Getting Started in Amateur Radio in Teller County

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Mountain Amateur Radio Club NXØG

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Introduction

This guide is intended for a person living in or visiting Teller County who

- is interested in amateur radio
- is working on getting their first amateur license
- has just gotten their amateur license
- is a licensed amateur who is new to the area

This guide is specific to radio services covered and licensed under 47 CFR Part 97 Amateur Radio Service and assumes the reader will have a valid amateur license under Part 97 for the frequencies of operation before operating any transmitter on those frequencies.

This guide does not cover the use or licensing of other radio services such as

- Part 95 Personal Radio Services such as Citizens Band (CB), FRS, GMRS, etc.
- Part 90 Private Land Mobile Radio Services such as Public Safety Radio, Business/Industrial Radio, etc.

We will focus on using the 2m (144-148 MHz) and 70cm (420-450 MHz) amateur bands in Teller County, since those are available to all license classes. If you are a ham who has their extra ticket and is interested in CW DX contesting, this guide is not going to be much help ;)

You can find a copy of this document on the Mountain Amateur Radio Club website http://WWW.NX0G.COM

Clubs

Amateur radio clubs are organized to promote the amateur radio hobby. Under that broad umbrella, clubs may operate repeaters, provide emergency communications during disasters, provide mentors (we call those “elmers”…it’s a ham radio thing), run authorized testing for licenses, provide training classes, have educational programs, sponsor participation in ARRL Field Days and contests, conduct social activities and much more.

Mountain Amateur Radio Club (MARC)

The amateur radio club in Teller County is the Mountain Amateur Radio Club (MARC), with the club call sign of NXØG[1]. MARC operates five linked repeaters located in Teller County and Colorado Springs that are available for all licensed amateurs to use, regardless of club membership. These repeaters cover all of Teller County, much of Park County, western Douglas County, southern Jefferson County, eastern Fremont County, parts of Custer County and points south and much of central Colorado Springs. While most of the traffic on our repeaters consists of the usual ham conversations about the weather or the latest gadget, emergency traffic such as reporting a traffic accident, search-and-rescue missions or emergency communications during disasters, has priority. The frequencies of the MARC repeaters may be found in the Appendix.

MARC Meetings

MARC holds a monthly meeting on the third Wednesday of every month at 7pm in the downstairs meeting room at the Woodland Park Public Library (Rampart Library District, Woodland Park Public Library, 218 E Midland Ave, Woodland Park, CO 80863, https://rampart.colibraries.org/). During the COVID-19 pandemic we have been meeting on Zoom. Details for the Library location and the Zoom link are on the MARC website. Meetings consist of a business portion and an informational program or roundtable discussion about some aspect of ham radio. Meetings are open to anyone with an interest in amateur radio, regardless of license or club membership.

We also hold an on-air "net" every Tuesday evening at 7:30 pm on the MARC repeater frequencies (see Appendix). Amateur radio "nets" (short for networks) are structured conversations among many hams. While the largest nets can have a hundred or more participants, our Tuesday Night Net usually has a dozen or so participants. Nets serve to get us familiar with the kind of structured communications that are used during emergencies and to test our repeater system. They are excellent for new hams to help get on the air because all you have to do is identify yourself with your call sign, say a few words, closing with your call sign[2], when asked for comments. The net is open to all licensed amateurs.

MARC Membership

Membership fees support our club activities and the operation or our linked repeater system. You can download a membership application **here**.

If you are a new, never-before-licensed amateur and tested at one of the MARC-sponsored test sessions, you should have received a voucher for a free membership for the remainder of the year in MARC. That voucher can be submitted with your application in lieu of a check for your initial MARC membership. It is our way of welcoming new hams to the hobby.

Help Getting Started

MARC members are happy to help other hams. If you need help programming your radio, getting on the air or any other question about the hobby, come to one of the MARC meetings to get connected with an

[1] A word about how amateurs write call signs. Most amateurs use the "slashed zero" in their call signs like this: NXØG because it helps to distinguish between the number "0" and the letter "O". Windows users can generate a slashed zero by typing ALT+0216 in most windows applications.

[2] 47 C.F.R. §97.119(a) "Each amateur station…must transmit its assigned call sign on its transmitting channel at the end of each communication…"

elmer (mentor). We are investigating ways to connect hams with elmers online, so keep an eye on the MARC website (NX0G.ORG) for developments.

Licensing

Obtaining an amateur license is fairly easy. The American Radio Relay League (ARRL) has a wealth of information about obtaining your license on their website. They publish training materials and have practice exams online to help you prepare for your test. There are many other license preparation resources available as well that may be found through internet searches.

The Mountain Amateur Radio Club Volunteer Examination (VE) team is affiliated with, and accredited by, the ARRL Volunteer Examiner Coordinator (VEC) system. The MARC VE team conducts license testing sessions on the first Saturday of every odd-numbered month in Woodland Park. Further information about testing sessions, including specific dates, times and locations and registration information is available on the MARC testing webpage.

Radios

The most useful radio for a new ham wanting to get on the air quickly and inexpensively is one capable of operating in the 2m VHF (144-148 MHz) and 70 cm UHF (420-450 MHz) ham bands using frequency modulation (FM). These are available in handheld (walkie-talkie), mobile and table top formats from a number of manufacturers. These can range in price from less than $50 for a simple handheld radio to thousands of dollars for a flagship, multi-band, table top model.

Your station needs three essential components:

- Radio: The radio creates a modulated radio frequency transmission that transmits your voice or code to other radios. It also converts received modulated signals into audio that you can hear or into a code that can be interpreted by a computer.
- Power supply, including any cables to connect it to the radio
- Antenna, including any cables to connect it to the radio

While amateurs in Colorado and Teller County operate on all the bands and using all the modes available to amateurs, in this document we are going to focus on using the frequency modulated (FM) mode on the amateur 2m (144-148 MHz) and 70cm (420-450 MHz) amateur bands.

Handheld

Handheld radios are an all-in-one solution that combines the radio, power supply (battery) and antenna in one lightweight, portable package. As sold, these will also include a battery charger and perhaps other accessories. The cost for these type radios runs from less than $50 to a few hundred dollars.

These radios typically have adjustable output power levels ranging from less than a watt to five watts, though some models go as high as ten watts. Two people standing on level, open ground can communicate using these over a range of about 5-10 miles. Connecting an

external antenna, such as an antenna affixed to the roof of your car with a magnetic base or an antenna mounted on the roof of your home, can extend the range of these radios many more miles when communicating with a station with a sensitive antenna and receiver. If you are standing on top of a tall structure or a mountain top and have a specialized directional antenna, they can reach well over 100 miles. Many hams use the model pictured, the Yaesu FT60R, to communicate with the International Space Station.

Mobile

Mobile radios, like the Kenwood TM-V71A, pictured at the right, require a separate power supply and antenna. So-called because they are designed to be mounted inside a vehicle, many hams use these inside their homes as base station radios. They typically range in price from about $100 to several hundred dollars. Many of them feature detachable front faceplates that allow the body to be mounted out of sight and just the faceplate mounted within reach of the operator, like the one shown. They usually have larger speakers and better audio quality than handhelds. They are more powerful, too, with adjustable RF power ranges from 1W up to 50W or more. The increased power and external antenna mean they can reach stations further and provide a signal that is received with less noise away than a handheld.

Table Top

These style radios focus mostly on the HF bands that are accessible to amateurs with General and Extra class licenses, though some also include the 2m and 70 cm bands. They range in price from a few hundred dollars with basic features to models like the ICOM IC-7851, pictured here, that retails for over $10,000. While these radios typically will only emit 100-200W in RF power, they are often coupled with amplifiers to achieve the legal maximum power of 1500 W. This style radio requires external antennas for the bands of operation and a separate power supply. Operating on the HF bands, with a good operator, the right antenna and the right ionospheric conditions, you can communicate directly to another operator anywhere on the planet.

One or more of these radios will be found in the “ham shack” or fixed operating station of a serious amateur radio enthusiast. It can get a little “out of hand”:

Figure 1 George Ulm, W9EVT, "World's largest Ham Shack", filled with quite a few historical radios. See his page on QRZ https://www.qrz.com/db/w9evt for more about George and his passion for ham radio. (Photo courtesy of George Ulm W9EVT)

Radio Decisions

Every ham has their favorite brands and many hams are as passionate about those brands as football fans are about their favorite teams.

Which style of radio you choose usually starts with asking: What do you want to do with the radio? and How much money do you have to spend?

Most new hams will start with a dual-band (2m/70cm) handheld or mobile. These two bands are available to all amateur license classes and there are a lot of things you can do with those radios in Teller County and Colorado. Popular features to consider are:

- Programmable memory – the ability to pre-program frequencies of interest into memory and recall them with a few presses of a button or turns of a dial. The size of the programmable memory may be important if you want to pre-program a lot of repeater frequencies for a cross country automobile trip, for example. There are about 300 2m and 70cm repeaters in Colorado that can be used with the basic dual-band radios.
- Expanded receive – the ability to receive and listen to frequencies and bands outside of amateur bands such as the aviation bands, public service and business bands, etc.
- Dual VFO – the radio is capable of operating on two frequencies simultaneously
- Scanning – the ability to scan across frequencies or pre-programmed channels to search for active transmissions
- GPS receiver and APRS – the ability to pinpoint the location of the radio using GPS (Global Positioning System) and broadcast that locations using APRS (Automatic Packet Reporting System) so that people can follow your movements online. This is very popular with backcountry enthusiasts who want a buddy to be able to know where they are in case of an emergency.
- Ability to program the radio from the front panel or a computer. Front-panel programmability (FPP) means you can add or modify memory channels without the use of a computer and

connecting cable. The ability to use a computer means that you can maintain a collection of channels in your radio more easily.

- CTCSS/DCS tones – these block unwanted stray signals and are required on repeaters. All modern radios have this ability, but many vintage radios do not. See "Repeater Tones" later in this document for more information.

As in most things, you get what you pay for, so more expensive radios will have more features/functions or better build quality (mechanical, RF, audio) than less expensive radios.

Used radios may be a great deal if you find a reputable seller and a clean radio. Like other used items, it helps if you have the skills and equipment to evaluate the condition of a used radio. Or if you have a buddy who can help you.

With new radios, shop carefully and understand what the warranty and support options are for a new radio. Some warranties are handled in the USA, but some require shipment to the country of origin for warranty service.

Operational Considerations: Simplex & Repeaters

Line of Sight

When we consider frequency modulated signals on the frequencies in the 2m and 70cm amateur bands, the most important thing to remember is: line-of-sight. These radios can communicate with each other if there is an unobstructed path from one antenna to the other. Anything that gets in the way, such as trees, buildings, rocks, hills, mountains or the curvature of the earth will interfere with the signal. While a little vegetation will make little difference at these frequencies, a large mountain is a signal stopper. Because we have a lot of "terrain" in Colorado and Teller County, line-of-sight communications can be difficult. That is why placement of your antenna above the surrounding terrain, called HAAT or height above average terrain, is important. An operator in Florissant cannot usually talk to an operator in Colorado Springs on 146.520 MHz because Pikes Peak is in the way. But that same operator can converse with a station in Kansas if they take their HT or mobile station to the top of Pikes Peak. Sometimes, signals in the 2m and 70cm bands can bounce off the sides of a mountain (reflection) or bend over the top of a ridge or peak (diffraction) and occasionally reach unusual locations.

Simplex

Hams call talking to each other on the same frequency, say 146.520 MHz, "simplex" communication. Each takes a turn at speaking and listening and one frequency is used for both. The two radios must have an unobstructed path between them, even though the distance could be many miles.

Certain frequencies have been set aside as "calling frequencies". These are reserved by agreement among amateurs for use in establishing contact with another station and conducting short conversations or agreeing to move to a different frequency for longer conversations. Hams call those longer conversations "rag chews", which we love. The nationwide calling frequencies in the 2m and 70cm bands are:

146.5200 MHz

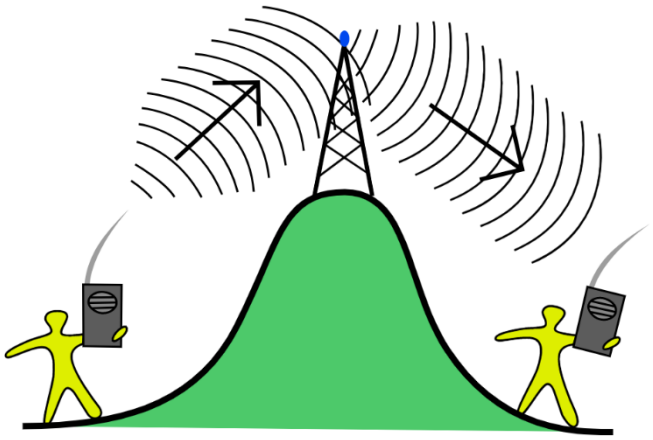
446.0000 MHz

Setting Your Radio for a Simplex Frequency

You will program your radio to transmit and receive on the same frequency, say 146.520. That's it.

Repeaters

We get around these line-of-sight limitations through the use of repeaters. A repeater is a pair of radios, one that is a receiver set for one frequency and the other that is a transmitter set for a different frequency. Anything that is received by the receiver radio is transmitted immediately by the transmitting radio on the second frequency. Repeaters are connected to very good antennas that are set as high as possible – high on a tower or even high on a tower on top of a mountain. My radio must be within line of sight of the repeater antenna, but because the repeater re-transmits my signal in real time, another radio can receive it even though it cannot "see" my radio, so long as it can "see" the repeater antenna.



Repeater Offsets

By convention, amateur repeaters use pre-defined rules for the separation between their input (receive) and output (transmit) frequencies. In Colorado, the rule for offset calculation is:

Repeater Output Frequency	Offset to Repeater Input Frequency
Less than 147.0 MHz	-600 kHz (-0.60 MHz)
Greater than or equal to 147.0 MHz	+600 kHz (+0.60 MHz)
420-450 MHz	-5.0 MHz

In others states the direction of the offsets may be different. For example, in New Mexico, a positive 5.0 MHz offset is used in the 70cm band.

When we list our repeaters we always give the OUTPUT (transmit) frequency of the repeater – the frequency on which we listen to or hear the repeater.

Example #1:

The MARC repeater on Badger Mountain transmits on 146.685 MHz. We know that the input frequency of the repeater is 600 kHz below that frequency at 146.085 MHz.

Example #2:

The MARC repeater on Tenderfoot Mtn outside of Cripple Creek transmits on 147.015 MHz, so the input frequency of that repeater is 600 kHz above that at 147.615 MHz.

Repeater Tones

Repeaters are located in exposed locations and are subject to a higher than normal level of RF interference from a variety of sources. These RF signals can cause the repeater receiver squelch to open and then re-transmit that noise or unwanted signal. To prevent that, repeater receivers are configured to require a tone code to open the squelch and receive a transmission. These tones are sub-audible. The official term for these tones is Continuously Tone Code Squelch System (CTCSS), although many hams refer to them as PL (Private Line®, a Motorola Trademark) tones. They are specified by the tone frequency in Hz. Another system, Digital Coded Squelch, is less frequently used.

Some repeaters will also transmit a CTCSS tone so that operators may use CTCSS tone on their radios to block interference. Many amateur operators choose to leave tones off their radio's receive frequencies unless they experience actual interference.

If you do not set your radio to require a tone, then it receives and demodulates transmissions whether a tone is included or not. If you set your radio to require a tone on its receive channel, the radio will only receive and demodulate a transmission when the tone is present.

In lists, repeaters will be listed by their output frequency and CTCSS tones and sometimes include the offset direction. Here are examples for the MARC repeaters:

Repeater Name	Frequency & Tone	Description
MARC Cripple Creek	147.0150 (+) 107.2	Repeater Output: 147.0150 MHz Repeater Input: 147.6150 MHz CTCSS: 107.2 Hz Location: On Tenderfoot Mtn near the town of Cripple Creek
MARC Badger Mtn	146.6850 (-) 107.2	Repeater Output: 146.685 MHz Repeater Input: 146.385 MHz CTCSS: 107.2 Hz Location: On top of Badger Mtn near US-24 at Wilkerson Pass.
MARC Tranquil Acres UHF	448.6500 (-) 107.2	Repeater Output: 448.6500 MHz Repeater Input: 443.6500 MHz CTCSS: 107.2 Hz Location: In the Tranquil Acres neighborhood between Woodland Park and Divide
MARC Tranquil Acres VHF	146.8200 (-) 107.2	Repeater Output: 146.8200 MHz Repeater Input: 146.2200 MHz CTCSS: 107.2 Hz Location: In the Tranquil Acres neighborhood between Woodland Park and Divide
MARC Colorado Springs	447.4750 (-) 107.2	Repeater Output: 447.4750 MHz Repeater Input: 442.4750 MHz CTCSS: 107.2 Hz Location: Colorado Springs, northeast of downtown

Sometimes the CTCSS output tone on a repeater is different than the CTCSS input tone. In that case, two tones will be given.

Tones are almost never used on simplex.

Setting Your Radio for a Repeater Frequency

You will program your radio to receive on the repeater output/transmit frequency and to transmit on the input/receive frequency of the repeater.

> Example #1:
>
> To use the MARC Cripple Creek repeater, program your radio to receive on the repeater output/transmit frequency of 147.0150 MHz (no tone required) and program your radio to transmit 600 kHz above that on the repeater input/receive frequency of 147.6150 MHz with a 107.2 Hz CTCSS tone.
>
> Example #2:
>
> To use the MARC Tranquil Acres UHF repeater, program your radio to receive on the repeater output/transmit frequency of 448.6500 MHz (no tone required) and program your radio to transmit 5.0 MHz below that on the repeater input/receive frequency of 443.6500 MHz with a 107.2 Hz CTCSS tone

Band Plans

The FCC has authorized hams to use all the frequencies between 144-148 MHz and 420-450 MHz. Amateurs have an obligation not to interfere with each other's use of these frequencies.[3] Amateurs realized a long time ago that assigning certain portions of these bands for different types of amateur communications helped us not to interfere with each other. These are called band plans.

The ARRL has nationwide band plans that they publish here on their website.

The amateur radio clubs in Colorado have formed the Colorado Council of Amateur Radio Clubs, Inc (CCARC) to develop and manage more detailed band plans within the state of Colorado. CCARC coordinates the assignment of specific repeater frequency pairs for every repeater operating within Colorado. Due to the height of their antennas above the terrain, repeater signals can easily travel 100 miles or more. Ensuring repeaters within range of each other are on different frequencies helps us prevent interference.

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[3] See 47 C.F.R. §97.101(a-d) General standards (emphasis added)
(a) In all respects not specifically covered by FCC Rules **each amateur station must be operated in accordance with** good engineering and **good amateur practice**.
(b) **Each station licensee and each control operator must cooperate in selecting transmitting channels** and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station.
(c) At all times and on all frequencies, each control operator must give priority to stations providing emergency communications, except to stations transmitting communications for training drills and tests in RACES.
(d) **No amateur operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal.**

The Colorado Amateur Frequency Use Plans managed on our behalf by CCARC are here. The repeater coordination database is here.

Band plans and coordination plans are like putting stripes on the highway – it helps us stay in our lanes and not crash into one another. Plans are also recognized and supported by the FCC. If two operators are interfering with each other, the FCC will put its enforcement weight behind the station that is operating in accordance with the band and frequency coordination plan applicable for that geographic area.

Repeater Networks in Colorado

We are graced with many natural "radio towers", *i.e.*, mountains, in Colorado and enterprising hams have taken advantage of those for setting up repeaters.

There are many individual hams and clubs who operate repeaters in Colorado. A few clubs operate repeaters that are accessible to Teller County hams either operating within Teller County or travelling to nearby counties: El Paso (Colorado Springs), Fremont (Canon City), Park and Douglas.

The following websites have complete information about the organizations who have repeaters accessible from Teller County as well as complete information about all the repeaters they operate. In the Appendix to this guide, we have included the frequencies likely to be used by amateurs somewhere in Teller County.

Mountain Amateur Radio Club - a linked system of five repeaters covering all of Teller and parts of Park, Douglas, Jefferson, Fremont, Custer and El Paso counties. Each site has emergency backup power.

Pikes Peak FM Association - Two repeaters at the summit of Pikes Peak with coverage of a wide area surrounding Pike Peak. These may or may not be linked.

Cheyenne Mountain Repeater Group – both linked and standalone repeaters covering El Paso, Park, Chaffee, Fremont, Pueblo counties

Colorado Repeater Association – standalone repeaters and two linked networks of repeaters covering the Front Range from Fort Collins to Colorado Springs and west into the mountains

The Colorado Connection - a linked system of sixteen repeaters covering most of Colorado

The Fun Machine - a linked system of almost a dozen repeaters covering Fremont, Chaffee, Pueblo, El Paso, Huerfano counties and select locations near Denver and Creede. This system also has links into internet based digital voice networks (NXDN, P25, DMR, DStar, System-Fusion "C4FM") that extend the range worldwide

Rocky Mountain Ham Radio - a linked system of 33 repeaters using the Digital Mobile Radio (DMR) digital voice mode that stretches from Cheyenne, WY, to Albuquerque, NM, and across most of Colorado. This is a self-contained DMR network with almost 100% emergency backup power that can provide a robust digital voice network during a disaster.

As you look at these repeater networks it is useful to understand Colorado geographical names, particular mountains, since most repeaters in Colorado are on mountain tops. Google Maps is a good

resource for identifying those. That can help you evaluate whether you will be able to reach the repeater site with your radio from your location.

Volunteers provide the labor for maintaining these repeaters, but equipment and power must be purchased. The organizations who operate these repeaters rely on and are very grateful for voluntary financial support in the form of a membership or a donation. If you use a repeater more than occasionally or you depend on that repeater for emergencies on your backcountry trip, consider sending some money their way.

Repeater Lists

RepeaterBook

An invaluable resource for identifying repeaters is the RepeaterBook. This database relies on amateurs providing updated information about their own repeaters. Note: In RepeaterBook, the input frequency is called "uplink frequency" and the output frequency is called "downlink frequency".

There is no fee to use this resource. However, donations are welcome.

The Android & Apple RepeaterBook apps will use your phone's GPS to tell you how far you are from the repeater, which can help you to judge whether you can reach the repeater with your radio.

RFinder and *The ARRL Repeater Directory*

The ARRL publishes *The Repeater Directory* on an annual basis in hardcopy. The current cost is $10. The information in the book comes from RFinder. Rfinder operates a subscription amateur repeater directory called the World Wide Repeater Directory that is accessible on the web, as an Android app, or as an Apple app. The current cost for an annual subscription is $12.99. This database relies on amateurs providing updated information about their own repeaters, so it may be out of date.

The Android & Apple RFinder apps will use your phone's GPS to tell you how far you are from the repeater, which can help you to judge whether you can reach the repeater with your radio.

The smartphone versions of both these apps are a big help to the travelling ham who wants to identify a repeater in the vicinity of their current location.

Popular Organized Amateur Radio Activities

Field Day - "Ham Radio's Open House"

http://www.arrl.org/field-day

2021: 26-27 June 2021

Additional details to be supplied soon!

Winter Field Day

https://www.winterfieldday.com/

2022: 29-30 January 2022

Mountain Amateur Radio Club Campfest

Usually the last weekend in August. More details to be announced.

28-29 August 2021

Summits on the Air

Worldwide Program: https://www.sota.org.uk/

Colorado Program: http://www.w0c-sota.org/

Colorado 14er Event: https://ham14er.groups.io/g/ham14er/wiki/

Additional details to be supplied soon!

Parks on the Air

https://parksontheair.com/

Additional details to be supplied soon!

Hamfests and Swap Meets

Calendar of upcoming hamfests and swap meets coming soon!

Amateur Radio Emergency Service (ARES)

Colorado ARES: https://coloradoares.org/

Pikes Peak ARES (Colorado Region 2 District 2) Teller and El Paso counties: https://www.ppares.net/

National ARES Program: http://www.arrl.org/ares

Additional details to be supplied soon!

Appendix: Glossary

To be supplied – coming soon!

Appendix: Useful Frequencies for Amateurs in Teller County

Abbreviations used in this table:

CMRG = Cheyenne Mountain Radio Group
COLCON = The Colorado Connection
CRA = Colorado Repeater Association
MARC = Mountain Amateur Radio Club
PPFMA = Pikes Peak FM Association
RM = Rocky Mountain Ham Radio
RMRL = Rocky Mountain Radio League
Royal Gorge ARC = Royal Gorge Amateur Radio Club

The information in this table is provided as a courtesy. It may change from time to time and the website of the sponsoring organization should always be used to verify the data.

Name	Output Freq (MHz)	Input Freq (MHz)	CTCSS (Hz)	Mode	Comment
Repeaters					
MARC Badger Mtn	146.6850	146.0850	107.2	FM	
MARC Tranquil Acres VHF	146.8200	146.2200	107.2	FM	
MARC Cripple Creek	147.0150	147.6150	107.2	FM	
MARC Colorado Springs	447.4750	442.4750	107.2	FM	
MARC Tranquil Acres UHF	448.6500	443.6500	107.2	FM	
CMRG Cheyenne Mtn	147.3450	147.9450	107.2	FM	
CMRG Badger Mtn	147.3600	147.9600	107.2	FM	
COLCON Thorodin Mtn	145.3100	144.7100	88.5	FM	
COLCON Leadville	145.4450	144.8450	88.5	FM	
COLCON Cheyenne Mtn	145.1300	144.5300	88.5	FM	
COLCON Breckenridge	147.3900	147.9900	88.5	FM	
CRA S Mtn	145.1450	144.5450	107.2	FM	
CRA Cheyenne Mtn	145.1600	144.5600	107.2	FM	
CRA Westcreek VHF	147.2250	147.8250	107.2	FM	
CRA Westcreek UHF	448.4250	443.4250	107.2	FM	
Fun Machine Westcreek	449.9750	444.9750	100.0	FM	
Fun Machine Canon City	447.9750	442.9750	100.0	FM	
Fun Machine Fremont Peak	447.2500	442.2500	100.0	FM	
PPFMA VHF	146.9700	146.3700	100.0	FM	
PPFMA UHF	448.4500	443.4500	100.0	FM	
Royal Gorge ARC Canon City	145.4900	144.8900	103.5	FM	
RMRL Evergreen	145.3400	144.7400	103.5	FM	
RMRL VHF S Mtn	146.9400	146.3400	103.5	FM	
RMRL UHF S Mtn	449.4500	445.4500	103.5	FM	
RM Almagre Mtn UHF South	446.9500	441.9500	CC7,TS2	DMR	TG 719

Name	Output Freq (MHz)	Input Freq (MHz)	CTCSS (Hz)	Mode	Comment
RM Almagre Mtn UHF Wide	446.9500	441.9500	CC7,TS1	DMR	TG 700
RM Almagre Mtn VHF East	145.2350	144.6350	CC7,TS2	DMR	TG 705
RM Almagre Mtn VHF Wide	145.2350	144.6350	CC7,TS1	DMR	TG 700
RM Badger Mtn Cent	446.7625	441.7625	CC7,TS2	DMR	TG 720
RM Badger Mtn Wide	446.7625	441.7625	CC7,TS1	DMR	TG 700
RM Breckenridge Central	445.0875	440.0875	CC7,TS2	DMR	TG 720
RM Breckenridge Wide	445.0875	440.0875	CC7,TS1	DMR	TG 700
RM Canon City South	446.7375	441.7375	CC7,TS2	DMR	TG 719
RM Canon City Wide	446.7375	441.7375	CC7,TS1	DMR	TG 700
RM Colorado Springs South	445.0625	440.0625	CC7,TS2	DMR	TG 719
RM Colorado Springs Wide	445.0625	440.0625	CC7,TS1	DMR	TG 700
RM Devilshead Local	446.9250	441.9250	CC8,TS2	DMR	TG 711
RM Devilshead South	446.9250	441.9250	CC8,TS1	DMR	TG 719
RM Leadville Central	445.0500	440.0500	CC7,TS2	DMR	TG 720
RM Leadville Wide	445.0500	440.0500	CC7,TS1	DMR	TG 700
RM S Mtn Central	446.9375	441.9375	CC7,TS2	DMR	TG 720
RM S Mtn Wide	446.9375	441.9375	CC7,TS1	DMR	TG 700
RM Thorodin Central	446.8000	441.8000	CC7,TS2	DMR	TG 720
RM Thorodin Wide	446.8000	441.8000	CC7,TS1	DMR	TG 700
RM Westcreek Central	446.8750	441.8750	CC6,TS2	DMR	TG 720
RM Westcreek Wide	446.8750	441.8750	CC6,TS1	DMR	TG 700
Simplex Channels					
UHF001 440.7000	440.7000	440.7000		FM	
UHF002 440.7250	440.7250	440.7250		FM	
UHF003 440.7500	440.7500	440.7500		FM	
UHF004 440.7750	440.7750	440.7750		FM	
UHF005 440.8000	440.8000	440.8000		FM	
UHF006 440.8250	440.8250	440.8250		FM	
UHF007 440.8500	440.8500	440.8500		FM	
UHF008 440.8750	440.8750	440.8750		FM	
UHF009 440.9000	440.9000	440.9000		FM	
UHF010 440.9250	440.9250	440.9250		FM	
UHF011 440.9500	440.9500	440.9500		FM	
UHF012 440.9750	440.9750	440.9750		FM	
UHF013 441.0000	441.0000	441.0000		FM	
UHF014 441.0250	441.0250	441.0250		FM	
UHF015 441.0500	441.0500	441.0500		FM	
UHF016 441.0750	441.0750	441.0750		FM	
UHF017 441.1000	441.1000	441.1000		FM	
UHF018 441.1250	441.1250	441.1250		FM	

Name	Output Freq (MHz)	Input Freq (MHz)	CTCSS (Hz)	Mode	Comment
UHF019 441.1500	441.1500	441.1500		FM	
UHF020 441.1750	441.1750	441.1750		FM	
UHF021 441.2000	441.2000	441.2000		FM	
UHF022 441.2250	441.2250	441.2250		FM	
UHF023 441.2500	441.2500	441.2500		FM	
UHF024 441.2750	441.2750	441.2750		FM	
UHF025 445.7000	445.7000	445.7000		FM	
UHF026 445.7250	445.7250	445.7250		FM	
UHF027 445.7500	445.7500	445.7500		FM	
UHF028 445.7750	445.7750	445.7750		FM	
UHF029 445.8000	445.8000	445.8000		FM	
UHF030 445.8250	445.8250	445.8250		FM	
UHF031 445.8500	445.8500	445.8500		FM	
UHF032 445.8750	445.8750	445.8750		FM	
UHF033 445.9000	445.9000	445.9000		FM	
UHF034 445.9250	445.9250	445.9250		FM	
UHF035 445.9500	445.9500	445.9500		FM	
UHF036 445.9750	445.9750	445.9750		FM	
UHF037 446.0000	446.0000	446.0000		FM	National Calling Frequency
UHF038 446.0250	446.0250	446.0250		FM	
UHF039 446.0500	446.0500	446.0500		FM	
UHF040 446.0750	446.0750	446.0750		FM	
UHF041 446.1000	446.1000	446.1000		FM	
UHF042 446.1250	446.1250	446.1250		FM	
UHF043 446.1500	446.1500	446.1500		FM	
UHF044 446.1750	446.1750	446.1750		FM	
UHF045 446.2000	446.2000	446.2000		FM	
UHF046 446.2250	446.2250	446.2250		FM	
UHF047 446.2500	446.2500	446.2500		FM	
UHF048 446.2750	446.2750	446.2750		FM	
VHF001 146.4000	146.4000	146.4000		FM	
VHF002 146.4150	146.4150	146.4150		FM	
VHF003 146.4300	146.4300	146.4300		FM	
VHF004 146.4450	146.4450	146.4450		FM	
VHF005 146.4600	146.4600	146.4600		FM	
VHF006 146.4750	146.4750	146.4750		FM	
VHF007 146.4900	146.4900	146.4900		FM	
VHF008 146.5050	146.5050	146.5050		FM	

Name	Output Freq (MHz)	Input Freq (MHz)	CTCSS (Hz)	Mode	Comment
VHF009 146.5200	146.5200	146.5200		FM	National Calling Frequency
VHF010 146.5350	146.5350	146.5350		FM	
VHF011 146.5500	146.5500	146.5500		FM	
VHF012 146.5650	146.5650	146.5650		FM	
VHF013 146.5800	146.5800	146.5800		FM	National Adventure Frequency
VHF014 146.5950	146.5950	146.5950		FM	
VHF015 147.4200	147.4200	147.4200		FM	
VHF016 147.4350	147.4350	147.4350		FM	
VHF017 147.4500	147.4500	147.4500		FM	
VHF018 147.4650	147.4650	147.4650		FM	
VHF019 147.4800	147.4800	147.4800		FM	
VHF020 147.4950	147.4950	147.4950		FM	
VHF021 147.5100	147.5100	147.5100		FM	
VHF022 147.5250	147.5250	147.5250		FM	
VHF023 147.5400	147.5400	147.5400		FM	
VHF024 147.5550	147.5550	147.5550		FM	
VHF025 147.5700	147.5700	147.5700		FM	
VHF026 147.5850	147.5850	147.5850		FM	

Notes

1. A special radio, capable of the DMR mode, is required to use the DMR repeaters.
2. Many repeaters are linked to other repeaters managed by the same club or to very large national and global networks. Some links are static (in place all the time), others are scheduled for short periods (usually to facilitate nets) and others are on-demand (established by the user). This is completely under the control of each sponsoring club. You should refer to the club's website for additional information.
3. The location "S Mtn" is listed on maps "Squaw Mtn". Since that word is a slur, we have replaced it in our documents with "S".

Notes