Guide to the AE2A Codeplug Programming

Base Level Programming

The Digital Contacts List

The Digital Contact List is the starting point for building a codeplug. This list must contain all of the Talk Groups you will be using in both the 'Channels' and 'Receive Groups 'you will be adding later on. My 'base' set of contacts contains about 115 of the DMR-MARC 'Officially Recognized' talk groups. In addition, I have added some other frequently used talk groups from other networks such as the NC-PRN network and the FLORIDA-DMR-NET. I use a tool that allows me to keep this list sorted by the DMR-ID. Do not try to resort or insert new talk groups in this list unless you understand the consequences of this; all other references to entries in this list are pointer to the position in the list as originally created! This means that if you add a channel and use the 'LOCAL REPEATER' talk group (ID=9) and you insert an entry above this entry, all of the subsequent references to 'LOCAL REPEATER' will be referencing the entry you just added! This will quickly 'break' a working codeplug! I use a common base set of contacts even though not all of the entries may be used in a particular codeplug so as to eliminate the need for any editing of the list.

I have intentionally left 'SPARE' entries in some places to allow for growth without corrupting the list. I have also placed some frequently used Private Call entries at the bottom of the 'base' set. Placing your list of 'Private Call' entries below here will allow the radio to display the call sign and name of your frequently contacted partner ID's. If you use any tool which can import any of various list of Private Calls, you can enter these in any order as long as you enter them below the 'base set' of entries.

The Receive Groups List

The Digital Receive Groups (RX Group) list is an important part of keeping a codeplug simple yet functional. There is much discussion about whether or not to use receive groups or even if they are necessary. By strict definition of the DMR (ETSI) standard, the TX Contact is implicitly included in all channels. Unfortunately some radio manufacturer's firmware (Tytera) violates this part of the standard. I use RX Groups so that you will hear any traffic on the selected timeslot (of the current channel) as well as allowing you to hear all traffic on the repeater when in scan mode (scans both time slots). This simplifies your codeplug by allowing your Scan Lists to require only two entries for each repeater, one for time slot one, and one for time slot two. You must be aware of the radio limitations when using this method as a 'large' codeplug for wide geographical areas or one that has many repeaters may require you to selectively optimize or combine RX Groups in order to not exceed the limits of your radio. Some radios only allow 16 or 32 RX Groups, yet may have the capacity of 250 or more 'channels'! Fortunately there is both an easy and logical method that can be used to reduce the number of needed RX Groups.

Normally all of the repeaters in any given area are members of a common network and utilize a common set of Talk Groups across all of the region. This would allow one to create two RX Groups (one for time slot one, one for timeslot two) and apply one or the other of these RX Groups (as appropriate) to each of the channels (or zones) in that region. Be aware that although some repeaters may use a common set of Talk Groups, it is up to each individual repeater owner as to what set of Talk Groups are actually implemented, and some repeater owners may not follow the DMR-MARC or their network

recommendations as to which talk groups are accessible on which time slots. It will not do any damage to add a few more talk groups to a RX Group list as long as the same talk group does not appear in both time slots!

Fortunately the Tytera MD-380/MD-390 series has the ability to utilize 250 RX Groups! Other brands of radios may only allow 16 or 32 RX Groups which will require you to be creative in your approach to the use of RX Groups.

The Zones List

Zone are the way that the radio groups 'Channels' into a logical order. In other manufacturers' lingo, you may have heard the term 'banks', which is the equivalent of this hardware function in the DMR world. Most DMR radios have a capacity of 16 channels per Zone and typically one selects the channel with the channel selector knob on the radio. The selection of the individual zone is usually selected by a menu or other method. Most radios can accommodate between 16 and 250 'zones'. This is quite a large number of channels! My methodology uses the basic geographical area as the zone name. This allows almost anyone to pick up the radio, determine the area they are in and select that zone, and begin using the radio. Other methods utilize the call sign of the repeater for the zone name or some other naming convention. In some cases there may be more than one repeater in an area, so you may need to develop some method of naming your zones. Be aware of the limitations of how many characters your radio's display can accommodate so as not to use too long of a name for a zone. In some areas I have had to use abbreviations and add the direction (North, East, South, West or other) to a zone name.

The Channels List

This brings up a need to discuss 'channel names'. Although you may be able to use up to 20 characters in your radio's CPS software, your radio might only display the first 8 to 10 characters! If your display will scroll left to right, all the better! If the radio will only display 10 characters, you will not be able to see the complete channel name. Some folks may choose to use the frequency of the channel as its name, but you quickly run out of any descriptive text space for any details. Others may choose to use a cryptic shorthand combining parts of the frequency and parts of the TG number. My naming convention uses the Talk Group Name with a 3 character suffix that denotes the zone. The MD-380/MD-390 have a 2-line display which is quite nice as the Zone Name is shown on the second line and the Channel Name is displayed on the first line. This allows you to 'see' most of the critical information all at once.

If you create your own codeplug, you are free to use any naming that makes sense to you. If you use someone else's codeplug, make sure you understand the names and conventions the author used.

Depending on which radio and which model radio you have, the list of parameters needed for each channel entry may be just a handful or may be quite extensive if the radio has extended capabilities. At the least you will need to name (or number) the channel, Define the RX and TX frequencies, set the mode to digital (or analog), the transmit admit criteria (almost always 'Color Code Free' for DMR), a receive group list name to apply, the transmit talk group to use for this channel, the digital color code used for the channel, the time slot, and the power level to use. There may also be other settings, but these are not required to be set to any particular value, but may be set as desired. One hidden option that is not obvious in the MD-38-/MD-390 is the use of simplex channels. These are commercial use radios and the term 'talk-around' is used to denote simplex operation on the RX frequency. Enabling this option allows this option on a channel by channel basis. Beware that if you deliberately define a channel

with the same RX and TX frequency (simplex) the MD-380/MD-390 will not transmit unless you also enable 'talk-around'!

Another point of interest, the 'normal' end of transmission 'courtesy tone' is not automatic in the MD-380/MD-390! You must apply this option to each channel as "Channel Free Indication Tone" in the General Settings menu and apply this option to each channel (with an outboard software tool or editor) in each channel as the "Reverse Burst/Turn Off Tone". This option is NOT visible in the Tytera supplied CPS software!

The Wrap Up

As you can see, there are many lists that interact with each other in some not so obvious ways. The lists are linked when you create a codeplug which is why the sequence is all important. Naming conventions may seem confusing at first glance, but be sure to open your codeplug file and try to understand how it works. Finding that broken entry in a codeplug that does not work can be a daunting task to the beginner! Go slow, change only one thing at a time, verify that what you did made a difference (hopefully positive), and if needed, drop me an email if there is something you need changed.

Better yet, try your hand at making a codeplug from scratch. Start with one channel in one zone. Add some more channels, make a scan list. Get familiar with what you can do with the programming. Experiment with the different methods of using the different lists. You might just find a unique method of solving a perplexing issue! Join the Yahoo! Groups for DMR.

Best wishes!