

Devil's Head	Function	Tactical Designator	447.525 TX CTCSS TX	442.525 RX CTCSS RX	Timeout Seconds
General Operations	Operations	525 Alpha	146.2	146.2	240
CDEM Comm Support Group / District Ø	Tactical Callout	525 Charlie	156.7	156.7	60
District 22 Arapahoe County	Tactical Callout	525 Delta	114.8	114.8	60
District 23 Jefferson County	Tactical Callout	525 Echo	100.0	100.0	60
District 24 Douglas / Elbert Counties	Tactical Callout	525 Foxtrot	107.2	107.2	60
District 27 Adams County	Tactical Callout	525 Golf	127.3	127.3	60
District 13 Denver County	Tactical Callout	525 Hotel	131.8	131.8	60
District 14 El Paso County	Tactical Callout	525 India	192.8	192.8	60
District 6 Park County	Tactical Callout	525 Juliet	173.8	173.8	60
Douglas County Search and Rescue	Tactical Callout	525 Kilo	88.5	88.5	60
EmComm Colorado Admin	Administration	525 Lima	186.2	186.2	240
Reservoir Tower (SMFRA)	Function	Tactical Designator	447.525 TX CTCSS TX	442.525 RX CTCSS RX	Timeout Seconds
General Operations	Operations	525 Bravo	146.2	203.5	240

Note the split tone on this repeater. Users without radios capable of split Tx/RX tones should program their radios to encode only on the repeater's RX tone.

Users should note that the Time Out Timer (TOT) is set very short on tactical callout tones. This is to discourage use of the tone for anything other than short tactical communication. The General Operations tone of 146.2 intentionally is set for a very long Time Out to facilitate use of the repeater for scheduled and spontaneous nets.

## USAGE PRIORITIES

The system has the following usage priorities, listed in descending order of priority:

1. Colorado Division of Emergency Management during periods of actual activation or standby for activation. The system will be the primary operations channel for the CDEM support group and for inter-district coordination.
2. During a multi-jurisdiction incident the system may be used as an inter-district coordination channel.
3. By any individual A.R.E.S.<sup>®</sup> District or other emergency response organization during an actual emergency incident located within a geographic boundary for which this system offers a distinct propagation advantage. E.g. A forest fire in the Pike National Forest where this system may provide the only reliable amateur communication in the area.
4. By any A.R.E.S.<sup>®</sup> District or other emergency response organization during an actual emergency incident, whether or not the distinct propagation characteristics of this system are advantageous.
5. By any A.R.E.S.<sup>®</sup> District or amateur radio organization providing communication support for a planned event within the coverage pattern of the system. E.g. Bailey 100 Bike Race. (Event planners should contact the trustee as early as possible to secure priority usage of the system. The trustee reserves the right to allocate priority usage in the overall public interest consistent with the primary mission of the system and EmComm Colorado, Inc.)
6. By any A.R.E.S.<sup>®</sup> District or emergency response organization wishing to use the system for regularly scheduled nets should contact the trustee for availability clearance.)
7. All other permissible uses.

## ARRL REPEATER LISTINGS

The 525 repeaters will be listed in the ARRL's published repeater directory and other published directories. Due to the unique configuration of the Reservoir repeater with a split tone configuration, and because of agreed upon usage guidelines between EmComm Colorado Inc. and the South Metro Fire Rescue Authority, the Reservoir site will be listed in the directory as a "Closed" system. The Devil's Head repeater system will be listed as an "Open" repeater. Members of an A.R.E.S. District, R.A.C.E.S. unit, or other organized emergency response organization are authorized access to the Reservoir system by virtue of their status in those organizations.

## FURTHER INFORMATION

Further information, requests for clarification of these guidelines, or requests for scheduling use of the system may be directed to:

**EmCommColorado@comcast.net**

August 2010

# EmComm Colorado Inc.

*Communications with a Mission<sup>SM</sup>*

## "525" Repeater Policies

### OVERVIEW

EmComm Colorado Inc. (EmComm) is an organization formed in response to a perceived need for reliable short-range 2-way communications in support of emergency communications, sometimes referred to as "emcomm". This support of emcomm needed to be without reliance on various other, or "club" repeaters in north central Colorado.

Acquisition and implementation of the 447.525 repeaters, also known as the "525 repeaters" was the first project undertaken by EmComm Colorado Inc. to fill this need.

While other local repeaters, sometimes called "club" repeaters, are a vital component of the emcomm tool box, they have certain drawbacks. For example, emergency communications can be interrupted by the routine traffic of users who tune to the emcomm frequency while unaware that it is being used for emcomm. When this occurs, the emergency radio service may have no control over the availability of the repeater, so safety of the public can therefore be endangered.

## SYSTEM CONFIGURATION

The 525 repeater system is made up of two separate repeaters to provide redundancy and seamless coverage. One repeater is located in the Pike National Forest, just west of the Devil's Head Peak. This repeater is a commercial grade full duty cycle Motorola MICOR UHF repeater with a commercial Zetron 38A repeater controller and community tone panel. The Colorado Division of Emergency Management provided a new commercial grade Telewave duplexer to connect the repeater to Andrew LM7, 1<sup>5/8</sup>" , hardline feeding a commercial Andrew 8 bay folded dipole antenna mounted atop a 60 foot tower at an elevation 9,048 feet above sea level. While obstructed to the due east by Devil's Head Peak, the site has unobstructed views of the entire Denver Metro Area, Colorado Springs and Woodland Park, and the previously underserved rural regions of West Douglas, Southeast Jefferson and Park Counties.

The second 525 repeater is located on a 100' tower with the center of the antenna 95' above ground level at the South Metro Fire Rescue Authority communications site near Rueter-Hess dam between Parker and Lone Tree / Castle Pines North. This is a commercial grade Motorola GMR1225 UHF repeater feeding a commercial grade TPL 100 watt power amplifier. The Colorado Division of Emergency Management again provided a new commercial Telewave duplexer for this site. The duplexer feeds a commercial Andrew 4 element UHF folded dipole antenna with Andrew 7/8" feedline. The antenna is mounted 48" off of the northern most leg of the triangle-shaped tower to reduce or eliminate tower null to the south.

Both sites are equipped with standby power generators on an automatic cutover switch fed by large propane tanks. Transitional power is provided by Uninterruptable Power Supplies.

## OPERATIONAL PROCEDURES AND CONSIDERATIONS

The most important consideration is that these two repeaters operate on the same coordinated frequency pair, 447.525, with a negative offset. This has negatives and positives.

The positives include an ability to monitor both repeaters without having to put a radio in scan mode. Both sites have a common PL (CTCSS) output tone of 146.2Hz. Site selection is accomplished by selecting between two input PL tones: 146.2Hz for the Devil's Head site and 203.5 for the Reservoir site. The tones are given the tactical designators Alpha and Bravo, respectively.

The Devil's Head site offers wide area coverage to the north, south and west. The Reservoir site offers superior support for portables and mobiles in the metro Denver area. It is one of the very few repeaters located on the east side of the Denver metro area. This location offers potential coverage in canyons and other areas shadowed from mountain peak repeaters along the Front Range.

It should be noted that while support for split encode and decode tones is common in commercial radios, few amateur radios will support this feature. Users of amateur gear may be forced to set the Bravo channel (Reservoir) for 203.5 Hz encode only with carrier squelch receive, while being able to set the Alpha channel for encode/decode on 146.2 Hz.

Since the coverage patterns of the two repeaters substantially overlap, users must exercise intellect and discretion in using the machines. To assist with identifying which repeater is in use, a courtesy beep has been programmed on the Devil's Head repeater. Each transmission on Devil's Head is followed by a brief beep tone. Transmissions of the Reservoir site have no beep. Cross talking the two repeaters should be avoided, if possible, because the repeater tails at the end of transmissions can overlap and cause interference. When necessary to cross-talk, be sure to let the other repeater drop prior to transmitting. Recognize also that the two machines do not have completely overlapping coverage. Not everyone who hears the Devil's Head machine may be able to hear the Reservoir machine, and vice versa. When possible, users should try to communicate using the same repeater. Nets may wish to organize themselves to take check-ins separately by repeater to avoid conflict, assuming the net control station can hear both repeaters. It might also be advisable when using a different site to identify as such when calling. E.g. "This is NØESQ on 525 Bravo."

## GENERAL USAGE POLICIES

These repeaters have, as their primary mission, support of emergency communications. They are not intended to be used for *ragchew* communications. Emergency communication groups including A.R.E.S.<sup>®</sup>, R.A.C.E.S., Salvation Army and organized Search and Rescue squads are all afforded priority access to this system.

The limitation on usage does not however mean that routine traffic may never be handled. Quite to the contrary, emcomm users are welcome to use the machines for administrative traffic, logistics, calling, nets, and training; as well as for missions, either planned or spontaneous. Routine drive-time discussions of the weather, what happened at work, or family plans for the weekend are examples of traffic that are better left to the "club" repeaters. Discussions regarding an upcoming Simulated Emergency Test, a work day at the EOC, and the like, are perfectly acceptable traffic.

Some users may wish to *park* on the channel and use it as a calling channel. It is perfectly acceptable to make contact and have a brief exchange on the system. If a longer QSO, not related to emcomm is desired, make the initial contact and suggest moving the QSO to a "club" repeater.

## TACTICAL STANDBY USE

Another feature of the 525 System is multiple PL (CTCSS) tones on the Devil's Head repeater. Community Tone Panels have been used for years by commercial radio users. A tone panel allows a repeater owner to share the repeater among multiple users without

different user groups hearing each other's traffic. This is accomplished by assigning each user, or user group, a different PL tone.

For example, commercial radios of the past were often equipped to automatically un-mute the PL squelch when the microphone was removed from its mount. Therefore, when a user from Company "A" lifted the microphone, that user's radio would revert to carrier squelch mode so the user would hear traffic if the repeater was already in use by a user from Company "B." The company "A" user would politely (in theory) wait until the frequency was clear prior to transmitting. Amateur radio receivers must be manually opened to un-mute carrier squelch and thus be able to hear other users' traffic on the repeater.

Frequently A.R.E.S.<sup>®</sup> and/or R.A.C.E.S. personnel are placed on standby when the potential for activation exists. These personnel must then "guard" a particular repeater frequency prior to the repeater being placed into formal net mode. While guarding the frequency, the personnel have no choice but to listen to routine *ragchew* or other traffic on the system. In some cases responders are at work or in other situations where monitoring superfluous traffic is problematic. These personnel are then forced to turn down their radios, which places them at risk of missing vital traffic. The 525 repeater system was implemented to eliminate this problem and address similar situations.

The tone-panel technology is an integral part of the 525 repeater and has been adapted for emcomm use in the following manner: The Denver Metro area A.R.E.S.<sup>®</sup> Districts, as well as Douglas County Search and Rescue have each been assigned distinct PL tones on the Devil's Head repeater. If one of these districts wishes to place its members on standby, district officers may request that their personnel guard 447.525 on their district's assigned tone (the Tactical Standby channel). Those responders will not hear any other traffic on the system because it will not be on their tone. If and when activation is required, that district's officer can make an announcement on the Tactical Standby channel directing responders to switch to whatever other frequency the district or organization normally uses as part of its communication plan. It goes without saying that the officer making the transmission to the personnel on standby should disable tone squelch in his radio and monitor the frequency prior to making a transmission. This will assure there is not communication being made on the repeater using an alternate tone. The following table shows the tones assigned on the repeater.

