

## TRBO (DMR) Network

November 6, 2013

Rocky Mountain Ham Radio has installed and operates a network of Motorola MotoTRBO radios across the Colorado Front Range in cooperation with partner organizations. MotoTRBO conforms to the worldwide Digital Mobile Radio (DMR) standard. We hope to continue expanding this network in the future

The network is currently configured into several ‘talk groups’ as depicted on the Radio Site information tab on the Rocky Mountain Ham Radio web page ([www.rmham.org](http://www.rmham.org)). While the term “talk group” has a specific meaning when referring how users share frequencies on a trunked radio system (and which users talk to which other users), for the purposes of the RMHam system, it is how repeaters are grouped together to form a network that covers a broad region of Colorado.

There are four primary geographic groupings:

- South (Monument Hill and points south)
- Denver (Monument Hill north to Boulder and Southern Weld)
- North (Larimer, Weld, Morgan and Northern Boulder County)
- Colorado (All of the above regions grouped together)

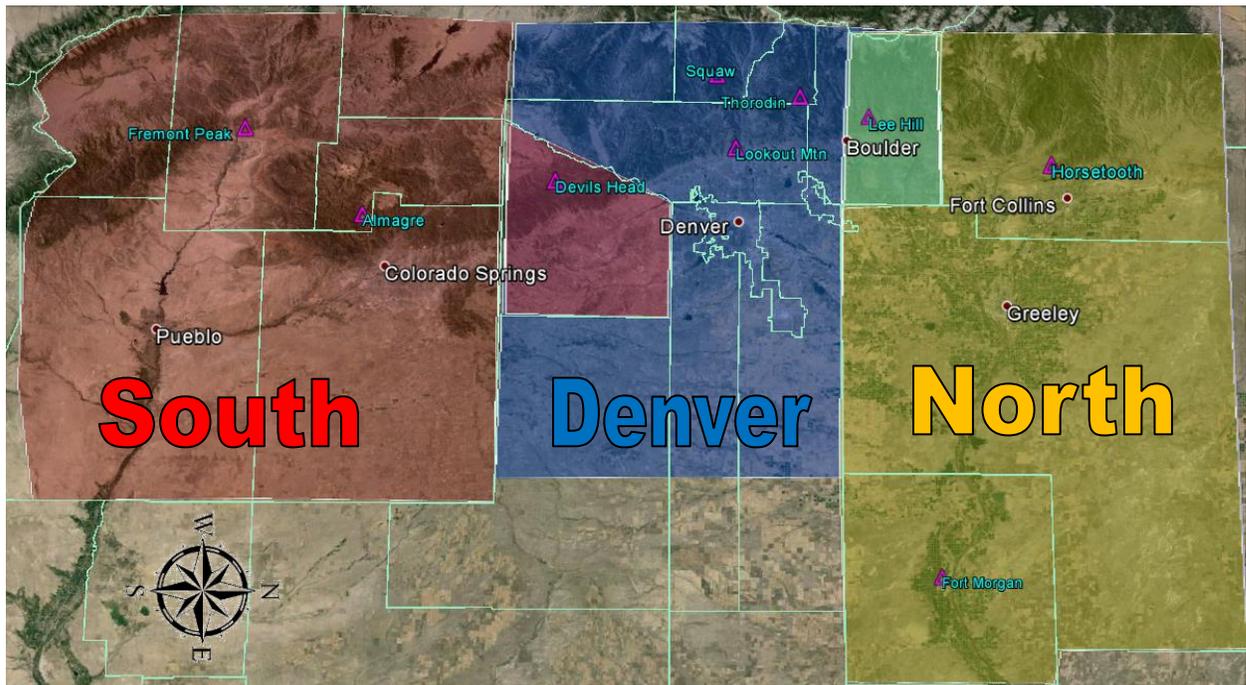


Figure 1: RMHam TRBO Network - Zone Description

This map does not depict repeater coverage area; it is rather the primary geographical service area of each regional network. Note that Douglas County overlaps both South and Denver regions, and Boulder County overlaps Denver and North.

**Generic Codeplug**

The RMHAM Generic codeplug for TRBO UHF radios is organized by coverage region and repeater site for the digital network. Analog services are grouped by use or owner (such as RMHAM or EMCOMM). The Zones for handheld or mobile radios in the generic codeplug are as follows:

- TRBO Denver
- TRBO North
- TRBO South
- TRBO RMHAM All
- DMR – MARC
- RMHAM Analog
- SX Analog (Simplex)
- SX Analog NB (Narrowband Simplex)
- SX Digital
- EMCOMM
- TRBO-Misc Denver
- Portable Repeaters
- HAM 447
- HAM 448
- HAM 449
- RMHR ROAM

**TRBO Denver, North, South**

Each of these groups allow users to select the zone where they wish to communicate (Denver, North, South). Within each zone, the repeater sites that provide service within the zone are listed as individual channels. Note that Colo (Colorado Wide) is also available to be selected from each zone. Example:

**TRBO Denver**

<u>Channel</u>	<u>Repeater Site</u>	<u>Region</u>
1	Thorodin	Colorado
2	Thorodin	Denver
3	Squaw	Colorado
4	Squaw	Denver
5	Lookout	Local *
6	Lookout	Denver
7	Lee	Colorado
8	Devils	Denver
9	Trailer	Colorado
10	Trailer	Denver

Making a call using Zone ‘TRBO Denver’, channel 1 (labeled “Thorodin Colo”) will be transmitted to the Colo Wide repeaters which include Thorodin, Lee, Squaw, Horsetooth, Fort Morgan, Almagre and Fremont. Making a call on channel 2, will only be transmitted to the “Denver Region” repeaters: Thorodin, Squaw, Lookout and Devils Head. It also transmits to Lookout Mountain’s VHF frequency. Each of the TRBO regional zones functions in a similar manner. There are two special cases for which users should take note: first; in the TRBO Denver zone, channel 5 is for Lookout Local. This repeater slot will only retransmit on Lookout and can be used for local communications. Second: Devil’s head does not have a Colo Wide slot—and only participates in the South regional and Denver regional networks. See the description on the RMHam.org website (MotoTRBO section) for more details of talk groups, regional coverage and repeaters.

### **TRBO RMHAM ALL**

This zone will allow users to scan all TRBO repeaters regardless of the user’s location and can access any repeater that is currently within range.

### **DMR-MARC**

This zone will access all digital repeaters that participate in the DMR-MARC network. This includes repeaters that are not part of the RMHam network. When accessing non-RMHam repeaters, users should be aware of and follow the guidelines established by the repeater owner. All users should ensure they are using a DMR-MARC assigned Radio ID prior to accessing the DMR-MARC network. See the DMR-MARC website for the process to obtain a DMR-MARC Radio ID. The characters at the end of the listing (D), (N), or (S) indicates the region where the repeater is located: Denver, North or South. This is RMHam’s designation and not necessarily used by the repeater owner.

### **RMHam Analog**

This zone accesses the Rocky Mountain Ham Radio analog UHF repeaters. Each channel depicts the repeater site name and the frequency. More information on RMHam analog repeaters can be found on the RMHam.org web site.

### **SX Analog**

This zone contains eight (8) of the analog simplex frequencies used in Colorado. Each frequency is listed once using carrier squelch (no tone) and once using a 141.3 Hz CTCSS.

### **SX Analog NB**

This zone contains five (5) analog simplex Colorado frequencies using narrowband FM (12.5Khz). RMHam members practice more efficient use of spectrum when communicating with each other using radios with narrowband capabilities. Each frequency is listed once using carrier squelch and once using a Digital PL (DPL) tone.

### **SX Digital**

This zone contains nine (9) digital simplex frequencies used in Colorado. These frequencies utilize narrowband techniques and digital encoding for spectrum efficiency and excellent digital voice quality.

## EMCOMM

This zone contains the frequencies used by EmComm Colorado's "525" repeater system. Please consult the instructions for using this system at:

[http://coloradoares.org/forms/emcomm\\_trifold.pdf](http://coloradoares.org/forms/emcomm_trifold.pdf)

## TRBO-Misc Denver

This zone contains digital TRBO/DMR radios that are stand-alone or otherwise non-affiliated with the RMHam or DMR-MARC networks. As new repeaters in this category become known, we will endeavor to include them in our codeplug as well as create a "North" and "South" zone when appropriate.

## Portable Rptrs

This zone contains frequencies for portable repeaters and links used by RMHam members.

## RMHR ROAM

This zone permits users to roam in each of the regional zones and the user's radio should select the correct/optimal repeater based on the user's current location. For more information, see the section on Roaming below.

## HAM 447, 448, 449

These zones hold the frequencies for various analog Amateur Radio repeaters across the Front Range of Colorado. The zone name, e.g. HAM 448 indicates the frequencies of the repeaters in this zone all begin with "448." Of note is the 448.200 machine in Fort Morgan which is coordinated as a multi-mode machine—capable of operating DMR, analog conventional and analog narrowband. This repeater can be accessed in the TRBO North zone when using digital, or in this zone select 448.200 Narrow when using analog narrowband, or 448.200 141.3 when using analog conventional. Information about the repeaters in these zones is in the chart below.

Channel	447	Tone	Location	Owner	448	Tone	Location	Owner	449	Tone	Location	Owner
1	447.125	91.5	Horsetooth	K7PFJ	448.025	100.0	Loveland	NCARC	449.050	107.2	Squaw	WGON
2	447.150	107.2	Conifer	CRA	448.075	123.0	Guy Hill	WOIG	449.125	103.5	Devils Hd	RMRL
3	447.175	186.2	Lookout	WA2YZT	448.125	107.2	Lookout	NOPYY	449.350	100.0	Squaw	DRC
4	447.225	103.5	Portable	RMHAM	448.200	Narrow	Ft Morgan	WOFT	449.450	103.5	Squaw	RMRL
5	447.225	141.3	Critchell	RMHAM	448.200	141.3	Ft Morgan	WOFT	449.525	100.0	Douglas Mtn	KEOSJ
6	447.275	100.0	Horsetooth	NCARC	448.225	141.3	Squaw	RMHAM	449.600	100.0	Waterton	DRL
7	447.350	151.4	Cedr Hts	GGARC	448.450	100.0	Pikes Pk	PPFMA	449.625	141.3	Lookout	WOKU
8	447.450	123.0	Horsetooth	WOIG	448.475	100.0	Greeley	WARS	449.650	136.5	Squaw	CARN
9	447.500	88.5	Conifer	ARA	448.500	100.0	Smoky Hill	CRRG	449.725	127.3	UNC Campus	KOOJ
10	447.650	141.3	Evergreen	ACOKQ	448.625	100.0	Green Mtn	DRC	449.750	103.5	Guy Hill	RMRL
11	447.700	100.0	Buckhorn	NCARC	448.675	100.0	Squaw	WOFCI	449.800	123.0	Estes Park	EVARC
12	447.750	141.3	Lee Hill	RMHAM	448.700	146.2	Centennial	WQ8M	449.825	103.5	RM Airport	RMRL
13	447.825	Narrow	Lakewood	DRC	448.850	88.5	Guy Hill	KOIBM	449.850	100.0	CSU Campus	WDOGCK
14	447.925	100.0	Cañon Cty	KOJSC	448.900	100.0	NCAR	BARC	449.875	103.5	Eldorado	RMRL
15	447.975	107.2	Lee Hill	CRA	448.975	123.0	Blue Mtn	WOGV				
16					448.975	100.0	DIA	WOGV				

Figure 2: RMHam Generic Codeplug – Analog Repeaters

## Loading the Generic Codeplug

Most radio owners already have a codeplug that is personalized. Use the cut & paste method to merge data from the generic codeplug to your own. Depending on the amount of personalization, you may either start with your codeplug and copy data from the generic into your codeplug, or start with the generic and copy your personal data into it. If you start with the generic codeplug, or a codeplug from a different radio than the one you plan to program, you will need to CLONE the codeplug as opposed to using the WRITE function. Open both your own (or other baseline) codeplug and the RMHam Generic codeplug and arrange the windows side-by-side:

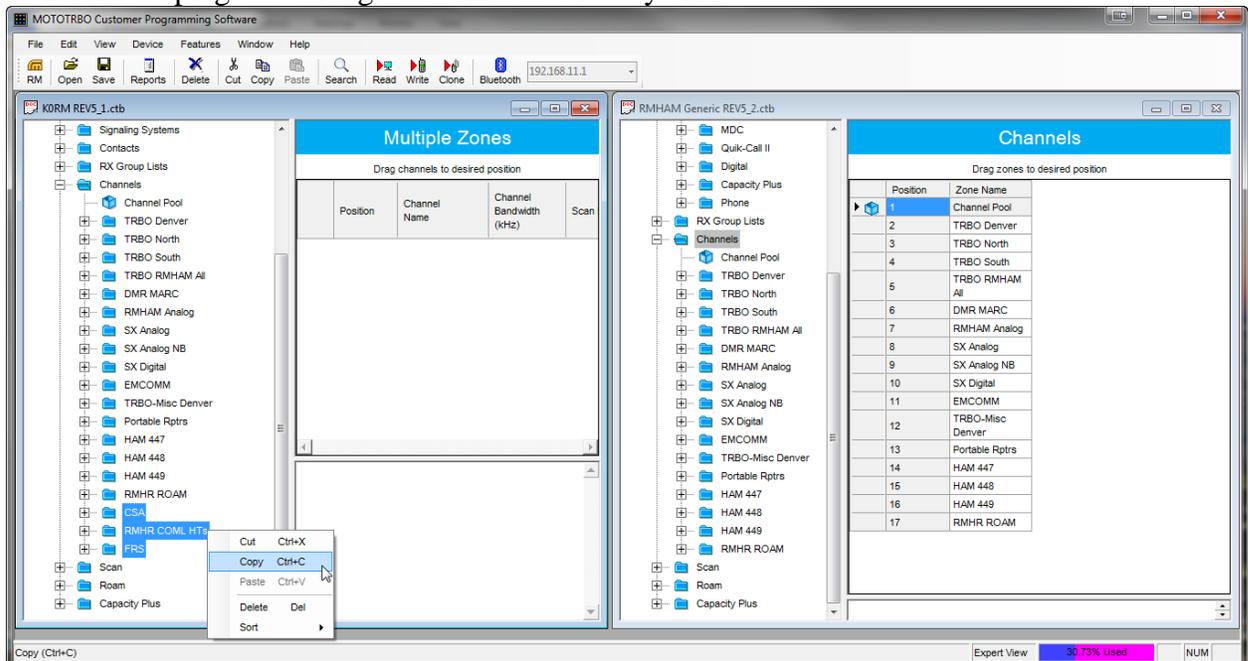


Figure 3: CPS Cut and Paste

In this example, data from the existing codeplug (on the left) is being copied over to the new generic codeplug (on the right). The existing codeplug contains personal zones that are not in the generic. One or more zone(s) can be individually selected (CNTL+ click); then right-click on the highlighted entries and select “Copy”. Move to the “Channels” entry on the new codeplug, right-click to highlight, and select “Paste”. All of the data from the selected zones in the existing codeplug will be copied into the new codeplug. When finished copying data, close the left window (codeplug) and prepare to Clone the new codeplug to your radio. Ensure your programming cable is connected and your computer can ‘see’ your radio (it must be turned on). Click on the ‘Clone’ button. It is suggested that as soon as the CLONE programming is complete, you immediately READ the data back to the CPS software and save it as your own callsign/codeplug version. If you need to make minor changes or other custom updates (such as button assignments or adding your own frequencies to an existing zone) you can now use this new personalized version of the codeplug. It is important not to interrupt the clone, read, or write process so ensure you have a good connection, your radio is on and the battery is sufficiently charged.

## **Roaming**

Roaming is the term applied to the radio when it is automatically searching a list of channels and selecting the one with the best received signal strength indicator (RSSI). This is different than scanning, which is the radio looking at all of the channels in a particular zone and 'stopping' when activity is detected on a channel. When activity ceases, the radio resumes scanning.

Roaming is a different activity. A separate zone, RMHR ROAM, exists to permit the radio to determine which channel in the group is sending the best signal. The assumption is that all channels in the roam group are transmitting an identical signal and the radio will automatically select which one has the highest quality. When the RSSI drops below the established threshold the radio will switch to whichever channel in the group has the highest RSSI. This permits users to travel throughout the area and not be concerned where they are with respect to a specific repeater. The user selects which group (North, South, Denver or Colorado) is desired for communications and radio will automatically seek and lock on the best signal available.

## **Help**

If any assistance is needed in setting up a codeplug, loading a codeplug into a radio or answering any questions, please contact the individuals below.

Mike Davey, NØVBY            n0vby at arrl.net

Jeff Ryan, KØRM            k0rm at comcast.net