

DMR Workshop

Colorado DMR/TRBO

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ARES R3 EC



Agenda

- DMR Basics - New to TRBO/DMR?
- DMR Resources
 - World Wide
 - Local
- Programming Basics
- Operation DOs and DON'Ts
- Resources

ARES Region 3

- ARES R3 uses UHF DMR for emergency Support – RM Ham TRBO network
 - Numerous Front Range Repeaters
 - Repeaters in Ft. Morgan and Akron
 - Looking to expand to Sterling
- RM Ham North Talkgroup available to all R3 Districts on a non-exclusive basis (more later)

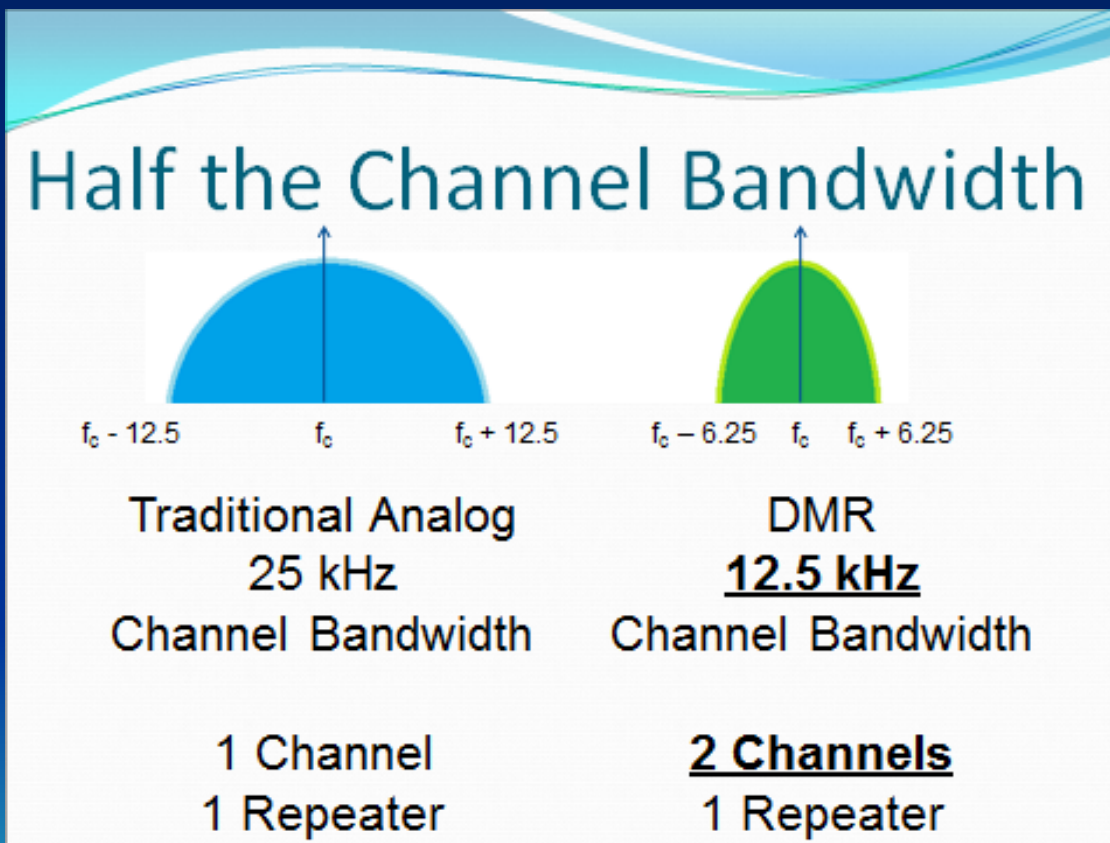


DMR (Digital Mobile Radio)

- DMR: European Telecommunications Standards Institute Standard
- Commercial radio standard and equipment adopted for Amateur use (VHF & UHF)
- DMR Association – MOU between major manufacturers to manage compatibility. Motorola TRBO is a superset of the DMR standard (Encryption and Roaming features)
- Transmission of both Voice and Data

Efficient Use of Amateur Spectrum

Two Slot System – two repeaters in one – Two Time Slots
Or “channels” in 12.5kHz Bandwidth – TDMA digital encoding



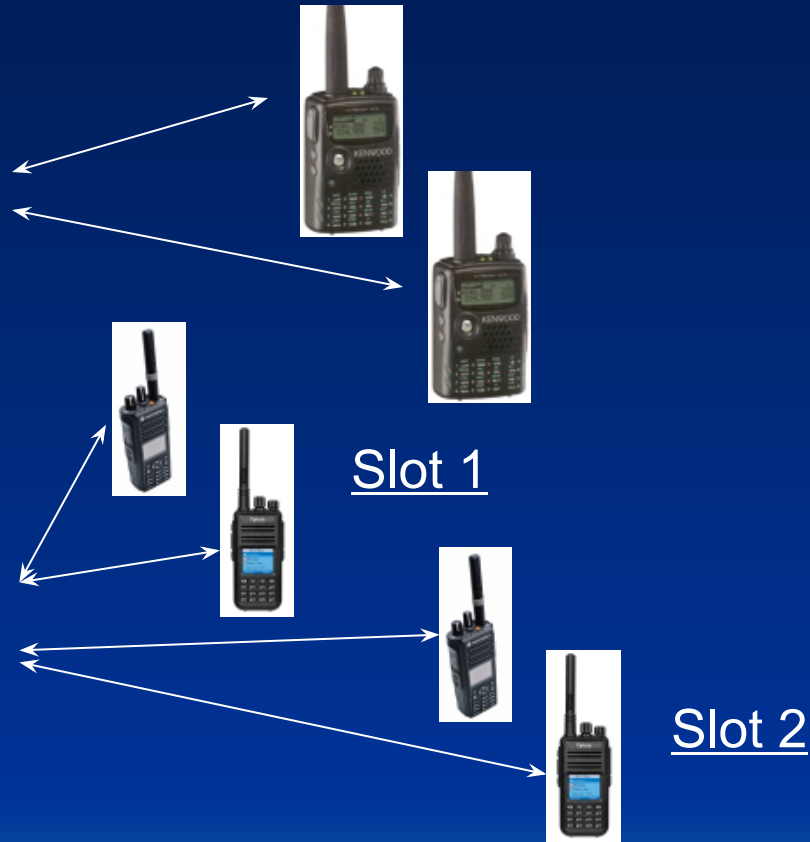
TWO Repeaters in One!



Analog Repeater



MotoTrbo/DMR Repeater



DMR: Two simultaneous channels per repeater

Commercial Equipment for Amateur Use



50+ different Manufacturers listed @
<http://dmrassociation.org/members-of-the-association/>

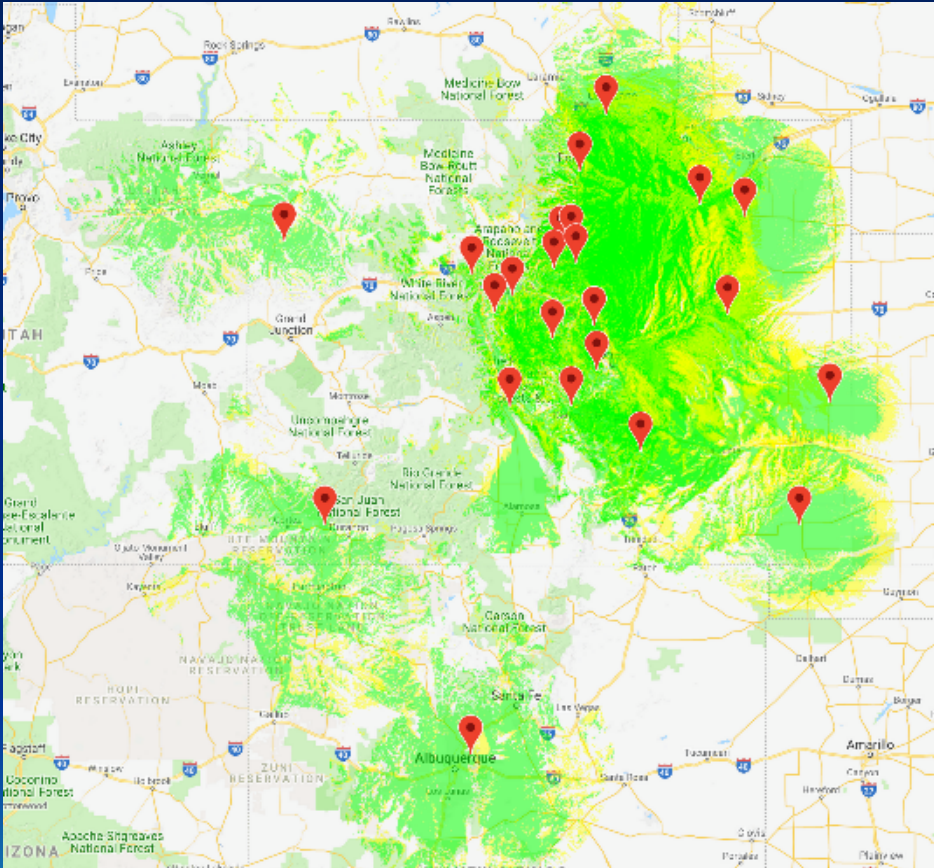
Misbehaving Radios

- As of this presentation, several new “inexpensive” DMR radios are tying up both time slots when operating. This disrupts the IPSEC network and may NOT be used until they are fixed (if possible) – they are NOT spec compliant.
- Baofeng DM5R
- TYT MD398 & Radiodity GD-55
- See Rmham.org for the updated list

Local DMR/Trbo Networks

- Mostly Motorola Repeaters
 - IP Site Connect – Repeaters Connected via IP (Private Backbone or via Internet)
 - Individual Repeater networks may be interconnected via a device called a C-Bridge
- Local Networks
 - RM Ham: <https://www.rmham.org>
 - NoCo: <http://www.w0dmr.org/>

R3 Uses the RM Ham Trbo Network 40+ Networked Repeaters



Albuquerque NM to
Cheyenne WY

Primarily UHF TRBO
with two VHF Mixed Mode
repeaters on Squaw and
Almagre
and a DMR-MARC linked
repeater on Lee Hill/Boulder

Info and Sample Code Plugs:
www.rmham.org

*Additions to map:
Granby CO*



Region 3 ARES & RM HAM

- DMR is a key operating mode for R3
 - R3 Code Plugs are available for:
 - XPR 6550
 - CS700 (Excel utility to generate CS750 and CS701A plugs)
 - TYT MD380
 - XPR 5550
- Due to planned expansion, R3 is looking at transitioning to the Sample Code Plugs found at www.rmham.org
- Podcomms with Trbo available in Fort Morgan and Stratton (K0MC EC) (including a cache of HTs)
- Portable repeater (on the air) in Fort Morgan and full time Repeater in Akron and Genoa



Digital Subscriber ID

- Required for networked communications
- Used for TRBO IPSEC repeater routing
- Geographically based:
 - Individuals: CO = 3108xxx
 - Repeaters: CO = 3108xx
 - The Colorado has run out of 3108xxx numbers - use the address below for new #s
- New Register address: <https://radioid.net>
 - Dmr-marc.net has an ID link to above



World Wide Communications

Brandmeister Network

- Subscriber Repeaters typically use Slot 1 for the International and National talk groups
 - Slot 2 is generally local talk groups
- Your Digital Subscriber/DMR-Marc ID is required to use this system
- RM Ham and NoCo have repeaters dedicated to the Brandmeister Network
- Many talkgroups supported
- Originally the DMR-Marc network
- <https://brandmeister.network/>



DMR/TRBO Operations

- User Identification (generally voice) is required as per Part 97
- Radio ID (Subscriber ID) is not legal identification – Transmits numeric data only

DOs and DON'Ts: Private Calls

- DMR radios have the ability to allow exclusive connection between two users via the contact list.
- This mode ties up the repeater without others ability to hear traffic.
- Use this mode for sensitive data and for a limited duration. (There is discussion as to the legality of this mode since it can not be monitored unless you know the subscriber ID of the individuals involved – but it is not encryption!)

DOs and DON'Ts: Encryption

- DMR supports encryption of the digital stream
 - This is usually manufacturer specific
- Programmed via CPS
- NOT ALLOWED FOR AMATEUR APPLICATIONS

DOs and DON'Ts: GPS/APRS

- DMR supports automatic GPS reporting over one time slot
- Programmed in CPS
- AGAIN, NOT ALLOWED FOR AMATEUR USE
 - NO CALL SIGN IDENTIFICATION CAPABILITY
- Note – some DMR users have been experimenting with DMR simplex and manual Identification of the GPS time slot.

Making a Call on DMR Networks

- Key up and wait for permit tone
- Make you call and add the name of the talkgroup you are using
- WA7BNG this is WØFT on North
 - This lets listeners know which system and talkgroup you are using.
 - Periodic ID required - same as analog repeaters

Some Basic Programming Terms

- Code Plug - Radio Programming File
- Digital Subscriber IDs (Colorado is 3108xxx)
- Talkgroups & Contacts
- Slots (time slots 1&2)
- Color Codes
- Zones
- Channels
- Scan Groups
- Roam Groups
- Receive Groups
- Talkaround
- IPsite Connect

Programming Introduction

- Start with the sample code plugs from www.rmham.org or R3 Code plug from WØFT, modify & add as required or desired.
- Connect Systems & Tytera CPS
- Motorola CPS
- See Rmham.org for the latest supported Radios

CS700 & MD380 Programming

- General Setting
- Menu Item – *Talkaround*
- Buttons
- Digital Contact (same as Moto Contacts)
- Digital RX Group Call (Moto Rx Group Lists)
- Zone Information
- Scan List
- Channel Information (Repeaters)

General Settings

CS700 - [General Setting]

File Edit Program Setting View Window Help

Be sure to manually place
Your info for Name and ID

CS700

- Basic Information
- General Setting
- Menu Item
- Buttons Definitions
- Text Message
- Privacy Setting
- Digit Emergency System
- Digital Contact
- Digital RX Group Call
- Zone Information
- Scan List
- Channel Information
- DTMF Signaling

Save

Save Preamble

Save Mode Receive

Alert Tone

Disable All Tone

CH Free Indication Tone

Talk Permit Tone Analog & Digital

Call Alert Tone Duration[s] Continue

Scan

Scan Digital Hang Time[ms] 4000

Scan Analog Hang Time[ms] 4000

Lone Worker

Lone Worker Response Time[min] 1

Lone Worker Reminder Time[s] 10

Power On Password

Password and Lock Enable

Power On Password 00000000

Radio Name W0FT

Radio ID 3108102

Monitor Type Open Squelch

VOX Sensitivity 3

TX Preamble Duration[ms] 960

RX Low Battery Interval[s] 120

Programming Password

Disable All LEDs

Talkaround

Group Call Hang Time[ms] 3000

Private Call Hang Time[ms] 4000

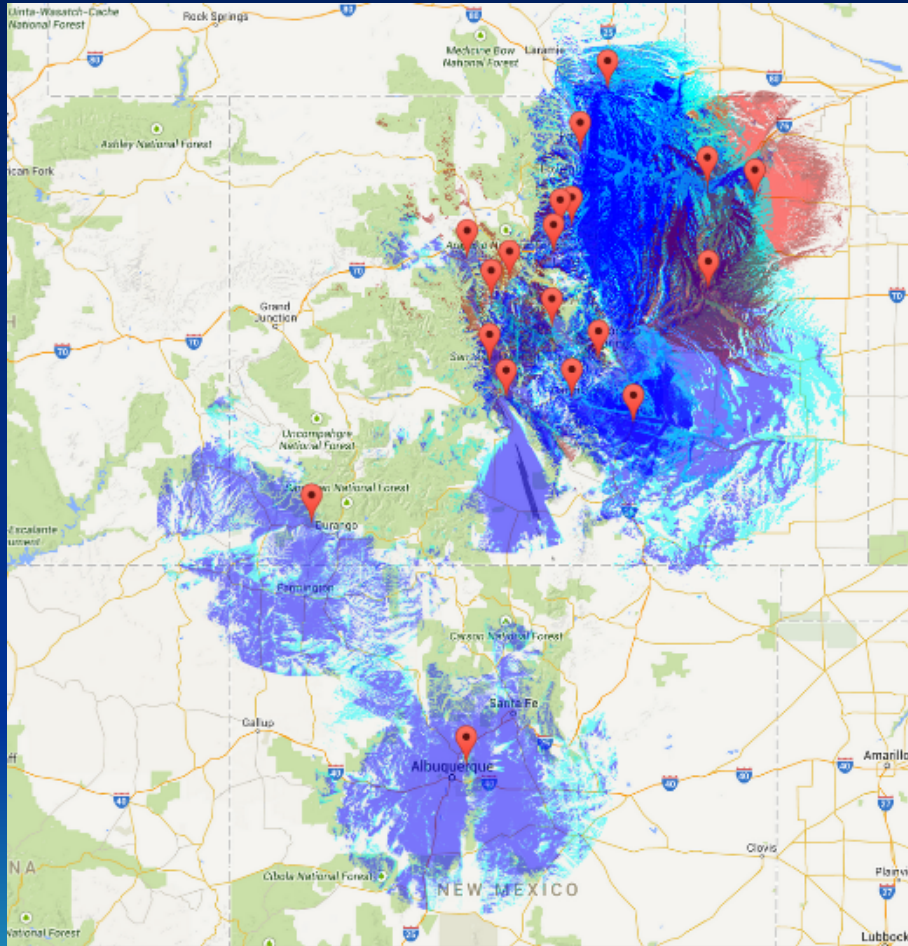
CS700 Radio Programming Software Copyright : CONNECT SYSTEMS INC. 400MHz - 470.0MHz 16-01-15 07:00

Digital Contact Menu

- Group Call
 - ID for Talkgroups – like a party line
 - Examples:
 - RM Ham Colorado talkgroup:
 - 700 – Rocky Mountain (whole system, slot 1)
 - 719 – South (Slot 2)
 - 720 – Central (Slot 2)
 - 721 – North (Slot 2)
 - DMR-MARC – Group Call numbers 1,2,3, etc.
- Private Call
 - Individual subscriber IDs or contacts
 - Associates the transmitted ID to a call sign and name within your radio – Mainly DMR-MARC IDs (see DMR-MARC slide)

RM Ham System Talkgroups

700 - Rk Mtn

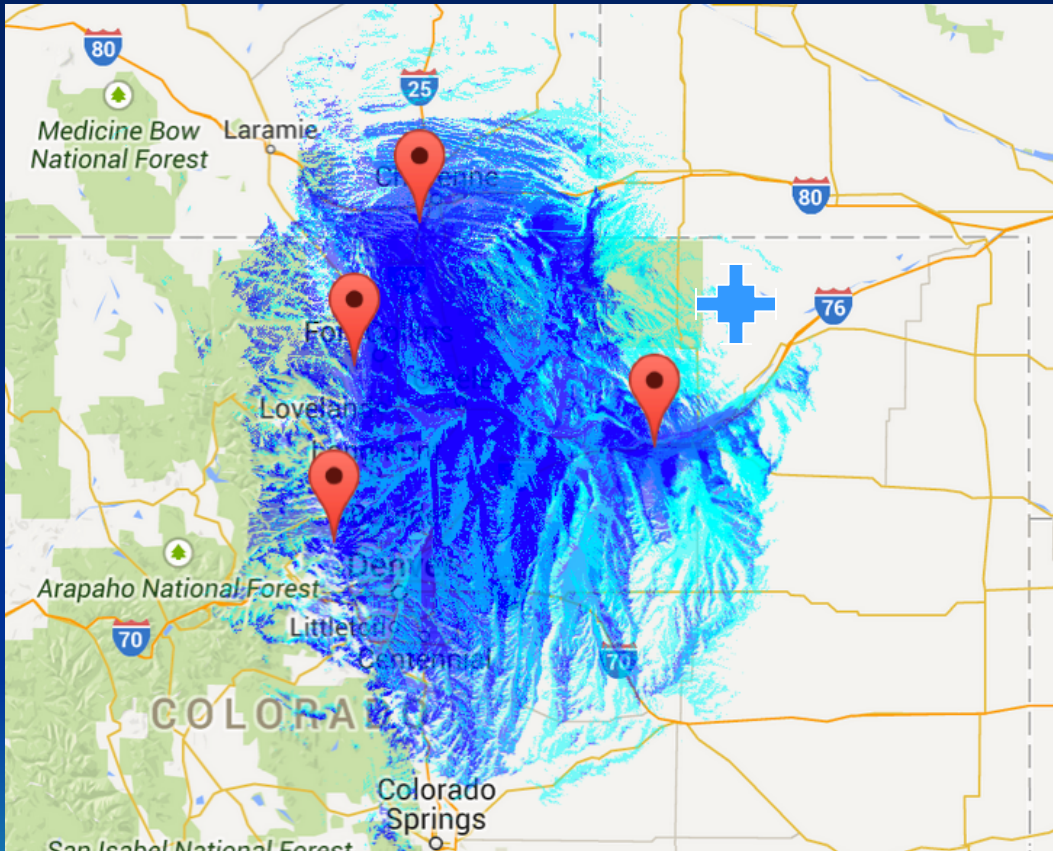


- Rk Mtn Talkgroup
 - Rocky Mountain Wide
 - Entire linked system
 - Formerly Colo Wide
 - Slot 1

RM Ham System Talkgroups

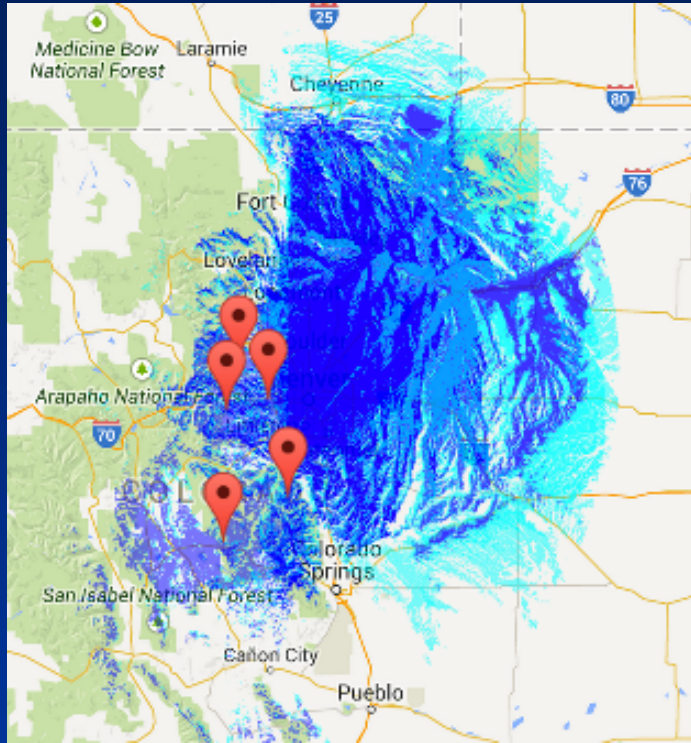
721 - North

- North Talkgroup
 - North of Denver
 - Slot 2

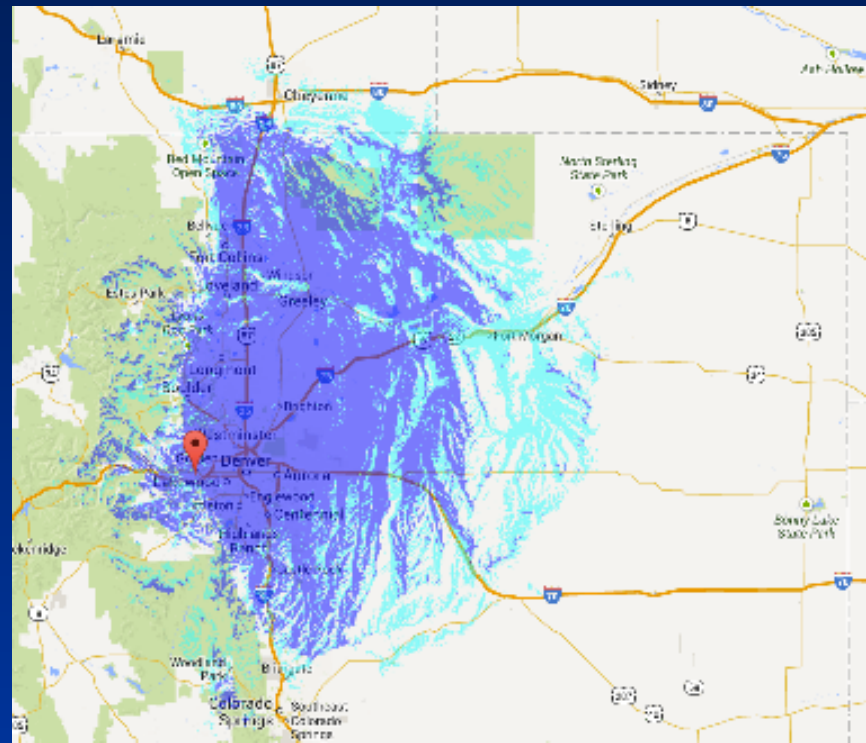


RM Ham System Talkgroups

720 - Central



UHF

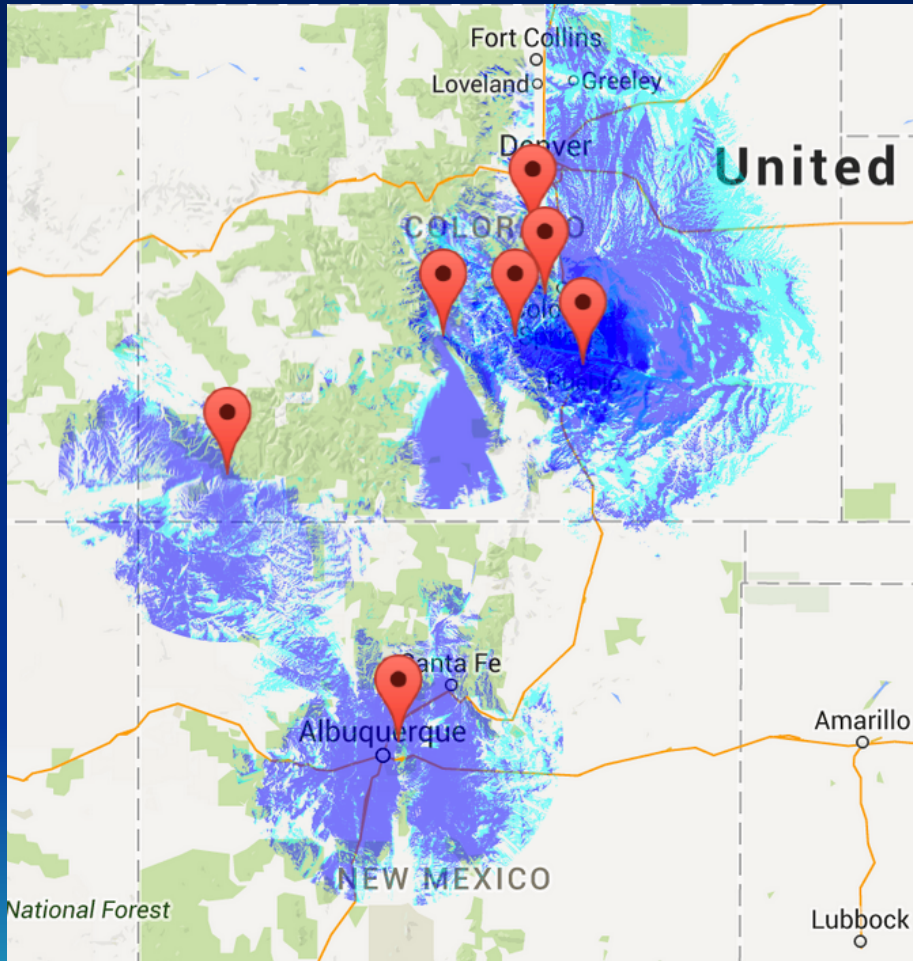


VHF

- Central Talk Group Denver Area, Slot 2, formerly “Denver”

RM Ham System Talkgroups

719 - Rk Mtn



- Southern Talkgroup
 - South of Denver
 - Slot 2

RM Ham System Talkgroups For Brandmeister

Dedicated DMR-MARC Repeaters:

Boulder – Lee Hill and Cheyenne

- 1 – DMR-MARC World Wide
- 2 – DMR-MARC Local
- 3 - DMR-MARC North America
- 13- DMR-MARC World Wide English Speaking

Digital Contacts – Group (talkgroups) and Private (individuals)

CS700 - [Digital Contact]

File Edit Program Setting View Window Help

CS700

- Basic Information
- General Setting
- Menu Item
- Buttons Definitions
- Text Message
- Privacy Setting
- Digit Emergency System
- Digital Contact**
- Digital RX Group Call
- Zone Information
- Scan List
- Channel Information
- DTMF Signaling

No.	Contact Name	Call Type	Call ID	Call Receive Tone
1	DMR-M WW	Group Call	1	Yes
2	DMR-M LCL	Group Call	2	Yes
3	DMR-M NA	Group Call	3	Yes
4	DMR-M MTN	Group Call	3177	Yes
5	NoCo Net 3171	Group Call	3171	Yes
6	Colorado	Group Call	700	Yes
7	Lookout Local	Group Call	710	Yes
8	South	Group Call	719	Yes
9	Central	Group Call	720	Yes
10	North	Group Call	721	Yes
11	Cheyenne Local	Group Call	100	Yes
12	All Call	All Call	16777215	Yes
13	DMR-MARC WW ENG	Group Call	13	Yes
14	RMHAM Generic CP	Private Call	999	No
15	DMR-MARC Simplex	Group Call	99	No
16	NR2Y Marinus	Private Call	3108001	No
17	WA2VZT Paul	Private Call	3108002	No

Add Delete

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Receive Groups

- Allows monitoring* of multiple Talkgroups (Group Calls)
- Each RX Group can only monitor channels on the same time slot
- Name the RX group, Enter the Talkgroups desired and add this name to the Receive Contact box in the Repeater Channel

* Receive function only – Channel Transmit Contact info must be on active Talkgroup to transmit



Rx Groups let you monitor multiple Talkgroups on the same Slot

The screenshot shows the CS700 Radio Programming Software interface. The window title is "CS700 - [Digital RX Group Call]". The menu bar includes File, Edit, Program, Setting, View, Window, and Help. The toolbar contains icons for file operations and a help icon. On the left, a tree view shows the "Digital RX Group Call" folder expanded, with "DMR World Wide" selected. The main area displays the "Group List Name" as "DMR World Wide". Below this, there are two panes: "Available Contact" and "Contact Member". The "Available Contact" pane lists: DMR-M LCL, DMR-M MTN, NoCo Net 3171, Colorado, Lookout Local, South, Central, North, Cheyenne Local, and DMR-MARC Simplex. The "Contact Member" pane lists: DMR-M WW, DMR-MARC WW ENG, and DMR-M NA. Between the panes are "Add>>" and "<<Delete" buttons. At the bottom, there are navigation buttons: "1 of 14", "<", "<<", ">>", ">|", "Add", and "Delete". The status bar at the bottom shows "CS700 Radio Programming Software", "Copyright : CONNECT SYSTEMS INC.", "400MHz - 470.0MHz", and "01-15".

Group List Name: DMR World Wide

Available Contact:

- DMR-M LCL
- DMR-M MTN
- NoCo Net 3171
- Colorado
- Lookout Local
- South
- Central
- North
- Cheyenne Local
- DMR-MARC Simplex

Contact Member:

- DMR-M WW
- DMR-MARC WW ENG
- DMR-M NA

Buttons: Add>>, <<Delete

Navigation: 1 of 14, <, <<, >>, >|, Add, Delete

Status: CS700 Radio Programming Software, Copyright : CONNECT SYSTEMS INC., 400MHz - 470.0MHz, 01-15

More on multiple
Talkgroups later.....

Zones are just a grouping of Channels (Digital & Analog)

Some radios have a 16 channel limit per zone

The screenshot displays the CS700 Radio Programming Software interface. The main window is titled "CS700 - [Zone Information]". The menu bar includes File, Edit, Program, Setting, View, Window, and Help. The toolbar contains icons for file operations and radio settings. On the left, a tree view shows "Zone Information" with a list of zones including B1 TRBO North, B2 TRBO Central, B3 TRBO South, C1 ARES R3 (selected), C2 ARES R3, C3 ARES R3, D ARES EmComm, G RMHAM Analog, I Portable Rptrs, J1 DMR-M RMHA, J2 DMR-M Other, K TRBO-Misc Rpt, S2 SX Analog, S3 SX Analog NB, S1 SX Digital, T1 HAM 447, T2 HAM 448, T3 HAM 449, and U TRBO-Misc Rpt. The main area shows "Zone Name" as "C1 ARES R3". Below this, there are two lists: "Available Channel" and "Channel Member". The "Available Channel" list includes Boulder Colo, Boulder North, Cañon Colo, Cañon South, Almagre Colorado, Almagre South, Squaw Colo, Squaw Denver, Thorodin Colo, Thorodin Denver, Lookout Local, Lookout Denver, Devils South, Devils Denver, Horseth Colo, Horseth North, Ft Morgan Colo, Ft Morgan North, Cheyenne North, Pueblo Colorado, Pueblo South, Lee Hill WW, and Lee Hill NA. The "Channel Member" list includes 448.025 100.0, 447.275 100.0, 447.700 100.0, 449.850 100.0, 449.575 LRA, Horset CO R3, Horset Nor R3, Boul CO R3, Bou Nor R3, Akron CO R3, Akron Nor R3, FtMor CO R3, FtMor Nor R3, Thoro CO R3, Thoro Den R3, and FTC DMR LCL. Between the lists are "Add>>" and "<<Delete" buttons. At the bottom, there are navigation buttons: "4 of 20", "K-", "<<", ">>", "->|", "Add", and "Delete". The status bar at the bottom shows "CS700 Radio Programming Software", "Copyright : CONNECT SYSTEMS INC.", "400MHz - 470.0MHz", and "01-15".

Zone Name: C1 ARES R3

Available Channel	Channel Member
Boulder Colo	448.025 100.0
Boulder North	447.275 100.0
Cañon Colo	447.700 100.0
Cañon South	449.850 100.0
Almagre Colorado	449.575 LRA
Almagre South	Horset CO R3
Squaw Colo	Horset Nor R3
Squaw Denver	Boul CO R3
Thorodin Colo	Bou Nor R3
Thorodin Denver	Akron CO R3
Lookout Local	Akron Nor R3
Lookout Denver	FtMor CO R3
Devils South	FtMor Nor R3
Devils Denver	Thoro CO R3
Horseth Colo	Thoro Den R3
Horseth North	FTC DMR LCL
Ft Morgan Colo	
Ft Morgan North	
Cheyenne North	
Pueblo Colorado	
Pueblo South	
Lee Hill WW	
Lee Hill NA	

Scanning Function

- Scan Lists contain the channels desired for the Scan Function
 - Any Channel can have any Scan List
 - Scan works for both Digital and Analog repeaters
 - Scan Lists can scan either Time Slot

Scan List: Group of Channels that can be assigned to any Channel when using the Scan Function

The screenshot displays the CS700 Radio Programming Software interface. The main window is titled "CS700 - [Scan List]". The menu bar includes File, Edit, Program, Setting, View, Window, and Help. The toolbar contains icons for file operations and help. On the left, a tree view shows the project structure under "CP 111515", including "Scan List" and "Channel Information". The "Scan List" folder is expanded, showing a list of channels: TRBO Denver, TRBO North, TRBO South, DMR-MARC Othe, RMHAM Anlog, DMR-MARC RMI, EmComm, and ARES R3 Scan (which is selected). The "Channel Information" folder is also expanded, showing a list of channels: Boulder Colo, Boulder North, Cañon Colo, Cañon South, Almagre Colorado, Almagre South, Squaw Colo, Squaw Denver, and Thorodin Colo. The main area of the window is divided into two panes: "Available Channel" and "Channel Member". The "Available Channel" pane lists 25 channels, including Boulder Colo, Cañon Colo, Almagre Colorado, Thorodin Colo, Lookout Local, Lookout Denver, Devils Denver, Cheyenne North, Pueblo Colorado, Pueblo South, Lee Hill WW, Lee Hill NA, Lee Hill LCL, Lee Hill MTN, WOTX WW, WOTX NA, WOTX LCL, WOTX MTN, and FTC DMR WW. The "Channel Member" pane lists 10 channels, including Trailer Colorado, Horseth North, Horseth Colo, Squaw Denver, Devils South, Boulder North, Ft Morgan Colo, Ft Morgan North, Ft Mor Anal N, and two instances of 449.575 LRA and 449.850 100.0. Between the panes are "Add>>" and "<<Delete" buttons. At the bottom, there are fields for "Priority Channel 1" (set to Ft Morgan North) and "Signaling Hold Time[ms]" (set to 500). The status bar at the bottom shows "CS700 Radio Programming Software", "Copyright : CONNECT SYSTEMS INC.", "400MHz - 470.0MHz", and "2016-01-15 07:21:40".

CS700 - [Scan List]

File Edit Program Setting View Window Help

CP 111515

- Scan List
 - TRBO Denver
 - TRBO North
 - TRBO South
 - DMR-MARC Othe
 - RMHAM Anlog
 - DMR-MARC RMI
 - EmComm
 - ARES R3 Scan**
- Channel Information
 - Boulder Colo
 - Boulder North
 - Cañon Colo
 - Cañon South
 - Almagre Colorado
 - Almagre South
 - Squaw Colo
 - Squaw Denver
 - Thorodin Colo

Scan List Name: ARES R3 Scan

Available Channel

- Boulder Colo
- Cañon Colo
- Cañon South
- Almagre Colorado
- Almagre South
- Squaw Colo
- Thorodin Colo
- Thorodin Denver
- Lookout Local
- Lookout Denver
- Devils Denver
- Cheyenne North
- Pueblo Colorado
- Pueblo South
- Lee Hill WW
- Lee Hill NA
- Lee Hill LCL
- Lee Hill MTN
- WOTX WW
- WOTX NA
- WOTX LCL
- WOTX MTN
- FTC DMR WW

Channel Member

- Trailer Colorado
- Horseth North
- Horseth Colo
- Squaw Denver
- Devils South
- Boulder North
- 447.275 100.0
- 448.025 100.0
- 447.700 100.0
- Ft Morgan Colo
- Ft Morgan North
- Ft Mor Anal N
- 449.575 LRA
- 449.850 100.0

Priority Channel 1: Ft Morgan North

Signaling Hold Time[ms]: 500

CS700 Radio Programming Software Copyright : CONNECT SYSTEMS INC. 400MHz - 470.0MHz 2016-01-15 07:21:40

Repeater Channels

- Individual Repeater Information
- Analog or Digital
 - Analog: FM Wide (25KHz) or FM Narrow (12KHz)
 - Digital: Both time slots = 12.5K
- Digital:
 - Time Slot Number (one of two)
 - Color Code (like analog PL)
 - RX Group List- RX (List of multiple Talkgroups)
 - If left blank the receive group equals the Transmit Contact
 - Transmit Contact Name – (Talkgroup for transmit)

Channel Information (repeater setup)– Digital Example

Note: You can have multiple versions of the same repeater with different scan lists

The screenshot displays the CS700 Radio Programming Software interface. The main window is titled "CS700 - [Channel Information]". The menu bar includes File, Edit, Program, Setting, View, Window, and Help. The toolbar contains icons for file operations and radio functions. The left sidebar shows a tree view of channel information, with "Boulder Colo" selected. The main area is divided into two sections: "Digital/Analog Data" and "Digital Data".

Digital/Analog Data:

- Channel Mode: Digital
- Channel Name: Boulder Colo
- Band Width: 12.5kHz
- RX Frequency(MHz): 446.98750
- Scan List: TRBD North
- TX Frequency(MHz): 441.98750
- Squelch: Normal
- Admit Criteria: Color Code
- RX Ref Frequency: Low
- TX Ref Frequency: Low
- TOT[s]: 165
- TOT Rekey Delay[s]: 0
- Power: High
- Allow Talkaround:

Digital Data:

- Private Call Confirmed:
- Emergency Alarm Ack:
- Data Call Confirmed:
- Compressed UDP Data Header:
- Emergency System: None
- Tx Contact Name: Colorado
- Rx Group List: Colorado
- Color Code: 7
- Repeater Slot: 1
- Privacy: None
- Privacy No.: 1

At the bottom of the window, the status bar displays "CS700 Radio Programming Software", "Copyright : CONNECT SYSTEMS INC.", "400MHz - 470.0MHz", and "2016-01-15 07:17:01".

Multiple Talkgroups

- Multiple Talkgroups can be monitored on a given channel if all of the Talkgroups are included in the Receive Group used by that Channel
- Each RX List can only monitor channels on the same Time Slot
- Typically used to monitor activity on a given Time Slot – must switch to a channel that uses the Transmit Talkgroup that you want to transmit

Multiple Talkgroups

Transmit on: TX Contact: DMR-M WW

Receive all Talkgroups listed in DMR WorldW RX Group

The screenshot shows a software interface for configuring a radio channel. The main window is titled 'Channel Information' and contains several sections:

- Digital/Analog Data:** Channel Mode is set to 'Digital', Channel Name is 'Lee Hill WW', Band Width is '12.5kHz', Scan List is 'DMR-MARC', TX Frequency(MHz) is '440.05000', and RX Frequency(MHz) is '440.05000'. Other settings include Squelch (Normal), Admit Criteria (Color Code), and Power (High).
- Digital Data:** Emergency System is set to 'None', Tx Contact Name is 'DMR-M WW', Rx Group List is 'DMR WorldW', and Color Code is '1'. A red circle highlights this section.
- Analog Data:** CTCSS/DCS Dec and CTCSS/DCS Enc are both set to 'None', RT Revers is '180', Tx Signaling System is 'Off', and Rx Signaling System is 'Off'. There are also checkboxes for 'Decode 1' through 'Decode 8'.

The left sidebar shows a list of channels, with 'Lee Hill WW' selected. The bottom of the window shows a status bar with '22 of 190' and navigation buttons.



Receive Groups (RX Group)

CS700 - w0ft_CS_700_111515.rdt

File Edit Program Setting View Window Help

CS700

- Basic Information
- General Setting
- Menu Item
- Buttons Definitions
- Text Message
- Privacy Setting
- Digit Emergency System
- Digital Contact
- Digital RX Group Call
 - DMR World Wide
 - DMR Local
 - DMR NorthAmerica
 - DMR Mountain Rgn
 - NoCo Net 3171
 - Colorado
 - Lookout Local

Digital RX Group Call

Group List Name: DMR World Wide

Available Contact	Contact Member
DMR-M LCL	DMR-M WW
DMR-M MTN	DMR-MARC WW ENG
NoCo Net 3171	DMR-M NA
Colorado	
Lookout Local	
South	
Central	
North	
Cheyenne Local	
DMR-MARC Simplex	

Add>>

<<Delete

CS700 Radio Programming Software Copyright : CONNECT SYSTEMS INC. 400MHz - 470.0M

Motorola CPS

- General Settings
- Buttons
- Contacts
 - Group (talkgroups)
 - Private (individual ID's)
- RX Groups
- Channels -Zones and channels (repeaters)
- Scan
- Roam – List of a set of desired repeaters within a time slot
 - Automatic Repeater Switching based on Signal Strength (within a given time slot)

Mototrbo CPS – General Settings

Clone writes radio keeping the Name and ID already in the radio

Make sure the GPS Box is not Checked....

Newer firmware has Fixed the AGC issues. It is strongly suggested to use this feature

General Settings

Radio Name: MOTR Bo
Radio ID: 100000

GPS:

Private Call:

Search Time (sec): 15

ARC Inhibit Delay (min): 0

TX Inhibit Duration (sec): 100

Monitor Type: Open Squelch

Link Monitor:

Talkaround Group Call Line Time (ms): 3000

Talkaround Private Call Line Time (ms): 4000

Track All Pts:

Local Mode:

Call Forward:

Check for Password: None

Audio Profile

AN Suppress:

Link Suppress: Basic

Microphone

Microphone Mic: Mic Follow PTT

Analog Mic AGC:

Digital Mic AGC:

Analog Mic Gain (dB): 0

Review

- Digital Subscriber IDs
- Contacts & Talkgroups
- Slots
- Color Codes
- Zones
- Channels
- Scan Groups
- Roam Groups
- Receive Groups
- Talkaround
- IPsite Connect
- C-Bridge

Homework

- Take one of the local code plugs for your area (www.rmham.org)
 - Create a new Zone (name it whatever you like)
 - Create a new channel using the data from one of the other digital channels in the code plug and add a transmit group & receive group program the radio and give it a test.
 - Build a new Scan List, add it to your test zone channel and test scanning
 - Add an new private contact from the DMR-Marc website database

DMR Resources

- www.rmham.org – Trbo system info and tri-state network code plugs for most DMR Radios (both RM Ham network and DMR-Marc)
- www.dmr-marc.net – Information on using the DMR-Marc system & Regional Code Plugs – redirects to radioid.net for subscriber IDs
- www.trbo.org – DCI Network (TAC Talkgroups)
Definitions and DCI Talkgroup listings: <http://www.trbo.org/talkgroups/>
- <https://brandmeister.network/> - BrandMeister Network
- w0ft@arrl.net: R3 Code Plugs – XPR6550, XPR5550, CS700 & **Presentation Copy**
- <http://www.w0dmr.org> : Northern Colorado DMR group information

Q & A

- Presentation Copy: Email w0ft@arri.net

