



Colorado Connection Repeaters Inc.
Annual Report

Colorado Connection Repeaters Inc.
P. O. Box 22134, Denver, CO 80222
January 2021

Happy New Year. This past year was a changeling year due to COVID. We would like to take a few minutes to let you know what we accomplished in 2020, and what we are planning for 2021.

Website

We had to rebuild our website as our web host was hacked and destroyed. (FYI - we were not the only web site that was destroyed.) The www.colcon.org website is again running with the basic information and now backing it up! We are now working to provide additional information and content.

Board of Director and Officer changes

ColCon has made some leadership changes. After many decades of service, Paul Shackelford WB0QMR has decided to retire from the Board. Paul has been active with ColCon from the beginning. So that we can benefit from his knowledge, Paul has agreed to serve as an Emeritus board member. Thank you Paul!

Joining the Board in 2020 was Mike Ranalls KY0JAM (former KE0QQR). Mike is very active on our repeaters, and an organizer of the Colorado Emergency Reporting Net (CERN). He is responsible for manage the relationship between ColCon and CERN.

In December we changed the FCC registered trustee of the club callsign (KB0VJJ) used on the repeater system from John Thomson W0IG to Doug Sharp K2AD. John just recently fully retired and desires to spend more time with family and on the ski slopes. While John has stepped back as Trustee, he remains a Director on the Board of Directors. Thank you, John, for the many years of service as our system trustee! Thank you, Doug, for taking on the responsibility of the FCC trusteeship.

The Trustee is the individual registered with the FCC and is responsible to assure legal and proper operation of our repeaters.

Please let the board know if you have questions, concerns or comments at: kb0vjj@colcon.org

Finance Infomation

We had about \$7600 in cash donations in 2020 from our users/groups and also we have donations of equipment and labor that are in addition to the cash donations. Thank you all!

Our 2020 expenses:

Operations	\$700	examples include PO box, insurance
Repeater operation	\$3,500	examples include rent utilities
Repeater Upgrades & Repairs	\$4,300	

Our Relationship with RMHAM, CERN and other clubs

We have been operating in a synergistic relationship with RMHAM www.rmham.org, the Colorado Emergency Reporting Net (CERN) www.co-cern.org and several other Colorado clubs.

Rocky Mountain Ham Radio

Linking our repeaters is the microwave system operated by RMHAM. Most links are using amateur radio frequency microwave, with some backup links using the Internet. This IP backbone currently extends from Fort Collins to Pueblo, and Denver to Grand Junction. We are currently planning expansions in NE and SW Colorado for late 2021 and 2022. The IP microwave backbone supports both linking, monitoring and positive control of our equipment.

CERN Volunteer Monitors

We also have Volunteer Monitors listening to ColCon whenever possible. Should you have an emergency, and be unable to contact 9-1-1 directly, the Volunteer CERN monitors are available to relay to the appropriate authority. CERN holds a formal net each evening at 6:30pm. All are welcome to check-in and learn more about the volunteer monitors. At other times the Colorado Connection remains open to all amateurs for routine traffic.

Upgrades to the Connection –

This year we are working the following major projects:

- Add redundant paths, upgrade equipment and add voting receivers for the Colorado Springs repeater located on Cheyenne Mountain
- Replace the Kremmling repeater to provide coverage to Kremmling and areas of US 40 and CO 9 Highways
- Repair the Salida repeater and add backup batteries
- Our yearly maintenance of system equipment and equipment upgrades to improve function.
- Adding a repeater near Burlington, CO
- Adding a repeater near Sterling, CO

For further information, please see our website www.colcon.org or the Technical Report that follows.

We want to thank our technical crews and our volunteers that support our repeater system!

We appreciate all donations to the Colorado Connection Repeaters Inc. (EIN 84-1150556) Your donation may be tax deductible, please check with your tax advisor.

Thank you and 73

The Colorado Connection Repeaters, Inc - Board of Directors

The following pages will give you further information about our past year and also gives you a look at our system.

Technical Report – Repeaters and Linking

For those interested, here is a short summary of activities at our sites.

Denver / Thorodin Mountain Repeater – 145.310 MHz (88.5 Hz input / 123.0 Hz output)

Equipment never fails when the weather is warm and the skies are sunny. Equipment only seems to fail when the temperature is below freezing and snow is on the ground. Our Denver repeater equipment followed this rule. We had a few issues with both the repeater and associated linking equipment in early Winter 2020. Thankfully we were able to borrow a snowcat and make repairs. All worked well through the summer of 2020.

Later in the fall we returned to upgrade the master power supply, install a large battery backup, and perform preventative maintenance on the primary and backup repeater. Yes, for those that do not know, we actually have two full repeaters at the site: one on-air (GE MASTR III) and a hot-standby (Motorola MTR2000). It was technically still Fall but required a Jeep with 4-wheel chains to access the site. Our antenna is the taller 4-bay folded dipole on the roof above the Jeep. (Thanks N7CTM for the ride!)



Also serviced this year were the voting receivers for the Denver system. Most repeaters utilize a single receiver. ColCon Denver utilizes (currently) six receiver sites located across the Denver Metro. Current receiver sites are: Thorodin Mountain (two receivers and also the transmitter site), Squaw Mountain, Lee Hill (Boulder), Golden and Conifer. We hope to have the Fort Collins receiver operating by late-spring 2021. Also being considered is a Downtown Denver receiver.

We also experienced a major issue with our GPS receivers that provide the timing reference necessary to perform the receiver voting. These GPS receivers exhibited some software anomalies causing them to go off-line, and also some RIFs (Rodent Induced Failures) from data wires that provided a tasty snack for locals living at the sites. New GPS receivers are currently being installed at all sites. We are also placing wiring within armored conduit (or LiquidTite) wherever possible.

We also installed a backup battery bank, with DC -AC power inverter, at the site. The battery system consists of four AGM batteries delivering 24VDC at 200 amp hours. These batteries will operate the repeaters and associated equipment at full-power until the site motor generator is operating.

The Colorado Connection Denver 145.310 MHz repeater is unique in another way. Our Thorodin Mountain Denver repeater is actually two identical repeaters. The primary repeater is currently a GE MASTR III repeater operating at 100 watts. Our backup repeater is a Motorola MTR2000 backup repeater capable of 40 watts transmit. These two repeaters have virtually identical duplex filters, and are connected to two different antennas. Using the “belt and suspenders” approach we can immediately recover from simple failures by remotely switching repeaters. We cannot predict and prepare for catastrophic failures, but our main / standby configuration can bridge the gap and reduce repeater down-time.



Colorado Springs / Cheyenne Mountain - 145.130 MHz (88.5 Hz input / 123.0 Hz output)

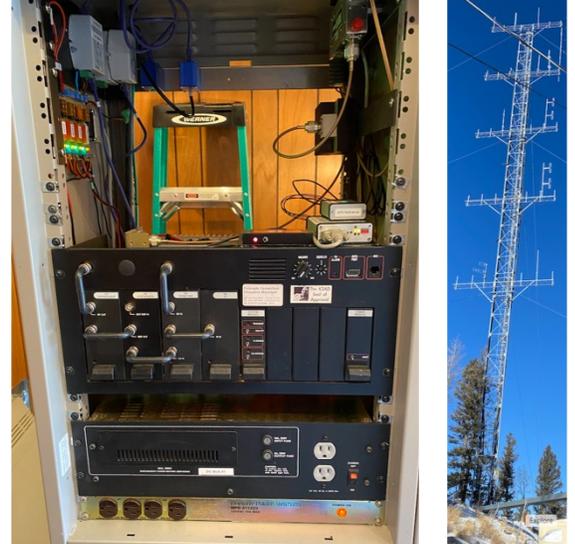
The Colorado Springs repeater has been serviced. Both repeater and antenna system are working well. We currently operate a GE MASTR III repeater with 2-bay folded dipole antenna near the top of the tower.

We are planning to add DC battery backup power in the near future. These batteries will allow us to continue operations when both the commercial power fails, and the backup motor generator fails to start.

Our current microwave link works well, but as the US Marines say, "Two is one, and one is none." We are currently in the planning stages for a backup microwave link to/from the site.

Also planned is at least one remote voting receiver someone in the late Spring 2021. Additional receivers can be added as funds and appropriate sites are identified.

The Board has voted to invest in upgrades to this site in 2021. Funding for these projects has been supported by the Colorado Springs user community, thank you.



Akron - 145.400 MHz (88.5 Hz input / 123.0 Hz output)

This repeater is on-air and operating normally. Current equipment is a GE MASTR III repeater. Maintenance in 2020 was replacement of the GaAs FET pre-amplifier and replacement of the VHF antenna. *(Sorry no photos available)*

Grand Junction- 145.355 MHz (88.5 Hz input / 123.0 Hz output)

An upgrade was made during Summer 2020 to the Grand Junction repeater. Installed was a reconditioned Kenwood TKR-750 repeater and Duracomm power supply. The link was also transitioned from analog (via the existing UHF hub repeater) to digital IP using the RMHAM backbone. The microwave link is working well, but we are experiencing some transmit and receive issues at this site. Likely issue is the antenna and feedline. A repair crew will address these issues in the early Summer 2021. Anyone desiring to support this repeater specifically should mark their donation as "Grand Junction."



Glenwood Springs - 146.850 MHz (88.5 Hz input / 123.0 Hz output)

The Summer of 2020 also saw an upgrade to the Glenwood Springs repeater. A refurbished Kenwood TKR-750 repeater was installed. An amateur radio frequency microwave IP link was also added



supporting both linking and equipment control. To date we have not experienced any failures (knock on wood) and coverage reports are favorable.

Mosquito Pass / Leadville - 145.445 MHz (88.5 Hz input / 123.0 Hz output)

The Kenwood TKR-750 repeater was serviced Summer 2020. The new (year old) omni repeater antenna is working well. New hardline was installed this trip.

This site operates off-the-grid as a solar-only site. Our current batteries are nearing end-of-life. Our solar panels are old and produce less power than current models. The Board is currently discussing an upgrade to our solar panels and site batteries.

If you are interested in specifically helping with this project, please mark your donation as “Mosquito Solar Upgrade.”



Fort Collins - 146.730 MHz (88.5 Hz input / 123.0 Hz output)

A new repeater was installed in 2020 atop Buckhorn Mountain, west of Fort Collins. The repeater is a GE MASTR III and a two-bay folded dipole on the tower.

This site is a joint site operated by The Colorado Connection (ColCon), Rocky Mountain Ham Radio (RMHAM) and the Northern Colorado Amateur Radio Club (NCARC).

This site does have some receiver limitations due to the multiple high power FM broadcast stations operating from the site. To overcome the site noise, we will be adding a voting receiver at an alternate site in Spring/Summer 2021.



Durango - 147.345 MHz (88.5 Hz input / 123.0 Hz output)

Our Durango repeater is located atop Missionary Ridge providing coverage for Durango and the surrounding area. Equipment is a GE MASTR III repeater and fiberglass omnidirectional antenna.

Due to the remote SW Colorado location, microwave linking is not currently feasible. We utilize an Internet link provided by a Wireless Internet Service Provider also operating on the mountain. A long term goal is to extend our amateur radio microwave link from the Grand Junction site to Durango as funds permit.



Salida / Methodist Mountain - 147.285 (88.5 Hz input / 123.0 Hz output)

This site is a GE MASTR III repeater with digital IP microwave link. We are currently experiencing a failure of the transmitter power amplifier. Receive functions are normal, but no transmitter. This site poses challenges with access during the winter months. We survived the fire in 2019, but we could not survive 2020. This repeater is on the list to repair as soon as snow melts in the Summer 2021.

Breckenridge / Mt Baldy - 147.390 MHz (88.5 Hz input / 123.0 Hz output)

This repeater was also refreshed during Summer 2020. During the site visit, the Kenwood TKR-750 repeater and antenna was verified to be operating normally. This site is also an off-grid solar-only site.



The solar panels and batteries likely have a few years of life remaining. Plans for a refresh in 2022 or 2023 are being considered.

Vail - 147.345 MHz (88.5 Hz input / 123.0 Hz output)

The Vail repeater is a Kenwood TKR-750 repeater and fiberglass omnidirectional antenna.

This repeater provides reliable coverage of Vail and the surrounding area.

The Microwave backbone is provided from the Mosquito and Eagle Hub sites.



Winter Park - 147.285 MHz (88.5 Hz input / 123.0 Hz output)

This repeater runs like the Energizer Bunny. Located just above the Town at the home of WA4CCC, it offers excellent coverage for those visiting Winter Park. The repeater is a Kenwood TKR-750 repeater. Thanks to Hank, WA4CCC for being our site host for this repeater. *(Sorry no photos available)*

Walden - 145.160 MHz (88.5 Hz input)

The Walden "repeater" continues to operate as a Half-Duplex Repeater. What is a half-duplex repeater you ask? Simply, it just relays the signal from our UHF hub repeater over to VHF on the 145.160 MHz transmitter. Any signal received on the 144.560 MHz receiver is sent to the UHF Hub repeater. The main difference, there is no VHF to VHF repeat function at this site.

You are probably asking, “Why did you configure the site as half-duplex?” Unfortunately it’s a long story. The short answer is, a few decades ago, this was the easiest way to bring a signal to this area. We are investigating installing a Kenwood TKR-750 repeater (same as Kremmling, Glenwood and Grand Junction) operating full-duplex at this site in the future. *(Sorry no photos available)*

Major Upgrades - “*Please pardon our dust while we rebuild to serve you better*”

Kremmling - 147.075 MHz (88.5 Hz input / 123.0 Hz output)

The Kremmling repeater is currently off-air while we identify a new repeater site. We were forced to change sites when the site ownership changed, and commercial power was no longer available. The equipment has been removed and is being serviced before being installed at a new site.

Steamboat Springs -

The equipment that has served for many years is no longer available. The Board is currently reaching out to the local hams to determine if a ColCon repeater can return to the area.

Craig - 146.970 MHz

This repeater is operational but not linked. The Board is investigating options to link the current equipment.