the Birmingham Telephone Area
Post Office 1978

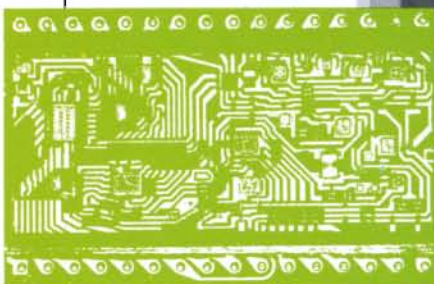
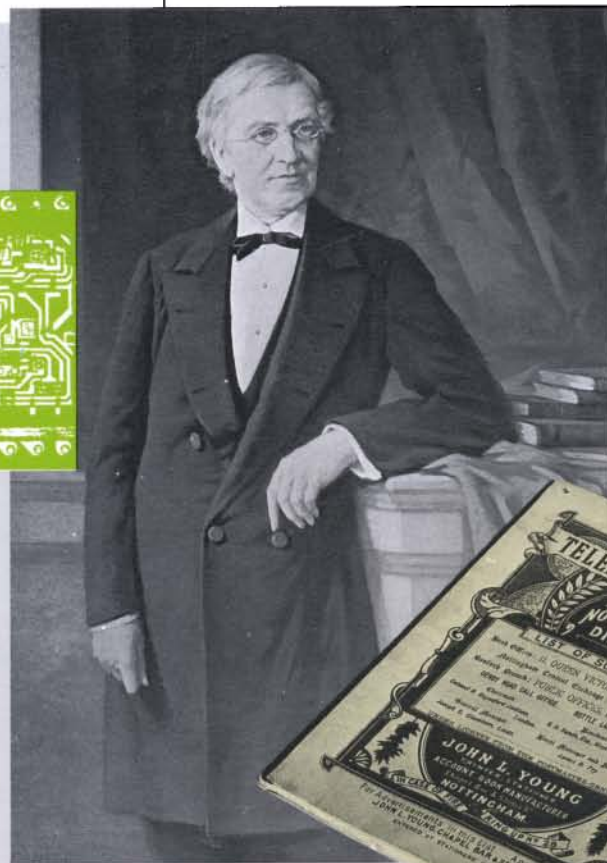
The First Hundred Years of the Telephone Service in the Liverpool Telephone Area
Roberts, S
British Telecom 1981

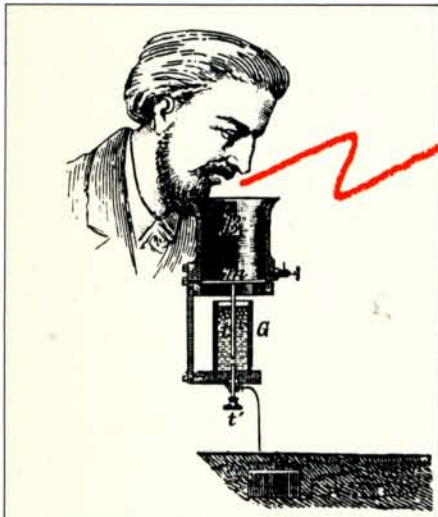
The First Hundred Years of Telephones Viewed from Norwich
Clayton, E G
BT/Post Office 1980

The Development of the Telephone in Oxford 1877-1977
Earl, R A J
Post Office 1978

A Century of Telephone Service 1880-1980
Green, M J
BT/Post Office 1980

Charles Wheatstone





Technology

The Electronic Mail Handbook
Connell, S & Galbraith, I
Century Publishing Co 1982

What to Buy for Business – A Handbook of New
Office Technology

Derrick, J & Oppenheim, P
Century Publishing Co 1982

The Computer Revolution (Exploration &
Discovery Series)
Jeremiah, D
Macmillan 1983

Discovering Computers
Mark, F
Longman 1982

Viewdata & the Information Society
Martin, J
Prentice-Hall Inc 1982

The Challenge of the Chip
Mayall, W H
HMSO 1980

Microprocessors: A Short Introduction
Morgan, E
Dept of Industry 1980

Dictionary of New Information Technology
Meadows, A J; Gordon, M; Singleton, A
Century Publishing Co 1982

General Texts

Telecommunications
Barnes, M J
Wayland 1980

Communication
Bear, J
Macdonald Educational 1973

Telecommunications – A Technology for Change
Davies, E
HMSO 1983

Broadcasting & Communications
Edited – Fox, L
Marshall Cavendish 1978

Broadcasting in Britain 1922-1972
Geddes, K
HMSO 1973

An Illustrated History of Science
Taylor, F S
Heinemann 1971

Radio & British Telecom (Tele Ed 50)
BT Education Service 1979

Chambers Dictionary of Science & Technology
Edited – Collocott, T C & Dobson, A B
Chambers 1974

Oxford Junior Encyclopaedia: Vol 4
Communications
OUP 1976

Oxford Junior Encyclopaedia: Vol 8 Engineering
OUP 1976

Pioneers in Telecommunications (ES 38)
BT Education Service 1983



How It All Works

How It Works – The Telephone
Carey, D
Ladybird 1978

The How It Works Encyclopaedia of Great
Inventors & Discoveries
Edited – Clarke, D
Marshall Cavendish 1982

The Way It Works – Man & His Machines
Kerrod, R
Marks & Spencer PLC 1983

The Way The New Technology Works
Marsh, K
Century Publishing Co 1982

The Telephone & the Exchange
Povey, P J
Pitman 1979

International Communications

Voices Across the Sea
Clarke, A C
Luscombe 1974

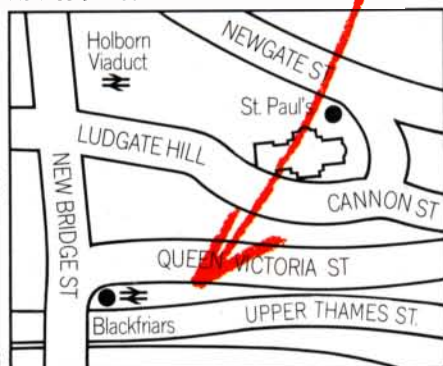
Submarine Telegraphy – The Grand Victorian
Technology
Finn, B S
HMSO 1973



PLACES TO VISIT

Telecom Technology Showcase
135 Queen Victoria Street, London EC4V 4AT
Telephone 01-248 7444.

Open Monday- Friday 10.00am to 5.00pm
(Closed Bank Holidays)
Admission free



Telephone Exchanges

You should be 14 years or older but exceptions are sometimes made in the case of groups of children accompanied by a teacher or youth group leader. Contact your local Telephone Area office.



The Science Museum
Exhibition Road, London SW17 2DD

The Telecommunications Gallery is on the 3rd Floor. The Museum is open on weekdays 10am to 6pm and Sundays 2.30pm to 6pm. It is closed on Bank Holidays. Admission is free of charge.

Teachers who wish to know about other British Telecom publications for schools should write to their local General Managers office. The address is in the preface of your Telephone Directory.

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