A Message from Our Director

It's almost Spring. I'm sure looking forward to all it brings. Here in Denver we had a wonderful Fall and a not too bad Winter so far. And to the 48 States that participate, here's to Spring forward, Fall back.

We have accomplished many items on the to-do list in the THG Archives. Cleaning out our intake room and putting in new lighting are two of the most recent. We have also been approached to lend artifacts for various displays in the area. The Castle Rock Museum put some of our things in a great display. The Molly Brown House is going to use most of the same artifacts they used in 2012 on the anniversary of the sinking of the Titanic. Centurion High School is borrowing a telephone booth and other artifacts for a play.

We continue to get research requests from students all over the country who are participating in National History day. If you have a chance to volunteer for this program in your state, I'd urge you to do so. We've learned just as much from the kiddos (and had just as much fun!) as they have by doing their projects.

Seattle volunteers are conducting regular tours and updating displays. Check out their on-line videos at the Connections Museum You-Tube site.

Enjoy the upcoming Spring, and thanks so much for your support.

Sincerely,

Renee Lang, Managing Director

TELECOMMUNICATIONS HISTORY GROUP

2022 Board of Directors

THG's Board provides voluntary service in the form of oversight and management of the organization. (Several of our Board members are also active volunteers at the Archives and the Seattle and Denver Connections Museums.) They are instrumental in the planning, development and fundraising that supports our efforts to preserve the history of the telecommunications industry.

Valued member and Treasurer John Kure retired from the Board. We will greatly miss his leadership and financial acumen. We're sad to see him go and thank him for his contribution to THG's success.

Officers

President - **Peter Amstein**, Software Industry Executive (ret.)

Vice President - **Michael W Nearing**, Network Engineer (ret.)

Treasurer - **Bill Johnston**, SVP & Controller Qwest-retired

Secretary – **Jody Georgeson**, U S WEST (ret.), THG Executive Director (ret)

Members

Sarah Autumn, Technical Trainer

Roger Christensen, Executive VP and Chief Admin. Officer, Media One (ret.)

Dave Felice, CenturyLink (ret)

Philip A Linse, CenturyLink

Edwin W Mattson, Medical Director-(retired)

Scott McClellan, VP Washington (ret.) Qwest

Mary Retka, SOMOS (ret.)

In memory of Gerald "Jerry" F. Wild
August 25, 1934 ~ January 23, 2022 (age 87)

Jerry was a proud Colorado Native, living his entire life in the Englewood/Littleton area. As a young man he worked in stables, rode bulls in rodeos and eventually joined Mountain Bell.

He would work with the phone company and its many iterations for the remainder of his career, rising from lineman to management, and from installing the very first phone lines in much of Colorado to working with fiber optics and the internet.

After his third effort at retirement Jerry kept busy by volunteering at the Telecommunications History Group and working with his fellow Pioneers to construct "beep balls" that allow blind athletes to play softball. He was passionate about volunteering and continued with both organizations well into his 80s.

Jerry joined THG in 1996, as one of our earliest volunteers. He was a knowledgeable, dependable volunteer, and our go-to guy about everything related to telecom technology. He kept our step switch display running, devised hands-on exhibits and delighted us with his stories. We miss him greatly.

The full obituary can be viewed at:

https://www.drinkwinemortuary.com/obituary/GeraldJerry-Wild?fbclid

Women's History Month

A few notes in honor of Women's History Month:

1912 – IBEW accepted telephone operators into the union. Julia S. O'Connor was the first president of IBEW's Telephone Operators' Department.

1918 – General "Black Jack" Pershing creates the Women's Telephone Operating Unit. Operators from almost every traffic office volunteered to go overseas.

1935 -- Madge Ulrich, (Phoenix, AZ) became the first female commercial manager in the Bell System.

1943 -- Gloria Shepperson became the first black operator in New Jersey Bell (and probably the first in the Bell System). She went on to become CWA's Director of Ethnic Affairs, and in 1977, Assistant to CWA's Secretary/Treasurer Louis B. Knecht.

1969 -- Lorena Weeks claimed that Southern Bell had violated her rights under the 1964 Civil Rights Act when they denied her application for promotion to a higher paying position because she was a woman. She was represented in the case by Sylvia Roberts, a National Organization for Women attorney. She lost the initial case but won after several appeals. Weeks v. Southern Bell was an important case as it marked the first victory in which NOW used the Civil Rights Act to fight gender-based discrimination.

1971 -- Sharon Roswell became the first woman "lineman" at General Telephone Company.

1995 – CWA's Barbara Easterling became the first woman to fill AFL-CIO's 2nd highest position.

CELL PHONES
By John Swartley

One of my fellow Telephone Pioneers sent me a series of cell phone cartoons and, since I am always looking for something to write about, I started researching cell phones.

Before cell phones were the fad, AT&T introduced Improved Mobile Service, (IMTS.) The system operated on VHF-UHF radio channels assigned by the FCC. These were bulky, expensive systems provided by AT&T. The handset was installed next to the driver and the control was installed in the trunk.

While working in Boulder I was loaned to the Special Services Department that installed the IMTS. We had to snake the cable from the trunk up to the handset console, keeping the cable hidden under the floormat. Our biggest customers were bank presidents who were concerned about their safety with all the turmoil going on in the late 1960s. Although the console had a dial, if I remember right the customer had to place their call through a special mobile telephone operator. There were only two channels and we had speakers monitoring each channel. Most of the customers probably did not realize they were being monitored and assumed it was like a landline for security. The conversations were more interesting than a good soap opera. The one I remember the most was a man talking to his insurance agent about buying a term insurance policy for his mistress; it would be interesting to know if she ever collected on the policy. The IMTS only had a 40–60-mile radius and required a push-to-talk handset.

In 1981 the FCC approved AT&T's Advanced Mobile Phone System. This analog two-channel system started using cell towers that allowed customers to travel greater distances. In Colorado AT&T started installing towers along the I-25 corridor along the front range. By then I was working on the Western Slope and unaware of what was going on in mobile technology. Later, when the cell phone was getting started along the front range, I was working in Telluride and a cell phone customer stopped me complaining that his cell phone was not working, I did not have the foggiest idea what he was talking about. I recently found on YouTube a 1978 AT&T archives video explaining how the new AMPS cell tower system worked. It was very informative.

The development of (MOS) large-scale integration (LSI) technology, information theory and cellular networking led to the development of affordable mobile communications and devices such as the car phone. The first handheld cellular mobile phone was demonstrated by John F Mitchell and Martin Cooper of Motorola in 1973, using a handset weighing 2 kilograms (4.4 lb.). The first commercial automated cellular network (1G) analog was launched in Japan by Nippon Telegraph and Telephone in 1979. This was followed in 1981 by the simultaneous launch of the Nordic Mobile Telephone (NMT) system in Denmark, Finland, Norway, and Sweden. Several other countries   followed in the early to mid-1980s. These first-generation (1G) systems could support far more simultaneous calls but still used analog cellular technology. In 1983, the DynaTAC 8000x was the first commercially available handheld mobile phone.

In 1988, the Bell Laboratories team introduced digital cellular technology in the United States. This occurred 15 years after the first mobile phone call was made over an analog system and changed the wireless communication industry into what it is today. Digital technology transformed and revolutionized communications and made it possible for mobile devices to transmit signals between our handsets and the cell phone towers. Known in those days as '2G' (second generation), the industry evolved rapidly and soon there was '3G' (third generation), then '4G' (fourth generation), and now '5G'(fifth generation). Each time a new generation is announced, cell phone users grow more optimistic and excited at the new possibilities to improve their cellular experience. Take '5G' for example. It promises faster download and upload speeds, and to drastically decrease the time it takes devices to communicate with wireless networks.

In 1983, the Motorola DynaTAC 8000 was the first commercially available handheld mobile phone, aka brick phone. It sold for $3,995. Since the lithium battery was not in production yet, it took 10 hours of charging for 30 minutes talk time. In 1985, with the ever-changing technology, Motorola developed many versions of the DynaTAC, each with major improvements.

Motorola introduced the "bag phone" in 1988. It was more powerful and came with or without backup batteries.

I purchased my bag phone in 1984 after moving to Buena Vista, Colorado. It was expensive to use so we only used it in the car. I did not have the battery and at that time my car's power source only worked when the ignition was turned on, which created problems. There was also a local calling area and calls made outside were long distance. One time we were traveling in Alabama and I called my son who was driving a truck in Utah. The thought of both traveling down the highway talking "blew my mind," for someone who thought a telephone should have a cord.

In 1989, Motorola came out with the MicroTAC and StarTAC (in 1996) starting the flip phone revolution. In time other manufactures produced a variety of cell phones.

With competition the monthly dialing plans varied from provider to provider. I stayed with AT&T, starting with a prepaid calling plan where I would soon run out of money to the flat rate I pay now with unlimited calls and texting. As the cell phones turned into mini-computers I had to start paying for data time. My wife still has a flip phone; this summer AT&T informed her she

could no longer use her 3G phone and sent her a free new phone capable of utilizing 5G service. It does everything an I-phone does except it does not have touchscreen making it hard to text.

On January 9, 2007, Apple CEO, Steve Jobs changed the world as we knew it with his announcement of the first-generation iPhone. This announcement made flip phones and digital cameras obsolete. By November 2018 more than 2.2 billion iPhones were sold worldwide. We could by then see the profound effect the iPhone was making world-wide, good or bad.

I kept my flip phone because I was too cheap to pay for an iPhone. A couple of years ago my daughter-in-law gave me her iPhone-7 because she had to upgrade to newer phone. Now I am so addicted to my iPhone I will probably pay whatever it costs for a new one if this one fails. Calling my iPhone a cell phone is a grave mis-nomenclature; the phone part is the least thing I use it for. I call it my "personal assistant".

The phone my sister has (she's six)

The phone I had when I was six

AMM

It has been over 60 years since I started my telephone career stringing wire all over Western Kansas to get everyone off an 8-party line onto a 4-party line. Now they are stringing a small black fiber cable down my alley which will in time replace the old lead cable up there. The fiber cable will have nothing to do with telephones, I am sure. What will the next 60 years bring? Maybe satellites and chips in our head will be all we need.

I have another theory on how the iPhone has changed our lifestyle. I live close to Starbucks and there is usually a long line waiting to get their "sugar kick." After observing the customers, I really believe they are willing to sit in line just so they can keep up on all their social media stuff and not feel guilty!!

Who remembers?

WAITING TO CALL LONG DISTANCE AFTER 7PM BECAUSE IT WAS CHEAPER

Express Systems
By Peter Amstein

THG recently received a question from a gentleman whose grandmother was a telephone operator in Seattle from 1895 to 1899. This was not quite at the very beginning of telephone service in Seattle, but it was certainly still in the early days (service began in 1883). His query led us to the Autumn and Winter 2007 editions of the THG newsletter. As it happens, these issues contained a history of telephone service in Seattle (up to 1935) using information from an old rate case filing. That filing says an "Express system" was installed in Seattle's Main office between 1896 and 1898. So possibly Rosa Evans, our correspondent's grandmother, was one of the operators who worked with that system.

But what exactly was an Express system? We were curious and did some research. The 1880s and 1890s saw a great deal of experimentation and development work on the very large manual switchboards needed for big cities. Express was developed by John I. Sabin (president of the Pacific Telephone Company) and an associate as an alternative to the multiple switchboard which was coming into use in large cities. Express was first used in San Francisco and later adopted in Seattle and Chicago and possibly in other west-coast cities as well. The Express equipment was manufactured in Oakland, California.

To understand the Express system, we need to contrast it with the multiple switchboard. The motivation for the multiple board was to find a more efficient way to handle call traffic in large exchanges with many thousands of subscribers. Before the use of multiple boards, one telephone operator could handle about 100 customers. If the calling and called party both happened to be in the same block of 100 subscribers on her board then a single operator could connect the call. But if subscriber number 89, for example, wanted to speak with subscriber number 217, then the first operator would have to pass the call over a trunk line to a second operator's switchboard for completion, and somehow communicate the wanted number to the second operator. In the early days it was done by shouting across the room, which was error prone, slowed down the process, was chaotic, and required more labor.

The multiple board addressed this problem by providing 100 jacks with annunciators at each switchboard as before but adding as many as 6,000 closely spaced jacks above that for outgoing connections only. Thus, operators could complete a call from any one of the 100 incoming subscriber lines they were responsible for to any of several thousand other subscribers in the exchange. There was one additional step – the operator had to check the called party's line to see if it was busy before completing the connection. This is because the same thousands of outgoing subscriber lines appeared on every switchboard in that exchange, so another operator might have already connected a call to the desired line. Operators did this check by pressing the tip of their cord plug to the outermost section (or sleeve) of the called party's jack. If there was a sharp click in their headset, the line was busy; the operator would ask the caller to try again later.

J.J. Carty, who eventually became AT&T's chief engineer, declared of the multiple board in 1884 that "in my judgment I consider the switchboard problem solved."[1] Apparently Sabin did

[1] Convention minutes, National Telephone Exchange Association, Philadelphia, September 16 and 17, 1884. Bell Labs Archives

not agree. The multiple switchboard was not without its own problems. It greatly increased the cost and complexity of the jacks and wiring in a central office. And there was an even more obvious physical limitation; no more than 6,000 jacks would fit into a switchboard and still have them all within an operator's reach. This meant that for very large exchanges, operators still had to pass the call to a second operator.

Sabin decided to go in the opposite direction in San Francisco. He embraced the idea that more than one operator would be needed to complete a call but believed that this would not be a problem if the process was efficient enough. We found an exceedingly detailed (and turgidly written) description of the Express system in *The Electrical Journal* (volume 1 issue 1, July 1895).[2] The system turns out to be quite interesting; operators worked in innovative ways with system features far ahead of the times.

The Express system had two operator positions: A boards and B boards. The A and B operators had different tasks. A and B boards were interconnected by both "local trunk" lines and separate lines called "order wires" (used for direct communication between A and B operators). B boards had 100 subscriber line jacks with associated annunciators to indicate when a line went off hook. A boards had only jacks and plugs for the local trunks. When a call came in the B operator would immediately connect the caller to an A board via one of the local trunk lines and without speaking to the subscriber. In fact, B operators had no way of ever speaking to or listening to subscribers because their operator headsets were permanently connected to the order wires.

Only A operators spoke with subscribers. On seeing a call come in from a B board they would use a key to connect their headset to the incoming local trunk and ask for "number please." After getting the number, the A board operator would use a different key to connect (using the order wire) to the appropriate B board operator to relay the wanted number. The B operator would respond with an available local trunk line number for the call by saying, for example, "on three." Then they both inserted plugs into jacks in order to complete the connection at their board, with the B operator responsible for ringing the called telephone.

Thus, every completed call was handled by three separate operators, B → A → B. But those operators were able to work quickly and efficiently – so much so that in principle, no more labor was needed than with the multiple-board system. The Express setup, as installed in San Francisco, had an intermediate board which allowed the chief operator to allocate local trunk lines to more (or fewer) A boards depending on time of day. It seems this provision was not used in subsequent installations.

The system had another feature which was surprisingly advanced for 1894–it used pre-recorded announcements. Since B operators had no way to speak to the caller, if there was no answer from the called party, the B operator would connect the incoming local trunk line from the calling party to a special jack which continuously played the recorded announcement "Subscriber called did not reply." Every B board had an appearance of this special jack. The recorded voice was supplied by a "standard office phonograph" which was connected to a telephone transmitter via a flexible rubber hose. A second phonograph played the recording "Busy, call again" for use by the A operators, who could connect a caller to that recording when the B operator verified (using the order wire) that the wanted number was already in use.

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[2] https://archive.org/details/journalof131895461897paci/page/n7/mode/2up
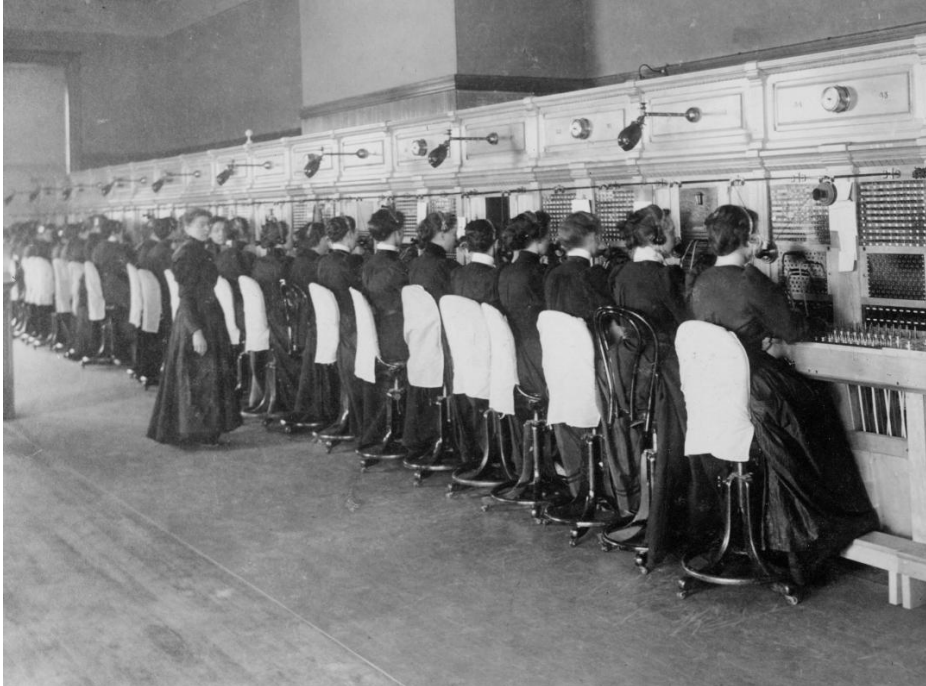
The Express System at Seattle Main in 1898. The rightmost operator is working at a "B" board. The operator to her left is at an "A" board. (THG photo archives)

One more nice feature of the Express system was that it allowed for "sub-offices" containing only B boards. All the A boards were in the main exchange. In 1895, San Francisco had sub-offices known as Drumm, Front, and Grant. The sub-offices allowed a large number of subscriber lines in a specific neighborhood to be aggregated onto a smaller number of trunk lines to the main office.

It's important to note that the Express system was the first telephone system to use a signal from the subscriber's switch hook to tell the operator that a call was coming in or that one had ended. Additionally, the subscriber sets did not need to have hand-cranked magnetos as the electrical power for this signaling system came from a set of large storage batteries in the main exchange building. However, the power to carry the voice signals (talk battery) was still supplied from a local battery in each telephone. In this way, the Express system was only a short step away from the later (and more cost-effective) *common battery* system where the central office supplies both talk battery and ringing current for the telephone subscriber (which eliminated the expense and effort of sending a battery wagon to replace the batteries in subscriber's telephones).

Our office records indicate that the original Express system at Seattle's Main exchange was replaced by a "common-battery multiple express system" in 1902. That was a system that combined ideas from both the multiple board system and the Express system. It used A board operators answering the calls directly and B board operators completing them at large boards with up to 9,000 outgoing lines. This combination system was upgraded to a Western Electric No. 1 type switchboard in 1908 and then finally cut over to panel (dial) equipment in 1924.

Mabel Bell

Mabel Hubbard was born into a rich, well-connected Massachusetts family. Her life and destiny were profoundly affected by deafness caused by scarlet fever at age five. It was the prevailing opinion in the United States that children who became deaf in their early years could not retain the ability to speak; signing was thus considered the best means of communication. To prevent Mabel from becoming mute, her mother found tutors who could teach her to lip-read and reinforce her speech, so that much of the time her highly intelligent daughter was educated among hearing children.

It was as a teacher of speech and the deaf that Alexander Graham Bell met Mabel Hubbard. One year out from Scotland, he had left Canada for Boston in 1871 to give a series of talks and he quickly became admired for his teaching techniques. He opened a school, lectured at Boston University's School of Oratory, and worked on inventions. "I both did and did not like him," Mabel wrote in her journal after her teacher Mary True brought her to meet him in 1873 to see if he could improve her articulation. Her sentiments quickly became more positive; engaged in 1875, they married two years later, the telephone by then a reality. On the back of a family picture of Mabel are the words "The girl for whom the telephone was invented." The couple's touching and lively letters bear witness to a lifetime of loving companionship.

It was on Cape Breton Island, N.S., where much of Bell's work after the telephone was accomplished, that the slender, gentle New Englander left her own legacy.

Bell's involvement in his work often set him apart. On occasion Mabel complained of "that work of yours of which I am so proud and yet so jealous," but she was tolerant of all his eccentricities and solitary habits. With his eyesight failing, he also needed assistance. When his work with large kites led to thoughts of powered flight, Mabel encouraged him and four young

collaborators to set up a formal organization in 1907. She financed the group as the Aerial Experiment Association with $35,000 of her own money, thus becoming the North American aviation industry's first backer. Independently wealthy, she had been further enriched at the time of her marriage when Bell turned over to her all but ten shares in the Bell Telephone Company. Mabel managed all the family's expenses.

In Baddeck Mabel participated vigorously in the community's life. The Bells brought new ideas and legitimized them by their personal involvement. Perhaps Mabel's favorite project was the establishment in 1891 of the Young Ladies Club of Baddeck, one of the first Canadian women's clubs. Founded "to stimulate knowledge and promote sociability," it drew inspiration from a similar type of club she had attended in Washington. A. G. Bell drew up its constitution and it continues to this day as the Bell Club.
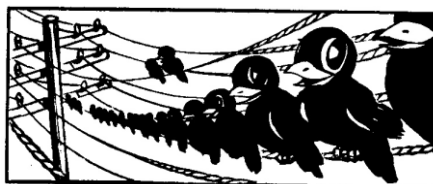
Since there was only one public library in Nova Scotia, in Halifax, they raised money to subscribe to newspapers and magazines. With George Kennan, a Washington friend and journalist who also summered in Baddeck, Mabel rallied support for a library. It became a reality when she bought a former Methodist church, named it Gertrude Hall after her mother, and donated it to the community.
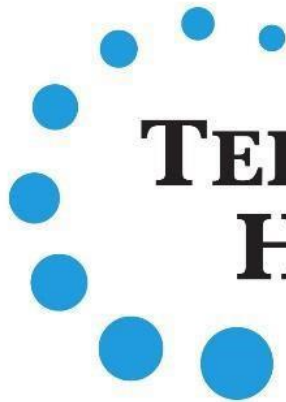
The Young Ladies Club also played a role in the development of a national home and school association. On 18 Dec. 1895, after Bell's talk to the club on the parents' organizations he had encouraged at American schools for the deaf, a group of interested women met at Baddeck Academy and formed a parents' association, the first in Canada.

In the 1890s Mabel's interests also encompassed handicrafts. Picking up on ideas made popular by the English arts and crafts movement, she tried to introduce better techniques and materials so that home crafts could generate significant income for rural women. Baddeck recognized Mabel's contributions, and tradition has it that sometime in the 1890s, though women did not have the franchise, the town gave her the right to vote in local elections. (History does not relate whether it was exercised.)

Gardens were a lifelong interest for Mabel Bell. Older people remembered that on her walks through Baddeck she would lean over fences, look, and chat about what was growing. She oversaw the development of magnificent gardens at Beinn Bhreagh. After Daisy's marriage in 1905 to David Grandison Fairchild, the plant explorer for the United States Department of Agriculture who helped develop the Florida citrus industry, Mabel often grew unusual foreign plants. One was the edible udo, of Japanese origin, which had been thought to have potential as a cash crop. Her delight with the outdoors extended as well to her participation in experiments at Beinn Bhreagh, to boating, camping and excursions.

"Mother always did her own thinking," Daisy recalled in a letter to the Bell Club some years after Mabel's death, "and it is interesting . . . to realize what a completely original individual she was. I don't think it was just because her deafness saved her from the endless objections and criticisms that so many of us hear when we have a new idea to put over. She just knew what she thought would be fun or interesting or worthwhile to do and then tried to do it." Mabel Bell died of cancer at Daisy's home near Washington on 3 Jan. 1923, six months after her husband's passing, and is buried next to him on top of Beinn Bhreagh.