

Indiana Oath Keepers **DMR Primer**

Hello Good Oath Keepers.

DMR Radio is different from FM analogue radio operation in that DMR stands for Digital Mobile Radio. In DMR your voice is converted to a digitized signal that can be sent over the air with amazing clarity and is well fitted for transmission over the internet as well.

A DMR repeater works just like any other repeater when the internet connection is taken out of the picture. It receives a signal from a radio and retransmits it so other more distant stations can receive the signal. As with any two meter (VHF) or seventy centimeter (UHF) system a repeater can receive and send signals farther because its antennas are usually mounted high up in the air, perhaps 300 to 400 feet in the air. A higher antenna has a far longer line of sight than a lower antenna.

The output power of the radio may contribute some but the height of the antenna is the biggest contributing factor. DMR repeaters also have the ability to connect to a central system over the internet allowing many repeaters to contribute to the reach of the system. Hence, DMR over the internet gives operators worldwide operations.

So, as Oath Keepers using DMR, we gain communications capabilities when the grid is up and loose no capability when the grid is down in comparison the analogue systems. Except perhaps the fact that there are more analogue repeaters than there are DMR repeaters. But these radios will fully function as analogue radios too. So we loose nothing by using these DMR radio's.

Getting Started with DMR

What you need to do is,

- Order a DMR Radio. Our Recommended Equipment List provides brief description of three DMR Radio's. The Anytone 878 Plus is an excellent DMR Radio with many added capabilities and features, I own two of these but they do cost more.
- Apply for your DMR ID. It is free and may take a day or two to get your number. You must have this number before programming your radio.

<https://www.radioid.net/register#!>

- Get your radio programmed. I have a program (Code Plug) set up for Indiana Oath Keepers. You can meet up with me and I can load your program or you can make arraignments to get the program and load it yourself. Contact me at commscoord@indianaoathkeepers.org
- Operate your radio.

Basic Operation

Basic Description - DMR works through Talk Groups. You tune to the Repeater (Zone) and then the Talk Group (channel) you wish to talk on then momentarily press your PTT to tune the repeater to that Talk Group, and if the channel is clear you begin operating. You must bump the PTT to tune the repeater to that Talk Group before you will be able to hear or talk on that group.

Some repeaters have static talk groups that are on the air all the time, if no one is using the repeater, so you can hear those static talk groups when you tune to the repeater sometimes. If you desire a different talk group and no one is using the repeater you are accessing then just bump the PTT and operate.

DMR Radios will function in simplex as well, you do not have to bump the PTT for simplex operation.

Busy Repeater - To determine if a repeater is being used you tune to the repeater and talk group and bump your PTT if someone is using the repeater you will get a tone and either a busy or failed message on your radio. No problem, just wait until they are done or join in the group conversation when the opportunity arises. On some radios there is a Monitor Function that allows you to hear any activity on a repeater regardless of the TG they are using. Often a repeater is being used and when you tune to your desired TG you do not hear the other operators because they are on a different TG, the Monitor function allows you to hear them if they are active.

Radio Buttons – Please note that on your program guide there is a listing for the button functions on this radio. The Moni Button is the one under the PTT switch on some Radios.

The Orange Button is above your PTT switch. Each button has a Long and Short Press Operation. You might want to note the Low/High power function as you will add life to your battery by operating in Low Power, however it may not be practical to use low power when traveling and using repeaters.

Tuning to a Channel - To tune a Channel

1. Select your desired Zone. Remember a Zone is usually representative of a select Repeater or a Hot Spot.
2. Select your desired Talk Group or channel.
3. On DMR bump the PTT switch to activate the Talk Group on the repeater or Hot Spot. Bumping the PTT is not necessary for Analogue channels or repeaters.
4. Operate as normal.

Notice the additional steps in DMR operation. You must select the Zone (repeater) then the Talk Group (channel) you wish to talk on. Each must be selected separately. If you wish to change Talk Groups on the same Zone you do not have to go into Zone Select again you just select the desired Talk Group and bump the PTT to activate it.

However, if other hams are on the same talk group and do not wish to change talk groups you must wait until they clear to change the talk group.

A Disadvantage With The RD-5R

The RD-5R does not work well with tactical mics. Something in the design of the radio and the nature of DMR radio the remote wired mics will inject a noise referred to as Motor-Boating into your transmission. This can be so loud that one cannot hear the audio. The only way I have found to use a tactical mic with the RD-5R is the remote your antenna away from the radio. This is a somewhat frustrating problem. Call me if you wish to talk about this problem more.

Other DMR Radio's like the Anytone 878 and the Beofeng DM-1701 do not have this problem.

Hot Spots via Wifi

A hot spot acts like your own personal repeater and connects to your local internet service via a network connection or wifi depending on the hotspot DMR device you choose to use. I use a Jumbo Spot (simplex Hotspot), which is really small, and a Full Duplex Hot Spot. These connect to my smart wirelessly and only need power applied to work. I use mine in my car while I'm driving even when I am in an area where there is a repeater. I find that often a local repeater will have other hams using the repeater and they are not on the Talk Group I desire. A hot spot removes this problem. Sometimes it is easier to just use the Jumbo Spot while I'm driving because I do not have to change repeaters as I travel.

I use this, <https://www.ebay.com/itm/Assembled-MMDVM-hotspot-Support-P25-DMR-YSF-raspberry-pi-OLED-Antenna-Case/122878428117?epid=12015335839&hash=item1c9c2003d5>

It is a little bigger than a 9 volt battery. Really small and once set up works great. It was a challenge to configure at first, so you may want help getting it set up.

Why Use A Hot Spot? – You don't have to use a Hot Spot if you are near a DMR repeater. But you need to understand,

- Some Repeaters restrict which Talk Groups you can access. This is determined by the repeater owner. Brandmeister Repeaters (a protocol) give free access to all Talk Groups by merely selecting the desired Talk Group and bumping your PTT. There are many Brandmeister Repeaters in our state.
- Some Repeaters may get busy at times making it hard to get on the Talk Group you desire at the time you wish to operate. Your DMR Hot Spot is dedicated just to you.
- You may not have a DMR repeater near you. A DMR Hot Spot will give you access to DMR wherever you have internet access.

I encourage all operators to get a hotspot and practice using it. Even if you have a local repeater. You will find the Hot Spot will give you better service even if you are traveling if you can connect it to the wifi in your smart phone.

Keep in mind that a DMR Hot Spot is not just any old cellular hot spot. It is a Hot Spot designed to access the DMR system. Examples include the Jumbo Spot, Shark Open Spot, and the Nano Spot. I use a Jumbo Spot.

Full Duplex and Simplex Hot Spots – A Simplex Hot Spot will operate only on time slot 2 and cannot transmit and receive at the same time; it is simplex. So, if you are on a talk group and you wish to change talk groups you must wait until no one is talking to key up your hot spot to the new talk group. Your hot spot cannot transmit and receive at the same time. A Full Duplex hot spot, which costs a little more, can transmit and receive at the same time so there is not problem sending signals to your hot spot even when someone is talking. I highly recommend spending a little more to get the Full Duplex Device.

However, part of the convenience of the single duplex device is its size. It can be placed in one's pocket with a small battery pack and be carried wherever you go. The Full Duplex unit is a little big for that. I use simplex hotspots in my car and a Duplex hotshot at home. **If you use more than one hotspot be sure they operate on different frequencies to avoid conflicts.**

A hot spot can work a distance, I can access mine out to about a quarter of a mile. This can vary depending on your surroundings. It is possible to amplify a hotspots output power using a specially designed amplifier

A Word About Talk Groups – There are all kinds of Talk Groups associated with

DMR; thousands of them. You can go to the Bradmeister web page and look up a list of the many Talk Groups and their intended purposes.

As a DMR operator just understand,

- World Wide, Nation Wide, and State Wide groups are intended as initial points of contact. A contact (QSO) should be relatively short on these Talk Groups. Those wishing to hold longer QSO's should arrange to meet the desired parties on another Talk Group designed for extended conversations. These wide area Talk Groups contact many repeaters and tie all of those repeaters up for the duration of the QSO.
- TAC Group – TAC group such as INTAC standing for Indiana Tac and TAC 313 through TAC 319 and other such groups are meant for longer duration QSO's and

operators should feel welcome and comfortable holding extended conversations on these Talk Groups. Avoid Tac 310-312.

- Club or Association Talk Groups – These groups are meant for their intended purposes which are described in the description of the group on the Talk Group website. Many of these various Talk Groups openly invite allhams to enjoy long QSO's on their Talk Group.
- Local 2 – This shows as “Local” in our program. This talk Group uses only the local repeater that the Operator has tapped into. Hams who have access to the same repeater are encouraged to use this Talk Group for their QSO as it only ties up one time slot on their repeater.
- Private DMR ID's – Any ham can use their DMR ID setup as a group talk group to establish a private talk group. In our code plug my DMR ID is setup for this purpose. Any of our hams that connect to these groups will be using a somewhat private talk group.

DMR ID.

Time Slot 1 & Time Slot 2 – DMR is unique in its use of TDMA which divides the repeater frequency into two time slots. This allows for two different QSO's on the same repeater at the same time. So, a ham or group of hams could be using Time Slot 1 to talk on Indiana Statewide while another group talks on Time Slot 2 using the Local Talk Group. This is an amazing feature of DMR.

As an operator you won't always know what Time Slot you are on but you will enjoy the QSO's and the technology.

I hope this DMR Primer will help you to understand enough about DMR to get on the air with your DMR radio.

I am always willing to help with Ham Radio Communications for Indiana Oath Keepers. Feel free to contact me with your questions or comments.

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