DMR PROGRAMMING Workshop – RMHAM-U

KØNGA MIKE

ROCKY MOUNTAIN HAM RADIO

MIKE'S DMR DOCTRINE

DMR is a commercial radio protocol. It was never designed nor intended for Amateur Radio use. Some things about DMR are not going to make sense.

Accept this. It will make your life easier.



WRITE THIS DOWN

- •438.600 MHz –
- Color Code 1
- Time Slot 2
- Talk Group 310801



AGENDA

Basics Review
Vendor/CPS differences
What you need to know
Programming workflow





"No, I will not fix your computer." -Me, constantly



WHAT IS DMR/TRB0?

- DMR (Digital Mobile Radio) is an international commercial digital radio standard (ETSI) that originated in Europe
- TRBO refers to MotoTRBO which is Motorola's implementation of the DMR standard
- Many Amateur Radio repeater networks use MotoTRBO equipment, which is why they are commonly referred to as "TRBO" networks
- You do not need to use a Motorola MotoTRBO radio to use these networks





TWO REPEATERS IN ONE!





NEW CONCEPTS

- Frequency Pair not new
- Color Code Functions similar to a CTCSS or DCS access tone
- Repeater Slot Each DMR Repeater has two, you must specify which one to use
- Talk Group Each repeater slot can be logically segmented further into talk groups
- Receive Group List of talk groups to monitor on the channel's assigned repeater slot



VENDOR/CPS DIFFERENCES

"What do you mean there's no codeplug for this brand-new bleeding-edge DMR radio from a company nobody's ever heard of?" -Too many people, too often

RANT, SORT OF

- Chinese radios are typically more affordable than Motorola
 - Less expensive to purchase
 - CPS typically free
- Typically, each Chinese radio (and, more often than not, each model) comes with its own CPS, which wont work with other radios/models
- Each CPS will have its own quirks
 - Terms will differ
 - Things that should be pull-downs will be buttons for some reason
 - Settings will be in different places
- Just because it's the newest doesn't mean it's better than what came before





"Yes, you need a computer to run computer software." -Me, on an actual AOL support call.



WHAT YOU NEED

- Tier 2 DMR Radio (very common)
 - Programming cable
 - Programming software (Customer Programming Software CPS)
 - Windows Computer
- Radio ID
 - https://radioid.net
 - Create an account
 - You'll need a downloaded copy of your license
- Information about the repeater
 - Frequency pair
 - Color code
 - Talk group(s)
 - Time slot / repeater slot





"To experience true DMR freedom, you must learn to program your radio yourself." -Me, constantly

RADIO ID

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BASIC PROGRAMMING CONCEPTS

- In order to program a DMR radio for repeaters, you must know:
 - Repeater frequencies
 - Repeater Color Code
 - Desired Talk Group/Receive Group
 - The Repeater Slot that Talk Group is on
- The order you need to add them to your codeplug:
 - Talk Groups
 - Receive Groups
 - Create Channels where you bring it all together
 - Add Channels to Zones so your radio knows what to do



EXAMPLE CHANNELS

	Color	Time	Receive	Transmit	
Channel	Code	Slot	Frequency	Frequency	Talk Group
					Rocky
Squaw Rky Mtn	7	Slot 1	446.9375	441.9375	Mountain
Squaw Central	7	Slot 2	446.9375	441.9375	Central
					DMR MARC
Lee Hill WW	1	Slot 1	445.05	440.05	WW
Lee Hill WW					DMR MARC
Eng	1	Slot 1	445.05	440.05	WW Eng
					DMR MARC
Lee Hill NA	1	Slot 1	445.05	440.05	NA
					DMR MARC
Lee Hill LCL	1	Slot 2	445.05	440.05	LCL
					DMR MARC
Lee Hill MTN	1	Slot 2	445.05	440.05	MTN



TALK GROUPS

- Access Control (analogous to tones on analog radios) is accomplished with Talk Groups
- If a repeater uses Talk Groups, you must know which Talk Groups the repeater uses in order to use the repeater with your radio
- Talk Groups are assigned to a Repeater Slot in a repeater
- More than one Talk Group can be assigned to a single Repeater Slot, but only one Talk Group can use the slot at any given time



CONTACT LIST

- DMR radios use a Contact List for:
 - Private Call (used for Radio IDs)
 - Talk Groups (required for most repeaters)
 - All Call (often used for simplex)
- Radios with displays will show the Radio ID of person who is transmitting
- If you have the Radio ID in your radio's Contact List, the contact name or tag will display instead of the Radio ID
- Typical contact names include call sign and name



CONTACT LIST EXAMPLE

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Conventional	🚜 2	DMR MARC LCL	Group Call	2	No			
Channel	44 3	DMR MARC NA	Group Call	3	No			
	3 <u>8</u> <u>8</u> <u>4</u>	DMR MARC WW Eng	Group Call	13	No			
DMR Services	342 5	DMR MARC Simplex	Group Call	99	No			
Text Message	342 6	Rocky Mountain	Group Call	700	No			
Rx Group List	🎎 7	Lookout Local	Group Call	710	No			
Encrypt	35 8	South	Group Call	719	No			
Emergency Personality	355 9	Denver	Group Call	720	No			
DTMF Services	🎎 10	North	Group Call	721	No			
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2Tone Services	🚜 12	DMR MARC MTN	Group Call	3177	No			
	💃 13	NR2Y Marinus	Private Call	3108001	No		Insert	
	💑 14	WA2YZT Paul	Private Call	3108002	No			
	💃 15	K0JSC Jeff	Private Call	3108003	No		Delete	
	💃 16	N2PDQ Dirk	Private Call	3108004	No		Sort By Name	
	💃 17	KF0KR Thomas	Private Call	3108005	No			
	💃 18	N0GQX Gerald	Private Call	3108006	No		Sort By Id	
	💃 19	N0VBY Mike	Private Call	3108007	No	~		
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RECEIVE GROUPS

- Receive Groups are how DMR radios use Talk Groups when receiving signals
- Talk Groups are assigned to Receive Groups. Receive Groups are assigned to the receive frequency on the channel in your radio.
- More than one Talk Group can be assigned to a Receive Group
 - Recommended config by DMR-MARC
 - Can cause confusion when scanning
- Remember Mike's DMR Doctrine



RECEIVE GROUP EXAMPLE





CHANNEL EXAMPLE





COLOR CODE

- DMR repeaters use a Color Code as the first access point after the receive frequency
- Color Codes are designed to allow two repeaters with the same frequency to operate effectively if they are relatively close to each other
- You must know the Color Code of the repeater in order to successfully use the repeater



REPEATER SLOTS

- DMR repeaters have 2 "time slots" that share a frequency, allowing for two separate, simultaneous conversations
- This means one repeater can do the work of two while using less bandwidth than a single analog repeater
- You must know which Repeater Slot you wish to use in order to set up your radio (more on this later)



EXAMPLE CHANNEL - RMHAM

💽 File Edit Program Option View Tools Window Help	
	_ 8 ×
Contact DMR MARC WW Thorodin Rk Mtn	×
Digital D 12345	^
Canon South	
Color Code	
Cheyenne North Repeater/Time Slot Slot 1	
an Devis South	
Durango Rk Mtn	
Auto Scan Start	
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Talk Around G	
Can Horsetooth North Lone Worker	
Pueblo South Receive Offset [MHz] Transmit	
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Rocky Mountain	~
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Lee Hill LCL Emergancy Alarm Ack	
Power Level High	~
Emergency Call Indication	-
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ZONES

- Channels are assigned to Zones
- Only one (1) Zone can be in use at a time
- On HTs (and some mobiles), corresponds with channel selection dial
- Radios can have numerous zones
- Channels can be a member of more than one Zone



QUESTIONS?



STUFF AND THINGS

- RMHAM Website http://www.rmham.org
- Interactive DMR repeater map: http://bit.ly/rmham-trbo-map
- Radio ID https://www.radioid.net/
- DMR-MARC Website http://www.dmr-marc.net
- Brandmeister
 - Dashboard: https://brandmeister.network/
 - Audio Feeds: http://hose.brandmeister.network/
 - Wiki: https://wiki.brandmeister.network
- Contact Me: K0NGA@arrl.net

