# THE HISTORY OF THE TELEGRAPH

Developed in the 1830s and 1840s by Samuel Morse (1791-1872) and other inventors, the telegraph revolutionized long-distance communication. It worked by transmitting electrical signals over a wire laid between stations. In addition to helping invent the telegraph, Samuel Morse developed a code (bearing his name) that assigned a set of dots and dashes to each letter of the English alphabet and allowed for the simple transmission of complex messages across telegraph lines. In 1844, Morse sent his first telegraph message, from Washington, D.C., to Baltimore, Maryland; by 1866, a telegraph line had been laid across the Atlantic Ocean from the U.S. to Europe. Although the telegraph had fallen out of widespread use by the start of the 21st century, replaced by the telephone, fax machine and Internet, it laid the groundwork for the communications revolution that led to those later innovations.

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. 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.
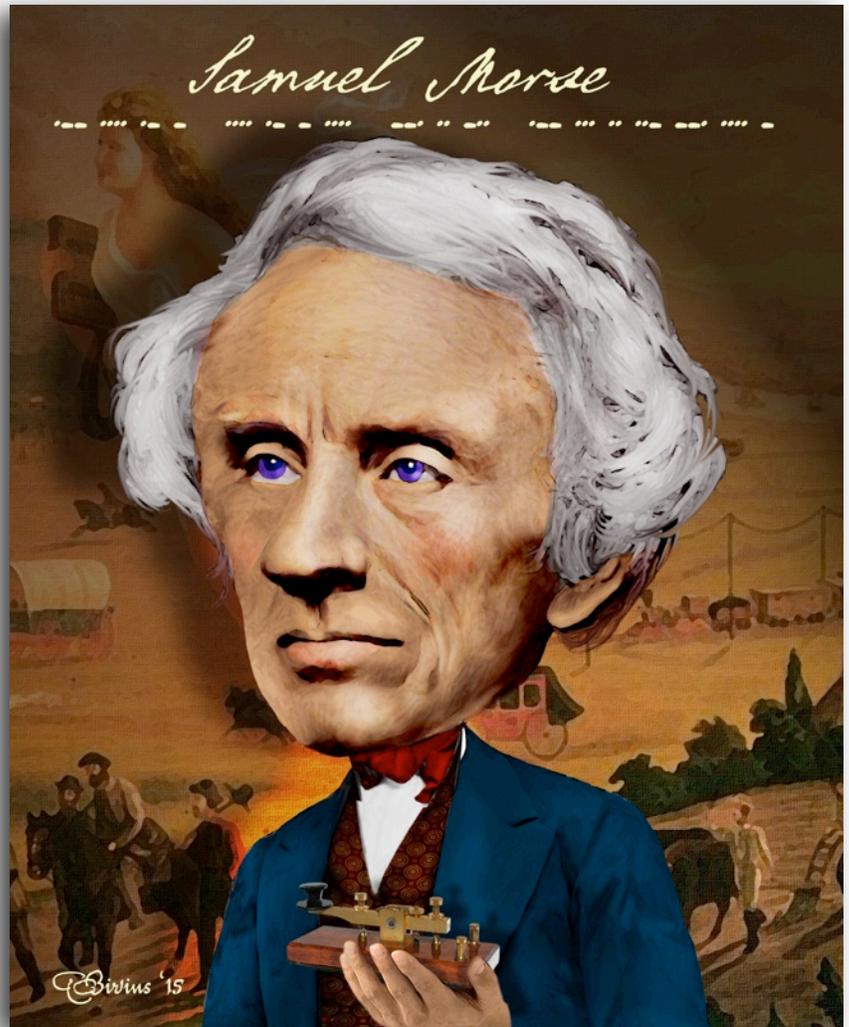
The Electric Telegraph

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 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 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 and Sir Charles Wheatstone in England, and Samuel Morse, Leonard Gale and Alfred Vail in the U.S.
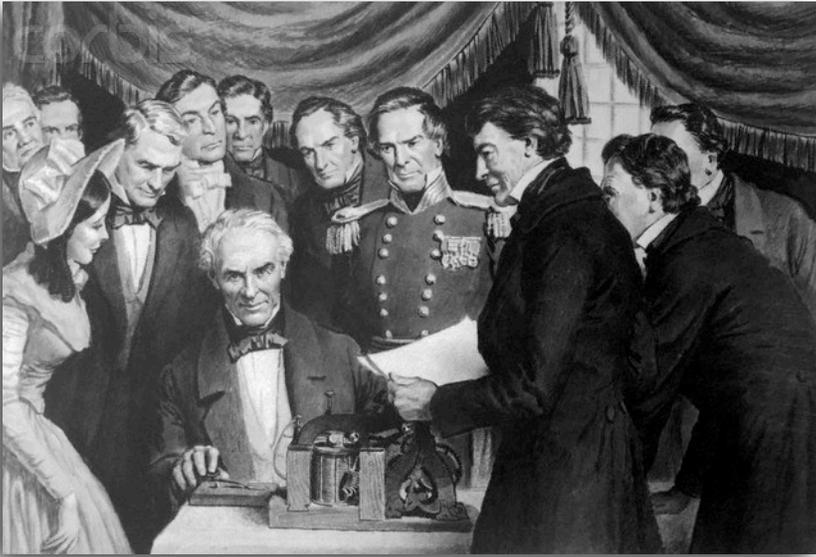
Samuel Morse sending the first telegraph message, "What hath God wrought?"

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 tele-

graph 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.

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.

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

Samuel Morse sending his last telegraph message upon retirement.