## A Message from Our Director

Summer is here, and a beautiful start it is. The mask mandates here have been greatly reduced. Many businesses have signs saying only that masks are recommended to those who have not been fully vaccinated. Businesses and restaurants are opening, and vehicle traffic is growing.

Most of our volunteers have returned to the office. They were greatly missed. We are thrilled to have them back. It feels great to be getting back to the "new normal."

Our Seattle museum is getting ready to open for tours in July. They are working hard on getting everything cleaned up and working. And their volunteers are raring to go.

It doesn't look like we will be giving tours at the Bell Palace till late July or August. There are still very few employees working in the building.

Congratulations to Mitchell Davis who won THG's special award for the best National History Day in Colorado project about telecommunications. His web site, "The BBC: Hope and Truth on the Airwaves of Occupied Europe," can be viewed at https://site.nhd.org/48516197

SOMEBODY ON THE WIRE.
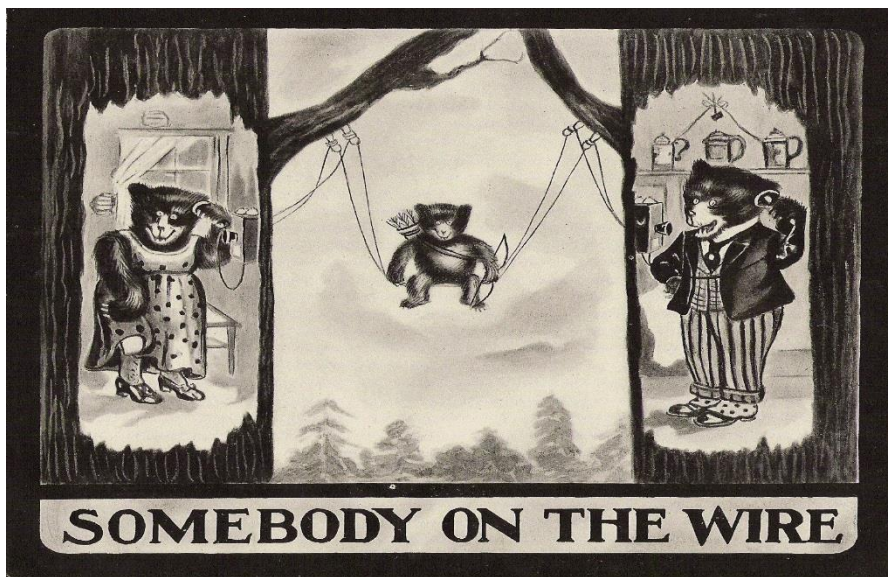
We hope you all are living the dream. Enjoy your summer.

Renne Lang
Acting Executive Director

THG's 2021 Challenge Grant

For the last two years one of THG's supporters has offered to double our member's contributions if they are made by August 15. Because this has been so successful both years, they have agreed to do it again. We are thrilled that so many *Connections News* readers responded so generously the last two times.

THG remains a volunteer-driven organization. Most of our mission is accomplished by the efforts of volunteers, but we do have some essential expenses that must be covered. Due to the closures, we had very little revenue from museum tours in 2020, and since we are only able to open the Seattle museum this summer, we can expect perhaps half of the usual income from that source this year. But our members really came through for us in 2020 despite the pandemic, and we were able to stay within budget for the year.

Now, in 2021 we look forward to things getting back to normal and we are counting on your support again.

Here's how it works: every donation you make between now and August 15, 2021 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 2021—and our challenge-grant donor will match your total contribution (including the amount applied to your renewal).

You may use the enclosed envelope to send a check, or you may make your donation online at http://www.telcomhistory.org/challenge/

The board of directors, the staff, and the volunteers at THG all want to thank you in advance for your generous help!

This terrific photo from the THG Archives shows a time when a crossbar switch (like the one in our museum) was brand new and just about to be put into service by a proud crew of technicians (circa 1963).

Seattle Museum Update

In July we expect to open Connections Museum Seattle after our long fifteen-month COVID shutdown. Fortuitously, our closure accelerated some significant upgrades to our exhibits. We don't have space here to describe all of them, but here are four significant projects we did. Our THG volunteers accomplished these tasks either remotely (at home) or at the museum (while wearing masks and maintaining appropriate social distance).

ANI System

When the first crossbar switching systems were designed in the 1930s, there wasn't any concern about automatic billing for long-distance, as all long-distance calls were operator-assisted. Telephone numbers of both the calling and called parties (and length of call) were noted by the operator for subsequent billing. But by the 1950s, that system could no longer meet the needs of ever-increasing long-distance traffic. This led to the development of Automatic Message Accounting (AMA). A key piece of AMA is what's known as Automatic Number Identification (ANI). In other words, the switch now had to identify (and track) not just the number being called but who was making the call; all this was necessary to ensure correct billing.

While the newer No. 5 crossbar system was designed with this need in mind from the beginning, the older No. 1 crossbar required backfitting to provide ANI after the fact. As the old saying goes, "thereby hangs a tale."

THG's No. 1 crossbar came into the museum 30 years ago with this added ANI circuitry included. Sadly, some of these circuits were damaged in transit and were no longer functional. As such, it was for many years a display-only exhibit. For three decades, the ANI frames sat broken and unloved . . . until this past year.

The special little printer at the top of this photo was used in some step-by-step officers to automatically print long-distance tickets. It spits out little slips of paper which were the same size and shape as the tickets used by long-distance operators. These specially printed tickets could go into the billing stream along with the common handwritten ones. Still, it was only a semi-automatic process; these tickets still required hand-

processing after they were printed. Later, when ANI was added to the No. 1 crossbar system, this same little printer was repurposed as a trouble information printer just for recording problems with the ANI circuitry. After 30 years of silence, this printer is finally working again in the Seattle Museum. It uses 2.5-inch paper tape, a width that is no longer made. But our volunteers have figured out how to cut wider rolls of paper to the appropriate size and how to revitalize the old ink roller. The resulting tickets will be a nice souvenir for future museum visitors.

In the photos, Sarah points to the relay cabinet below the printer that was severely damaged before it arrived at the museum in the 1980s. Many of these relays had to be replaced before the system would work once more.

It's worth noting that with this system, the actual long-distance calling records were not kept at the originating Central Office. Instead, the identified calling number was transmitted along with the called number to a toll office where the call would be completed and where details were punched onto paper tape. This system was called Centralized Automatic Message Accounting (CAMA).

Panel Switch Lighting Improvement

Another significant project was improved lighting for our historic panel switch. When panel offices were installed in the 1920s, fluorescent lighting did not yet exist. Later, industrial-style fixtures with the familiar four-foot cool-white fluorescent tubes became common in such

offices (including at our museum). Many of us found this lighting unpleasant, and it was certainly not appropriate to the period of our panel office.

We have now replaced all of that with warm-white LED spotlights. Of course, LED lighting is not really period-correct either, but it is energy-efficient and makes very little waste heat. And it provides illumination much more like the original incandescent lighting installed in panel offices.

One concession we did make was to install many more lights than would have been used in the 1920s. After all, we do need to provide good illumination for our museum visitors. Additionally, one row of our panel switch still has its original incandescent fixtures; this permits us to momentarily turn off the new LED lighting to let our visitors experience the surprisingly dim illumination that central office technicians once struggled with (particularly while working the night shift)

The Pre-translator

Another piece of equipment finally working again (after decades of sitting idle) is something called the pre-translator. It's part of our No. 5 crossbar switch. This is a device that examines the first three digits of each dialed number to determine if something special needs to happen. For example, calls to 411 for information (or 911 for an emergency) should go through immediately after those three digits are dialed. Other sets of three digits might be a local prefix or an area code, in which case the system needs to wait for an additional four or seven digits. Because our volunteers finally got the pre-translator working again, we can now demonstrate calls to special numbers (such as 411) for our museum visitors. Or better yet, they can try calling these numbers themselves!

The Trouble Recorder
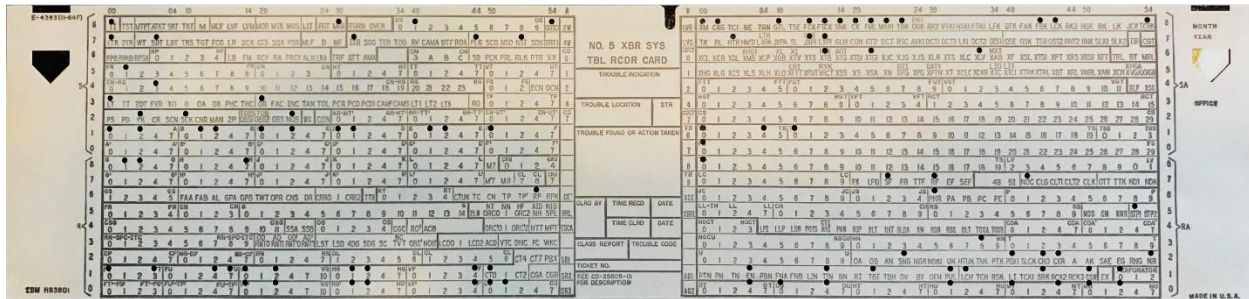
One of the many innovations of the No. 5 crossbar that we like to tell visitors about is the Trouble Recorder. This is a fiendishly complex mechanical card punch with a great many gears, cams, and levers. With this device, it was no longer necessary for Central Office technicians to rush to mark down information from a matrix of blinking lights. Instead, one could look at Trouble Cards. Each card revealed clues to understand what had gone wrong. It also made it easy to prioritize repairs and to determine which problems were happening more frequently than others.

Our trouble recorder had jammed many years ago and previous efforts to get it running had been frustratingly unsuccessful. We could show visitors some old cards but not the process of making one. More recently, with plenty of time and patience (and just as importantly, a new understanding of the subtleties of its mechanism), we got it running again. Not only that, our trouble recorder has already been the subject of some very popular videos on our YouTube channel; you can see these by searching for "The 5XB Trouble Recorder" at youtube.com.

To quote volunteer Sarah, "There's not a lot of room for mistakes when we work on it, because we don't have any more of these . . . and unfortunately we can no longer just call up Western Electric and ask them to send us replacement parts. But my experience with working on car engines, with all of their cams and moving parts, actually helped me to understand this machine."
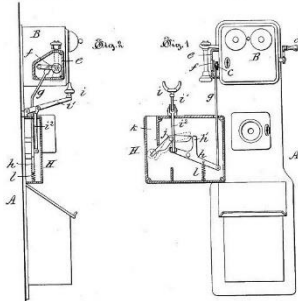
Conclusion

These are just four new things museum visitors will be able to see. We really look forward to once again sharing our passion for the history of telecommunications with our guests.

ME & PAYPHONES
by John Swartly

In my quest to keep my brain functioning and to find more information to write in my "Swartley's War stories" series I decided to research when payphones popped up.

By the 1880s, the telephone was a critical component of American infrastructure, but the man on the street looking to make a call had to locate one of the relatively rare agent-operated telephone pay stations and pay a fee to make a call. This could be a great inconvenience, as one William Gray would find out in 1888. The son of Scottish immigrants, Gray was a precision machinery polisher and amateur tinkerer in Hartford who was best known for designing an improved chest protector for baseball catchers that became the game's standard in the 1890s. As for the pay phone though, the story goes that Gray was inspired to create it when, depending on whom you ask, either his boss, his neighbor, or the workers at a nearby factory refused to let him use their phone to call a doctor for his ailing wife. Eventually, Gray found a phone and his wife recovered, but he was left with an idea: public telephones.

Gray's first prototype device involved a box that covered the mouth of the receiver and would slide away when a coin was deposited. However, it was rejected on the grounds that one coin could buy several phone calls and that if another station were called, the receiver would also have to pay -- obviously not an ideal solution. After a few more failed attempts, Gray found the surprisingly simple solution: a "coin-controlled apparatus" that used a small bell to signify the operator when a coin was deposited (US 408,709), and, a couple years later, a more elaborate "signal device for telephone pay stations" (US 454,470) In 1891, Gray set up the Gray Telephone Pay Station Company and began installing phones on posts and in cabinets across America. He continued to refine his creation, eventually racking up more than 20 patents related to the pay phone, including innovations related to toll apparatuses, coin holders, call registers and signaling devices. A hundred years later, there were more than 2 million pay phones installed in the United States.

The payphone concept started as far back as early as 1878. A business would install a telephone and assign an agent to collect the money or depend on the honor system. Some pay

stations utilized a fail-safe collection method: After making connections for the customer, the attendant would lock them in the booths so they could not leave before paying.

In 1910, Western Electric and Gray Telephone Pay Station Co, signed an agreement for Gray to manufacture coin collectors for the Bell System using both Gray and Western Electric patents.

The results of that agreement, the 50A coin collector, went into production in 1911. By the end of 1912, 25,000 of these coin telephones had been ordered for New York alone.

I found online a 1912 Gray Payphone catalog, and it was educational. William had designed several versions of his coin collector. There were units you could connect to any telephone and make a payphone out of it. The most common public payphone was the 50A that was coordinated with Western Electric. It was not until the late 60's that Western Electric started manufacturing the single coin "fortress" payphone.

All these models had to have a central office payphone telephone line. The line was "ring-ground-start." The central office sent a signal back to the payphone if the call were completed or not so the coin collector could either return or collect the money. On the early payphone toll calls the operator would break-in and tell the customer how much money to insert. Later computers accomplished the task, or we could enter the third-party number we wanted the call to be charged to. The single slot payphone put the stop to us telephone men opening the cover with our key to trip the coin collector to make our calls.

When I was working on the Boulder Campus, most of the payphones were the model like the one with the chicken on the coin box cover. There would be two or three payphones on each floor of the dorms. Each payphone had a 685 ringer/network installed just below the payphone. In some areas we had to install a cover the short wire that ran between the ringer and payphone because the kids learned to use a pin to start the dial tone on the ring-ground-start line. On outside public payphones we started to replace the older phones with the newer version of the 50A, that had a coin chute lever the customer had to pull down. People would "stuff' the open coin chutes with cotton and later remove the cotton and collect the money that was never returned to the caller. It was surprising how many people would walk out of the booth and not collect returned money. You could watch the "transits" go from booth to booth and check for change, I guess it was well worth their time.

In 1966, the FCC and Bell System decided the country was a lot safer with dial tone first, this allowed customers to dial 911 without needing a coin. I was working in Steamboat by the

time Mountain Bell started changing out all the payphones to dial tone first. By then dial tone first had the technology to control the collection or return of the money. The telephone line had to be changed to loop-start. This new requirement quickly did away with all the three-slot payphones. The older one slot payphone had the same backboard as the new dial-tone first ones and made for an easy change out.

While I was working in Steamboat, during hunting season, we would get "call-outs," to go repair payphones in Yampa or Oak Creek, a couple of hours drive from Steamboat. The coin boxes and slots would be full. To the dismay of many hunters all we could do was put an out-of-service on the payphone. Only the telephone office manager and the coin collectors had access to the coin boxes. It usually took a couple days before the hunters could call home again.

From day one we had been warned about the fact company security would "salt" some of the payphones with marked coins. So, after a repair call that resulted with coins stuck in the chute, these coins had better be in the coin box or the envelope supplied to return coins. I do not believe I had ever worked on a "salted" payphone, I was very careful to keep the coins separated from my own coins.

Soon after the divestiture, AT&T signed a contract with the Government to replace all Mountain Bell payphones. I was dispatched for a week to Colorado Springs to help change out the hundreds of payphones in all the government installations in the area. I spent a wonderful week replacing payphones at the Airforce Academy. The operation reminded me of my old storm break days on the line crew, they pulled in fellow employees from all over the state. Many of them I had worked with at some time in my career, and unlike the storm break days of working 10-12 hours, we had time to swap war stories after work. Again, these new payphones fit the old backboards and were easy to exchange. We would replace the payphone and place an out of service sticker on it until someone could come along and program it. The new payphone had an adapter the tech plugged into it to program it. The new AT&T payphones had the ability to calculate the cost of a call, and the billing rate changes could be controlled from the central office.

Like everything in the telephone world payphone booths evolved in time. The beautiful wooden booth was a work of art. My boss in Steamboat, let me take home one of the wooden booths. As I dissembled it, I was amazed at the beautiful maple wood and it had three layers. I made shelves and other projects out of the wood. Maybe I should have kept it, I see on e-bay they are selling for over 5,000 dollars. While working in Boulder the so called "hippies," would use the new aluminum booths for out-houses and to sleep in. No, we did not have clean them,

the company contracted a private company to do that dirty work. This is one reason the aluminum booths were soon replaced with hanging booths.

The Telluride Ski Corp wanted a European atmosphere, so they ordered in many of the British booths. The company sandblasted and painted them before I came along and installed PBX telephones in some of them, Mountain Bell installed payphones in the others.

After I started my own business, a friend in Telluride operated a place where young people hung out. He asked me how he could get a payphone for the kids to use so they did not use his business telephone all the time. I decided to get into the payphone business. I ordered this weird payphone and installed a business line in his business. It was an interesting piece of equipment; it would only take quarters and make collect long-distance calls. In a short time, and very few quarters later I realized this new project was not going to work. After walking into the business and observing the attendant allowing a young kid to use their business phone, I

cannot remember what I did with payphone for sure, I believe I sold it on E-Bay. My payphone experience was expensive and very short lived. My former working partner had built up a route of 25 payphones after he started his own telephone company, now thanks to the changing technology, they are setting on his shop bench. If anyone needs a smart payphone, I can put you in touch with him.

In 1978 Western Electric made, charge-a-call, payphones for the operating companies. They were very inexpensive, and the customers could only make credit card and collect calls. They did not go over very well and were discontinued after the divestiture in 1984.

One of my worst experiences with payphones was the first time I left Montrose after I started my own telephone company to visit my Mom in Kansas. I would stop at quick shops along the way calling my answering machines that required billing the call to my business number. Some of the payphones were still rotary dials, then I would have to repeat the process to call someone to make arraignments to solve whatever problem. I knew coverage was not going to work, so I worked out an arrangement with one of my friendly competitors. We would cover each other when needed, knowing we would not try to steal each other's customers, this arrangement worked for both of us.

As I reminisce back while writing my "war stories," and see all the vacant payphone locations, I put it in the same category as my dead collectable telephones because I no longer have a landline, technology changes everything in time.

Again, I want to thank the *Telecommunications History Group* for publishing my "war stories." Not only do I enjoy reliving part of my career, but I also usually learn a lot about my subject, and I am able to share my newfound knowledge.

My Years at Mountain Bell (continued)
By Kenneth E. Pratt June 2005

As promised, here is more of Ken's story:

Ed Hunter was the Appraisal Engineer for the company. He was involved in appraisals for rate cases with the various state commissions, and for purchases and sales of telephone plant. In addition, he prepared broad gauge unit costs used by outside plant engineers throughout the company for estimating the costs of new construction.

The field of Operations Research (OR) was new to the telephone system and AT&T was eager to get some people trained on it. Bob Kelly and Jim Belt in our Statistical Department had taken a course on it and were to administer a correspondence course in our company. John King and Bill Davis from Denver, one man in Arizona, and I signed up for it. It was called the Bell System Correspondence Course in Operations Research Techniques, BSCCORT for short. It was difficult and time consuming but, by the three of us here in Denver sharing what we learned, we all got through it. I bugged Jim Belt for years for not giving us a fancy diploma for the completion of the course.

Our company conducted a financial class on telephone company operations for first and second level managers. I was chosen to be one of the four leaders that worked with it. The students in the class were divided into three groups and each group would operate their own telephone company, having to take care of the normal problems and the unexpected ones that the leaders would create. It was a busy week but very interesting, educational, and rewarding. I received comments from the students for years.

Bell Telephone Laboratories was conducting an eighteen-month course called Operating Engineers Training Program, OETP for short. The course was held at the Labs in New Jersey and two persons from each company were permitted to attend each session. Fran Marick from Helena and I were chosen to be the engineers from Mountain Bell to attend the session starting in January of 1961.

The next I heard was when Jim Heckman, who was Vice President of Revenue Requirements and had been our General Manager in Idaho, called and offered me a District Manager Job to head up our small Operations Research group. I quickly accepted the assignment.

I had a staff of two to start with on the Operations Research job. Rosie Elliot was involved with a market research project at Greeley and John King, who had taken the BSCCORT course with me, was involved in learning the Program Evaluate and Review Technique (PERT) scheduling system. PERT had been developed by the Navy and had been used in the development of the Polaris submarine and its missile system. It had been credited with saving much time in that process. The North American Air Defense Command had set up headquarters in Colorado Springs and the engineering was underway to place their operation in Cheyenne Mountain. The government was using PERT for scheduling the design and construction and required that all subcontractors use it also. John was the PERT man for Mountain Bell for our telephone installation and also for AT&T since they had no one knowledgeable in PERT. He became the Bell System expert on the PERT system and later transferred to the Bell Laboratories and worked there the rest of his career.

In 1964 I lucked out and got to attend a nine week "Program for Executives" at

Carnegie Tech in Pittsburgh. One of the specialties in the program that year was Operations Research. It was an excellent program. I got more operations research and much further background into management in general. Their graduate school of industrial management conducted the program and the twenty students were from various industries throughout the United States and one from Mexico.

The company did not seem to be sure where our OR group should be structured in the company. We started in Revenue Requirements, then spent some time in Data Systems and then to Accounting Department in their Statistical Department. While in Data Systems I inherited a group working on computerizing the construction program and while in the Statistical Department I took over some of their statisticians, including Bob Kelley and Jim Belt who had administered the BSCCORT for us. I still bugged Jim for not giving us diplomas!

In 1967 Ed Hunter retired. I was asked to take his job. I was given a unique charge with it -- to work myself out of the job. One of the first things I got into was the sale of the Teletypewriter Exchange service (TWX) to Western Union. This sale was made by AT&T, then our parent company. The sale involved the teletype sets and certain central office equipment that was unique to TWX system. I ended up being the coordinator for our company.

I first made a little computer program for computing and printing the broad-gauge unit costs. This was my first computer program and was written in Fortran. (A man from McDonnell Automation helped me with it.) With the computer program we could easily tailor make them for each state. The states liked that, and the Outside Plant Engineering staff group was eager to take on the responsibility. Rate case activity was quiet then and the Depreciation Engineers accepted the responsibilities in purchases and sales. About that time the AT&T Personnel Department developed a Management Job Evaluation System (MJE) and Mountain Bell was quite involved in the trial of it. Our Personnel Department put together a small group to use it and I became the Engineering representative.

In the early 1970s the manager in Personnel who had headed MJE was transferred to New York and I was offered the job of running the MJE system for Mountain Bell. The decision had been made to use the system to evaluate all first through fifth level management jobs in our company. This amounted to something over 10,000 jobs. I acquired a small group of employees and some 50 to 60 from the states and other general staff departments were assigned to work on MJE, some on a part time basis. A committee of fifth level managers was assigned to oversee our project.

As MJE was implemented the maintenance of the system became significant. Jobs kept changing and there was always pressure to combine smaller management jobs. We had to develop a system to manage MJE on an ongoing basis.

What an amazing career! Stay tuned for the rest of Ken's story in the Autumn edition of Connections News. Until then, stay safe and have a wonderful summer!

TELECOMMUNICATIONS HISTORY GROUP