





MERRY CHRISTMAS ALL!

Well November was really busy all the way around for me with travel, new puppies at home, getting back into DMR radio, still with AllStar ham radio connections, 3 new rigs, and more to write about here at the end of 2018 than I expected. Still keeping up on Flight Simulator stuff as I can, AND I did live shows on WFLI "The Big Jet Fli" in Chattanooga Tennessee during my visit to the scenic city in the month. That was a HUGE highlight for me and a literal adult dream come true! And thanks to John Bisset of TelosAlliance for publishing my article about my home made tilt over mast mount in one of the issues of RadioWorld Magazine. You can see that here online if you haven't yet: https://www.radioworld.com/columns-and-views/build-this-inexpensive-and-versatile-lazy-susan-mast-mount

There are two new rigs now in the KEØVH fleet of radios, I wrote about the Yaesu FTM-100 and 400 in last month's article, along with the Zumspot hotspot that does DMR, D-Star, Yaesu Fusion C4FM, and has the bridge from Fusion to DMR ability. That is what I am mainly using with those radios (along with analog to 449.450, my AllStar nodes and other repeaters of course) as the C4FM digital is really great too. The crossover to DMR is done in the Zumspot and works extremely well. SO when mobile, or in my office I can scan all the frequencies and modes I use with the FTM-100 and the same with the FTM-400 in the truck PLUS beacon my APRS location as KE0VH-2.

Honestly, I really like using the Zumspot even better than AllStar, and it will become my traveling radio companion both in the truck on work journeys and traveling around the country. I use my TYT MD-380 handheld to access it and the Rocky Mountain Radio League KIOGO DMR Brandmeister repeater here in Denver. The Zumspot is much smaller, no Linux software and its complications you have to deal with as it is easily accessible thru a Windows GUI. EASY with its own WiFi to configure to whatever internet WiFi you happen to use in a hotel, (the AllStar Linux system IS NOT!) your cellphone hotspot or other, plus it is its own node radio with the raspberry PI-0 in a much smaller package. There are ways to cross over from DMR to AllStar and more. I will be exploring those possibilities and write about them in future articles.



The Zumspot on my simplex frequency of 446.075 MHz

### The control head of the Yaesu FTM-100DR monitoring DMR Talk Group 310847 thru the YSF (Yaesu Fusion) to DMR settings in the Zumspot



During my recent trip to Chattanooga Tennessee while on the drive from the Nashville airport to Chattanooga I used the FTM-100 to beacon my APRS position as KEOVH-9, while using the MD-380 and the Zumspot accessing the internet thru my cell phone hotspot and using Brandmeister DMR TalkGroup 318047 setup in the Zumspot was able to talk to the guys back in Denver, Kenny in the Chattanooga area, and Shane KØSDT in Montana (he was using the same setup as me while on the road up there). Communications were solid and worked better than expected really. Then, when I got to my mom's house in the Chattanooga area, I accessed the talkgroup utilizing her WiFi, and stayed in touch with above mentioned folks and more including Glen, WNØEHE in the Phoenix AZ area, and Joe WOTX in Denver on the Bransmeister DMR repeater. I am SOLD! And the funny thing is I had all but given up on DMR radio as the other repeaters in the area I had tried just didn't seem to work that well. The Rocky Mountain Radio League DMR repeater is really solid with a large coverage area, plus it just plain works. The Rocky Mountain Ham group has a really great working system, but it doesn't connect to the Brandmeister network so there isn't country and worldwide coverage at

this point.

BTW, these hotspots are **ON SALE** at Ham Radio Outlet during the Holiday Season. HMMMMMMMM...... The documentation on the Zumspots is getting better on the 'net, but if you get one and need some help drop me an email at <u>ke0vh@outlook.com</u> and I will be glad to talk you thru it quicker than trying to decipher some of the internet instructions. We can set up a time and get on the phone. Shane KØSDT helped me, I helped Cris W5WCA and Matt KEØLNU get theirs going. Once you understand the setup then making adjustments and/or changing DMR TalkGroups will be easy depending on your situation and who you would like to communicate with.

> For more on the Zumspot using the Pi-Star software see this website: <u>https://amateurradionotes.com/pi-star.htm</u>

However, and this is important, when you buy the Zumspot you get both the radio and PI-0 with a mini SD card ALREADY LOADED with the PI-Star operating system! So no flashing of a card and all that goes along with the setup on the webpage above.

#### Tell Clayton at Ham Radio Outlet DENVER I told you to call! 🙂

Understanding DMR can be complicated and not easy if you are a beginner. I am still understanding more and more as time goes on. Jerry Wanger at Connect Systems INC, manufacturer of some fine DMR rigs (I've owned one) put together this explanation and permitted me to include it in this month's article. Thanks Jerry!

Check out their line of amateur and professional products at: <u>http://www.connectsystems.com/</u>

#### APPLICATION NOTE: UNDERSTANDING KEY PARAMETERS (of DMR)

#### General

There are only a few key parameters that needs to be understood if a DMR radios. The key parameters are as follows:

Frequency Time Slot Color Code Tx Contact Rx Group List Radio ID/Digital ID

#### Frequency

Frequency is the part of the Electromagnetic Spectrum that you are licensed to operate your radio. Each country has their own government entity that grants a license for you to use a specific frequency or a range of frequencies. If you are a Ham, then you are allowed to use in the United States the frequencies shown below. There are also some frequencies above 1 GHz that amateurs are allowed to use but not shown here.

Frequ	ency	,	Generic name	Generic Band
1.800 MHz	to	2.000 MHz	160 Meter	HF
3.500 MHz	to	4.000 MHz	80 Meter	HF
7.000 MHz	to	7.300 MHz	40 Meter	HF
10.100 MHz	to	10.150 MHz	30 Meter	HF
14.000 MHz	to	14.350 MHz	20 Meter	HF
18.068 MHz	to	18.168 MHz	17 Meter	HF
21.000 MHz	to	21.450 MHz	15 Meter	HF
24.890 MHz	to	24.990 MHz	12 Meter	HF
28.000 MHz	to	29.700 MHz	10 Meter	HF
50.000 MHz	to	54.000 MHz	6 Meter	VHF
144.000 MHz	to	148.000 MHz	2 Meter	VHF
219.000 MHz	to	225.000 MHz	1.25 Meter	VHF
420.000 MHz	to	450.000 MHz	70 cm	UHF
902.000 MHz	to	928.000 MHz	33 cm	UHF

By common (gentleman's) agreement, each band is subdivided with each sub band designated for certain functions.

#### **Time Slot**

A DMR radio is based on Time Division Multiple Access technology (TDMA). The DMR is designed as a two slot TDMA with each slot being 30 millisecond long. They are designated as Slot 1 and Slot 2.

The advantage of the DMR radio is the ability to have two voice channels in a 12.5 KHz wide band, lower power dissipation because the transmitter is only transmitting half the time, and no need for additional hardware to make a two channel repeater system.

It is best to visualize the two slots as two different frequencies. Therefore if you listen to a repeater, do not expect to hear both channels at the same time.

#### **Color Code**

The color code is a way of allowing multiple repeaters in a given area to share the same frequency without being keyed by the wrong radio. That does not mean that both repeaters can transmit at the same time without interfering with each other but it prevents multiple repeaters from being keyed by the same radio. A better approach would be to separate the repeaters by a large distance but that is not always possible.

#### Radio ID

Each radio is programmed with its own individual ID. For the Amateurs, the DMR Marc Group assigns the ID. For commercial users, the ID is assigned by the owner of the repeater. Connect Systems has a unique feature that allows the ID to be assigned on a per channel basis if desired. This allows the radio to be assigned the DMR Marc ID for the Ham channels and a different ID for the Commercial Radios. To apply for a DMR Marc ID, go to the following Internet address: http://dmr-marc.net/contact.html.

#### **Tx Contact**

The Tx Contact is what defines who you transmit to and who you receive from. The Tx Contact can take on three forms.

- 1. Private Call
- 2. Group Call
- 3. All Call

Private calls allows you to transmit between two radios. To work both radios have to be set for the complementary private call number. That means Radio A has to have the Tx Contact set to Radio's B ID number and Radio B has to have the Tx Contact set to Radio's A ID number. A private call cannot be put in the Rx Group to allow you to monitor multiple private calls.

Group calls allows an individual radio to speak to multiple radios at the same time and can be put in the Rx Group list to allow you to monitor multiple groups at the same time. Note that you can only transmit to one Group per Channel so hearing the Group on the channel does not mean you can press the PTT and speak back to the person unless you change the channel. Group calls ignore the individual ID's in each radio.

All Calls allow you to transmit to all radios on your repeater time slot and should not normally be used for amateur applications. An all call cannot be put in the Rx Group to allow you to monitor all calls. For that you need to use the Digital Monitor Mode.

# Here are some examples of programming with the CSI software available for their radios. FREE SOFTWARE by the way.

						2		
1			Chan	nel Alias DMR 43	39.0250			
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			Co	lor Code 1	•			
			Repeater/T	ime Slot Slot 1	•			
			·	can List 🔒 Nor	ie 💌			
			Auto S	an Start				
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	Ref Frequency [MHz]	Middle	•		Ref Frequency [MHz]	Middle	•	
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	Emergency Alarm Ack				Power Level	High	•	
	Emergency Call Indication				Tx Admit	Always	•	
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No.	Contact Name	Call Type	Call Id	Receive Tone	<b>^</b>	
<b>å</b> 1	1 MOTO RuKi	Private Call	1	No		
<mark>32</mark> 2	WORLD	Group Call	1	No		
<b>3</b>	LOCAL	Group Call	2	No		
<b>3</b> 8 4	NORTH AMERICA	Group Call	3	No		
<b>\$</b> \$ 5	TG9.DV4	Group Call	9	No		
<b>\$</b> \$ 6	FRENCH WORLD	Group Call	11	No		
<b>38</b> 7	WORLD ENGLISH	Group Call	13	No		
8	SPANISH WORLD	Group Call	14	No		
<mark>32</mark> 9	DIRECT MODE	Group Call	99	No		
<mark>88</mark> 10	ENGLISH 1	Group Call	113	No		
<b>3</b> 3 11	ENGLISH 2	Group Call	123	No		bbA
<b>38</b> 12	209 NORCAL	Group Call	209	No		
<mark>88</mark> 13	CENCAL 1	Group Call	221	No		Insert
<b>3</b> 8 14	TAC 310	Group Call	310	No		
<b>3</b> 8 15	TAC 311	Group Call	311	No		Delete
<b>3</b> 3 16	559 CenCal	Group Call	559	No		Sort By Name
<b>38</b> 17	NORCAL 1	Group Call	621	No		
18	NORCAL 2	Group Call	622	No		Sort By Id
<b>88</b> 19	647 CenCal	Group Call	647	No		

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## Thanks again to Jerry Wanger at Connect Systems INC for allowing me to share this information in the "Hamshack"!

Here is another find that I think you may enjoy. In the September 2018 edition of the QST from the ARRL on page 58 at the bottom they wrote an article on the MFJ 1708 B RF Sense SDR Receiver TR Switch. It will allow you to use an SDR receiver connected to your ham antenna's on one connection while using your regular rig for transmit on the second connection using a RF sense switch to switch between the two. If you remember back in May I wrote about a panadapter board for my Kenwood TS-2000. See that at:

http://www.ke0vh.com/hamshack/archives/TheKE0VHHamshack201805May.pdf

This eliminates the need for any board additions or rig modifications to give ANY RIG you want to use SDR receive capabilities! WOW! Wish I had known about this back when I was doing that project. The MFJ unit is right at \$100 so not that bad! Think about it, now you can use ANY current or OLDER HF rig, even up to 440 and above. And with the grounding of the SDR receive and switching out during transmit the SDR is protected. I like the fact that it also has the TX indicator light on the front.



Yep, I may have to try this out. I am using SDR Sharp with this SDR
RTL-SDR Blog R820T2 RTL2832U 1PPM TCXO SMA Software Defined Radio
(Dongle Only) for about \$21 on Amazon. It has a a 1 PPM temperature
compensated oscillator (TCXO), SMA F connector, aluminum case with thermal pad for passive cooling, software activatable bias tee circuit.

 Can tune from 500 kHz to 1.7 GHz and has up to 3.2 MHz (2.4 MHz stable) of instantaneous bandwidth. (HF reception below 24 MHz runs in direct sampling mode) Well back to the Zumspot and how it works, here are some pics of me talking to Kenny K4KR in Chickamauga Georgia (SE of Chattanooga TN) and the display as he using DMR comes thru the system to my Zumspot then transmitted to the Yaesu FTM-100DR.



As these pictures show the ID of the ham you are contacting is shown and in the pic below the DMR Talkgroup is ID'd.



On my aforementioned trip to Chattanooga while using the FTM-100DR for APRS I used my TYT MD-380 and Zumspot for DMR mode communications and while in the rental car (and my worktruck) I use the USB port to run the Zumspot. While at home, office or hotel room I have a USB PS wallwart that provides 5 volts at about an amp. While away from AC power or having to be portable I use a USB battery charger that I carry with me.

The pictures below show me talking to Shane KØSDT while he was in Wyoming and I was in the Nashville





I don't know how long the Zumspot will run on that USB Charger device, but I talked to Shane for 20 minutes or so at the airport anyway without killing the battery. More experimentation is needed to determine its runtime. One website states: Current needs peak at <400mA for the Pi 3 Model B and <300mA for the Pi Zero W with steady state being about 100ma less than peak.

#### https://youtu.be/0CbWkfCA9tc

How's this for a ground connection ???????? NO NO NO NOT on my watch!!!! From a Facebook post! 😕



See past editions of the newsletter at: http://www.ke0vh.com/hamshack/archives/TheKE0VHHamshack201701Jan.pdf http://www.ke0vh.com/hamshack/archives/TheKE0VHHamshack201702Feb.pdf http://www.ke0vh.com/hamshack/archives/TheKE0VHHamshack201703Mar.pdf

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> 2 YEARS AGO: http://www.smpte-sbe48.org/wp/2016/12/

> 3 YEARS AGO: http://www.smpte-sbe48.org/wp/2015/12/

> 4 YEARS AGO http://www.smpte-sbe48.org/wp/2014/12/

5 Years AGO: http://www.smpte-sbe48.org/wp/2013/12/

6 Years AGO: http://www.smpte-sbe48.org/wp/2012/12/ Don't forget the SBE Chapter 73' Of the Air AllStar (and Echolink) Hamnet, every <u>MONDAY EVENING</u> At 7pm Mountain time (9pm Eastern) for radio discussions, both Broadcast engineering and amateur radio. Details on how to join us are at http://www.ke0vh.com/net/net.html.

I hope You will be able to join us and share your engineering and Ham exploits!



73' from "the Shack" & God Be With You!