HISTORY OF THE TELEGRAPH

THE HISTORY OF THE TELEGRAPH

Early Forms of Long-Distance Communication

Before the development of the electric telegraph in the 19th century revolutionized how information was transmitted across long distances, ancient civilizations such as those in China, Egypt and Greece used drumbeats or smoke signals to exchange information between far-flung points. However, such methods were limited by the weather and the need for an uninterrupted line of sight between receptor points. These limitations also lessened the effectiveness of the semaphore, a modern precursor to the electric telegraph. Developed in the early 1790s, the semaphore consisted of a series of hilltop stations that each had large movable arms to signal letters and numbers and two telescopes with which to see the other stations. This "optical telegraph" is now more commonly referred to as the Chappe telegraph.

Its invention is attributed to Frenchman Claude Chappe and his brothers, who unveiled their device on the 3rd of March, 1791 between the towns of Brûlon and Parcé, a total distance of 14 kilometers. Claude was only 26 at the time. It wouldn't be for another two more years, however, before he and his brothers could perfect their contraption and convince the government that it would be successful The construction of his telegraph was approved by the Convention Nationale (the Assembly) on the 4th of August, 1793. The Paris-Lille line opened a year later, on the 16th of July, 1794.

By the mid 19th century, an expansive network of 534 relay stations connecting 29 major French cities across some 5000 kilometers was in place. Now a communiqué from Paris to Strasbourg would take approximately two hours.

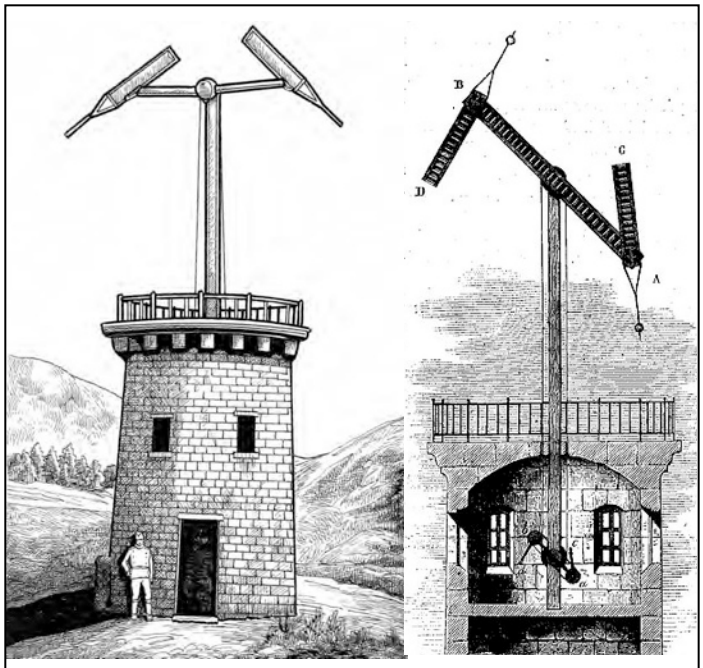
Napoleon Bonaparte immediately saw its military potential and had the network vastly expanded under the urgency of the tense situation during the French Revolution. After its peak success, Bonaparte, then First Consul of France, decided in 1800 to reduce the appropriation of funds to the construction of the telegraphs and, in dispair, Claude Chappe committed suicide by throwing himself into a well. Interestingly enough, however, once Napoleon was crowned Emperor, he made an effort to re-expand the network as a means of keeping control. In fact it was during this time that the system of telegraphs expanded across borders and into Italy, Belgium, and Holland. The true demise of the technology was not until 1856, when it was replaced by its electric counterpart.

Claude Chappe

The Chappe telegraph was truly remarkable in allowing for reliable and rapid transmission of words across long distances. A message could travel 500 kilometers in just about two hours, a remarkable speed in a time of messengers on horses.

How did it work?

The Chappe telegraph is a semaphore not unlike the ones used at sea by flagmen in order to communicate from ship to ship. In order to send signals over larger distances, however, the Chappe telegraph used a stationary tower upon which stood a wooden stand approximately 7 meters in height. A 4.6m x 0.35m long black regulator wooden beam was pivoted upon this stand, and two indicator "wings" were affixed to the ends of this. The different positions of the wooden beams would thus communicate a particular signal and were ultimately controlled by a system of pulleys and ropes developed by the famous watchmaker Abraham Louis Breguet. The towers would be positioned approximately 10-15 kilometers from each other in order to guarantee visibility, though fog or night would halt communication altogether.

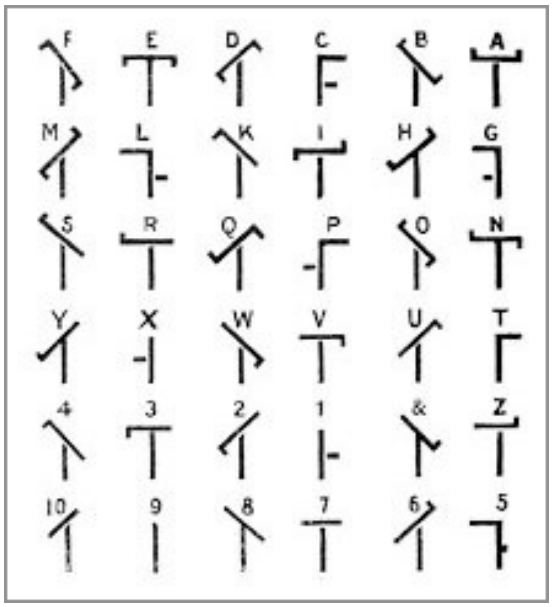


A Chappe telegraph seen if full view and a cutaway showing the mechanical workings.

Although the beams would be kept completely vertical in the absence of a message to transmit, once a code signal was displayed by an operator at a tower, he would wait for the following tower to copy the same signal. As a result, if a transmission was not being recieved correctly a relay station would continue sending the same signal, backing up the whole process to the origin of transmission if something wrong should occur. Ninety-eight unique signals could

be made, of which six were reserved for particular communications such as “error in transmission” or “priority.” The two signalmen stationed at each post knew the significance of only these six, and recorded the 92 others by number only, to be deciphered by superior officers. In order to include more sophisticated messages, each transmission would be divided into two numbers: the first would indicate a page number for a particular reference manual that each station had, and the second would indicate a particular number line on that page. All told this allowed for 92 x 92 signals or 8464 unique words or phrases. For example, the phrase “I respond to your last dispatch” (Je réponds à votre dernière dépêche) was located on page 53, line 21.

Like ancient smoke signals, the semaphore was susceptible to weather and other factors that hindered visibility. A different method of transmitting information was needed to make regular and reliable long-distance communication workable. Enter the electric telegraph.



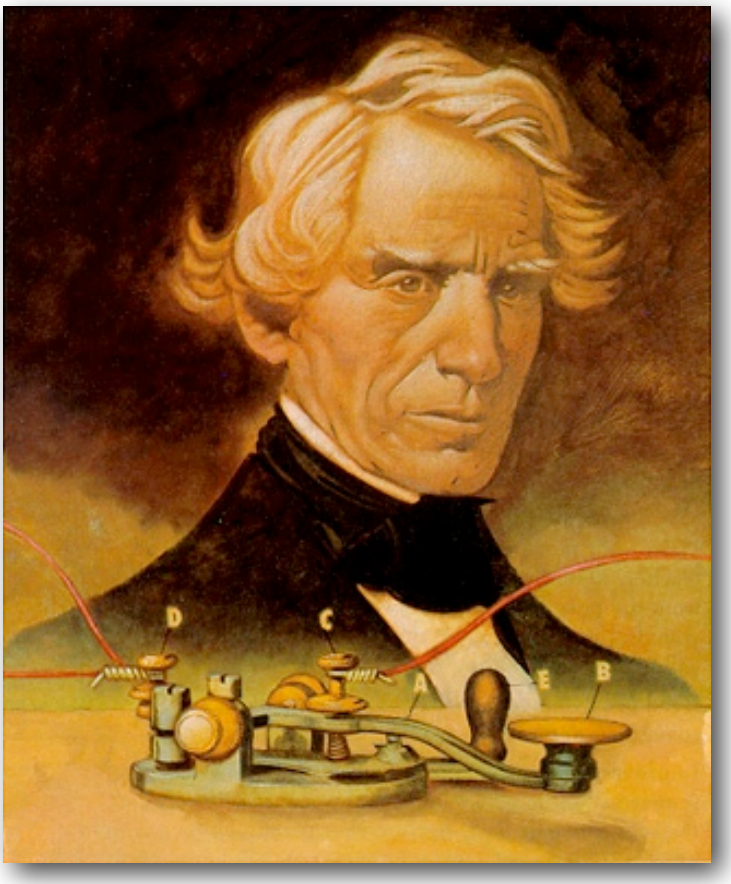
Alphabetic and numerical equivalents of Chappe signals.

The Electric Telegraph

Developed in the 1830s and 1840s by Samuel Morse (1791-1872) and other inventors, the electric telegraph revolutionized long-distance communication. It worked by transmitting electrical signals over a wire laid between stations.

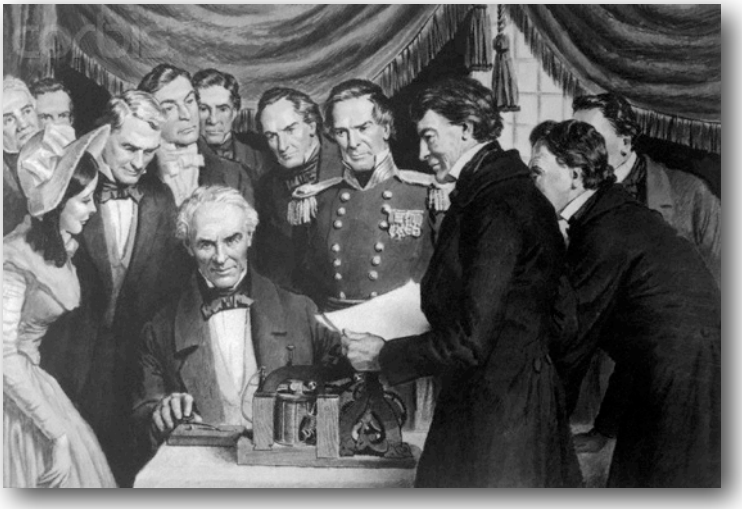
In the early 19th century, two developments in the field of electricity opened the door to the production of the electric telegraph. First, in 1800, the Italian physicist Alessandro Volta (1745-1827) invented the battery, which reliably stored an electric current and allowed the current to be used in a controlled environment. Second, in 1820, the Danish physicist Hans Christian Oersted (1777-1851) demonstrated the connection between electricity and magnetism by deflecting a magnetic needle with an electric current. While scientists and inventors across the world began experimenting with batteries and the principles of electromagnetism to develop some kind of communication system, the credit for inventing the telegraph generally falls to two sets of researchers: Sir William Cooke (1806-79) and Sir Charles Wheatstone (1802-75) in England, and Samuel Morse, Leonard Gale (1800-83) and Alfred Vail (1807-59) in the U.S.

In the 1830s, the British team of Cooke and Wheatstone developed a telegraph system with five magnetic needles that could be pointed around a panel of letters and numbers by using an electric current. Their system was soon being used for railroad signaling in Britain. During this time period, the Massachusetts-born, Yale-educated Morse (who began his career as a painter), worked to develop an electric telegraph of his own. He reportedly had become intrigued with the idea after hearing a conversation about electromagnetism while sailing from Europe to America in the early 1830s, and later learned more about the topic from American physicist Joseph Henry (1797-1878). In collaboration with Gale and Vail, Morse eventually produced a single-circuit telegraph that worked by pushing the operator key down to complete the electric circuit of the battery. This action sent the electric signal across a wire to a receiver at the other end. All the system needed was a key, a battery, wire and a line of poles between stations for the wire and a receiver.



Morse Code

To transmit messages across telegraph wires, in the 1930s Morse and Vail created what came to be known as Morse code. The code assigned letters in the alphabet and numbers a set of dots (short marks) and dashes (long marks) based on the frequency of use; letters used often (such as "E") got a simple code, while those used infrequently (such as "Q") got a longer and more complex code. Initially, the code, when transmitted over the telegraph system, was rendered as marks on a piece of paper that the telegraph operator would then translate back into English. Rather quickly, however, it became apparent that the operators were able to hear and understand the code just by listening to the clicking of the receiver, so the paper was replaced by a receiver that created more pronounced beeping sounds.



Samuel Morse sending the first telegraph message, "What hath God wrought?"

Rise and Decline of the Telegraph System

In 1843, Morse and Vail received funding from the U.S. Congress to set up and test their telegraph system between Washington, D.C., and Baltimore, Maryland. On May 24, 1844, Morse sent Vail the historic first message: "What hath God wrought!" The telegraph system subsequently spread across America and the world, aided by further innovations. Among these improvements was the invention of good insulation for telegraph wires. The man behind this innovation was Ezra Cornell (1807-74), one of the founders of the university in New York that bears his name. Another improvement, by the famed inventor Thomas Alva Edison (1847-1931) in 1874, was the Quadruplex system, which allowed for four messages to be transmitted simultaneously using the same wire.

Use of the telegraph was quickly accepted by people eager for a faster and easier way of sending and receiving information. However, widespread and successful use of the device required a unified system of telegraph stations among which information could be transmitted. The Western Union Telegraphy Company, founded in part by Cornell, was at first only one of many such companies that developed around the new medium during the 1850s. By 1861, however, Western Union had laid the first transcontinental telegraph line, making it the first nationwide telegraph company. Telegraph systems spread across the world, as well. Extensive systems appeared across Europe by the later part of the 19th century, and by 1866 the first permanent telegraph cable had been successfully laid across the Atlantic Ocean; there were 40 such telegraph lines across the Atlantic by 1940.

Samuel Morse sending his last telegraph message upon retirement.

The electric telegraph transformed how wars were fought and won and how journalists and newspapers conducted business. Rather than taking weeks to be delivered by horse-and-carriage mail carts, pieces of news could be exchanged between telegraph stations almost instantly. The telegraph also had a profound economic effect, allowing money to be "wired" across great distances.

Even by the end of the 19th century, however, new technologies began to emerge, many of them based on the same principles first developed for the telegraph system. In time, these new technologies would overshadow the telegraph, which would fall out of regular widespread usage. Although the telegraph has since been replaced by the even more convenient telephone, fax machine and Internet, its invention stands as a turning point in world history.

Samuel Morse died in New York City at the age of 80 on April 2, 1872.

Source:
Morse Code & the Telegraph, History.com