

(geared towards the Anytone AT-D868UV)

AT-D868UV and programming software can be found here: [www.importcommunications.com](http://www.importcommunications.com)

1. By the end of this lesson you will be able to program a DMR radio with basic functions.
2. You will also learn how to spell DMR.
3. And you will have more questions when we are done so let's get started.

Step 1. Register at DMR-Marc for a radio ID. You only need 1 DMR ID for all your DMR radio's or hotspots. Your ID will be emailed to you generally within 48hrs. <https://www.dmr-marc.net/cgi-bin/trbo-database/userreg.cgi>

Step 2. Determine if a DMR-Marc repeater is available in your area at <https://www.dmr-marc.net/repeaters.html>. If not then a DMR hotspot such as a DVmega-BlueDV or Openspot are great choices. If you are fortunate to have a local DMR repeater then an excellent portable radio is the Anytone AT-D868UV. It is a dual band VHF/UHF HT with analog FM & DMR capability for around \$170.00

Step 3. Program your radio with the manufactures CPS software. This lesson will only focus on basic DMR programming that connects to a DMR-Marc repeater.

## **Section 1: What is DMR?**

Digital Mobile Radio is an open digital standard defined in the European Telecommunications Standards Institute (ETSI) and is divided into three tiers.

Tier 1 is a single channel spec and uses 6.25 kHz bandwidth & is good for simplex but will not work on Ham repeaters.

Tier 2 is a 2-slot TDMA 12.5 kHz bandwidth protocol. Amateur DMR repeaters allow for 2 slots each being 6.25 kHz wide. This allows for 2 simultaneous radio channels to be used on 1 repeater. When purchasing a radio for Ham use make sure you look for Tier 2.

Tier 3 builds on Tier 2 but adds trunking. Currently not used in Amateur Radio.

## **Section 2: DMR Repeaters and networks**

Not all Amateur Radio DMR repeaters are connected to the internet. If the DMR repeater has no network capability then it will not be able to access any of the global talk groups and will only be a local area repeater. You will need to check with your local repeater operator to see what groups/time slots are available.

For this conversation we are only going to discuss the DMR-Marc network from Motorola. You can access the DMR-Marc network information at <https://www.dmr-marc.net/repeaters.html> Locate your local repeater to retrieve the repeater programming information.

There are 3 popular wide area DMR networks currently being used worldwide, DMR-Marc, Brandmeister and DMRplus. Your local repeater operator determines which one to use. Some DMR repeaters have no linking capability and are local area repeaters only.

**Common talkgroups on DMR-Marc repeaters:** The following DMR talkgroups are generally available on all DMR-Marc networks; NA for North America, WW for WorldWide, WWE for WorldWide English, State Wide, certain regions & some TAC channels. TAC channels such as TAC-310 are not on by default. You will manually need to key up using talkgroup 310 to start using it but it **will timeout after 5-10mins of no local activity.**

**Hotspots cannot connect to DMR Marc repeaters directly.** You will need to review what talkgroups are in common with your hotspot network & your local DMR Marc repeater. TAC-310 is common between DMR-Marc & Brandmeister but needs to be activated manually.

**Section 3: AC4XQ DMR repeater located on the Broward/Dade line** Great coverage in all parts of Broward & Dade County

Callsign: AC4XQ  
Frequency: 443.12500  
Offset: +5.000  
ColorCode: 10

IPSE2  
North Dade, Florida

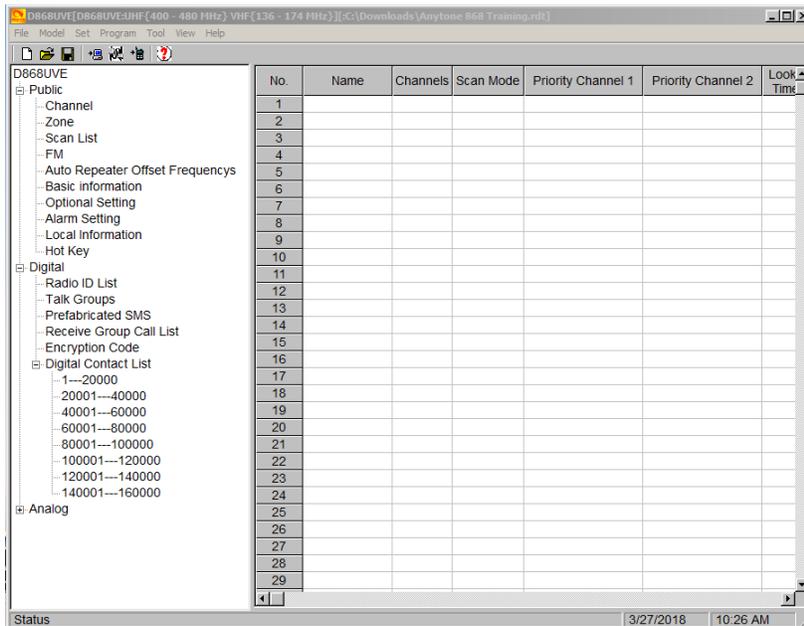
Repeater Callsign: AC4XQ  
Repeater City: North Dade  
Repeater State: Florida  
Repeater Country: United States  
Repeater Frequency: 443.12500  
Repeater ColorCode: 10  
Repeater Offset: +5.000  
Repeater M/P: Master  
Repeater Time Slots: TS1 TS2

Time Slot #1 - Group Call 1 = World Wide  
Time Slot #1 - Group Call 13 = WW English  
Time Slot #1 - Group Call 3 = N. America  
Time Slot #2 - Group Call 2 = Local  
Time Slot #2- Group Call 3112- Florida Statewide

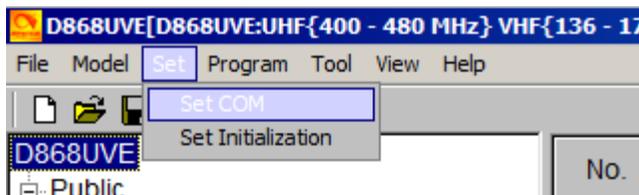
## Section 4: Programming your DMR radio

Note: For this lesson we will only be installing the minimum required settings to get on the AC4XQ repeater plus one simplex UHF analog channel. The radio used for this demo will be the **Anytone AT-D868UV** portable radio. The CPS programming software will look different for each model radio but the same info must be stored.

1. Download & install the CPS software “Customer Programmable Software” for your radio’s specific model.
2. With your radio turned off, plug in your DMR radio programming cable & install it to the radio and your computer. Some programming cables require a USB driver so you may need to download the driver from the manufacture website. Do not continue if your USB programming cable is not recognized. Some USB cables show up as com ports while others are native Windows USB devices. Some programs require you to manually set the com port so check your radio’s documentation.
3. Turn on your radio.
4. Start your CPS software then expand the left window. Other manufactures CPS screen will look a little different but must contain the same basic information.

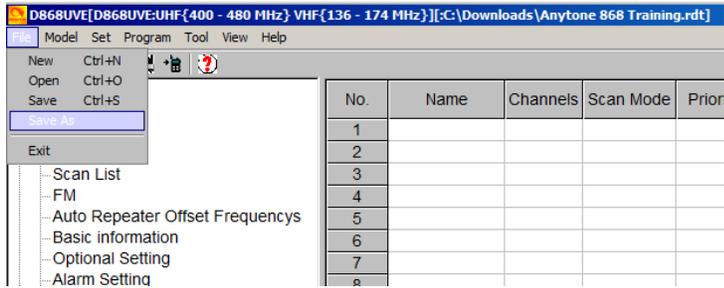


5. From the top menu, select “Set” then “Set COM” and choose your com port.



6. If this is a brand new radio then we highly recommend you read in your radio configuration. Select Program then “Read from Radio”. Wait for read to complete. If the program does not read the radio then check your USB cable connection & or your com port settings.

7. Save your file by selecting “File” then “Save As” & give it a descriptive name like “original code plug”

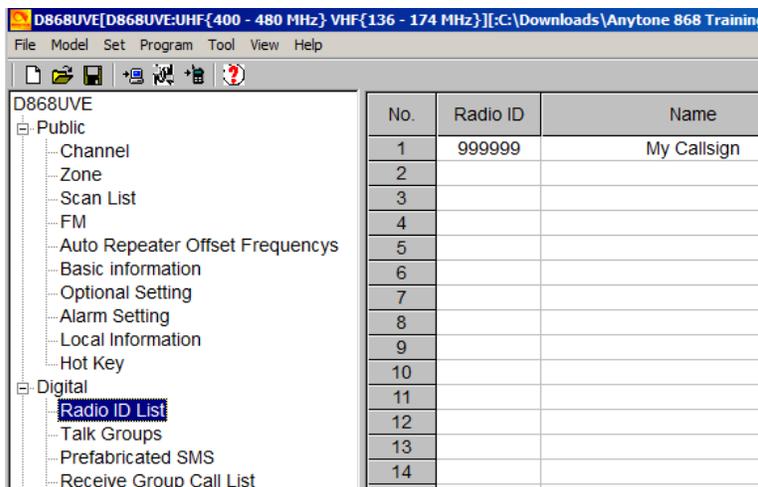


8. Your radios configuration settings are also known as a “**code plug**”. So if you install someone else’s radio code plug you will need to know the following:

- a. You will lose all your radio programming settings/frequencies and get theirs.
- b. If the code plug is from a different area, county/state then it will not work in your area.
- c. If the code plug is from a different model radio then it will generally not work with very few exceptions. Example: A code plug from a TYT MD380 can be read into a TYT2017 & TYT MD9600 radio but will not work on different model DMR radios.
- d. If the code plug is from your local area then you will need to enter your DMR ID, your callsign & your radio screen name.

9. Now you’re ready to start programming. Follow these steps in order to make the programming process easy.

- a. Expand “Radio ID List” & enter your DMR ID and callsign in the right window.



- b. Expand menu “Talk Groups” & enter all 9 entries. These are the same Talk Groups as in section 3 and are common for all North America DMR-Marc repeaters with the exception of the statewide and regional TG’s.

No.	TG/DMR ID	Call Alert	Name	Call Type
1	1	None	WW (TG1)	Group Call
2	2	None	Local 2 (TG2)	Group Call
3	3	None	NA (TG3)	Group Call
4	13	None	WW Eng (TG13)	Group Call
5	91	None	WW (TG93)	Group Call
6	93	None	NA (TG93)	Group Call
7	3112	None	FL State	Group Call
8	3174	None	SE Regional	Group Call
9	310	None	TAC-310	Group Call
10				
11				
12				
13				
14				
15				

- c. Expand “Channel” then in right window double click on line 2 to edit the channel. The screen below already shows programmed channels so for this example we will be editing line 2.

No.	Receive Frequency	Transmit Frequency	Channel Type	Power	Band Width	TCSS/DC Decode	TCSS/DC Encode	Channel Name	Contact
1	146.52000	146.52000	A-Analog	High	12.5K	Off	Off	146.52	WW (TG1)
2	443.12500	448.12500	D-Digital	Turbo	12.5K	Off	Off	AC4XQ Local	Local 2 (TG2)
3	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ NA	NA (TG3)
4	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ WW	WW (TG1)
5	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ WWE	WW Eng (TG13)
6	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ FL	FL State
7	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ SReg	SE Regional
8	443.12500	448.12500	D-Digital	High	12.5K	Off	Off	AC4XQ 310	TAC-310
9									
10									

Channel Name: AC4XQ Local

Receive Frequency: 443.12500  
Transmit Frequency: 448.12500

Channel Type: D-Digital  
Transmit Power: Turbo  
Band Width: 12.5K  
TX Permit: Same Color Code  
Scan List: None

TX Prohibit  
 Work Alone  
 Talk Around

Digital

Contact: Local 2 (TG2)  
Radio ID: My Callsign  
Color Code: 10  
Slot: Slot2  
Receive Group List: None  
Digital Encryption: Off  
Encryption Type: Normal Encryption

Simplex TDMA  
 TDMA Adaptive  
 Call Confirmation

Analog

CTCSS/DCS Decode: Off  
CTCSS/DCS Encode: Off  
Squelch Mode: Carrier  
Optional Signal: Off  
DTMF ID: [ ]  
ZTone ID: 1  
PTT ID: Off

Reverse  
ZTONE Decode: 1  
Custom CTCSS: 131.8

Buttons: OK, Cancel, Previous, Next

- d. You are now ready to enter your first DMR channel. Enter your AC4XQ repeater talkgroups as shown in section 3. For this example we are going to program **AC4XQ Local** which will allow you to talk to the local Broward/Dade area only. You can add other channels for this repeater that connect to other talkgroups such as North America, Worldwide, etc by simply changing the channel name, contact, & repeater slot. See above illustration for the entries below.

At "Receive Frequency" Enter 443.125

At "Transmit Frequency" Enter 448.125

At "Channel Type" Select D-Digital

At "Power Level" Select Turbo (This is high power 6 watts)

At "Bandwidth" Select 12.5k

At "TX Permit" Select "Same color code"

At "Contact" Click on bar then search for "Local 2" This is the local Talkgroup for AC4XQ.

Double click on Local 2 to select it.



At Radio ID you should see your callsign

At Color Code Select 10

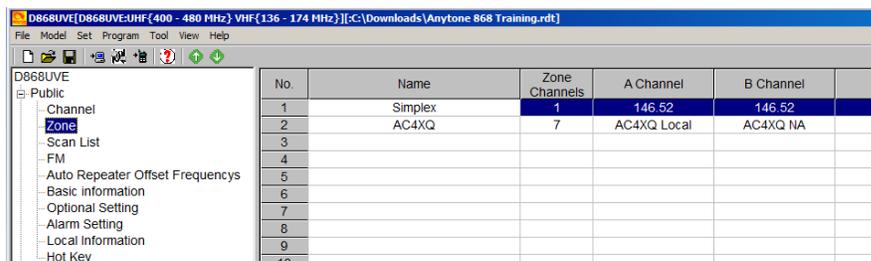
At Slot Select Slot 2

Click on the "OK button.

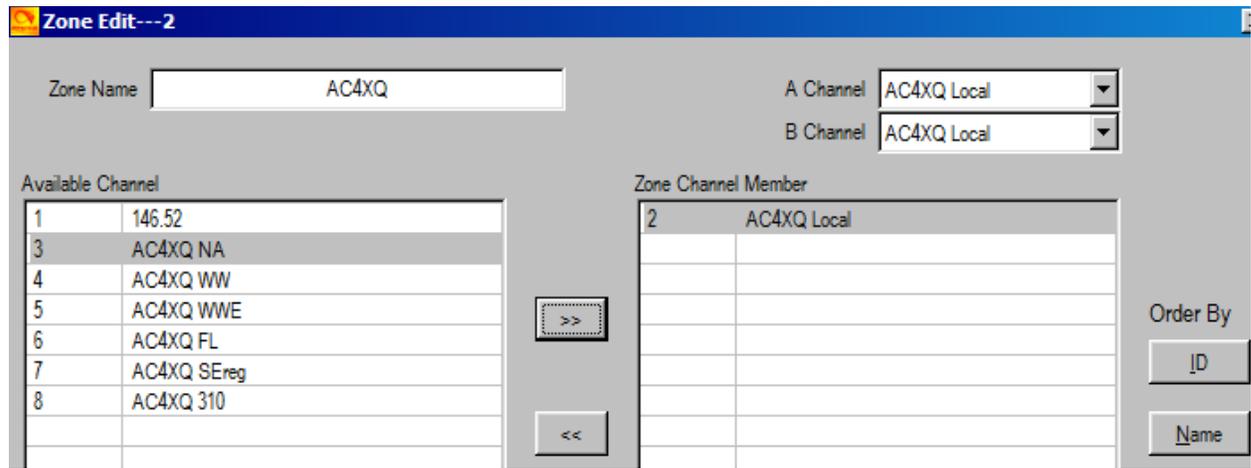
- e. **Repeat above steps to enter the other talkgroups for AC4XQ.** If you are programming another TG on the same repeater then all the information is the same except for the "Channel Name", Contact TG, and slot number.

- f. The next step is to create a Zone. You must add channels to zones to use the radio in either analog FM or DMR mode.

Expand menu "Zone" then in right window select the next available empty line.



Highlight the available channels in left window then click on right arrow to place them in the right window. Add all the channels you wish to associate to this zone. You should now see those channels on the right side. Change “Zone Name” to AC4XQ then click the OK button.



10. **NOW SAVE YOUR WORK & DO IT OFTEN.** USE DIFFERENT FILENAMES IN SOME SEQUENCE SO YOU NEVER OVERWRITE OR CORRUPT YOU'RE ORIGINAL OR LAST UPDATED FILE. ALWAYS USE THE "FILE SAVE AS" OPTION. Example: "ANYTONE 1" then "ANYTONE 2"
11. Now write the configuration to the radio. Select "Program" then "Write TO Radio" and wait for it to finish.
12. Congrats, you programmed your first DMR channel. Use this technique to program the other channels.
13. To program an analog frequency, simply change the "Channel Type" from "D-Digital" to "Analog" then enter in the frequency, power level, and PL tone if required. Remember, you need to add all channels to some Zone including analog channels.
14. If you add new channels or modify existing ones or make any changes in your CPS software then you need to perform a write to the radio to get those changes.
15. **To use your DMR radio.** This example is specific for the Anytone AT-D868UV radio but can be applied to any DMR radio.
  - a. select Menu then "**Zone**". Use the radio up/down buttons to select the zone you wish to use.
  - b. Select the "**TalkGroup**" by turning the knob next to the antenna. This selects the different talkgroups that you programmed. Other model radio's may require you to use the menu and up/down buttons to make talkgroup selections.
  - c. For this example we wish to select "**AC4XQ Local**" You are ready to transmit when the display shows "AC4XQ Local". Do not transmit if someone is using that talkgroup. If no one is using that talkgroup then "Press & hold the PTT button for 2 seconds then start talking". You will get a confirmation tone or a screen alert during a DMR transmission. Some DMR radio's have two different types of audio transmit tones. One tone is a successful repeater connection alert and the other but different tone is repeater cannot be reached.

**Note:** DMR radios can be programmed to disable all audible sounds so if this is the case then you will not get any notification sound but your screen will display a connection error if you are not able to reach the repeater. Also, you may be in range to reach your local repeater but the issue could be with bad programming such as the wrong freq, slot# or colorcode so verify all your settings first.

THIS COMPLETES THIS LESSON.