



# Western Pennsylvania Section

**SERVICE ♦ INTEGRITY ♦ EXCELLENCE**

## DMR in WPA

SUGGESTIONS FOR PROGRAMMING

AND

OTHER USEFUL INFORMATION

CURRENT AS OF **23 FEB 2019**

**SUBJECT TO FREQUENT REVISION SO PLEASE CHECK THE DATE!!!**

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## A Word of Caution

Congratulations and welcome to the fun-filled world of DMR. Your new radio probably has a “codeplug” that someone else put together. Maybe it suits your needs, or maybe you want to make some changes.

To paraphrase Ricky Ricardo, “You’ve got some Learnin’ to do!”

But don’t worry, it’s not all that bad. In fact if you ignore all the Commercial radio history and start with a clean slate going forward from today as Amateur DMR continues to evolve, it makes a lot of sense.

First a warning: Everything you see on the internet is 100% true and correct... **NOT!!!**

Rule #1 – **ALWAYS check the date** on the “information” you find online. Amateur Radio use of DMR is undergoing **rapid** and continual **change**. Hundreds of new users show up every day, and the existing systems are feeling the impact of all the newbies who don’t know—or care—about the “Proper Commercial Radio Way” things have been done in the past.

Currently there are 3 times as many hotspots as there are repeaters. This is leading to a dichotomy of ways people use DMR. Repeater operators are used to the somewhat inflexible selection of talkgroups, reflectors and “C-bridges” their repeaters use to connect to the outside world. Hotspot users are used to picking a number—ANY number—and going there for a few minutes and then going somewhere else.

Repeater operators who have been happy to carry wide area talk groups like statewide, nationwide and worldwide calling groups are used to well-informed Commercial two-way radio technicians abiding by the gentlemen’s agreements about not QSOing on calling channels, but are now dismayed by hundreds of ratchet-jawing newbies prattling away with each other on the calling channels, tying up dozens of other repeaters in 24-hour-a-day transmitting sessions while local repeater users (who pay the bills for their local repeaters) can’t get a word in edgewise.

Some of the newbies get offended (seems like EVERYBODY is easily offended these days) when they are respectfully asked to move their QSO somewhere else. Often, the codeplug the newbies are using does not have anything but the calling channels in it. In some cases the logic of the channel names escapes the newbies who have not been indoctrinated in “The Commercial Radio Way.”

For example, if you look through the list and see “3142 – Pennsylvania Statewide” you may think, “Well... I’m in Pennsylvania, so I should use this one for my main talk group...”

Turns out, you’d be wrong!

In the Commercial Two-Way Radio Technician School you didn’t go to, you would have learned that such a name is Very Special because it does not have the word “TAC” in it. That means it is a calling channel only, and once you contact the person you want to talk with, you invite them to move your QSO to “TAC-318” or the like.

For this reason, it is good operating practice to have all of the common “TAC” (TACtical) groups defined in your codeplug, and available for your use. As the massive influx of new DMR users with cheap radios and their own hotspots continues to grow, this will become more and more important.

We will attempt to keep this document up-to-date with information on commonly used talk groups. We will provide a three-step approach to building your own custom code plug to take advantage of these preferred operating practices, and you won't have to worry about embarrassing yourself (we've already embarrassed ourselves enough for everybody!

The design of most codeplugs copies that of Motorola MOTO TRBO commercial radios, many of which will also work well in Amateur DMR. The terminology used can be mysterious when you first start out, but if you learn a few simple basics, you will be making codeplugs like a pro in no time!

## What's In A Codeplug?

Simply stated, the codeplug consists of several sets of information and settings to make your DMR radio behave in a certain way. The three most important parts of your codeplug are the Contact List, the Channel List and the Zone List. You need to have all three and they need to be able to work together.

### The Contact List

When you begin to make a new codeplug, you should start with your **contact list**. This is a “database” that contains the ID number name and type of every talk group you want to use, or user (buddy) you want to contact directly. Every other digital-mode part of your codeplug needs to use this list, so it must be done first! Here is a sample:

Name	CallID	CallType	CallReceiveTone
Worldwide	1	Group	No
Local/Cluster	2	Group	No
North America	3	Group	No
Regional	8	Group	No
Local or Reflect	9	Group	No
W3BC	3142453	Private	No
W3LID	3142999	Private	Yes

## The Channel List

Next, we tell the radio how to reach each of these contacts. What frequencies to use, what modes to use, etc. You may have to make multiple entries for each contact if you have multiple repeaters or hotspots at your disposal. You can enter both DMR and FM channels, PL tones, Normal and odd splits, different squelch settings, and a whole lot more for each channel!

Name	RxFrequency	TxFrequencyOffset	ChannelMode	Bandwidth	ScanList	Squelch	Tot	TotRekeyDelay	Power
Clarion 442	442.65000	+5.00000	Analog	25	N1	1	165	0	High
Clarion 444	444.32500	+5.00000	Analog	25	N1	1	165	0	High
N Bethlehem 442	442.72500	+5.00000	Analog	25	N1	1	165	0	High
Windber	443.15000	+5.00000	Analog	25	S2	1	165	0	High
WPA SNP 1	442.00000	+5.00000	Analog	25	None	1	165	0	High
WPA SNP 2	442.02500	+5.00000	Analog	25	None	1	165	0	High
N3QC VHF	147.31500	+0.60000	Analog	25	None	1	165	0	High
N3QC UHF	442.95000	+5.00000	Analog	25	None	1	165	0	High
2M DMR Simplex	145.79000	+0.00000	Digital	12.5	None	1	165	0	High
2M Simplex2	146.52000	+0.00000	Analog	25	None	1	165	0	Low
ARES ALT-1 (N2)	145.51000	+0.00000	Analog	20	None	1	180	0	High
CALL 146.52	146.52000	+0.00000	Analog	20	None	1	180	0	High
ARES ALT-3 (S1)	145.51000	+0.00000	Analog	20	None	1	180	0	High
ARES TAC-4	147.54000	+0.00000	Analog	20	None	1	180	0	Low
ARES TAC-5	146.55000	+0.00000	Analog	20	None	1	180	0	High
ARES TAC-7	147.57000	+0.00000	Analog	20	None	1	180	0	High
ARES TAC-8	146.58000	+0.00000	Analog	20	None	1	180	0	High
ARES ALT-9	145.59000	+0.00000	Analog	20	None	1	180	0	High
DMR 145.79	145.79000	+0.00000	Digital	12.5	None	1	Infinite	0	High
-WPA Section	441.08750	+0.00000	Digital	12.5	WPA DMR	1	165	5	Low
-PEMA ACS	441.08750	+0.00000	Digital	12.5	WPA DMR	1	45	5	Low
-PEMA TAC 1	441.08750	+0.00000	Digital	12.5	WPA DMR	1	45	5	Low
-PA Call	441.08750	+0.00000	Digital	12.5	WPA DMR	1	15	5	Low
-3rdCallDistrict	441.08750	+0.00000	Digital	12.5	WPA DMR	1	45	5	Low
-Mid-Atlantic	441.08750	+0.00000	Digital	12.5	WPA DMR	1	45	5	Low

The table above is just a PART of all the information for each channel. There is a LOT of information that instructs your radio how to access every channel correctly. Fortunately, once you set one up right, the software makes it easy to do all the rest the same way!

## Zones

After getting all those channels set up (and there can easily be *hundreds* of them!) it's time to create some zones and drop the appropriate channels into them. Traditionally, Motorola MOTO TRBO radios had a "16-Channel Knob" which limited each zone to 16 channels that were somehow related to each other. Newer, Amateur Radio specific radios permit 64 or more channels per zone.

Name	Channel1	Channel2	Channel3	Channel4	Channel5	Channel6
UHF Hotspot	-Hangup	FM 446	DMR 441	-WPA Section	-PEMA ACS	-PEMA TAC 1
WPA ARES	~WPA Section	~PEMA ACS	~PEMA TAC 1	~PA Call	~3rdCallDistrict	~Mid-Atlantic
WPA SW	Apollo .900	Apollo .925	Brentwood	Bridgeville	Canonsburg	Carnegie
WPA SE	DMR 145.79	ARES ALT-1 (N2)	CALL 146.52	ARES ALT-3 (S1)	ARES TAC-4	ARES TAC-5
2m DMR Low Rptrs	145.11 Local	145.13 Local	145.15 Local	145.17 Local	145.19 Local	145.21 Local

# Suggested Contacts

Here are suggested contacts that cover most of the talk groups of interest in Western PA.

Name	CallID	CallType	CallReceiveTone
Worldwide	1	Group	No
Local/Cluster	2	Group	No
North America	3	Group	No
Regional	8	Group	No
Local or Reflect	9	Group	No
TG-91 Worldwide	91	Group	No
TG-93 NA	93	Group	No
Simplex	99	Group	No
TAC-310 [cb]	310	Group	Yes
TAC-311 [cb]	311	Group	No
TAC-312 [cb]	312	Group	No
TAC 313 [bm]	313	Group	No
TAC 314 [bm]	314	Group	No
TAC 315 [bm]	315	Group	No
TAC 316 [bm]	316	Group	No
TAC 317 [bm]	317	Group	No
TAC 318 [bm]	318	Group	No
TAC 319 [bm]	319	Group	No
USA Nationwide	3100	Group	No
MD Statewide	3124	Group	No
MD TAC	31242	Group	No
NY Statewide	3136	Group	No
WNY Section	31367	Group	No
OH Statewide	3139	Group	No
OH ACS	31398	Group	No
OH ARES	31395	Group	No
OH Northeast	31391	Group	No
PA Statewide	3142	Group	No
PEMA Statewide	31420	Group	No
PEMA TAC1	31421	Group	Yes
<b>WPA Section</b>	<b>31422</b>	<b>Group</b>	<b>Yes</b>
WV Statewide	3154	Group	No
Northeast	3172	Group	No
Midwest	3169	Group	No
Mid-Atlantic	3173	Group	No
Net Talkgroup 1	31001	Group	No
Net Talkgroup 2	31002	Group	No
USA Area 0	31600	Group	No
USA Area 1	31601	Group	No
USA Area 2	31602	Group	No
USA Area 3	31603	Group	No
USA Area 4	31604	Group	No
USA Area 5	31605	Group	No
USA Area 6	31606	Group	No
USA Area 7	31607	Group	No
USA Area 8	31608	Group	No
USA Area 9	31609	Group	No
APRS	310999	Private	No
Parrot	31000	Private	Yes
[Disconnect]	4000	Private	Yes

Groups below 99 are local to the repeater, except 1 may be linked worldwide, 2 and 9 may be lonked to other local repeaters, and 8 lnked to regional repeaters.

[cb] = “C-Bridge” repeater linking

[bm] = Brandmeister only group (may not be available on C-Bridge repeaters)

TAC = Use for longer QSOs

For ARES Mutual Aid

PA Statewide CALLING ONLY!

WPA 31422 is suggested to be a “Static” group for hotspots and repeaters in WPA

Last 3 = Brandmeister utilities

Use “Parrot” to talk to yourself!

## Channel Information

Your channels can list FM and DMR frequencies. Each FM frequency need only be listed once, with the correct PL tones, timeout warning time, power level, offset or split, etc.

## Hotspots

Your DMR channels will link all your DMR contacts for each DMR frequency. For a hotspot, create 1 channel for each Contact you wish to use. All of these channels should show the frequency of your hotspot. Most hotspots only recognize one “Time Slice” and map it as TS2. There are 16 “Color Codes” but unless you have a very, very good reason to use anything but 1, just use CC1.

## Repeaters

For repeaters, consult with your repeater group for what’s available, and the proper way to use the DMR repeater. Pay attention to Time Slice and Color Code, as you will not have any results if you mess these up. A rule of thumb is that wide coverage talk groups live on time slice 1, and local ones live on time slice 2. Most repeaters use color code 1, but there are some that use other ones. **ASK YOUR LOCAL REPEATER GROUP FOR GUIDANCE!**

Also, please support your local repeater/repeater group. It takes a lot of \$\$\$ to keep repeaters on the air, and if you’re going to be using one a lot, it’s only fair to chip in a few bucks to help keep it going.

## Simplex

FM Simplex is easy. You already know how to do that. (avoid using PL tones on FM Simplex!)

DMR Simplex is almost as easy. For all DMR Simplex, use the contact for talk group “99” and time slice “2”.

## Simplex Frequencies to Use

First, a warning: **DO NOT USE DMR ON FM-SIMPLEX CALLING FREQUENCIES 146.52 AND 446.000 MHz.**

Use 145.79 on 2 meters. **Do not use 145.51** on 2 meters, even though the Internet says you should. That frequency is bandplanned by WPRC as FM simplex to make up for the loss of 15 other simplex frequencies to make 7 new repeater pairs (the “1-Meg Splits”).

Use 441.0 for DMR Simplex on the 70 cm band.

For all DMR Simplex, use the contact for talk group “99” and time slice “2”.



## Hotspot Frequencies

On VHF, the following are available: 145.61, 145.63, 145.65, 145.71, 145.73, 145.75 and 145.77.

**DO NOT USE THE D-STAR SIMPLEX FREQUENCY 145.67!!!**

**And:**

**STAY OUT OF THE AMATEUR SPACE BAND 145.800-146.000 !!! PLEASE !!!**

On UHF the WPRC has bandplanned the following for digital use: 440.9500, 440.9625, 440.9750, 440.8750, 441.0125, 441.0250, 441.0375, 441.0500, 441.06250, 441.0750, and 441.0875.

**DO NOT USE ANY OTHER FREQUENCIES. THEY ARE IN USE, OFTEN BY WEAK SIGNAL APPLICATIONS, AND YOU COULD UNWITTINGLY QRM SOMEBODY'S QSO!**

**ALSO, IF YOU ARE IN ERIE COUNTY, DO NOT USE ANYTHING BELOW 430 MHz!**

## WPA ARES Simplex Frequencies

These are changing on March 1, 2019. Every county has a new frequency. Every district has a new alternate frequency for use by all counties to aid congestion. Every District has a new name (Southeast instead of South-2) to comply with the NIMS principle of "Plain Language."

Here are 11 channels to get you started:

1	WPA ALT-1	145.5100	Northeast (N-2)
2	2m SX	146.5200	
3	WPA ALT-3	145.5300	Southwest (S-1)
4	WPA TAC-4	147.5400	
5	WPA TAC-5	146.5500	
6	446 SX	446.0000	
7	WPA TAC-7	147.5700	
8	WPA TAC-8	146.5800	
9	WPA ALT-9	145.5900	Northwest (N-1), Southeast (S-2)
10	DMR SX	145.7900	DMR TS2, CC1, TG99
11	DMR Sxu	441.0000	DMR TS2, CC1, TG99