

A History of Telegraphy



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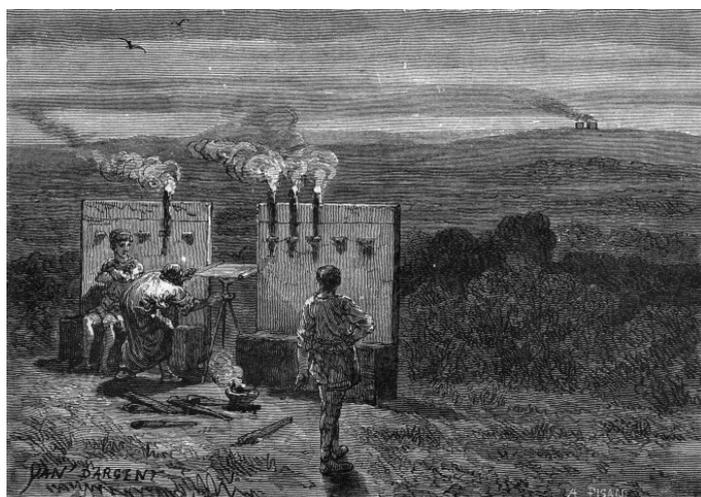
In our advancing digital age, instantaneous communication has become something upon which we depend to conduct our daily lives whether through instant messaging, social media or even online shopping. The extent to which we are able to communicate instantly with any person, anywhere in the world has led to the view that whilst the world's population is increasing, the world itself seems to be shrinking.

Communication in the days before any forms of telegraphy travelled at the speed of a human or animal; a letter posted in the days before the railways would travel at an average speed of seven miles an hour. As with many great innovations however, it was often protection from an enemy that provided the catalyst for the earliest forms of telegraphy

The word 'telegraphy' has its roots in Greek and translates as 'message from a far'. Many of the precursors to electrical telegraphy were known as methods of optical telegraphy as they relied upon the message being visualised over the distance. The word 'telegraph' was first used by Claude Chappe, who invented the semaphore system at the start of the French Revolution. Samuel Morse, inventor of Morse code believed that the word telegraph should only be used in situations where messages can be both sent and recorded over a distance. Morse favoured the term 'semaphore' which translates as 'bearer of signals' for all forms of optical telegraphy, such as smoke signals and the use of flags or torches to send messages.

Smoke Signals

The earliest form of optical telegraphy was smoke signals which were believed to have first been used by soldiers in Ancient China. Along the length of the Great Wall of China, soldiers who were posted in towers would use smoke signals to warn one another of an enemy attack. This would enable a message to be



passed over a great distance in a relatively short amount of time although the smoke could only be used to indicate an enemy attack rather than providing any further information.

Polybius, a Greek historian, developed a system to combat this problem in approximately 150 BC. His system made use of torches that would be held aloft in different combinations to signal different letters of the alphabet as seen in the picture below:

This very early form of coding was later developed by cryptographers and steganographers with a similar system being adopted by the Germans during the First World War.



Native Americans are perhaps the best known advocates of the traditional smoke signal system, constructing fires using damp grass on hilltops and controlling the release of the smoke with a blanket.

Each tribe would develop its own communication system so that the meaning would be agreed between sender and receiver beforehand. For many tribes, one puff of smoke would be sent up as a greeting or to attract attention followed by two puffs to indicate that all was well, or three puffs to indicate difficulty or danger. The use of three puffs of smoke or three fires or blows on a whistle, is still used to indicate difficulty by the Boy Scouts of America today.

Semaphore

Whilst smoke signals enabled one party to indicate their presence to another, they were limited in the complexity of the message that could be sent in addition to requiring a fuel source and dry weather. It would be another conflict that would propel the world of long range communication forward at the beginning of the French Revolution in the late 18th Century.

During the French Revolution, the French government were in desperate need of a communication system that would be efficient and reliable as the country was in turmoil, with cities in revolt and enemy forces rapidly advancing on its borders. The Chappe brothers, during the summer of 1790, began to develop a communication system that would allow the government to keep abreast of events quickly as well as relaying orders to the front lines. Their first message was sent over a distance of nearly ten miles on March 2nd 1791 using black and white panels, together with telescopes, codebooks and clocks.

In the following summer, Claude Chappe was tasked with installing a semaphore line between Paris and Lille, a distance of 143 miles. This was to be an invaluable tool in



the war against Austria and related the message of the capture of Condé-sur-l'Escaut (in 1794) in less than an hour.

How does semaphore work?

British officials would use semaphore to send messages between London and the naval base at Portsmouth as early as the start of the 19th century. They used semaphore shutters which signalled letters using lights that would flash from one tower to the next. This could relay a message over the 85 mile journey in about 15 minutes.

Semaphore relay towers had to be located on hilltops every 20 miles and could transmit messages at a rate of two words per minute. Semaphore can use lights, coloured flags or paddles and whilst the early systems had the advantage over smoke signals in that it didn't require a fuel source, it did still require good weather and light as reliable electrical lighting was not available until the 1880s. The cost of this communication method, in terms of both personnel and towers, restricted its use to mainly governmental communication.

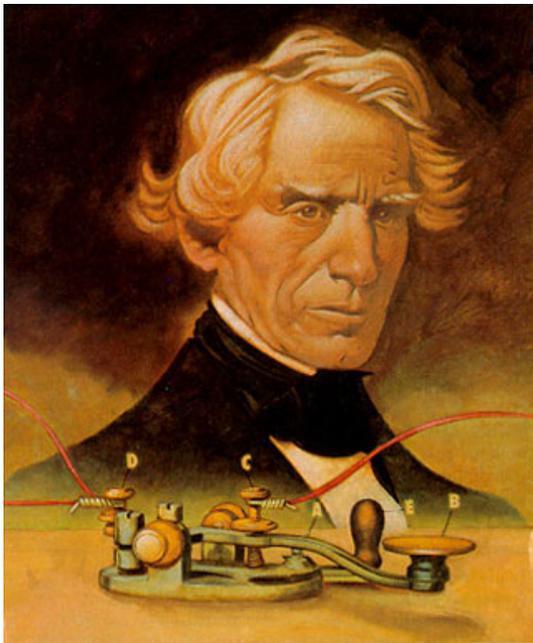
Semaphore is still used in maritime settings today, especially when replenishment is taking place at sea. There are 8 different hand positions that a signaller may use to represent letters or numbers. Some positions represent both a letter and a number and therefore the signaller will indicate 'letter' or 'numeral' with a signal at the start of the sequence. The flags themselves are not essential, the communication is obtained from the hand position but it does enable better visibility for the receiver. During nocturnal semaphoring, lighted wands can be used in the place of flags. Red and yellow flags, known as Oscar Flags are used at sea and white and blue flags, known as Papa Flags are used on land. Semaphore has also been used in non-maritime settings where oral or digital communication may be restricted such as between lifeguard patrols on a beach or the Royal Canadian Mounted Police.



Shifting Economies & The Industrial Revolution

The Industrial Revolution of the early part of the 19th century paved the way for a revolution in communication and travel. This period of history saw a transition from rural to urban living and the development of a manufacturing workforce rather than one based in agriculture. The transportation of people, with the newly developed railways in the 1840s and the transportation of messages with the dawning of an electrical telegraphy service in the same decade made a significant contribution to this economic shift. The urgency with which development of a quicker and more robust form of telegraphy was required is seen in the emergence of systems independent of each other in both North America and Europe.

An American Triumph – Morse Code



Samuel Morse was an Arts and Design professor at New York University. He developed a system in 1836 that used an electrical current over a wire to move an electromagnet, which in turn moved a marker to record codes onto a strip of paper. A modification of this system in the following year saw the paper embossed with dots and dashes. Morse sent his first message, with the help of his assistant Alfred Vail, across a two mile stretch of wire in Morristown, New Jersey in 1838.

The United States Congress were so impressed with Samuel Morse's invention that they provided \$30,000 of funds (the equivalent of roughly \$10 million today) to establish a telegraph line over the forty mile distance between Baltimore and Washington D.C. in 1843. Although Morse considered placing the cables underground to begin with, he determined that overhead cables suspended from poles would be more effective.

On May 1st 1844, the Whig Party who were holding their national convention in Baltimore, nominated Henry Clay. News of Clay's nomination was delivered in person to Annapolis Junction, a distance of 18 miles from Baltimore and the end of the Washington cable line at that point in time. This notice became the first news to be transmitted by telegraphy, when it was sent by Alfred Vail, Samuel Morse's assistant, to Washington D.C.

Just three weeks later, Annie Ellsworth, the young daughter of a friend of Morse selected the Bible verse from Numbers 23:23, 'What hath God wrought?' to become the first telegram to be sent along the completed line between the Capitol and Baltimore. Morse sent the message to Vail from the old Supreme Court chamber on May 24th 1844.

Just two years later, telegraphy had become such a key part of communication in North America that the Associated Press was formed, using telegraph lines to transmit news stories to their offices. In 1848, the telegraph was used to communicate the result of the presidential election which had been won by Zachary Taylor. The following year, in 1849, Associated Press employees based in Halifax, Nova Scotia, were able to gather news arriving on European boats and telegraph it to their New York newspaper offices that would subsequently print the news long before the boats docked in New York Harbour.

By the time of Abraham Lincoln's election to the presidency in 1860, the telegram had become a very popular means of communication, particularly for news of important historical events. In December 1861, Lincoln made his first State of the Union address and it was transmitted via telegraph to a number of US cities at a phenomenal rate of 82 words per minute;

"The message of President Lincoln was telegraphed yesterday to all parts of the loyal states. The message contained 7,758 words, and was received in this city in one hour and 32 minutes, a feat of telegraphing unparalleled in the Old or New World." ⁱ

Abraham Lincoln also saw the vast potential of the telegraph in times of conflict and it is said that he would spend hours in the War Department building located close to the White House during the Civil War; using the technology as a reliable method of contact with his military leaders on the battlefields.

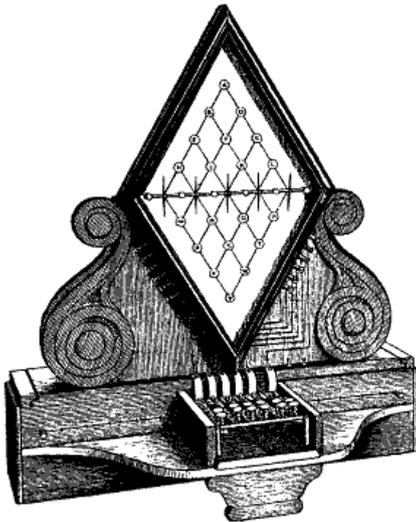


Lincoln in the War Room

A British Triumph – Cooke & Wheatstone Telegraph

In the same year as Samuel Morse invented his telegraphy system, Sir William Charles Fothergill Cooke and Charles Wheatstone, two British physicists, patented their electromagnetic telegraph. Their system

used a board containing a number of needles that would move to point towards letters of the alphabet. Its first installation was on the railway built by Robert Stephenson between London and Birmingham in 1837 and its purpose was to signal to the Camden Town engine house when it needed to begin pulling the locomotive up an incline on the approach to Euston station. Whilst their system worked, it was soon to be replaced by a pneumatic whilst system used elsewhere on the rail network.



Two years later, in April 1839, Cooke and Wheatstone enjoyed the accolade of producing the world's first commercial electrical telegraph machine. Their invention was used on the 13 mile railway line known as the Great Western Railway that ran from London Paddington to West Drayton. In the years that followed, as new railway lines were built running out of London, so too were more telegraph lines added. Cooke formed the world's first telegraph company, the Electrical Telegraph Company in 1846 and soon after this the installation of telegraph machines at Post Offices began throughout the country, becoming a tool for both commercial and personal communication. Cooke's company merged with the International Telegraphy Company in 1855 and with the British General Post Office in 1868.

How does electrical telegraphy work?

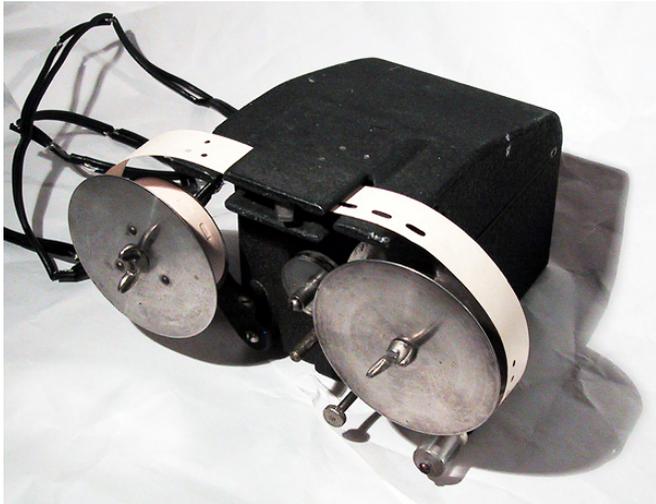
Telegraphy works when a simple switch is depressed and this action completes an electrical circuit which permits electricity to pass through it. As electricity passes through the circuit, a light or sound is emitted at the receiver's end of the wire. The receiver interprets the length of the sound or light as a particular letter or number. The telegram's message can therefore be heard (if a sounder is used), watched (if light is used) or even recorded onto paper for reading later.

In the earliest days of both Morse and Cooke & Wheatstone, telegrams were only transmitted over relatively short distances. Once the technique was improved, telegraph poles were placed every two hundred feet or so and the wire used to transport the signal would be coated in zinc to improve its strength.

By 1851, Morse Telegraph was the accepted form throughout Europe with the exception of the United Kingdom, and its empire, which retained the Cooke & Wheatstone model. As the use of telegraphy gathered pace, it was necessary to improve the speed at which messages could be received and interpreted. David Edward Hughes created the first printed telegraph machine in 1855 and it was quickly adopted throughout the world.

The benefit of this system was the negation of the need for an operator at the receiving end of the message. Initially the automatic recording of the Morse message onto paper was seen as progressive, but it still required interpretation by a trained operator. Whilst this was an advantage for automation

purposes, it meant an additional step in the process. In time, a sufficient number of Morse operators were trained who could interpret telegrams as soon as they were received at a rate of 40 to 50 words per minute which is in keeping with average typing speeds today.



A fully automated telegraphy system was possible with a further invention from Charles Wheatstone. A message in Morse code was generated on perforated paper which was then fed into the telegraph machine by an operator at a rate of 70 words per minute which was twice the speed of previous manual transmissions.

It is easy in our digital age, where access to the internet at any time and in any place is more the

norm than the exception, to negate the significance and impact of the telegraph at the time of its introduction. As Tom Noel, a history professor at the University of Colorado at Denver explains;

“At the time it was as incredible and astonishing as the computer when it first came out. For people who could barely understand it, here you had the magic of the electric force traveling by wire across the country”ⁱⁱ

A Telegraph network around the world

By 1902, less than 60 years after the first successful telegram had been sent and received, the world had been circumnavigated by a telegraphy network, resulting in the potential for almost instantaneous communication between all continents;

- 1849** Permission was sought and obtained to create a telegraphic route from England to France, with the first cable being laid in the following year.
- 1851** Telegraphic link between Paris and London established, all the more remarkable considering the Napoleonic Wars had ended just decades earlier.
- 1854** Establishment of the New York Newfoundland & London Telegraph Company by Cyrus Field who raised funds to lay the first cable under the Atlantic Ocean from Nova Scotia to the Dingle Peninsula in Ireland.
- 1857** Cyrus Fields' project began with the departure of ships from the Dingle Peninsula, Ireland. This first attempt ended in failure.
- 1858** Saw the transatlantic cable completed and the first message sent by Cyrus Field from Newfoundland to Dingle. 11 days later, Queen Victoria sent a message of congratulations to the American President James Buchanan. This victory was short lived with the cable failing shortly afterwards.
- 1861** Western Union built the first transcontinental telegraph line, linking the East and West Coasts of North America and marking the end of the era of the Pony Express.

- 1865** Cyrus Fields' attempted for a third time to establish a telegraphy service across the Atlantic Ocean and on this occasion its failure was caused by the cable snapping just 600 miles from the coast of Newfoundland.
- 1866** The first sustained successful telegraphy route was established across the Atlantic Ocean.
- 1870** Cables connected Britain and India and soon after Australia who were now able to receive news from around the world, which began with the Oxford University Press.
- 1902** The completion of the Pacific route signalling the telegraphic encircling of the globe.

Was it expensive?

It seems that the cost of sending a telegram was dependent upon the length of the message and the distance that it was being sent. As a method of communication, it was at least 30 times cheaper than using a semaphore system and so was instantly more appealing to the commercial sector. Where charges were made per word or for each set of ten words, customers were advised to be frugal with their language and resist worrying about the usual etiquette associated with written letters;

“Naturally, there is a right way and a wrong way of wording telegrams. The right way is economical, the wrong way, wasteful. If the telegram is packed full of unnecessary words, words which might be omitted without impairing the sense of the message, the sender has been guilty of economic waste.”ⁱⁱⁱ

It is from advice such as this that the tradition of using the word ‘stop’ in the place of punctuation in telegrams originates. There would be an additional charge for punctuation as it would require a change in the pace of the telegraph operator.

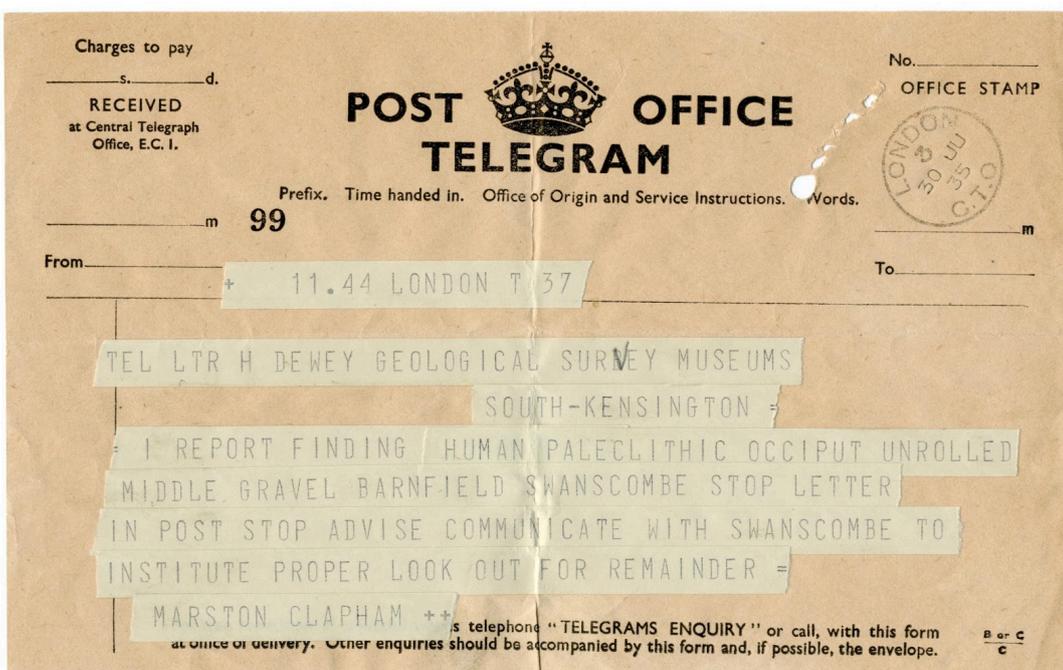


Image of telegram from 1930s

Whilst there appears to be a variety of prices quoted for early telegrams, several sources suggest that at its inception, a telegram sent locally would cost an American penny per word, 2 cents per word in the 1920s and by the 1940s, 5 cents per word. This would suggest that a 10 word telegram would have cost an average worker an equivalent value of \$17 in 1866, \$8.50 in the 1920s and \$18.00 in the 1940s.^{iv} It is possible that the reason for its cheaper relative price during the 1920s could be as a result of the growing popularity of the telegraph during the 1920s and 1930s when its usage was at a peak and it was far cheaper to send a telegram rather than a long distance telephone call.

The End of the Telegraph

It could be suggested that the invention of the telephone, just 40 years after the telegraph was the beginning of its demise. The subsequent inventions of radio communications, telex and fax, all of which have their scientific roots in telegraphy led to its decline in the second half of the twentieth century.

Whilst it is still possible to order a telegram online^v to be delivered by either a personal messenger or by postal delivery, the traditional telegraph service has ceased in most countries throughout the world. Ireland and England ceased their telegraph services in 2002 and 2003 respectively, with the Western Union in the United States ending their telegram services in 2006. Australia and India, whose many remote communities had relied upon the telegraph service, were later to make the transition with their last telegrams sent in 2011 and 2013.

The emergence of the Internet towards the end of the twentieth century and the prolific expansion of wireless technologies and communications at the start of the twenty first century have relegated the telegraph to the annals of history. It is imperative to remember however, the contribution of the telegraph to the birth of globalisation; as peoples from all continents were able to communicate instantaneously with one another, it became necessary for a common language and a common approach to language to be established;

“Messages would now travel far and wide, and the telegraph demanded a language ‘stripped of the local, regional; and colloquial,’ to better facilitate a worldwide media language.”^{vi}

ⁱ Quotation taken from *New York Times*, December 4th 1861 quoted by R McNamara in *The Invention of the Telegraph*

ⁱⁱ Quotation taken from *Telegram Passes Into History*, Associated Press, 2nd February 2006 located at <http://www.wired.com/science/discoveries/news/2006/02/70147>

ⁱⁱⁱ N E Ross, *How to Write Telegrams Properly*, 1928 located online at <http://www.telegraph-office.com/pages/telegram.html#How Tolls Are Computed>

^{iv} This statistic is calculated using the labor value measurement calculator at the Measuring Worth calculator located at <http://www.measuringworth.com/uscompare/relativevalue.php>

^v This service in the UK is provided by <http://www.telegramsonline.co.uk/history.asp> who took over the business from British Telecom in 2003.

^{vi} J Carey, *Communications as Culture*, 1989, p210, Routledge, New York & London. Quotation taken from <http://en.wikipedia.org/wiki/Telegraphy>

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