

Ham Radio and the Pony Express



Providing communication in remote areas.

The Pony Express provided mail service between Sacramento, California, and St. Joseph, Missouri, using relays of horse-mounted riders from 3 April 1860 to October 1861. The route, shown in Figure 1, was roughly 1,966 mi (3,164 km) long, through country inhabited mainly by Native Americans with a few scattered white settlements in the western United States. The Pony Express is reenacted annually, with riders galloping day and night to carry the mail across the country. Ham radio operators provide emergency communication for this event across the remotest sections of the route, using a variety of base and repeater stations,

handheld and vehicle-supported radios; ultrahigh frequency (UHF), very HF (VHF), and HF bands; and an array of deployed antennas, described in this article.

INTRODUCTION

The Pony Express crossed both the rugged Rocky Mountains and the Sierra Nevada range, through two states (Missouri and California) and six territories (Kansas, Nebraska, Colorado, Wyoming, Utah, and Nevada). Running day and night, in all weather, riders galloped from 5 to 20 mi (80 to 320 km), depending upon the terrain, between stations, swapped to a fresh horse in 2 min or less, and continued on to the next station, covering a total of 100 mi (1,600 km) before switching riders. All the same, this 10-day transcontinental

delivery time was a breakthrough in communication speed, cutting the time required for mail delivery by stagecoach (21 days) in half. This feat required 80 riders, more than 400 horses, 184 stations, and several hundred support personnel. In a whirlwind delivery, the Pony Express brought news of President Abraham Lincoln's election to the West Coast in a record-setting seven days and 17 h.

The riders were often teenage boys. A famous advertisement allegedly read, "Wanted: Young, skinny, wiry fellows not over eighteen. Must be expert riders, willing to risk death daily. Orphans preferred." However, the ad has never been found, and many historians question its veracity. "Buffalo" Bill Cody claimed to have been a Pony Express rider, and he later glamorized the Pony Express in his "Buffalo Bill's Wild West Show," capturing imaginations and turning its young riders into national heroes. The horses were outfitted with special lightweight saddles, and the mail was carried in a leather mail bag, called a *mochila*—four locked pouches, called *canteens*, attached to a leather saddle cover that fit over the saddle, held in place by the weight of the rider sitting on it. When the rider would pull up to a station, he would exchange the *mochila* from his tired horse to a fresh mount, swing up, and gallop off.

The Pony Express was never intended to be long term nor the only system of delivery. Mail was still carried overland in wagons and stagecoaches. Ponies carried only express mail, at US\$5 a half ounce (14 g), the equivalent of more than US\$140 today. The transcontinental telegraph, already well on its way to linking the frontier when the Pony Express began operating, merely sealed the doom of the operation, which was already collapsing due to conflicts with Native Americans, harsh winter conditions, and financial mismanagement. The riders of the Pony Express made a last gallop across the country in November 1861, soon to be replaced by the transcontinental telegraph, depicted in Figure 2.

But the romance of the Pony Express never really faded away. In 1923 a Re-Ride, from St. Joseph to Sacramento (not necessarily following the original Pony Express trail), was kicked off by a signal from President Calvin Coolidge. In 1935, 300 Boy Scouts carried the mail from west to east, following the original trail. In 1960, for the Pony Express Centennial, the mail was carried simultaneously both east and west. Following this ride, the National Pony Express Association (NPEA) was organized, and a Re-Ride of the famous journey between St. Joseph, Missouri, and Sacramento, California, has been an annual event since 1985. Each state organizes mounted relay teams, with rides between 2 and 10 mi (3.2 and 16 km) each, before passing off the *mochila* to the next rider. Riders are sworn in as temporary mail carriers taking the same oath as the original riders, and the 50-lb (23-kg) *mochila* contains actual U.S. mail [souvenir letters from the Pony Express, which cost US\$5 (the same as in 1860) to send].

The Pony Express originally ran through a remote frontier, typically following stagecoach routes with vast empty expanses between small urban areas. Stage stations served as home bases where riders

stopped, and smaller stations between them provided places just to exchange horses. Today, much of the trail remains remote and rugged with majestic mountains to scale, primitive roads to follow, long distances between water, and miles and miles of nothing but miles. Imagine galloping a strong horse under a full moon through a remote desert where it can be 40 mi (64 km) or more to a telephone, 125 mi (200 km) between gas stations, and the only traffic consists of wild mustangs, antelope, and coyote. Often, the only domestic thing that is seen is a range cow.

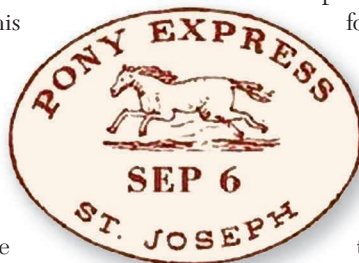
With no cell phone coverage and long distances without access to emergency care, amateur radio (ham) operators provide tactical and emergency communications for various events in these areas, such as races, bike events, and the Pony Express Re-Ride. In Utah and parts of California, they follow in a truck behind the riders, as seen in Figure 3. In Nevada and most of California, they are posted along the trail. Either way, they provide information on the location of the pony and rider and are there in case of an emergency. Figure 1 shows a map of the ham radio support (marked by blue dots) along the trail, as well as the locations of repeater stations, and so on used along the way.

Ham reports, plus a satellite tracker in the locked mail pouch, track the *mochila* as it traverses the country. The tracking is updated continuously on the NPEA website and is followed by people all over the world [1]. This helps riders to saddle up and be ready when the mail is coming, and reports the locations of rider exchanges for people who want to see and cheer on the riders as they come through. Their reports from the trail are uploaded to the NPEA website. But the most important communication the ham operators can provide is for emergency assistance—injuries, medical issues, runaway horses, flat tires and truck problems, lost riders, and so on.

This article is about the details of the ham radio support for the Pony Express Re-Ride and the challenges of providing communication for long distances in remote areas with rugged mountains and deserts, through quite literally rain, hail, sleet, snow, mud, and the dark of night. The trail and terrain through each state are a little different, requiring different ham radio support, as described next.

CALIFORNIA HAM SUPPORT

California hams cover the whole stretch of the Re-Ride from Old Sacramento, California, to the Nevada border or close to it. There are 43 exchanges (covering 143 mi in 23 h), 42 of which are accessible for ham coverage to report to net



control the rider in/out times. Ham support is particularly necessary in the High Sierra mountains, where cell phone coverage is spotty. There are two different trails used for the Re-Ride, depending on if the ride is from east-to-west (when the mochila and amateur reporting are handed off to Nevada Express and the Sierra Intermountain Emergency

Radio Association (SIERA) hams at Woodfords, California) or west-to-east (when they pick up the mochila from Nevada at the border in South Lake Tahoe). The terrain varies from the high Sierras where the rider and the hams are far from the road to the great Sacramento Valley and Old Sacramento with traffic and potentially irritated motorists, annoyed for

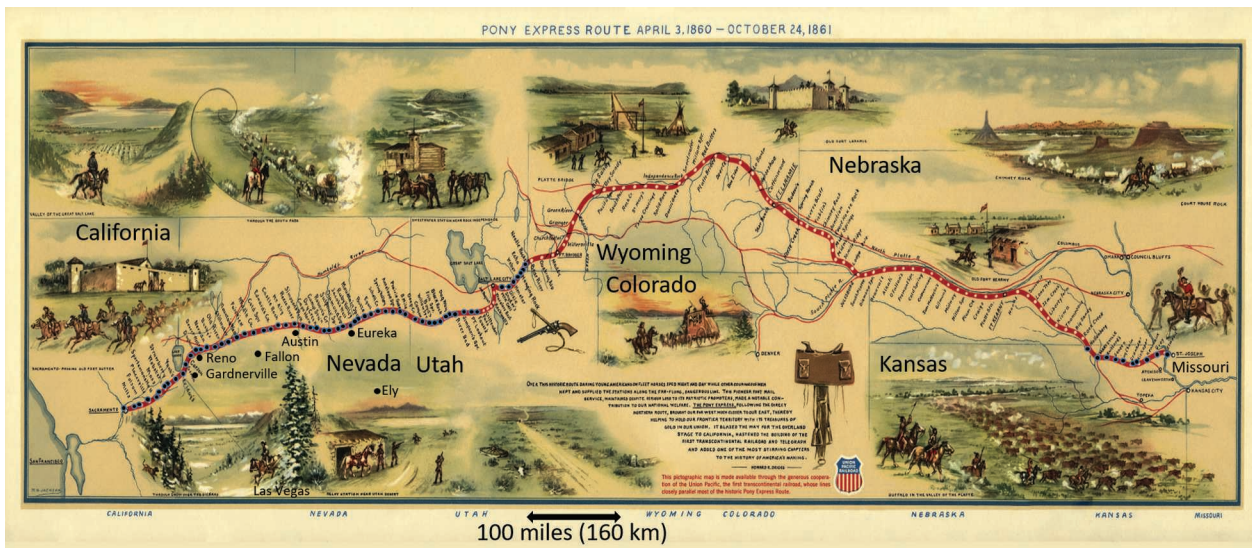


FIGURE 1. The Pony Express (1860–1861) carried the mail between St. Joseph, Missouri, and Sacramento, California, about 1,900 mi (3,100 km) in 10 days, running day and night in all weather. The annual Pony Express Re-Ride closely follows most of the original routes. Some areas are as remote as they were in the mid-19th century. Blue dots indicate portions of the Re-Ride through Utah and Nevada supported by ham operators. (Source: Wikipedia; courtesy of the Library of Congress.)



FIGURE 2. The romance of the Pony Express, of a young rider galloping headlong across the desert, continues to capture imaginations to this day. Wire-line communication—the telegraph—brought a quick end to the Pony Express. (Source: The Utah Historical Society; courtesy of the Library of Congress.)

any delay in their travel. In these urban areas, the ham pick-up truck travels close behind the horse and rider, protecting them from cars.

California has 23 h to get the mail through the state, with ham coverage all the way. Two net controllers split the shift, and an operation officer manages the whole route, with two ride captain ham shadows who stay with the captain and relay information that is pertinent to the smooth operation of the ride. There is also a shadow following the ride lieutenants. The exchanges are usually 5 mi (8 km) apart. Usually, there are 20 hams taking part in the Re-Ride, leapfrogging from one place to the other.

Repeater 146.805 in Pollock Pines, California, covers 95% of the trail. The other 5% is covered by linking into the SIERA's repeater in Minden, California. Although there are areas where cell phone communication is readily available, the repeater is used for the whole trip, so all the information goes through the net control and keeps the hams on the route in the link as to what is happening. Unlike their peers in other states, the hams do not follow the pony, especially in the Sierras, because a jeep cannot get through.

NEVADA HAM SUPPORT

Amateur radio is a hobby that encompasses many different interests. Some like contests, using low power, or building equipment. Others like serving their communities by providing public service communications support, and the Pony Express ham radio support is only one example of such an activity. The SIERA solicits volunteers to help with the NPEA Pony Express Re-Ride each year, and ham radio operators throughout the state of Nevada step up to provide communication support for this annual event.

In Nevada, ham support is provided for the entire Re-Ride from east to west. Throughout the route, cell phone coverage is sparse. Nevada is one of the longest remote stretches in the Pony Express Re-Ride. Ham operators provide communication support from repeaters on mountain summits to areas that are flat, harsh desert. Stations can be sweltering during the day and icy cold, and it can sometimes snow at night. Jeff (K7BCV) and Sue (KI7CTT) Cauhape spent the first 15 years on Overlook Pass West (see Figure 4), north of Eureka, Nevada, where they strung out an 80-m (covering 3.5–4 MHz, roughly 130 ft long) antenna up the hillside and also hoisted a mast for a 40-m (covering 7–7.3 MHz, about 65-ft-long) antenna. Huddling over VHF and HF radios powered by a deep-cycle battery in the back of a Jeep, they helped cover the state. Now, they use a mobile antenna system that was made by MFJ. It consists of two pairs of verticals that can be mounted on the back bumper of the Jeep on separate 12-ft (3.6-m) masts to form dipoles. In addition to providing communication support, they also shelter the riders as they wait, often hours, for the mail (Figure 5).

Austin, Nevada, is a very small community located near the center of the state on U.S. Route 50 close to the path that the original Pony Express riders used. The 2010 Census listed the population of Austin as 192. Nearby, the Austin Summit is about 8,500 ft (2,600 m) above sea level and has a view of a major part



FIGURE 3. Utah ham operators in the Rover follow rider Cindy Furse on her horse, Tesla, through Utah's West Desert. Note the leather mochila mail pouches (carrying a GPS transponder locked in with the mail) on either side of the horse and the antennas protruding from either side of the Rover. (Source: Jamie Marvadakis; used with permission.)



FIGURE 4. Ham radio support on Overlook Pass West includes dipole antennas, VHF and HF radio links, and shelter from the weather. (Source: Sue Cauhape; used with permission.)



FIGURE 5. In wet and soggy years, ham stations sometimes also provide shelter from the weather for both ham operators and Pony Express riders. The horse, Patriot Commander, is making it clear he'd like to come all of the way into the tiny tent. (Source: Sue Cauhape; used with permission.)

of the state. The dirt forest road from Route 50 to the summit is poorly maintained and difficult to climb. In 2018, Bob Nelson made it to the summit in a pickup truck pulling a small utility trailer (shown in Figure 6) and set up communications with the mobile operators who track the progress of the Pony Express riders both along the roads that are used and at checkpoints in areas where the riders are cross-country. As can be seen in Figure 6, he set up two tall poles with dual-band J-pole antennas, one set on the VHF simplex frequency (146.55 MHz) to communicate with the mobile and checkpoint operators and one set to communicate with the repeater (KC5ARS) near Fallon, Nevada (147.345 MHz) to reach the base stations, which were all in the Reno to Gardnerville, Nevada, area. That repeater was 117 mi (188 km) away, and the operators were somewhat surprised at how good the signal was in both directions throughout the two-and-a-half days of the Nevada Pony Express transit. Dipole antennas on two HF frequencies (3.965 and 7.230 MHz) were set up as a backup but were not used. The Pony Express runs 24/7, and the ham support does as well. Originally expecting to support only a 4-h shift near the Austin transit, the unexpectedly good coverage led Nelson to work a full 18 h without a break, as the Pony ran across the state.

Nelson's station is made up of equipment that is built into a camper shell on the back of a pickup truck (shown in Figure 6) and a linear amplifier that is stationed at his home. In the camper are 15 two-way radios, several modems, two laptop computers, and three 50-Ah, 12-V batteries. Everything in the truck runs on 12 V of dc, except the air conditioner. The utility trailer contains all the camping gear and two small Honda generators. The radios are mostly commercial Motorola radios and cover the 1.8–900-MHz radio bands. Nelson operates four HF radios with three of them in the truck and one in a very-low-noise area just at the north end of Las Vegas. He operates this from wherever he is using an Internet device to link the control head to the radio. The camper was custom built for Nelson by Alaskan Campers of Winlock, Washington. The top rises and lowers using a hydraulic system so that when up, as in the photos, it has a full 6-ft-tall



FIGURE 6. This photo shows the 2018 setup at the peak of the Austin Summit. There are two dipoles off to the right of the photo, and the 19-ft whip on the camper shell was used for various HFs through an autotuner.

interior, but when lowered, it is slightly above the pickup cab, which makes driving much easier.

After the communication success in 2018, Nelson and three other operators [Frank Kostelac (N7ZEV), Linda Kostelac (KC7IIT), and Keith Gordon (K7KSG)] planned to support communication from Austin Summit, sharing the workload in shifts over the two-and-a-half days that the Pony Express was crossing Nevada. About a week before the event, they were told that the road to the summit was so bad the maintenance crews for the microwave relay station on the summit were still using a tracked snowcat to get to the top. Kostelac came up with the idea of building a cross-band repeater that would operate on solar power with batteries for nighttime, and he proposed using his Jeep, outfitted for off-road work, with which he was sure he could reach the summit. The remaining equipment would be set up at the Austin Airport, which was line of sight to Austin Peak. Gordon, who is a corporate pilot, arranged access at the airport through the Austin Airport Authority, which was very supportive of the effort. The Austin Airport Authority not only provided use of the airport grounds but also gave the radio operators access to the lounge, bathroom, shower, and electric power. Kostelac and Gordon took the equipment up to the summit and set it up while Nelson set up the antennas and radio equipment at the airport. The cross-band repeater operated on the VHF frequency (146.55 MHz) to the mobiles and on the UHF frequency (446.025 MHz) to the airport. They were not able to reach the Fallon, Nevada, repeater from the airport, so they used the HF radios on 3.965 and 7.230 MHz with dipoles cut for those frequencies. These dipole antennas were set up using some surplus Collins Radio antennas, which have coils of wire and a simple mechanical computer that enable pulling out just the right amount of wire for the desired frequency. They also have a balun and work remarkably well. They also set up an 80-ft (24.4-m) wire about 10 ft (3 m) off the ground fed with an SGC autotuner. They used that radio for trying various frequencies and principally for Winlink transmission and reception as a backup to the HF voice communications. Nelson also used Winlink [2] (using the fast Pactor mode), which he has found to be a particularly effective tool in emergency and public service communications. Winlink gateways (from Nevada to Utah, California, Mexico, and sometimes Oregon) or a Winlink capable station can pass email or peer-to-peer traffic.

In all, four HF radios were used. One was connected to each of the dipole antennas, one was connected to the 80-ft wire, and the fourth was Nelson's remote radio in Las Vegas, Nevada, operated through the Internet using a Verizon hotspot for connection to long-term evolution (LTE). That radio is connected to a terminated folded dipole for HF, so it covers the HF spectrum. The base stations were about 150 mi (240 km) from the airport and about 350 mi (560 km) from the Las Vegas radio. The propagation conditions worked out that either the local radio at the airport or the Las Vegas radio was in solid contact with the base stations every time they needed to communicate. They also had one VHF radio in the truck at the airport on the simplex 146.55-MHz frequency and one UHF radio on the cross-band repeater UHF frequency (446.025 MHz), which could have been used if needed.

During the 2019 Pony Express Re-Ride, the team began communicating with the mobiles to the east of the airport, north of Ely, Nevada, and were able to communicate most of the way to Fallon, Nevada, covering about 200 mi (320 km) of the Re-Ride route. The airport was on the Re-Ride route, so the ham operators stationed at the airport saw the riders as they passed. Numerous mobile and checkpoint operators helped throughout the two-and-a-half day event. They used mobile and handheld VHF radios to contact the airport crew via the cross-band repeater. They also manned several base stations in the Reno, Nevada, to Gardnerville, Nevada, region, posting information day and night on the riders' progress.

Plans for the 2020 Pony Express Re-Ride include three cross-band repeaters. One will be set up as it was in 2019 to communicate with the mobiles and checkpoints along the route. The second will communicate with one of the repeaters near Fallon, Nevada, as in 2018, and a third will communicate with a repeater near Ely, Nevada, which should have coverage most of the way to the Utah border. The support team hopes to set up again at the Austin Airport.

The equipment inside the camper is shown in Figures 7 and 8. In Figure 7, the Pelican case on the left contains the control head and speaker for the remotely operated radio at the north end of Las Vegas. One of the laptop computers is to the right of that unit and is the main operating position. There are two 110-W Motorola MCS 2000 commercial VHF radios, one with a dual-control head so that it can be operated from the cab of the pickup. Below the VHF radio is a Motorola UHF digital mobile radio. There are two Motorola Micom HF radios to the right of the VHF radios. One is a Micom 2, and the other is a Micom 3. These are 125-W commercial HF radios. In the center is the controller for the three 100-W solar panels that run all the equipment within the camper. Below the tabletop are stored the two cross-band repeaters, one that operates VHF to HF connecting to the Micom radios and one that is VHF to UHF as well as some backup VHF and 900 MHz radios. The UHF radio covers both the amateur 70 cm band and the General Mobile Radio Service frequencies. To the right of those radios is the telephone patch equipment

that provides two means of providing phone patch capabilities, a direct hard-wired line when at home and on the road either voice over IP or a standard analog phone using a Verizon LTE hotspot. This hotspot also enables control of the Las Vegas radio from the camper. In Figure 8, three of the modems are shown. These include the SCS Pactor 3/4 modem, the RapidM RM2 modem for the military M110A mode, and the Kantronics packet modem. There is also a modem for Winmor that is behind the computer. Antenna hardware (not shown) includes two dual-band J-pole antennas, a UHF beam, a 900-MHz collinear antenna, a dual-band log periodic antenna, and two Collins Radio adjustable dipole antennas. Many feet of coaxial cable, fiberglass poles, and nylon guy ropes are used to set up the antennas.

Ham radio support for an event as remote, long, and challenging as the Pony Express Re-Ride requires the skill and cooperation of a huge team of ham radio operators. Because of the late spring, the dirt roads were mostly impassable, so they used two jeeps to set up a cross-band radio on the summit instead of setting the relay station on the summit. (Figure 9).



FIGURE 8. Three of the modems are shown. These include the SCS Pactor 3/4 modem, the RapidM RM2 modem for the military M110A mode, and the Kantronics Packet Modem. A modem for Winmor is behind the computer.



FIGURE 7. Radios and control units inside the camper.



FIGURE 9. Operators who manned the Austin, Nevada, relay site shown are (from left): Robert Nelson (WA3PAD), Frank Kostelac (N7ZEV), Linda Kostelac (KC7IIT), and in the camper, Keith Gordon (K7KSG).

UTAH HAM SUPPORT

Ham operators provide support for the Utah segment of the Pony Express Re-Ride on both the east and west sides of the state where cell phone coverage is limited or nonexistent. The ride through the central part of the state goes through Salt Lake City and the surrounding urban areas, so ham coverage is not required there. The eastern ride from Barker Ranch on the Utah–Wyoming border to the This Is the Place Monument on the eastern side of Salt Lake City is a steep (paved) mountain road with deep canyons that sometimes limit even

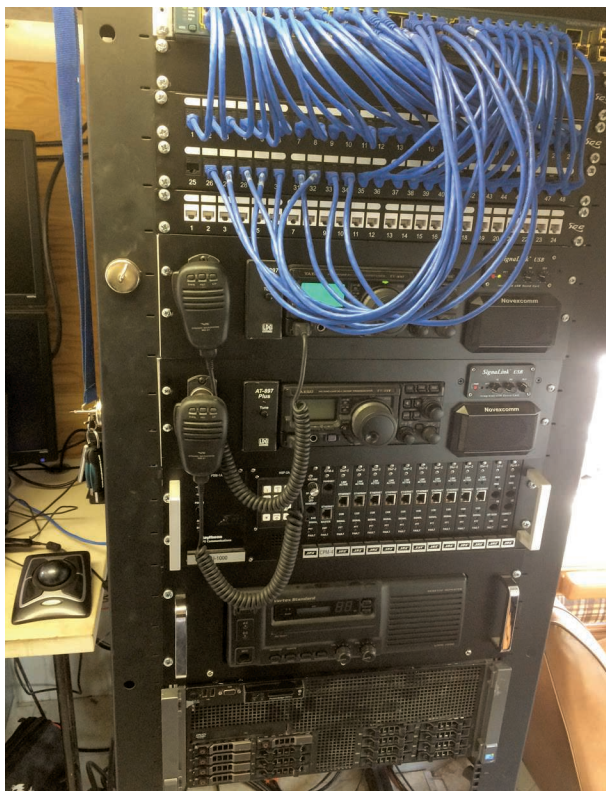


FIGURE 10. Servers, VHF radios, and switches are rack-mounted behind the driver's seat. Operator stations are to the left, and the radios can be operated from the driver's seat as well.



FIGURE 11. The Rover carries VHF mobile communication equipment, six crossed-dipole antennas, and two operators. Here, it is almost ready to start the night ride support, following the pony across Utah's west desert.

ham coverage. West of Salt Lake City from Camp Floyd, Utah, to Ibapah on the Nevada border is a gravel road through desolate desert. Wild horses and coyote are often seen. The Re-Ride is generally scheduled on a weekend where a full moon lights the way through the desert at night.

The eastern part of the state is covered by two repeaters, K7HEN located on Lewis Peak and W7SP located on Farnsworth Peak. The route through Utah's western desert utilizes four linked repeaters provided by W7EO. The repeaters are located at Vernon, Wendover Peak, Black Mountain, and South Mountain in and around the Tooele, Utah, area. Typically, 15–20 amateur radio operators volunteer their time to provide communications along the roughly 36-h route. One or more vehicles equipped with amateur radio equipment (for example Figures 10 and 11) and operators accompany the horse and rider along each of the routes. A net control operator monitors the repeaters, relaying the position of the pony and being ready to handle emergency communications if required.

Mobile ham support is provided by the Rover (shown in Figures 3 and 11), a 1978 Dodge Kary van that had once been a crime scene investigation sheriff's vehicle, complete with running water and an on-board generator. Charles (Chuck) Killian (WB6YOK) and Gerald Hasty (AD7QF) gutted the vehicle, fitting it out with two operator positions (Figure 12). They installed a high-capacity battery stack, a rack with VHF radios (2 m, 144–148 MHz), Internet and keyboard video mouse switches, and seven Dell servers. Several crossed-dipole antennas on masts that can be raised when the vehicle is stopped, as well as several field-deployable antennas, are included. Today, they have a single vmWare host that supports several guests. They can access OpenStreetMap an Asterisk private-branch exchange, to enable phone connections, computer systems for the two operators, radio location equipment, and more. The Rover is an ongoing project, and they are currently adding equipment that supports an amateur radio emergency data network at the microwave frequencies of 2.4, 3, and 5 GHz to allow the remote sharing of the Rover capabilities with others in the line of sight.



FIGURE 12. Chuck Killian (right) and another ham operator, waiting for the rider to bring the mail. They will support the next team of riders running the mail across the desert overnight. Many ham operators, such as Killian (shown wearing the official Pony Express uniform), also join the NPEA.

The practical and logistical issues of providing continuous communication support day and night over long distances in challenging, remote locations stress the systems (mechanical, electrical, and human). A pickup truck and trailer (the Rover support vehicle) provide a second large generator and enough gas, food, and water for three days, as well as more complex antenna systems, as needed. Quick snack food and freeze-dried food with water heated on a propane stove are the norm. Cold water from the Rover's fridge is a luxury in the desert heat and dust.

WYOMING, NEBRASKA, COLORADO, KANSAS, AND MISSOURI

The route through Nebraska and Colorado mainly follows the Platte River Valley and Interstate 80, and cell phone coverage is generally available. Ham radio support has been provided some years but not others.

Through Kansas and Missouri, the route follows both well-established roads (where the ham support may include marking railroad crossings), as well as more primitive dirt roads, rarely graded. Mud and washed out bridges have required rerouting riders, and the ham operators have helped to communicate these changes, collaborating with the local sheriff offices to ensure the safety of the Re-Ride. Severe weather warnings (rain, hail, and even one tornado warning) have also been shared so that riders could take cover. Ham operators have also helped with a couple of emergencies including a wheel coming off a trailer (it was found about 3 mi back down the road) and the loss of a rider's pocket Bible (carried by the riders, as in the original Pony Express; this was also found back down the trail). The challenges of covering the ride (see Figure 13), which takes more than 30 h, requires the cooperation and collaboration of numerous dedicated volunteer ham operators plus local law enforcement, weather service, and the Pony Express captains who organize their teams of horses and riders. Each state-line crossing is cause for celebration, and bragging rights are won for the relays that keep the mail on time or make up time when it gets behind.



FIGURE 13. Kansas ham operators follow the rider in a mobile home, supporting the ride day and night. (Source: Dennis Mason; used with permission.)

CONCLUSIONS

The Pony Express, although short lived, remains a romantic icon of the Old West frontier. The 1,900-mi (3,100-km) mail run is rerun in 10 days each year (day and night, through all weather) by teams of dozens of horses and riders, carrying the mail between Sacramento, California, and St. Joseph, Missouri. Much of the Re-Ride closely follows the original trail, and much of this remains rugged and remote, even today, with little or no cell phone coverage. Volunteer ham radio operators provide communications support throughout these remote areas, helping organize the ride by sharing where the mail-carrying rider is and providing emergency communications as needed.

Perhaps it is poetic, in an engineering sort of way. The Pony Express was the high-speed communication link of its time. It was soon outpaced by the transcontinental telegraph, only to ride again a century and a half later, supported by ham radio. In the cheer of the riders—"Go! Pony!"

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