



CONNECTIONS *news*

www.telcomhistory.org

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Dave Felice, editor

A Message from Our Director

In the past I have talked about our great volunteers. They continue to help build The Telecommunications History Group. This time I wanted to tell you about our archivist, Jody Georgeson. She has been with THG since 1999. She has been secretary, Director for thirteen years, archivist extraordinaire and a board member and volunteer. Her knowledge of telephone history is astounding and something we all rely on. Her Masters in Library Information and Science degree has been pivotal in building the archive and museum to what it is today. She is my good friend. I can't thank her enough for her editing skills. I have learned so much from her in the years we have been involved with THG and traveled together.

Each one of our volunteers brings their own knowledge and skills to the projects they work on. Here's to all of them. May they continue with us for many years.

Ken Pratt, a volunteer for many years, turned 102 in April. We miss him and wanted to "shout out" to him and his supportive family.

We would love to have your telephone stories and remembrances, as well as anything you like to read in the newsletter. Send your suggestions by e-mail to telcommhist@aol.com with the word "Editor" in the subject line.

Have a great summer. Thank you so much for your support.

Sincerely,

Renee Lang, Managing Director

Telecommunications History Group 2023 Challenge Grant

Again this summer, members and newsletter readers can double the value of their support for Telecommunications History Group.

In this year's Challenge Grant, every donation you make between now and August 1, 2023 will be matched one-for-one up to a total of \$20,000. In addition, if you contribute at least \$60, THG will count \$35 of that as a renewal of your membership for 2023, and the grant will match your total contribution (including the amount applied to your renewal).

Visits to our museums and archives and back up to, and on many days even exceeding, the pre-pandemic levels. And the opportunities for us to preserve even more history are also increasing, as we continue to be offered significant artifacts and document collections. It does require some spending on our part if we want to accept many of those offers.

So as always, we rely on our members to help us keep the lights on and the phones ringing. You may use the enclosed envelope to send a check, or you may make your donation online at <http://www.telcomhistory.org/challenge/>

Everyone at THG wants to thank you in advance for your generous and crucial help!

Congratulations, National History Day Scholar

Each year, THG awards a prize to the National History Day Colorado project that best portrays an aspect of telecommunications history. This year, the young scholar prize recipient is Jerry Stone, for his web site, "The Wireless Frontier: Edwin Howard Armstrong and Frequency Modulation. The site can be viewed at <https://site.nhd.org/18904607/home>



National History Day in Colorado (NHDC) is a social studies and literacy program that equips students in elementary, middle, and high school with the skills necessary to succeed in college and the real world. Students participate in a project-based learning curriculum that emphasizes critical reading and thinking, research, analysis, and the drawing of meaningful conclusions. Students can complete these projects in groups or as individuals in one of five categories: documentary, paper, exhibit, performance, or website. They then compete in one of our thirteen regions across the state in either the junior (middle school) or senior (high school) division, or in the elementary poster contest (4th and 5th graders). Regional winners compete at the State Contests in May on the University of Colorado Denver campus. First and second place state winners compete in Nationals at the University of Maryland, College Park in June.

THG is a proud sponsor and cultural partner of NHDC. We provide research materials in our archives, special awards, and volunteer judges at the various contests.

Rare artifact "discovered" at Connections Museum

by Peter Amstein

Sorting or reorganizing often reveals a valuable item located at the bottom of a box or back of a shelf. And so it is that the THG Connections Museum can now prominently display a precious telecommunications artifact.

While rearranging a display cabinet in the museum in Seattle, THG volunteers discovered something tiny, but valuable, which no one even knew we had. As challenging as it is to try to maintain a complete inventory of their holdings, even large professionally run museums discover unknown things in their collections. For a volunteer run organization like ours it can happen much more often. In this case, the item in question was well hidden behind a couple of much larger objects in an old glass display case near our No. 1 crossbar.

Of all of the important inventions and discoveries to come from AT&T's world-famous Bell Laboratories research organization, perhaps none can claim to have changed the way we live and work so dramatically as the transistor. Credited to William Shockley, John Bardeen, and Walter Brattain, the first working device was shown internally in 1947 and shown publicly in 1948. These very first transistors were of a type known as the point contact transistor. But it would take many more years of development before transistors could be mass produced in volume and began to appear in ordinary products. The first transistor radio went on sale in November 1954,

and it was only in the 1960s that they began to give vacuum tube radios really serious competition.



What we discovered in the museum was an early "New in Box" example of a Western Electric type 1760 point-contact transistor with a date code of April 1953. This type was made in very limited numbers and was not typically sold commercially but was made only for military and phone company uses. A 1954 electronics catalog lists a similar transistor made by RCA priced at \$15.40 (about \$172 today).

A transistor is a tiny circuit made from a nearly perfect crystal of germanium or silicon, which controls electronic signals.

Tiny though it is, the 1760 is still huge when compared with one of the billions of microscopic transistors on the integrated circuits in a modern cell phone. In the 1940s Bell Labs was simply hoping to improve the amplifiers needed for long distance telephone transmission, but they ended up creating a game changing breakthrough in the world of electronics.

Now that we have re-discovered it, the little device has a prominent place in our cabinet of curiosities on the museum's second floor, and we are pleased to have one more fascinating thing to show visitors when we share the amazing history of telephony and its legacy.

Lumen leader honors telecommunications women

Lumen Technologies President and Chief Executive Officer Kate Johnson observes Women's History Month by visiting THG's museum in Denver. She posted this item on her Linked In page.

I recently toured the telecommunications museum at [Lumen Technologies'](#) historic 14th Street building in Denver, formerly known as "Colorado's Bell System Palace." Not only did I enjoy seeing the evolution of communications technology and industry, but I also loved learning about the leaders and workers who helped shape this great company.

Alexander Graham Bell hired operator Emma Nutt – the world's first woman employee in telecom – on Sept. 1, 1878. By 1890, telephone operators were exclusively women, welcoming the professional opportunity as a great improvement over factory work or domestic service. These women were significant contributors to our country's industrial and social development, leading improvement of women's working conditions across the world. CenturyLink (now Lumen) founder Clarke Williams' mother was a telephone switchboard operator who met her husband – a lineman – by answering the switchboard when he called in to test repairs.

My mother was also a telephone switchboard operator in the 1950's. When they were dating, my father used to call the switchboard to try to get her to answer. He has described with glee the times they created a party line to patch in their friends to plan their Saturday shenanigans.

I wonder if Emma Nutt, Mrs. Williams, or Mom could ever have imagined a female CEO leading their telecom company. I'm so grateful to all the women who helped pave the way for me to achieve my dreams. In celebration of Women's History Month, I commit to paying it forward!



<https://www.linkedin.com/feed/update/urn:li:activity:7038978498467692544/>

Technology preservation on display

After visiting the THG Connections Museum in Seattle, a reporter for National Public Radio (NPR) concludes that telephone technology actually formed the first "social network."

"These days Americans often connect to other humans through machines," says reporter Brian Mann. "It's easy to forget how we got here, and how the phone system design still shapes how we talk today."

Mann describes the Communications Museum as "a Willy Wonka's factory of clattering gizmos, many invented by steam age eccentrics and tinkerers who managed to connect an entire world." The reporter retrieved his own gizmo, a pocket audio recorder, and collected the whirring and clicking sounds for his radio report.

"This (museum) is a place where self-described technology nerds are preserving and restoring machines that ran America's first landline telephone network," says Mann. He reports that museum volunteer Peter Amstein views the original phone industry as a "high tech startup story, only it's 120 years old now." The shops and laboratories where telephone pioneers worked are absolutely rudimentary by today's standards.



Mann did not report that all elements of his story are based on telephone technology. Recording and editing, distribution (wireless and wired), and delivery to the end user are all rooted in telephony. He does quote Amstein's comment that "So much of the stuff that I built my whole tech career on comes out of the telephone system, out of the early developments."

As a small example of the technical commonality, the patch panel in most broadcast control rooms and data centers works essentially the same way as a telephone switchboard, moving signals from point to point. Mann photographed a visitor operating the switchboard.

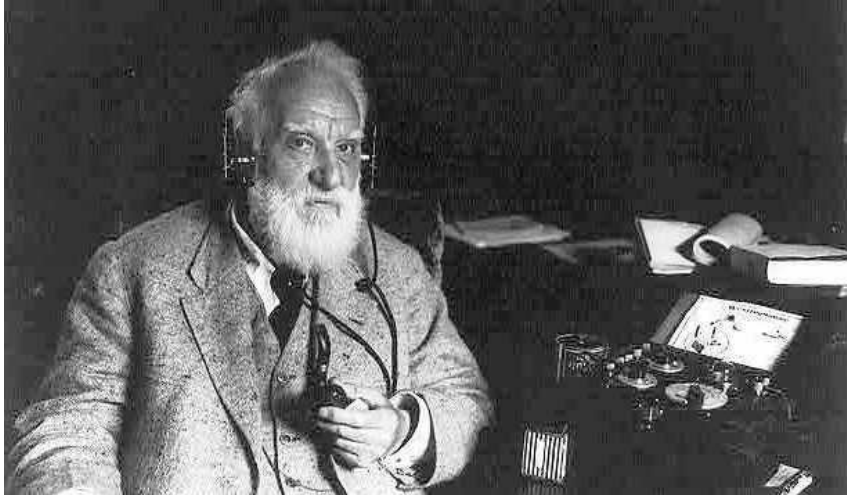
The NPR reporter also tells how Sarah Autumn led other volunteers in spending hundreds of hours over several years rebuilding one of the museum's most prized possessions, the last fully functional panel telephone switching system. "It's a beautiful machine," says Autumn. "Folks who worked on these systems were highly skilled and highly trained at understanding this complex web of interrelationships."

Mann concludes with the observation that "the technology feels ancient; but in the rumble and clatter of these old machines, you can glimpse a piece of how America got to where we are now — an age of smart phones, TikTok and AI (artificial intelligence)."

NPR's Brian Mann usually reports on politics and social issues. The Connections Museum story, text and audio, is posted on line at: <https://www.npr.org/2023/05/10/1174719805/social-network-landline-telephone-system-computers-machines>

Smithsonian restoring Bell recordings

After a decade of preparation, the Smithsonian Institution is entering the years-long active phase of restoring the world's oldest audio recordings, made by Alexander Graham Bell.



"Hear my voice" declared Bell himself on a wax-and-cardboard disc recording that Smithsonian researchers were able to recover in 2013. Previously considered "unplayable," the disc's audio launched a new initiative called 'Hearing History: Recovering Sound from Alexander Graham Bell's Experimental Records.'

"Over the three-year duration of this remarkable project, we will preserve and make accessible for the first time about 300 recordings that have been in the museum's collections for over a century, unheard by anyone," says Anthea Hartig of the Smithsonian's National Museum of American History. The new initiative will begin later this year.

Bell and his colleagues produced hundreds of recordings at Volta Laboratory in Washington, D.C., and at Bell's property in Baddeck, Nova Scotia, between 1881 and 1892. According to the museum, the Volta Laboratory innovations in sound recording and playback proved foundational to the emerging music, broadcast and entertainment industries.

In recent years, researchers have already recovered sound from 20 experimental recordings at Volta Laboratory, including the only documented recordings of Bell's voice. The new work focuses on recovering the rest of the collection. Volta was the forerunner of Bell Laboratories.

The research team will be translating the cardboard-and-wax discs created by Bell and his associates. These discs were once thought to be "mute artifacts," says Carlene Stephens, curator at the National Museum of American History. Bell's attempts to play them back apparently had been lost to history and Stephens says she "began to wonder (in 2013) if we would ever know what was on them."

A team of experts from the museum, Lawrence Berkeley National Laboratory and the Library of Congress uses a newly-developed process, making a digital scan of the grooves on the wax disc. The scanning removes any scratches or damage that might interfere with the recovery attempt. Then, a software "stylus" follows the grooves and produces a new digital audio file.

From the late 1880s until his death in 1922, Bell donated an extensive collection of laboratory materials to the Smithsonian, where he was a member of the Board of Regents. In addition to the sound recordings on discs and cylinders, the holdings also documented Bell's research, in case of patent disputes similar to the lengthy legal wrangling that surrounded invention of the telephone.

Bell conducted his sound experiments between 1880 and 1886, collaborating with his cousin Chichester Bell and technician Charles Sumner Tainter. They worked at Bell's Volta Laboratory, at 1221 Connecticut Avenue in Washington, originally established inside what had been a stable. In 1877, his great rival, Thomas Edison, had recorded sound on embossed foil; Bell was eager to improve the process. Some of Bell's research on light and sound during this period anticipated fiber-optic communications.

Bell and his associates intently tested the potential of a variety of materials, including metal, wax, glass, paper, plaster, foil and cardboard, for recording sound. The precise methods they employed in early efforts to play back their recordings are lost to history.

It's known that Bell voice had a deep bass tone, but his accent was an amalgam. He was born in 1847 in Edinburgh, where the Scottish brogue is noticeable, but not as strong as other parts of the country. As a young man, he lived in London. Bell later moved to Ontario, then to Boston, where he might have adapted two more linguistic influences. In later years, he spent most of his time in Baddeck, Nova Scotia, where many residents spoke Scots Gaelic. Speech patterns influenced by geography can make a difference. For example, even today it's possible someone from Edinburgh and someone from South Boston, both speaking English, might not understand each other.

Curator Carlene Stephens of the Smithsonian's National Museum of American History was intrigued by the possibility of resurrecting the "mute artifacts," Stephens learned that physicist Carl Haber at the Lawrence Berkeley National Laboratory in Berkeley, California, had succeeded in extracting sound from early recordings made in Paris in 1860. He and his team created high-resolution optical scans converted into an audio file. Early in 2011, Haber, his colleague physicist Earl Cornell and Peter Alyea, a digital conversion specialist at the Library of Congress, began analyzing the Volta Lab discs. Muffled voices could be detected reciting Hamlet's soliloquy, sequences of numbers and "Mary Had a Little Lamb."

In autumn 2011, Patrick Feaster, an Indiana University sound-media historian, aided by Stephens, compiled an exhaustive inventory of notations, many scratched on wax and all but illegible. Documents indicated that one wax-and-cardboard disc contained a recording of Bell speaking. At the Library of Congress in June 2012, a team including Haber, Stephens and Alyea was transfixed as it listened to the inventor himself: "In witness whereof—hear my voice, Alexander Graham Bell."

The Smithsonian's audio recovery project is made possible with public-private funding through an initial grant from the Save America's Treasures program and matching support by Linda and Mike Curb and Seal Storage Technology. Additional support was provided by SEDDI Inc. and the Alexander and Mabel Bell Legacy Foundation.

"Having dedicated my career to the recording industry from an early age, I have great respect for the history of recorded sound," says Mike Curb, founder and chairman of Curb Records.

Michael Horowitz, Seal Storage Technology CEO, says the project "aligns perfectly with the company's goal to preserve history through technology." Seal is a Web3 cloud storage provider.

A sample of the Bell audio is posted at: <https://soundcloud.com/smithsonianmag/we-had-no-idea-what-alexander-graham-bell-sounded-like-until-now>. Some cylinder recordings previously restored by the University of California are at: <https://www.openculture.com/2023/01/download-10000-of-the-first-recordings-of-music-ever-made.html>. This story is adapted from Smithsonian source material. In the Library of Congress photo, Bell is shown with Westinghouse audio equipment. Bell, Nikola Tesla, and George Westinghouse had intense competitive disagreements with Thomas Alva Edison.

New technology poses new problems

News media, government agencies, and consumer organizations are warning of the perils of new technology known as "voice cloning."

Produced by Artificial Intelligence (AI) technology, voice cloning enables unscrupulous telephone marketers (robo-callers) to imitate a full solicitation message in a familiar voice from just a small sample of the true voice.

The March 2023 AARP Bulletin reports makes "frauds such as the grandparent scam – built around a fake call supposedly from a grandchild – frighteningly effective." The AARP newspaper quotes Siwei Lyu as saying "the scammers reply on the familiarity of the voices." Lyu is an expert in the relatively new science of "digital media forensics." According to AARP, consumers lost \$2.6 billion in this kind of fraud last year, the upward trend continues, and even more sophisticated fraud is on the horizon.

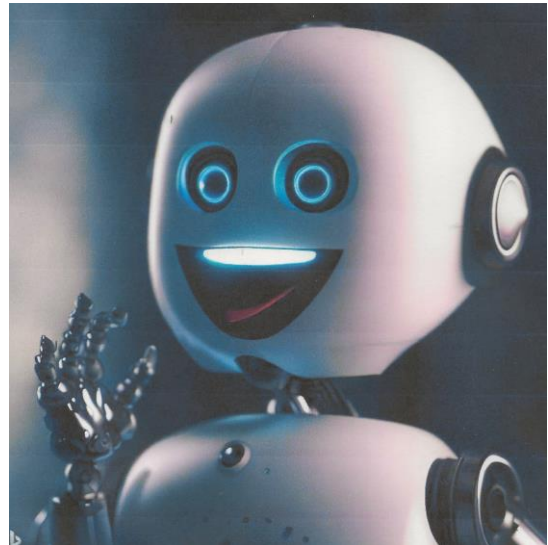
In Congressional testimony, the CEO of the company responsible for the well-known consumer AI application, ChatGPT, appeared to support regulation. Sam Altman of OpenAI says: "My worst fear is we cause significant harm to the world. If this technology goes wrong, it can go quite wrong." Quartz news service says committee members "treated Altman as a responsible steward of an inevitable technology."

Microsoft Chairman Satya Nadella also endorses proper regulation. "AI is moving in the right direction. It is moving fast where humans are in control. It is important to capitalize on this technology. Regulation would be good for the companies," says Nadella in an MSNBC broadcast interview. He adds that Microsoft is comfortable partnering with the nonprofit governance of OpenAI, "a company that has a mission of fundamentally pursuing this very powerful technology."

The Federal Communications Commission and the Federal Trade Commission are both warning consumers to beware of potential telephone solicitation calls which sound as if they are from a familiar or famous person. The most common advice is to resist pressure and go slowly with any offer.

Robo-calls persist as a significant problem. Unwanted call complaints are far-and-away the largest category of consumer complaints to the FCC, with approximately 120,000 complaints last year. One industry estimate indicates the average U.S. consumer receives 14 spam or fraud calls per month. And these calls have real consumer consequences. According to the FTC, consumers lost nearly \$800 million by phone fraud in 2022.

The growing threat of voice cloning means there's another reason for people to avoid answering the phone, or at least to verify the source of the call.



Peter Amstein of Telecommunications History Group made the illustration for this article, using the ChatGPT application running on the Microsoft Bing platform. The story is by Dave Felice.

Swartley's Stories:

Western Electric's major role in telecommunications

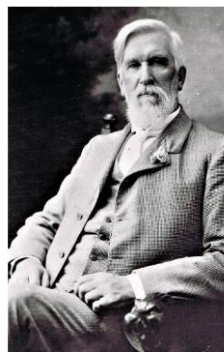
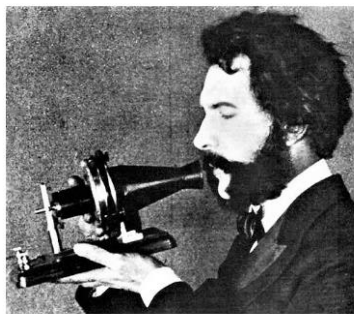
by John Swartley

(Author's Note: I recently chatted with the editor of the Telecommunications History Group's Connections News quarterly newsletter, about subject material. The newsletter, originally known as Dial-Log, has published about 30 of my "Swartley's War Stories," mostly relating to experiences of my telephone career.

Editor Dave Felice suggested writing about Western Electric's role in the Bell System. Western was one of the main players that made Bell Telephone the highly successful "world's largest monopoly" until the court-ordered breakup in 1984.

I am thankful many retired telephone employees took their time to offer information on the Bell System for me. It was a huge task to create the world's largest telephone system, requiring millions of dedicated employees and a massive battery of lawyers. In my opinion, the many years of antitrust lawsuits did not create the breakup as much as new technology in communications. The large cumbersome regulated industry could not compete with ever-changing technology and pricing, because the Bell System had to request new rates from the FCC for every item.)

History teaches us Alexander Graham Bell invented the telephone and created the Bell System. Actually, an Italian, Antonio Meucci, (left photo) invented a working form of the telephone in 1849. Antonio filed a patent caveat, an intent to file, in 1871. In his filings, Meucci did not mention electromagnetic transmission of vocal sound like Bell and Gray did. Elisha Gray (right photo) filed a patent caveat for his telephone invention February 14, 1876, Bell filed his actual patent a few hours



later. Many lawsuits followed. Bell won and the rest is history. Elisha Gray was a big factor in the history of the Western Electric.

In January 1869, George Shaw

and Enos Barton purchased an abandoned Western Union Telegraph shop in Cleveland. In May, George Shaw sold his share to Elisha Gray. He and Barton moved to Chicago. On March 29, 1872, Gray and Barton became Western Electric Manufacturing Company of Chicago. American Bell Telephone bought controlling stock in 1881.

During this period, Bell had sole rights to the telephone patent. Bell formed several companies to install telephones under its own patent, and won patent rights of other startup firms, including Western Union.

These companies became American Bell Telephone in 1880 and then American Telephone and Telegraph in 1899. After more antitrust lawsuits Bell had to drop the Telegraph and became AT&T. American Telephone and Telegraph Long Lines was incorporated in 1885 to allow company-wide long distance service. In 1889, Long Lines became the umbrella company for the Bell System.

Bell originally contracted with six different manufacturing companies. In November 1881, Western Electric Manufacturing Company became simply Western Electric Company of Illinois. Early the next year, Western became the primary supplier for American Bell and subsidiaries.

In 1890, Congress passed the Sherman Act, outlawing monopolies or conspiracies to monopolize. This act required Bell to hire a large number of lawyers to argue the company was not acting in restraint of trade.

Independent phone companies formed in 1893 when Bell's telephone patent expired. Since several localities had dual service, Bell President Theodore Vail introduced the One Bell System campaign in 1908, to promote unified connection and discourage small operations. Dual phone systems disappeared, but many independent companies survived, mostly in smaller towns.

Western Electric built a 10-story facility in 1888 in lower Manhattan to produce telephone equipment along with the shop in Chicago. In 1901, Bell Telephone Company of Philadelphia contracted with Western Electric to be the sole supplier of telephone equipment. By 1938, Western Electric had 29 locations distributing telephone supplies to Bell companies. The savings of buying bulk materials was passed on to operating companies. Western Electric plants further reduced production costs by delivering finished products to distributing centers.

In November 1915, the Western Electric Company was incorporated under the laws of the of New York and took over Western Electric of Illinois. Just one month earlier, on July 24, 1915, over 2573



passengers, many of them employees of Chicago's Hawthorne Western Electric Plant boarded the Steamship Eastland. The ship was to ferry workers 38 miles across Lake Michigan to a park for a day of outdoor activities. The Eastland suddenly rolled on its side in the harbor and over 800 Western Electric employees lost their lives. Most of the company

workers were immigrants who safely crossed the ocean and found a new life working for Western Electric.

Before they became Western Electric, Gray and Barton were manufacturing telegraph and related equipment. Starting in 1915, the company manufactured new labor-saving modern convenience household electric products as more customers had access to electric service.

American Bell leaders wanted Western Electric to concentrate on telephone equipment, so December 31, 1920, they started the subsidiary, GrayBar, named after Gray and Barton, to handle the electrical business. AT&T sold all the Graybar stock in 1925 to the employees of the company. Graybar relabeled their household products, starting in 1926. The company was competing with Westinghouse, Sears and Roebuck, Maytag, and other companies, but dropped appliances during the depression. Garybar continues to be an employee-owned electrical supply company.

The first of the large Western Electric manufacturing plants opened in 1905 in Hawthorne Illinois, later incorporated into Cicero. At the peak of production, the plant employed 45,000 workers. The plant produced telephone equipment and consumer products until 1925 when Western Electric sold off its household division. Hawthorne was the “Electrical Capital of America,” a vast manufacturing complex extending over two hundred acres, employing thousands workers in more than a hundred buildings containing 2.5 million square feet of floor space.

With its own hospital, electric powerhouse, three hundred-member police force, fully equipped fire department and eleven cafeterias serving 28,000 meals a day, Western Electric’s Hawthorne Works functioned like a self-sufficient city. An army of dedicated laborers assembled the world’s most innovative telecommunications equipment, engineered by Bell Laboratories.

For most of the 20th century, the Works made everything from home telephones (22 million in its first twenty-five years) to sound motion picture projectors to missile guidance



systems. As the hardware maker for the Bell System and the government, the Hawthorne name became synonymous with quality, innovation, and reliability, says Morton College of Chicago.

Hawthorne workers were not members of a union, but they had pensions, sick pay, disability benefits, and stock purchase plans. Recreational and educational programs, included baseball leagues, lunchtime concerts, and evening classes. The company’s accident prevention program introduced safety

shoes, eye goggles, and other protective clothing. Western Electric studied social, behavioral, and medical sciences to better understand productivity and job satisfaction.

Starting in 1924, six women employees were part of a work study project. They were placed in a separate room producing relays for eight years, until 1932. The study would lengthen or shorten the workday, increase or decrease break time, vary light levels, and change other factors.

Another study, in 1931 and 1932, followed fourteen workers who assembled telephone equipment. The study, called the "Hawthorne Effect," set the stage for human and mechanical processes at future manufacturing plants.

Western Electric even built Manufacturing Junction Railroad, in 1903. Trains ran about 21 miles to the CBQ Railroad mainline. In May 1986, the MJR was sold to the Chicago West Pullman Transportation Corp. The last employee of the MJR Railroad was terminated in 2009. The company is still on the National Transportation records but listed as out of service.

Hawthorne was demolished in the late 1980s, except for the tower. The rest of the area is now a shopping center. Morton College acquired Hawthorne archives and artifacts, stating "the Hawthorne Works Museum preserves the few remaining artifacts from a time when good industrial jobs provided millions a gateway to the American Dream."

Western Electric would become AT&T Technologies, later in 1996 Lucent Technologies. Lucent merged in 2006 with the French company Alcatel. In 2016, Alcatel-Lucent was absorbed by Nokia, a Finnish multinational telecommunications company.

Until next time keep having fun; I am.

– Swartley

*If you have documents or artifacts you think might be worth donating to THG,
contact <https://www.telcomhistory.org/donate-equipment-historical-documents/>
for an advance evaluation.*