AE2A's How to Create a Code Plug

The Contact List:

Try to keep all contacts and displayed names in UPPER CASE as it make it easier to read on the display. I noticed that you timed out a lot of the predefined group call talk groups from the contact list. Although this works in a 'small' code plug, as you wish to add more channels and repeater talk groups eventually you will end up with a scrambled list. My BASE list consists of about 250 contacts sorted by their DMR ID and with the de-facto standard names for these talk groups. Although you are free to name any talk group to any alias you may find that trying to meet someone on a talk group you never heard of will be impossible and you may not have it in your contact list, so editing the list by inserting it back into the list will result in a 'broken' code plug.

There is no penalty for using the full contact list of BASE contacts, and using it will limit the possibility of future catastrophic failure. My list is a merged and sorted list of all of the DMR-MARC, DMR-FL, Brandmeister, K4USD, FLA.DMR.NET, and DCI network talk groups. These are the networks that repeaters here in Florida connect to. Our Friend Mike (KA9ZRZ) tried to trim the list to suit his needs and quickly found out that he needed to add back most of talk groups, but in the process he scrambled the list so badly it could not be made to work! My list has 'placeholder' unused names strategically placed in case some new groups are added. Simply edit the Alias and the group number and you are ready to go.

Once you have all the 'standard' groups, you add your personal 'Private Calls' to the bottom of the list. This will display the name and call sign of the stations you hear. As long as you have no channels using 'Private Call' functions, everything continues to work!

I keep my personal list of DMR-ID's of friends above the area where I constantly add the new guys so that they are 'protected'. I use the 'MARKER" of 'PERSONAL BELOW' and PERSONAL ABOVE' with unused DMR-ID's to mark these entries so they are always the same.

Style Hints:

If you create scan lists that do no match your zone lists, you will be stopping the scan on channels you cannot talk back on when these channels are active.

Hint: For each zone, create a scan list named the same as the zone it refers to (You can use the same name as they are separate lists). Apply the scan list to all of the channel entries in that zone. Now if you enable scan in that zone, when it stops, you will be able to talk back on that channel (Scan list hang time controls the amount of time you have to respond). The only exception to this rule happens when you deliberately have 2 repeaters in the same zone, then you create a merged scan list that you apply to only the first channel in the zone. Should you decide to separate the zones later, you simply revert the scan list on the first entry back to the original zone scan list.

Receive Groups:

Receive groups control what you hear on a channel. If you have no RX Group applied to a channel, you hear only the TX contact (group) set in the channel.

Example: You select the 'local' channel on KJ4OVA which has no RX Group programmed. You are in a QSO and now you see the activity LED is on but you hear nothing! You cannot transmit either! What's going on here? Simple, someone on one of the other 'full time' talk groups is active. With this method of programming you would need to have a channel with the 'full time' talk group in your scan list and then press the 'scan' button on your rig. But there is still a flaw! If there is also a QSO happening on the other time slot (2 slots per channel – remember?) you might stop on the 'other' time slot and still not hear what you want!

My method:

My method involves the use of 2 dummy channels with NO TX Contacts assigned per repeater and all channels get a talk group.Implementing this method is not difficult, the first step is to create two RX groups in the first two channels of the group of channels for this repeater.

I'll use KJ4OVA as a sample: KJ4OVA is a modified DMR-MARC repeater. KJ4OVA uses the generic DMR-MARC Timeslot assignments with the Brandmeister 1st Coast talk group as "full time' on time slot 1.

This means we will create two RX Groups for this repeaters' channels.

Create RX Groups;

We will create 2 RX Groups for this Network called "DMR-MARC S1" and "DMR-MARC S2". These Group lists will contain the talk groups for each time slot.

Contents of RX Groups :

From the DMR-MARC website we find the list of slot talk groups is:

DMR-MARC S1 Contents:	DMR-MARC S2 Contents:
#1 WORLDWIDE	# 2 LOCAL
#3 NORTH AMERICA	# 9 LOCAL 9 (NON-NETWORKED, but not used)
#13 WORLDWIDE ENGLISH	# 99 SIMPLEX (used for talk-around)
# 31121 1st COAST FLORIDA (the modification)	# 3112 FLORIDA STATEWIDE
# NORTHEAST REGION	# 3174 SOUTHEAST REGION
# 113 UA 113	
# 123 UA 123	
# 310 TAC 310	
# 311 TAC 311	

Create first two channels:

Channel 1 is going to be named "KJ4OVA SLOT 1" and is set for TX Frequency 443.13750 MHz, and RX Frequency 448.13750 MHz, with color code 1, time slot 1 and RX Group set to DMR-MARC S1. Also set the TX Timeout value and desired TX power Levels. Channel 2 is going to be named "KJ4OVA SLOT 2"

and is set for TX Frequency 443.13750 MHz, and RX Frequency 448.13750 MHz, with color code 1, time slot 2 and RX Group set to DMR-MARC S2. Also set the TX Timeout value and desired TX power Levels. These two channels are not used in any Zones, but serve as an efficient method of scanning only 2 channels (one per time slot) to receive all traffic on a repeater. When scanning stops due to activity using this method, you can PTT on the correct Talk Group (for the length of the Scanning Hold Timer value) and talk back correctly. You can also turn 'scan' off and select the proper talk group manually.

Now you will notice that the two lists don't exactly match the data on the DMR-MARC website, well, the data is incomplete (Thank you Ralph!).

The data here is 100% accurate. The DMR-MARC website will get you close, but there are lots of incomplete channel matrixes!

Now we see that we will need 14 'channels' to be added for KJ4OVA to be able to talk/hear all the activity on KJ4OVA.

We already created the first to channels (SLOT 1 and SLOT 2), so now add 9 new channels for the slot 1 talk groups and add 5 new channels for slot talk groups.

Naming the new channels during create:

Depending on the specifics of each type radio, you may have only 8 characters on some radios for a channel name, so you may be forced to invent some shorthand here. For those radios that hold 16 characters, this is how I go about it:

Create the channels:

KJ4OVA WORLDWIDE
KJ4OVA N.AMERICA
KJ4OVA 1st COAST
KJ4OVA NORTHEAST
KJ4OVA UA113
KJ4OVA UA123
KJ4OVA TAC310
KJ4OVA TAC311
KJ4OVA LOCAL
KJ4OVA LOCAL 9
KJ4OVA FLORIDA
KJ4OVA SOUTHEAST
KJ4OVA SIMPLEX
COPY the base settings (Right-click) from KJ4OVA SLOT 1 channel to all of the slot 1 channels.
COPY the base settings (Right-click) from KJ4OVA SLOT 2 channel to all of the slot 2 channels.

Go back to KJ4OVA WORLDIDE and set the TX contact to "WORLDWIDE".

Do the same for each of the remaining channels and set the correct TX contact for its name.

Create The Zone:

Create a zone called either KJ4OVA ORLANDO, or something you want to display on your radio. Edit the new Zone and add all of the channels for KJ4OVA in the order you wish (some like the LOCAL channels first). Do NOT add the KJ4OVA SLOT 1 and KJ4OVA SLOT 2 channels!

Hints and Kinks

NEVER delete anything you are not 100% sure of! This will break every reference below the deletion point requiring a total rebuild of the code plug.

Lists are NOT linked by the values in each list, they are linked by the position (row number) in the list! If you remove an entry (row) all of the references break! Not a good thing.

How this all works:

Every Zone (generally a repeater or geographic location) has 2 RX Groups.

The XXXX SLOT 1 RX Group has the Group Call Contacts assigned to SLOT 1,

The XXXX SLOT 2 RX Group has the Group Call Contacts assigned to SLOT 2.

RX Groups are specific to the Network of the channel or channel group (the Zone), and these might be used on more than one repeater (Zone) as the way most of the Jacksonville repeaters do. These are members of the First Coast DMR Network (FCDMR S1 and FCDMR S2 RX Groups).

Do not confuse RX Groups (look at these like multiple PL tones that control the Squelch function) with Scan Groups! Scan Groups contain references to Channels, not talk Groups. RX Groups contain references to Contacts (specifically Group Call Contacts). Private Call Contacts are NEVER included in RX Groups! The only exception is the FLA-DMR.net network which has only 1 RX group because there are only 2 Group Call contacts on this network.

The group of channels for each repeater has 2 'dummy' channels with no talk groups assigned. When building a code plug from scratch, you can create empty channels and copy these dummy channels to blank channels to save typing! You then just edit the channel name and assign the TX Contact (Group Call Contact) as needed.

These are the repeater call sign with SLOT 1 (the RX groups for SLOT 1), and the repeater call sign with SLOT 2 (the RX groups for SLOT 2). These two channels do NOT go into the Zone (the group of channels), but rather these are the only two members in the Scan Group used for this Zone.

Bookmark http://www.dmr-marc.net/repeaters.html as this is the place where you look for DMR-MARC network repeater information. http://www.dmrfl.org/home.html this is the link to the DMR-FL network repeaters and information.

The data on the FCDMR Network can be found at http://firstcoastdmr.org/ and look under DOWNLOADS for other information.

This is only a small sample of the detective work needed to create code plugs as complete as mine.

The way all of these 'lists' work together is complex and confusing. It has taken me a few years to get it all straight in my mind, and I am constantly trying to improve the performance and utility of my work. The method I describe above serves to improve scanning performance by only using two channels per repeater which reduces the time needed to scan (about 50 channels per second) and conserve a bit of power in the process. To my knowledge, no one else uses this method and some radios only allow 16 channels per scan list, so if there are more than 16 channels in the 'zone', you can't scan them all unless you use this method! Hytera radios only allow 32 scan lists per code plug, so if you have more than 16 zones you run into this wall very quickly! With this method, I never run into that wall, yet I retain the full functionality needed. This is the reason that there is a small cost for this work.

Anyone can create a code plug for 1 or 2 repeaters and 16-32 channels, when you want to cover 70 to 80 repeaters and about 1500 channels it's an entirely new problem.

Best practice:

Start at the bottom!

1. Create a fully sorted and complete Contact List with all of the "base" Group Call Contacts. This list is about 280 'talk groups'.
2. Next build the RX Groups, one for Slot 1, and one for Slot 2, refer to the network matrixes for the proper entries.
3. Now build your first two channels for the repeater, these are your SLOT 1 and SLOT 2 members.
    Make sure to reference the appropriate SLOT 1 or SLOT 2 RX Groups you just created above.

4. Now copy these two members as many times as needed using the SLOT 1 or SLOT 2 members as needed per the repeater channel matrix.
5. Now create a Zone for all of the channels for this repeater or geographic location (where the repeaters only have a limited number of channels).
6. Add or edit the list of channels so they are arranged in the order which you desire. Do NOT include the SLOT 1 and SLOT 2 channels in the Zone!

Repeat the six steps above for each repeater (Zone). Save your work frequently!

After all of your Zones are completed, export your Contacts List to CSV or Excel format, add your personal list of 'PRIVATE CALL' contacts to the BOTTOM of the list. Save the modified file. Re-import the modified file, save the code plug file. Now you have your personal list included in your code plug.

Polish up your Excel skills and you can work magic!

Now go get a cup of Joe and relax until you start it all over!