

# TYT DM-UVF10 Digital Transceiver



## Programming Guide

Guide rev 1.0 for programming SW version 2.4.8  
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# 1 Introduction

I started to write this guide after I bought three TYT DM-UVF10 digital radios and realized, that there is no programming guide or help file. I slowly discovered the advanced features of the radio (some of them are still mystery to me) and decided to write down my findings for other users.

The user guide for the radio could also have a better description, but this is another story. One day, maybe.

# 2 History

**v1.0** This is the initial revision of the programming software manual. It refers to programming software version 2.4.8. Several parts of this manual are not completed as I am still in the research process.

# 3 Resources

- Wikipedia, The Free Encyclopedia
- TYT DM-UVF10 User's manual
- Connect Systems CS600/CS700 Programming Guidelines

# 4 Radio

## 4.1 Software and cable

Just for the complexity of this manual - here are some links to the resources on the internet:



This is the link to the radio manufacturer (TYT) web site: [TYT DM-UVF10](#)

Here is a link for the latest version of programming software: [Software](#)

For programming, I use the USB programming cable for BAOFENG radio with 100% success. Here is a link for the cable drivers [Vista](#), [Win7](#), [Win8](#), [Win10](#) and for [WinXP](#).

## 4.2 Known bugs

During the testing of the radio, I came across several things which I consider to be a bug:

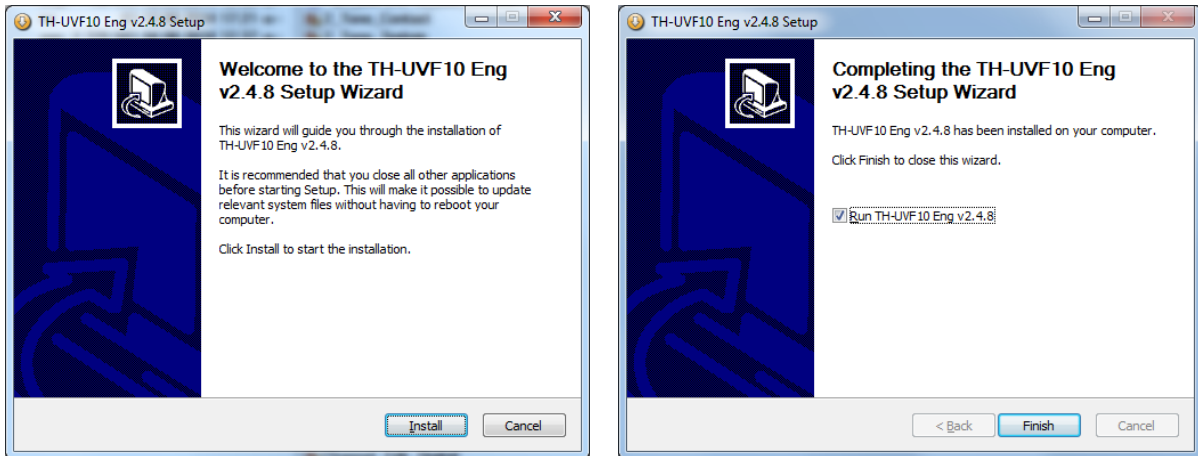
No.	Type	Description
1	HW	The display used in the radio (even when backlight is set to the highest level) is absolutely insufficient in direct sunlight, which makes the radio hard to use outdoors. Voice annunciation may help.
2	HW	The channel selection knob sometimes does not respond at all or jumps up for two steps instead of one increment.
3	SW	When you want to make a private or group call to a contact on a channel, which already has default contact set, the radio makes the first TX attempt to default channel contact and only after releasing PTT and pressing it again it calls the required contact.
4	SW	When you use the 5TONE signaling, the radio will not mute again after Auto reset time elapsed. Changing the channel up and down helps.

## 5 Software explained

In this section I will describe the software screen by screen, which will help you as quick reference for specific question on specific screen.

### 5.1 Software setup

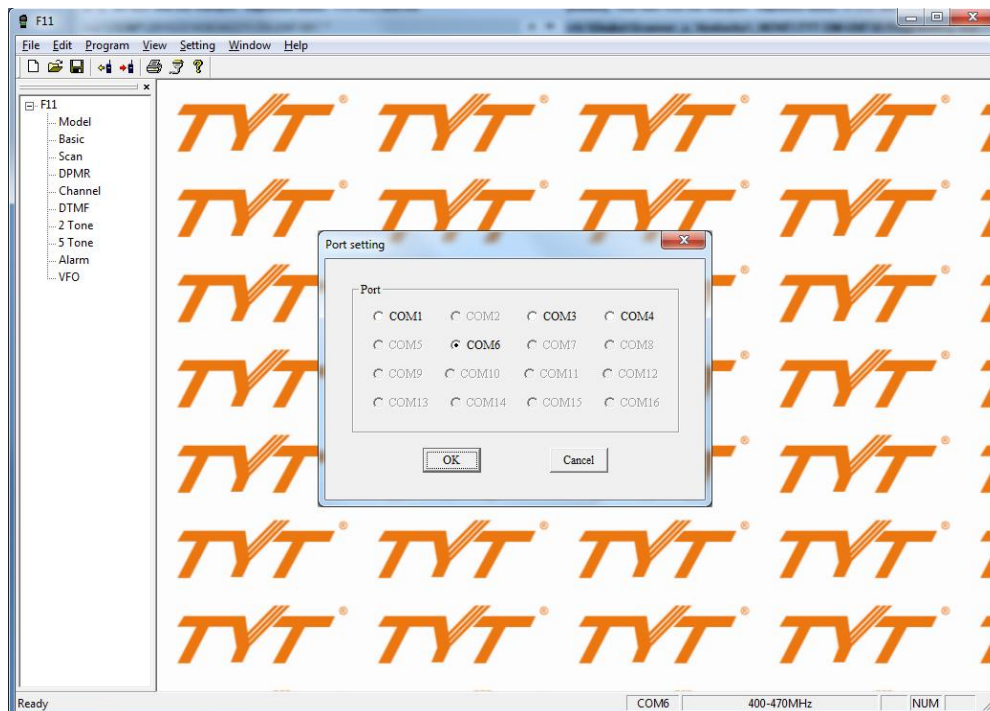
For installing the SW, hit TH-UVF10.exe and follow the instructions on the screen:




### 5.2 Serial port setup

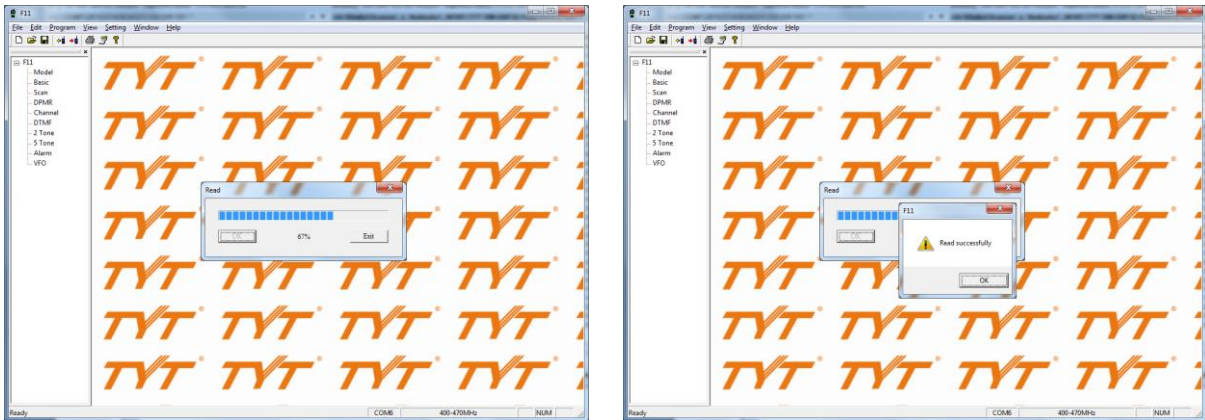
After SW installation, set up the correct communication port in the software. I assume that you have your serial/USB cable connected to you PC and you have proper drivers (USB cable) installed.


Go to **Setting** -> **Port** and select corresponding serial port for communication with the radio (in this case it is COM6).

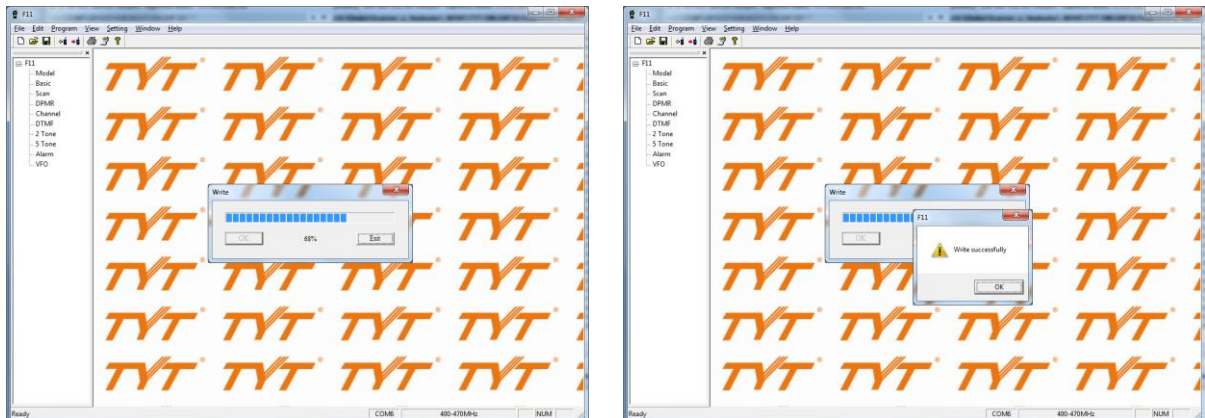


### 5.3 Read and Write the radio

When you want to **read** the data from the radio to the software, go to **Program** -> **Read** or press the radio icon with the yellow arrow . The radio LED is blinking **red** during read process.



When you want to **write** the data from the software to the radio, go to **Program** -> **Write** or press the radio icon with the red arrow . The radio LED is blinking **green** during write process.

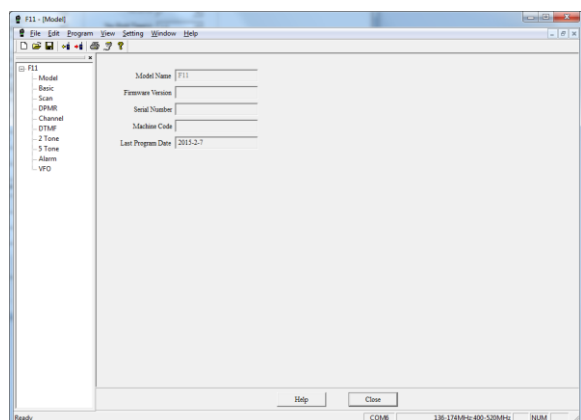


### 5.4 Model

The Model section does not display too much info, just the **last programming date**.

The indicated model name is **F11**, this is normal, do not worry.

The field Firmware version, Serial number and Machine code are not populated.



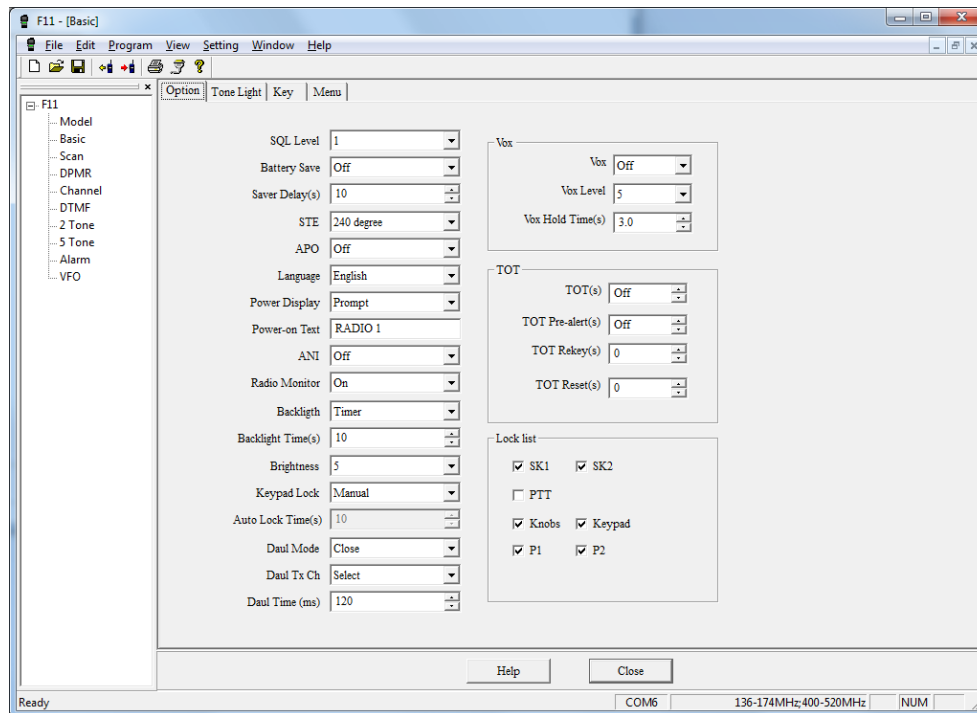
## 5.5 Basic setup

Basic setup is the general setting section for the radio. Here, the global radio settings are located.

The Basic section is divided into four tabs: Option, Tone Light, Key and Menu.

### 5.5.1 Option

The Option tab sets the general radio settings.



Individual settings are described in the table below:

<b>SQL level</b>	<b>SQL level</b> adjusts the threshold at which signals will open (un-mute) the audio channel. Lowering the setting will turn on the audio, and the operator will hear "static" if there is no signal present. The usual operation is to adjust the control until the channel just shuts off - then only a small threshold signal is needed to turn on the speaker. The settings are from 1 to 9, where 1 is the lowest setting (Squelch always open) and 9 is the highest (only the strongest signals can go through). The most sensitive setting is SQL=2, the default setting is SQL=5. Recommended setting is SQL=3.
<b>Battery Save</b>	<b>Battery Save</b> adjusts the proportion of working time and sleep time of the radio, which helps to save the battery. The settings are off, 1:1, 1:2, 1:3, 1:4, 1:5 and 1:6. The first number is the proportion of radio working time while the second number is the proportion of radio sleep time. The length of work/sleep cycle period is currently unknown, it may be around 1sec, which means that setting battery save for example to 1:4 results in radio being 200ms in standby mode and 800ms in sleep mode. Higher battery save settings may result in missing part of transmission before the radio wakes up. <b>For correct operation of digital signaling (such as OACSU), the recommended setting is Off.</b>
<b>Saver Delay (s)</b>	<b>Saver Delay</b> adjust the interval of inactivity (in seconds), after which the radio switches to <b>battery save</b> mode.

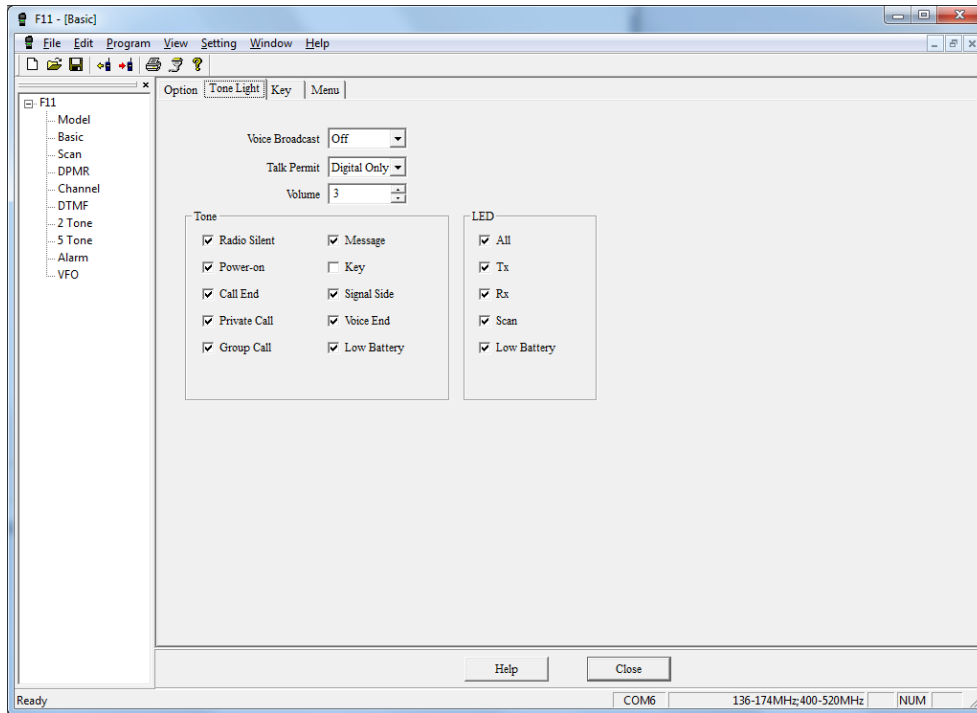
<b>STE</b>	<p>STE stands for <b>Squelch Tail Elimination</b> and is used to eliminate the squelch tail noise burst in systems using PL (CTCSS or DCS). STE (also called "Reverse burst") is a process that changes of the phase of the PL tone encoder for a short period of time (150-200ms) after the user releases the PTT while the transmitter carrier stays on - with the phase of the PL encoder offset by from 120 to 240 degrees (180 is a complete reversal). During the reverse burst time period the reverse phase stops PL decoding which causes the squelch to close. By the time the transmitting radio actually drops off the air the RX squelch on the receiving radio is already closed - which results in no burst of squelch noise being heard.</p> <p>The settings are Frequency, 120 degree, 180 degree and 240 degree. Setting it to frequency means no squelch tail elimination.</p>
<b>APO</b>	<p>APO is the <b>Auto Power Off</b> feature, which will turn off the radio after defined period of time. The settings are Off, 10M (10 minutes), 30M (30 minutes), 1H (1 hour) and 2H (2 hours). Recommended setting is Off</p>
<b>Language</b>	<p><b>Language</b> setting sets the language, in which the radio will display all information. Recommended setting is English.</p>
<b>Power Display</b>	<p><b>Power display</b> defines what information is displayed on the radio screen during power-on. The settings are <b>Off</b>, <b>Voltage</b> and <b>Prompt</b>.</p> <ul style="list-style-type: none"> <li>• <b>Off</b> - no information is displayed during power-on</li> <li>• <b>Voltage</b> - battery voltage is displayed during power-on</li> <li>• <b>Prompt</b> - user defined text (see <b>Power-on Text</b>) is displayed during power-on</li> </ul> <p>The recommended setting for multiple radios is <b>Prompt</b>, which allows you to display for example radio name or your HAM call during power-on.</p>
<b>Power-on Text</b>	<p>User defined text to display during power-on of the radio, works only if <b>Power Display</b> is set to <b>Prompt</b>. Can be used for example to display radio name or HAM call during power-on (e.g. RADIO1, RADIO2, RADIO3, etc.)</p>
<b>ANI</b>	<p><b>Automatic Number Identification (ANI)</b> is used in two-way radio selective calling to identify the transmitting user. Detail setting is described under signaling. The settings are On and Off. This option completely disables (Off) or enables (On) the use of ANI function in the radio. Using of ANI function requires further programming in both Channel section and Signaling section (DTMF, 5TONE,...).</p>
<b>Radio Monitor</b>	<p>This setting enables the radio to monitor the channel activity while in FM radio mode (see <b>FM radio</b> function). When set to On, any activity on the channel will interrupt the FM radio reception and the unit will switch to listen to the actual transmission. After the transmission ends, the FM radio reception will continue. When set to Off, the FM radio reception will not be interrupted as the unit will not check for the channel activity in the background.</p>
<b>Backlight</b>	<p>Backlight setting controls the behavior of display and keyboard backlight - it can be controlled independently and set to Off, On and Timer.</p> <ul style="list-style-type: none"> <li>• <b>Off</b> - backlight is turned Off (both the backlight of screen and keyboard ) and can be turned On manually by pressing programmed Backlight button (this turns on the screen backlight and keyboard backlight) or any other key (this turns on the screen backlight only while keyboard backlight remains off). After turned On, the backlight is turned off automatically after no key is pressed for defined interval (see <b>Backlight Time</b> setting)</li> <li>• <b>On</b> - backlight is turned On (both the backlight of screen and keyboard) and can be turned Off only manually by pressing programmed Backlight button. Pressing the programmed Backlight button or any other key results in turning the backlight of screen and keyboard back on.</li> <li>• <b>Timer</b> - same setting as <b>Off</b> with the difference, that pressing any key also lights up the keyboard and not only the display. It is turned off after no key is pressed for defined interval (see <b>Backlight Time</b> setting)</li> </ul>
<b>Backlight Time(s)</b>	<p>Defines the inactivity interval in seconds after which the backlight is turned off. Works only if the <b>Backlight</b> setting is set to <b>Timer</b> or <b>Off</b>.</p>



<b>Dual Mode</b>	<p>Dual mode activates simultaneous reception on both channel A and channel B. The settings are Close and Open</p> <ul style="list-style-type: none"> <li>• <b>Close</b> - dual reception is disabled, the radio receives only on the frequency/channel marked with an arrow on the left side of the display</li> <li>• <b>Open</b> - dual reception is enabled, the radio periodically checks both frequencies/channels. The priority is on channel marked with the arrow (this is the primary channel), the channel without the arrow is a secondary channel.</li> </ul>
<b>Dual Tx Ch</b>	<p>This setting defines the radio behavior when PTT is pressed and Dual Mode is activated (open). The options are select and Recent rx</p> <ul style="list-style-type: none"> <li>• <b>Select</b> - when the radio receives activity on the secondary channel (see <b>Dual Mode</b>) and the user press the PTT, the radio transmits on the primary channel.</li> <li>• <b>Recent rx</b> - when the radio receives activity on the secondary channel (see <b>Dual Mode</b>) and the user press the PTT, the radio transmits on the secondary channel.</li> </ul>
<b>Dual Time (ms)</b>	<p>This setting defines the proportion of time in which both primary and secondary channel is checked (see <b>Dual Mode</b>). It only works when Dual mode is enabled (Open).</p>
<b>VOX</b>	<p><b>VOX (Voice Operated eXchange)</b> is a function that operates when sound over a certain threshold (level) is detected. It is used to turn on a transmitter when user speaks and turn it off when user stops speaking. It is used instead of a PTT for hands-free operation. The settings are Off and On, where On is VOX enabled. Recommended setting is Off.</p>
<b>VOX Level</b>	<p><b>VOX level</b> defines a detection threshold (level) for VOX activation - in other words - how loud you have to talk into the microphone to activate the VOX function. The settings are 0-9, where 9 is the most sensitive. Unfortunately, even setting to 9 is not sensitive enough, it works only when you speak about 5cm from mic and quite loud.</p>
<b>VOX Hold Time(s)</b>	<p><b>VOX Hold Time</b> is a time period of silence (voice level below detection threshold), after which the radio un-keys the transmitter.</p>
<b>TOT (s)</b>	<p>Enabling <b>Time Out Timer (TOT)</b> shuts down the transmitter after the selected time (in seconds). This feature prevents overheating the transceiver during extremely long TX sessions as well as occupying the channel for long period. Note that on digital dPMR446 channels, the maximum TOT is 180sec. The setting can be Off or value from 30sec to 600sec.</p>
<b>TOT Pre-alert(s)</b>	<p>When <b>TOT Pre-alert</b> is set, the radio beeps and informs the user, when the Time Out Timer is going to be exceeded. It can be set to Off and from 1sec to 15sec, which means T-1s to T-15sec before the TOT will shut down the transmitter (see TOT).</p>
<b>TOT Rekey(s)</b>	<p>The <b>TOT Rekey</b> sets the minimum time after exceeding TOT, when the user can transmit again. Setting is from 0sec to 60sec.</p>
<b>TOT Reset(s)</b>	<p>The <b>TOT Reset</b> sets the interval, after which the TOT timer is set to 0 again. Setting is from 0sec to 30sec.</p>
<b>Lock list</b>	<p>The Lock list allows certain keys to respond even when the radio keyboard is locked. When the check-box is not checked, the key will respond even in the locked keyboard. When the check box is checked, the key will follow the lock keyboard rule.</p> <p>Key list:</p> <ul style="list-style-type: none"> <li>• <b>SK1</b> and <b>SK2</b> - upper and lower programmable keys on the left side</li> <li>• <b>PTT</b> - Push to talk button</li> <li>• <b>Knobs</b> - rotating channel knob on the top of the radio (the volume knob cannot be locked)</li> <li>• <b>Keypad</b> - front radio keys (keyboard)</li> <li>• <b>P1</b> and <b>P2</b> - green and red programmable keys on the front side</li> </ul>

### 5.5.2 Tone Light

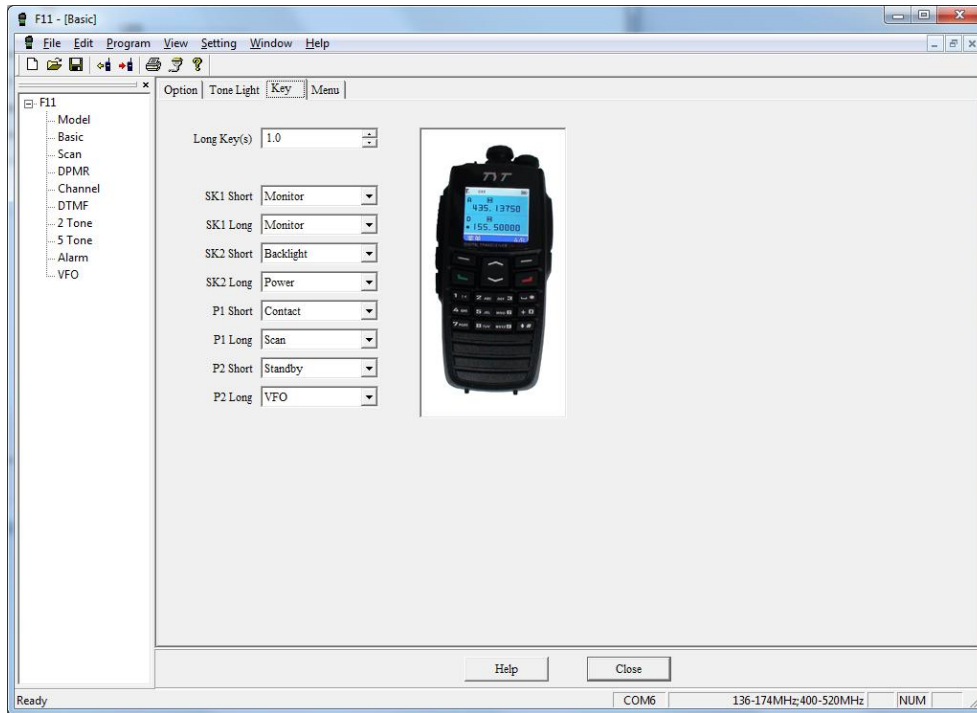
The Tone and Light tab sets the beeps and light LED behavior.



<b>Voice Broadcast</b>	<b>Voice broadcast</b> activates the voice annunciation feature. The radio gives you voice feedback for your actions. May be suitable for blind operation. Setting is Off, Chinese and English.	
<b>Talk Permit</b>	<b>Talk Permit</b> setting activates tone, which (after pressing PTT) informs user, that he can start talking. It may be useful in digital modes (especially when using OACSU) because establishing connection between two radios can take some time and when the user starts talking immediately after pressing PTT, beginning of transmission may be lost. The settings are Disable, Digital Only, Analog Only and Enable. Recommended setting is Digital Only (so the tone will beep only when transmitting on digital channel)	
<b>Volume</b>	<b>Volume</b> setting sets the volume level of beep tones in the radio. This volume level is independent on the master volume setting and can be changed only from the software, not from the radio.	
<b>Tone</b>	<b>Radio Silent</b>	When checked, <b>disables</b> all tones in the radio.
	<b>Power-on</b>	Activates the tone during power-on sequence of the radio
	<b>Call End</b>	Activates the indication tone, when group or private call is ended
	<b>Private Call</b>	Activates the tone announcing upcoming private call
	<b>Group Call</b>	Activates the tone announcing upcoming group call
	<b>Message</b>	Activates the tone for incoming SMS message
	<b>Key</b>	Enables/disables key press beeps
	<b>Signal Side</b>	To be completed
	<b>Voice End</b>	Short beep after voice transmission is ended (squellch is closed)
	<b>Low Battery</b>	Enables tone for low battery warning
<b>LED</b>	<b>All</b>	Enables/disables all LED indications
	<b>Tx</b>	Enables/disables red TX LED indication
	<b>Rx</b>	Enables/disables green RX LED indication
	<b>Scan</b>	Enables/disables green LED flashing during scan operation
	<b>Low Battery</b>	Enables/disables low battery LED indication

### 5.5.3 Key

The Key tab defines presets for user programmable keys on the radio



**Long key(s)** - This setting defines the duration of a key press, which has to be exceeded to consider a key press to be a "long press".

**Key definitions:**

**SK1** and **SK2** - upper (SK1) and lower (SK2) programmable keys on the left side

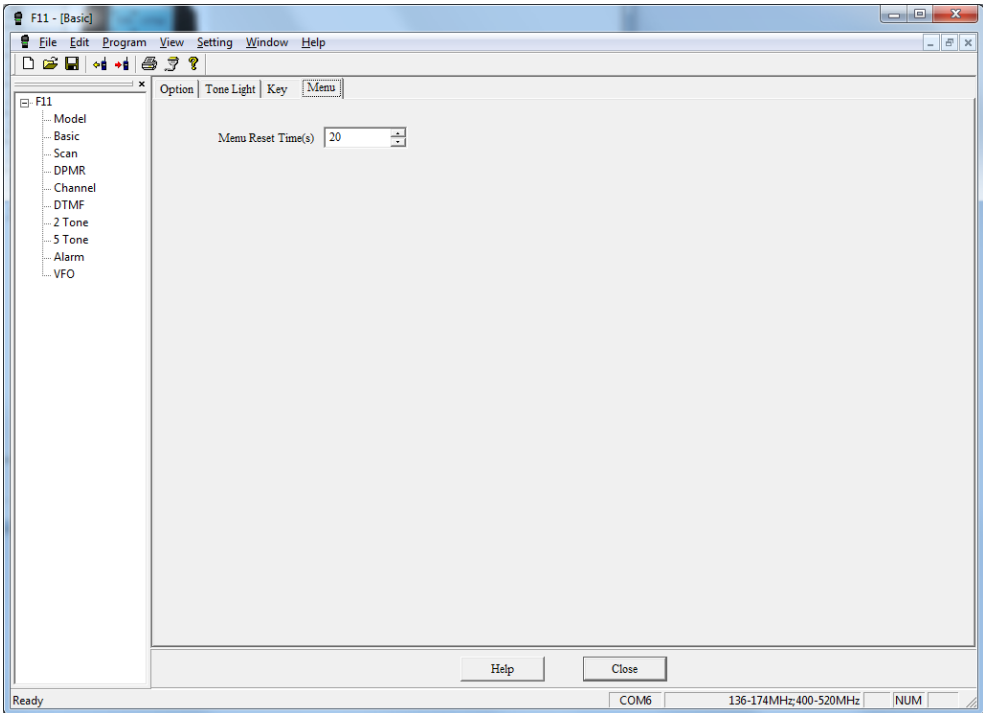
**P1** and **P2** - green (P1) and red (P2) programmable keys on the front side

**Functions available for use in the shortcuts:**

<b>None</b>	To be completed
<b>VFO</b>	
<b>Backlight</b>	
<b>Monitor</b>	
<b>Power</b>	
<b>EME Alarm</b>	
<b>Repeat</b>	
<b>Contact</b>	
<b>Encrypt</b>	
<b>Scan</b>	
<b>VOX</b>	
<b>Talk around</b>	
<b>Message</b>	
<b>Channel type</b>	
<b>Reverse</b>	
<b>Standby</b>	
<b>1750 Signaling</b>	

5.5.4 Menu

There is only one option in the menu screen. The **Menu reset Time(s)** defines the time interval, after the radio exits the menu automatically and returns to the standby status.

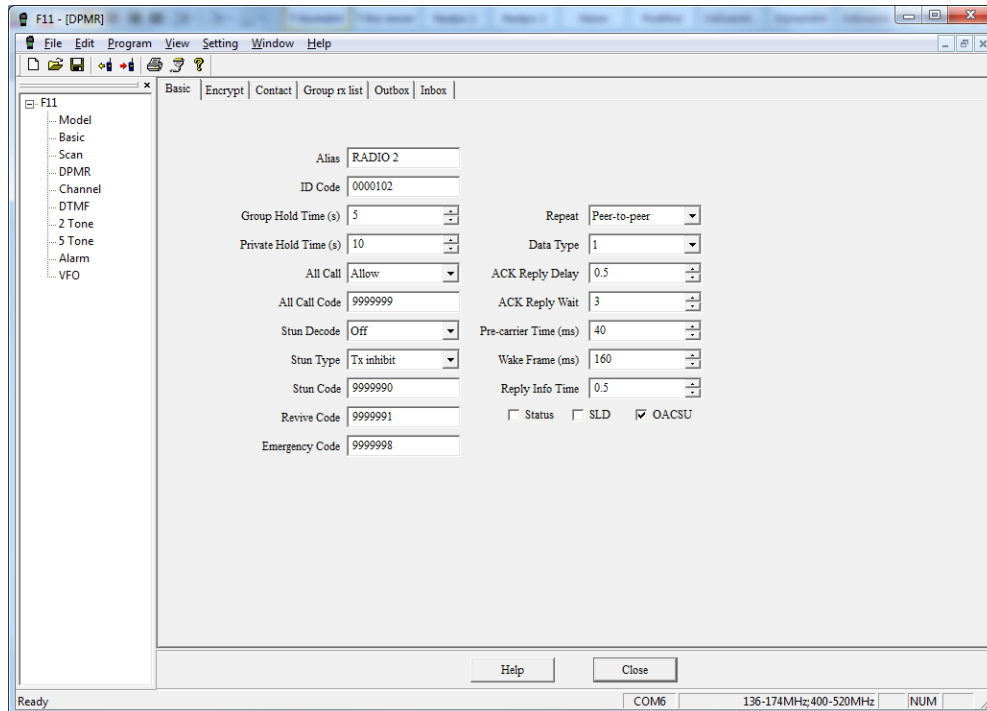


## 5.6 DPMR setup

DPMR section is used to program the options for digital part of the radio. In this section, there are general radio-wide settings and there is a lot of channel individual settings in other menus.

### 5.6.1 Basic

Basic tab defines radio identity and some basic digital functions



<b>Alias</b>	In this field, you can define the name of this radio.
<b>ID Code</b>	ID Code is the basic and unique identification of the radio in digital mode. This ID number is referred in many functions and is used by other calling radios when making a private call or sending a text message. Each radio in a system should have unique ID. The ID can be set from 0000001 to 9999998. The ID 9999999 is reserved for All Call feature.
<b>Group Hold Time(s)</b>	Sets the duration of time, in which both receiving and transmitting radios are waiting on the channel after the end of a group call transmission. During this time, by pressing PTT, the user will initiate a talkback instead of a new call.
<b>Private Hold Time(s)</b>	Sets the duration of time, in which both receiving and transmitting radios are waiting on the channel after the end of a private call transmission. During this time, by pressing PTT, the user will initiate a talkback instead of a new call.
<b>All Call</b>	This setting allows or prohibits the All Call feature for this radio. <b>All Call</b> is a special call from an individual radio to every radio on the frequency. The ability to initiate an All Call is normally programmed into radios that are used in supervisory roles. All other radios monitor All Call transmissions by default. This feature is very useful when a supervisor needs to communicate with all the users on a physical channel, rather than just a particular group or individual contact
<b>All Call Code</b>	This setting defines the reserved ID code for the All Call feature. It is recommended to keep it on 9999999 for compatibility across wide range of radios.
<b>Stun Decode</b>	This setting defines whether the radio will decode and follow the Stun command. For more detail about Stun function, please see the <b>Signaling</b> section.
<b>Stun Type</b>	This setting defines the radio behavior after stun request has been successfully decoded and Stun decode is On. The settings are: - Tx Inhibit - the radio is not able to transmit anymore

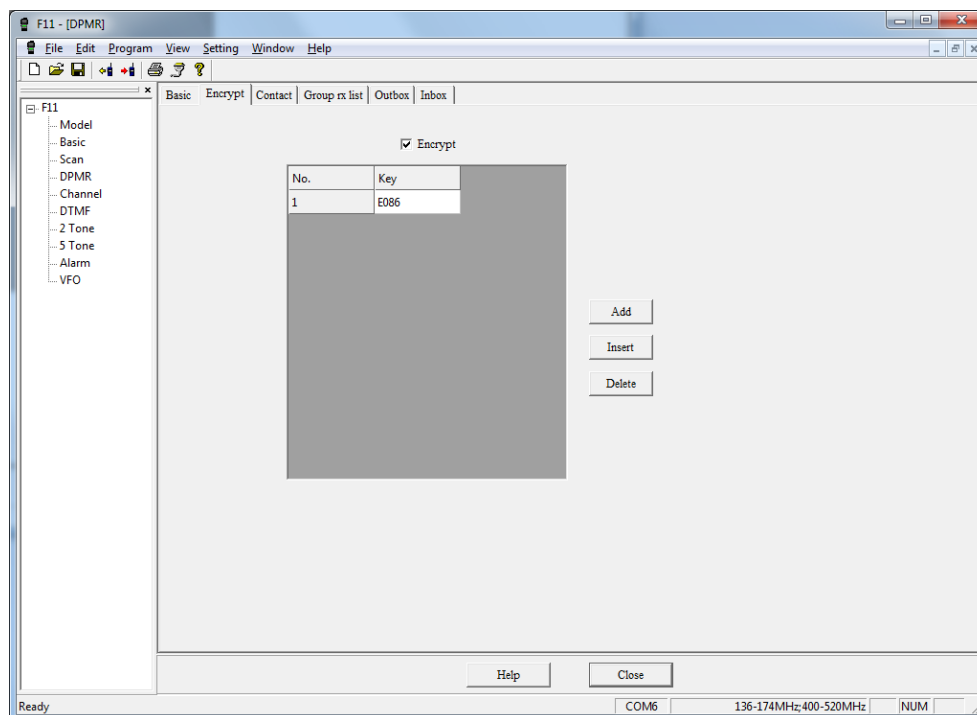
	<p>- TX/RX Inhibit - the radio is not able to transmit and receive anymore</p> <p>- Kill - the radio is locked completely and user cannot operate it anymore.</p> <p>For more detail about Stun function, please see the <b>Signaling</b> section.</p>
<b>Stun Code</b>	This setting sets the code for activating the Stun of the radio. For more detail about Stun function, please see the <b>Signaling</b> section.
<b>Revive Code</b>	This setting sets the code for de-activating the Stun of the radio. For more detail about Stun function, please see the <b>Signaling</b> section.
<b>Emergency Code</b>	This setting sets the code for activating the Emergency mode. For more detail about Emergency mode, see the Alarm setup section of this manual.
<b>Repeat</b>	This setting defines whether the radio will operate in <b>repeater</b> or <b>peer-to-peer</b> mode. When the <b>repeater</b> mode is selected, the <b>Talk Around</b> function is available. For more detail about <b>Talk About</b> function see the <b>Channel Setup</b> section of this manual.
<b>Data Type</b>	<p>This setting sets the data type system used in digital mode. The dPMR protocol supports three modes of operation:</p> <ul style="list-style-type: none"> <li>• Data Mode 1: Peer-to-peer direct mode (communication without infrastructure)</li> <li>• Data Mode 2: Centralized repeater network</li> <li>• Data Mode 3: Managed centralized repeater network (trunking)</li> </ul> <p>For recreational use without integrating the radios into sophisticated radio systems, the Data type 1 is recommended.</p>
<b>ACK Reply Delay</b>	This setting is used when OACSU feature is enabled. It defines the delay, after which the called radio will initiate respond function to confirm that the call request from calling radio has been received. When using OACSU, the recommended setting is 0,5sec.
<b>ACK Reply Wait</b>	This setting is used when OACSU feature is enabled. It defines the delay, for which the caller radio waits for the called radio to respond to the private call set-up request. After this time, the caller radio will retry (when PTT is still pressed) or abandon (when the PTT has been released) the effort to initiate private call to the called radio. When using OACSU, the recommended setting is 3sec.
<b>Pre-carrier Time (ms)</b>	This setting is used when OACSU feature is enabled. This setting defines the interval of silence between the start of transmitting and start of private call set-up request. This setting is particularly useful when the receiver radio uses some kind of power-saving feature, because it allows the receiving radio receiver to "wake up" and prepare for the private call set-up request decoding. It is recommended to set it at least to 40ms.
<b>Wake Frame (ms)</b>	This setting is used when OACSU feature is enabled. This setting defines the length of wake-up digital data frame used to initiate the private call set-up request. It is recommended to set it at least to 160ms.
<b>Reply Info Time</b>	This setting is used when OACSU feature is enabled. This setting defines the length of confirmation digital data frame used by the called radio to confirm to the caller radio, that the private call set-up request was successfully received and decoded. It is recommended to set it at least to 0,5s.
<b>Status</b>	To be completed
<b>SLD</b>	To be completed
<b>OACSU</b>	<p><b>OACSU - Off Air Call Set Up</b></p> <p>OACSU is a call set up mechanism where the system checks for the presence of the called party radio, before allocating a channel. When OACSU is disabled (default), the caller radio performs TX without checking the status of called radio.</p> <p>When OACSU is enabled, the caller radio first checks the status of the called radio and establishes call only if the called radio is in range.</p> <p>To enable and set up OACSU, you have to check the OACSU box it in the DPMR tab and you also have to set two parameters - you have to set Pre-carrier Time to 40ms and Wake Frame to 160ms.</p> <p>For detail information about using OACSU feature see the Advanced programming section of this manual.</p>

## 5.6.2 Encrypt

This feature allows encryption on selected digital channels. Encryption is a software-based scrambling solution that is not robust, and is only meant to prevent eavesdropping. The signaling and user identification portions of a transmission are not scrambled. Receiving radio(s) must have the same Encryption Key as the transmitting radio in order to unscramble the encrypted voice call. Only the digital radio communication can be encrypted.

To enable radio encryption and encryption keys definition, the **Encrypt** option must be enabled (checkbox checked).

In the Encrypt section, you can define maximum of 16 encryption keys (each encryption key is 16bit long - four digit in HEX).



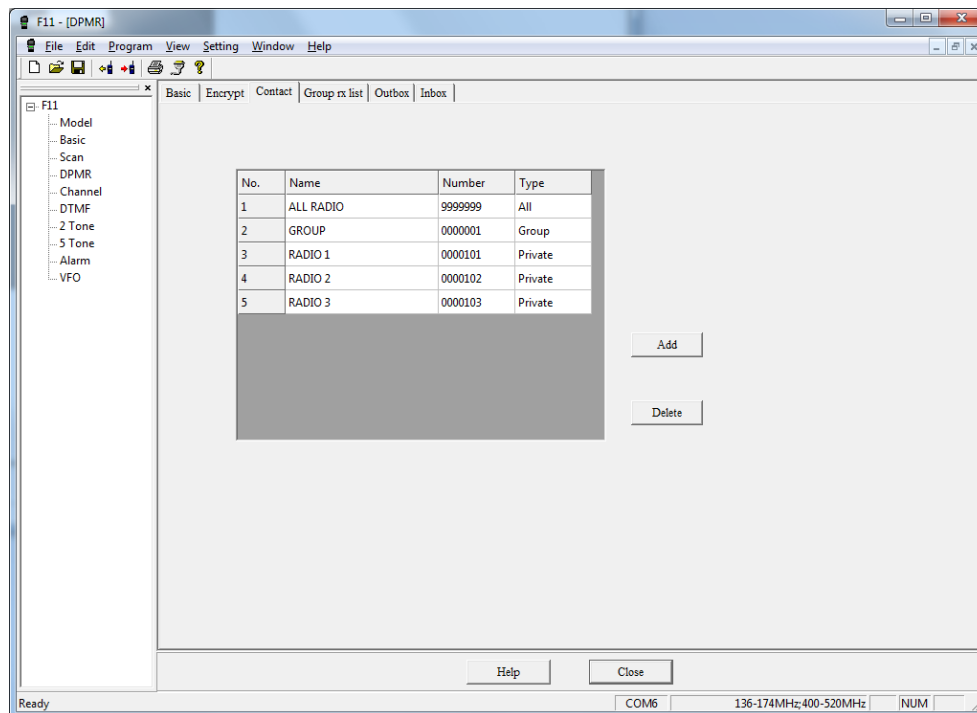
**Add** - adds a new encryption key at the end of the list

**Insert** - adds a new encryption key at the selected position

**Delete** - deletes encryption selected key

## 5.6.3 Contact

In this tab, you can define individual and group contacts for digital transmissions.



When you **Add** a new contact, you have to define:

**Name** - this is the name (**alias**) for the contact, which will be displayed in the contact list on the radio

**Number** - This is the **ID code** of the contact (radio). See section **DPMR Setup** -> **Basic**.

**Type** - This is the contact type (private, group, all). There are three basic types of contact:

**Private** is used for private calls                      one radio -> one radio

**Private Call** is a call from an individual radio to another individual radio.

**Group** is used for group calls                      one radio -> all radios in the same group

**Group Call** is a call from an individual radio to a group of radios.

**All Call** is used for All Calls                      one radio -> all radios in all groups on the frequency

**All Call** is a special call from an individual radio to every radio on the frequency. The ability to initiate an All Call is normally programmed into radios that are used in supervisory roles. All other radios monitor All Call transmissions by default. This feature is very useful when a supervisor needs to communicate with all the users on a physical channel, rather than just a particular group or individual contact.

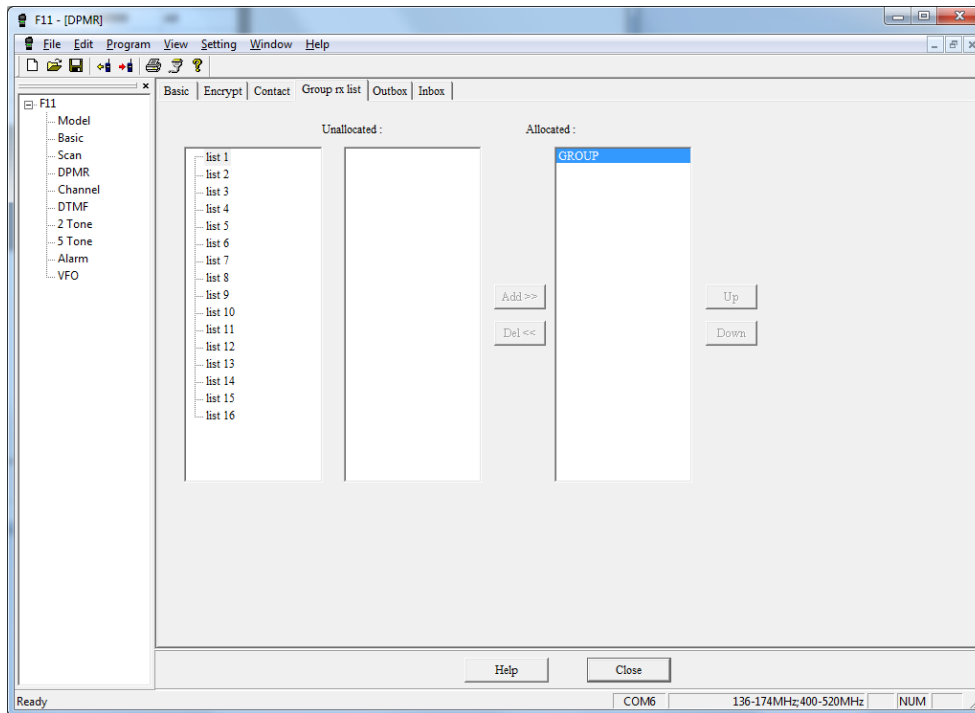
**The recommended setting for group of radios, which should communicate together, is Group call.**

You can **Delete** selected contact by pressing the "Delete" button.

#### 5.6.4 Group rx list

In this section, you can put several groups together into group rx list. The maximum number of group rx lists is limited to 16 groups. It is possible to allocate one group into one or more group rx lists. Using this feature, you can connect two groups of radios into one super-group called group rx list.





In the **left** column, there is a list of maximum 16 **Rx group lists** available.

In the **middle** column, you will see all available (**Unallocated**) **group contacts**, which you have defined in the **Contact** tab and can be added to the **right** column (**Allocated**).

The **right** column displays all **Groups** which the radio is a member of (or subscribed to) on **channels** which the **rx group list** is attached to. When the channel selected has this list attached, if the radio receives a group call that is addressed to any one of its subscribed groups, the radio will participate in that group call (i.e. it will unmute for incoming transmissions and talkback when the PTT is pressed).

**Explanation of RX Group list:**

**Group RX list** associates any available Groups to the channel for reception. The user can **listen to any Group in this list** when there is any activity on it and **talk back** within the **Group hold time**. Selecting the None option disables the user from receiving any Group Calls on this channel, except when the Call ID is the same as the Call ID of the transmit member.

**Example:**

Define following contacts:

No.	Name	Number	Type
1	Group1	991	Group
2	Group2	992	Group
3	Group3	993	Group

*Note: the contact number is not important, it just have to be different from each other.*

Define following Rx Group Lists:

List	Allocated	Unallocated
1	Group1	Group2, Group3
2	Group2	Group1, Group3
3	Group3	Group1, Group2

4	Group1, Group2	Group3
5	Group1, Group2, Group3	

Now, in the channel programming tab program the channels in the following way:

Ch	Contact	RX Group List
1	Group1	1
2	Group2	2
3	Group3	3
4	Group1	4
5	Group1	5

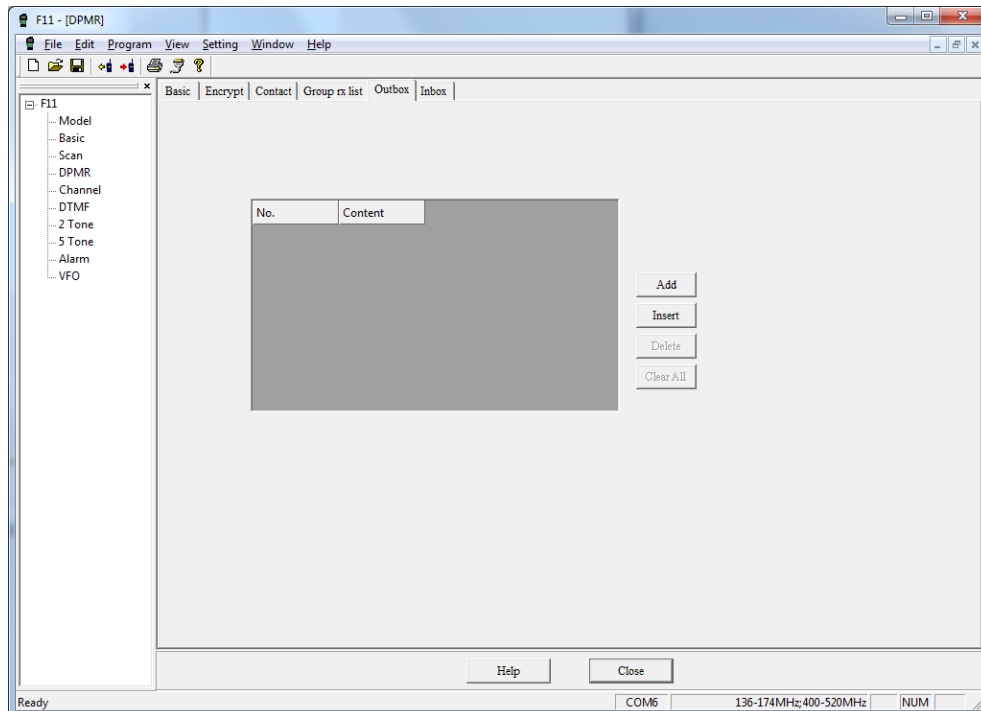
Now, when you communicate on channel and press PTT, your TX and RX will work according to this tab:

Ch	Transmit	Receive
1	Group1	Group1
2	Group2	Group2
3	Group3	Group3
4	Group1	Group1 + Group2
5	Group1	Group1 + Group2 + Group3

*Note: By default, after pressing PTT, the user will TX only to the **transmit** group. The user can reply to **all Groups** in the **rx Group List** when he presses the PTT within the **Group hold time** after receiving the call.*

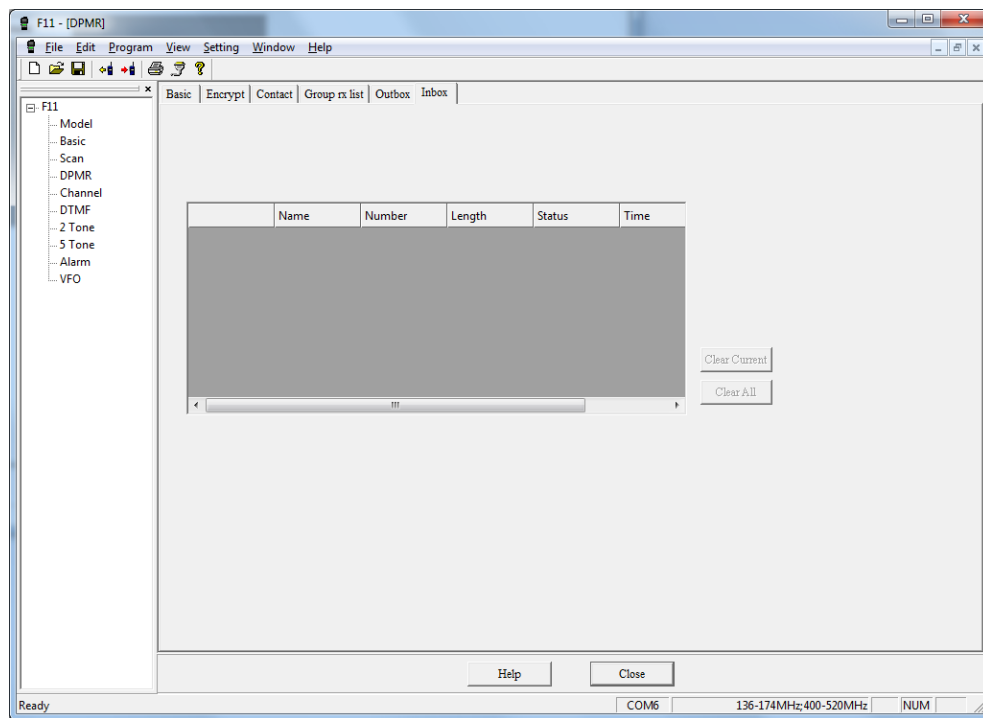
### 5.6.5 Outbox

You may enter up to 16 predefined text messages. The messages can be send by the radio using the Text Message Menu feature.



## 5.6.6 Inbox

In the inbox, you will find all received messages in the radio . You can read them, erase individual messages or erase all messages.



## 5.7 Channel setup

### 5.7.1 Channel list

The **Channel list** menu is the main section, in which you can define both **analog** and **digital** physical channel frequencies, as well as individual channel parameters. In the channel window, you will see all channels in a simple overview table and you can edit main channel parameters directly by clicking the desired field. However, for detailed channel programming, you have to edit the selected channel using the **Edit** button.

There is maximum of 256 channels, which are divided into two sections - channel A001 - A128 and channel B001 - B128.

Num	Rx freq (MHz)	Tx freq (MHz)	Ch type	Rx tone	Tx tone	Power	Bandwidth	Scan	Alias
A001	446.11875	446.11875	Digit	None	None	High	Wide	Delete	Hlavni D
A002	446.01875	446.01875	Analog	167.9	167.9	High	Narrow	Delete	Hlavni A
A003	446.11875	446.11875	Digit	None	None	High	Wide	Delete	Sifrovany
A004									
A005									
A006									
A007									
A008									
A009									
A010	172.65000	172.65000	Analog	167.9	167.9	High	Narrow	Delete	Zalozni A1
A011	172.95000	172.95000	Analog	167.9	167.9	High	Narrow	Delete	Zalozni A2
A012	172.97500	172.97500	Analog	167.9	167.9	High	Narrow	Delete	Zalozni A3
A013									
A014									
A015	172.65000	172.65000	Digit	None	None	High	Wide	Delete	Zalozni D1
A016	172.95000	172.95000	Digit	None	None	High	Wide	Delete	Zalozni D2
A017	172.97500	172.97500	Digit	None	None	High	Wide	Delete	Zalozni D3
A018									
A019									
A020	172.95000	172.95000	Digit	None	None	High	Wide	Delete	Sifrovany V

The information displayed in the main channel overview window is RX and TX frequency, Channel type, RX and TX CTCSS or DCS tone, TX power, selected bandwidth (narrow 12.5kHz or wide 25kHz), channel scan status and channel name (alias).

All information will be explained in detail further in this manual in the following detailed sections.

### 5.7.2 Edit

When you press Edit button, you will open **detail channel edit window**. The window description differ whether it is an **analog** channel or a **digital** channel. Channel type is selected as the "**Ch Type**" parameter.

The following parameters are identical for both analog and digital channels:

Channel number	Physical channel number (can be A001 to A128 or B001 to B128)
Rx Freq(MHz)	Sets a frequency (in MHz) on which the signal is received for the current channel. Can be set in range of 136-174MHz and 400-520MHz.
Tx Freq(MHz)	Sets a frequency (in MHz) on which a signal is transmitted for the current channel. Can be set in range of 136-174MHz and 400-520MHz.
Alias	Sets the channel name (or Alias), which will be displayed if the <b>Ch Display</b> is set to <b>Channel Name</b> and the radio mode is set to <b>Channel mode</b>
Ch Type	Configures the channel working in <b>digital</b> or <b>analog</b> mode. The other options can be Auto(Digit) and Auto(Ana), in which the channel will RX both digital and analog calls but

	will transmit in digital or analog mode only. Recommended setting is either Analog only or Digital only.
Power	Sets the radio transmission power level for this channel. It can be set to high (5W) or low (1W) High Power: Used when a stronger signal is needed to extend transmission distances. Low Power: Used when communicating in close proximity, and to preserve battery.
Scan	Associates the channel into a scan list. All channels which are associated to the scan list will be scanned during a scan operation. When this box is not checked, this channel will be skipped in the scan operation.
Reverse	When checked it allows the user to select the <b>Reverse</b> function, which uses the receive frequency of the channel instead of the transmit frequency when transmitting. The <b>Reverse</b> feature can be toggled via a programmable button, when the <b>Reverse</b> function is assigned to the button. <b>To be verified</b>
Talk Around	When checked, it allows the user to select the <b>Talk Around</b> function, which uses the receive parameters of the channel instead of the transmit parameters when transmitting. This feature enables communication between radios in close proximity without the use of a repeater, even when the particular channel is programmed as a repeater channel. The <b>Talk Around</b> feature can be toggled via a programmable button, when the <b>Talk Around</b> function is assigned to the button. <b>To be verified</b>
Ch display	The channel display defines in which format, the channel information will be displayed on the radio screen: <ul style="list-style-type: none"> <li>• <b>Channel number</b> - the channel number and frequency is displayed</li> <li>• <b>Channel name</b> - the channel number and channel alias is displayed</li> </ul>

### Analog channel

When you edit an analog channel, following window will open:

The screenshot shows a 'Channel edit' window with the following settings:

- Channel Number: B001
- Rx Freq(MHz): 446.00625
- Tx Freq(MHz): 446.00625
- Alias: PMR 1
- Ch Type: Analog
- Power: High
- Scan:  Scan
- Reverse:  Reverse
- Talk Around:  Talk Around
- Ch display: Channel name

The window is divided into two tabs: Analog and Digit.

**Analog Tab:**

- Rx Tone: None
- Tx Tone: None
- Bandwidth: Narrow
- Signal Type: None
- Signal System: None
- Busy Lock: Off
- SQL Mode: Carrier
- PTTID: None

**Digit Tab:**

- Encrypt: None
- Contact: RADIO 1
- Rx Group List: None
- Rx Color Code: Auto
- Tx Color Code: Auto
- Busy Lock: Carrier

The analog parameters are defined in the following tab:

Rx Tone	The <b>CTCSS</b> or <b>DCS</b> receive tone can be selected. When used together with <b>SQL mode</b> set to <b>Tone</b> , the CTCSS/DCS will mute the other users if they are using a different
---------	---

	CTCSS/DCS tone or no CTCSS/DCS.
Tx Tone	The <b>CTCSS</b> or <b>DCS</b> transmit tone can be selected. When using a pair of radios with <b>Rx Tone</b> set and <b>SQL mode</b> enabled to <b>Tone</b> , user have to set the CTCSS/DCS on both sides to the <b>TX Tone</b> in the <b>same way</b>
Bandwidth	Sets the channel bandwidth to Wide (25kHz channel bandwidth) or to Narrow (12.5kHz channel bandwidth)
Signal Type	Set optional signaling for the specific channel. Can be selected from <b>DTMF</b> , <b>2 Tone</b> or <b>5 Tone</b> . Further details about signaling will be described in the signaling section of this manual.
Signal System	When <b>Signal Type</b> is set, the user can select specific <b>signal system</b> in this option. Further details about signaling will be described in the signaling section of this manual.
Busy Lock	Determines criteria, when TX is allowed on the channel. This is used to prevent radio from transmitting on channels that are already being used. <ul style="list-style-type: none"> <li>• <b>Off</b> - The radio will always transmit when PTT is pressed.</li> <li>• <b>Carrier</b> - The radio will check for an idle channel prior to allowing a transmission.</li> <li>• <b>CTC/DCS</b> - The radio will check for a PL match prior to allowing a transmission. This option is available only when Rx Tone is set.</li> </ul>
SQL Mode	Defines the squelch type used for this particular channel. This option can be set to: <ul style="list-style-type: none"> <li>• <b>Carrier</b> - the squelch is only carrier operated, so it is open as soon as the squelch threshold is exceeded by the incoming signal</li> <li>• <b>Tone</b> - The CTCSS or DCS receive tone set in <b>Rx Tone</b> option will be taken into account. The squelch opens as soon as the squelch threshold is exceeded by the incoming signal <b>and</b> the PL tone of the incoming signal matches to the <b>Rx Tone</b> setting.</li> <li>• <b>Signal</b> - The signaling selected in the <b>Signal System</b> is taken into account. The squelch opens as soon as the squelch threshold is exceeded by the incoming signal <b>and</b> the radio receives the signaling tone(s), which match to the <b>Signal System</b> setting</li> <li>• <b>Signal and Tone</b> - this is the combination of Signal and Tone squelch. The squelch opens as soon as the squelch threshold is exceeded by the incoming signal <b>and</b> the PL tone of the incoming signal matches to the <b>Rx Tone</b> setting <b>and</b> the radio receives the signaling tone(s), which match to the <b>Signal System</b> setting</li> <li>• <b>Signal or Tone</b> - same as previous, but only PL tone <b>or</b> signaling must match to open the squelch.</li> </ul> <p><i>Note: The "Signal", "Signal and Tone" and "Signal or Tone" options are available only when Signal type is set to other than "none" in the <b>Signal type</b> option.</i></p>
PTTID	This setting enables user to allocate specific PTTID to a particular channel. The PTTID is used to identify a particular radio in the analog mode. Further details about signaling will be described in the signaling section of this manual

## Digital channel

When you edit a digital channel, following window will open:

The digital parameters are defined in the following tab:

Encrypt	Sets the encryption for the particular channel. Encryption must be enabled and encryption keys must be defined on both transmitting and receiving radios. See Encryption section of this document for further detail.
Contact	Defines the call that may be initiated on the channel by pressing PTT button. However, if the channel is attached to a Rx Group List with multiple Groups and there is an activity on one of the Groups, pressing PTT will initiate a talkback instead of a new call if it is within the hang time of the prior call. Selecting the None option prevents a call from being initiated on the channel.
Rx Group List	The user can listen to any Group in the selected RX Group List when there is any activity on it and talk back within the Group hold time. Selecting the None option disables the user from receiving any Group Calls on this channel, except when the Call ID is the same as the Call ID of the transmit member. See Group rx list for further detail.
Rx Color Code	This feature allows a color code to be assigned to a given channel. Channels may have the same or different color codes. A color code is used to identify a system. Different color codes are used to identify different systems. The radio will be able to scan across channels with different color codes. Radios will ignore any channel activity not containing the matching color code for that system.
Tx Color Code	Same as Rx Color code, but separate option for transmitting. It is highly recommended, when using a color code, to set both Rx and Tx color code to the same value.
Busy Lock	Determines criteria, when TX is allowed on the channel. This is used to prevent radio from transmitting on channels that are already being used. <ul style="list-style-type: none"> <li>• <b>Off</b> - The radio will always transmit when PTT is pressed.</li> <li>• <b>Carrier</b> - The radio will check for an idle channel prior to allowing a transmission.</li> <li>• <b>Color code</b> - The radio will check for a color code match prior to allowing a transmission. This option is available only when a color code is set.</li> </ul>

## 5.8 Signaling

### 5.8.1 DTMF

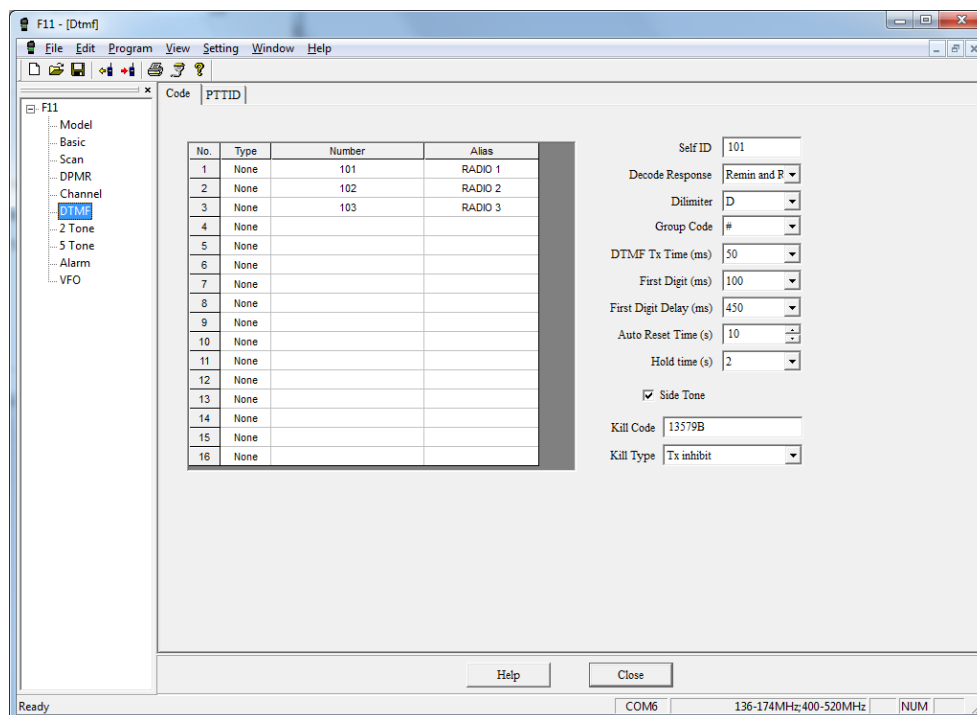
In DTMF selective calling, the radio is alerted by a string of digits. Systems typically use 2- to 7-digits. These are dialed from a transmitting radio automatic encoder.

The user can set the radios to monitor all system traffic or remain muted until called, depending on the settings. When the radio receives the correct digit string, it will shortly beep an alert. The radio can also be set to respond with acknowledgement to the caller's radio. After this, the radio's receive audio will be activated.

The radio can both encode and decode DTMF signaling.

#### **Code**

In this section, the user can set maximum of 16 predefined DTMF codes and other DTMF specific signaling settings.



In the left section of the screen the user can save up to 16 predefined DTMF sequences and name them with appropriate alias/name. The meaning of individual settings is:

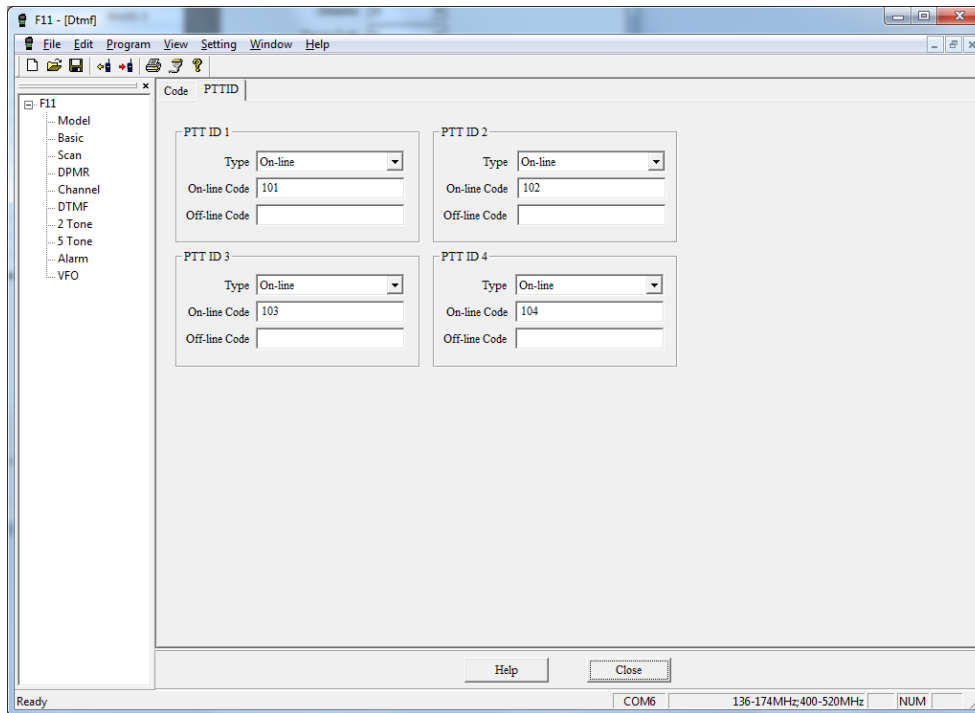
Type - it is a sequence type, it can either be set to none (and used only as a contact list) or to ANI (and used as an automatic number identification tone).

This part of document will be completed later after more experiments with the DTMF settings.

#### **PTTID**

In the PTTID section, the user can set up to four individual PTTIDs, which can be used in the ANI (automatic number identification) function. The PTTID is used to identify a particular radio in the analog mode.





For each PTTID, the following parameters can be set:

**Type** - defines whether the PTTID (ANI) is transmitted at the beginning of transmission (On-Line), at the end of transmission (Off-line) or at both the beginning and the end of transmission (Both).

**On-line Code** - defines the DTMF code to be transmitted at the beginning of the transmission

**Off-line Code** - defines the DTMF code to be transmitted at the end of the transmission

### 5.8.2 2TONE

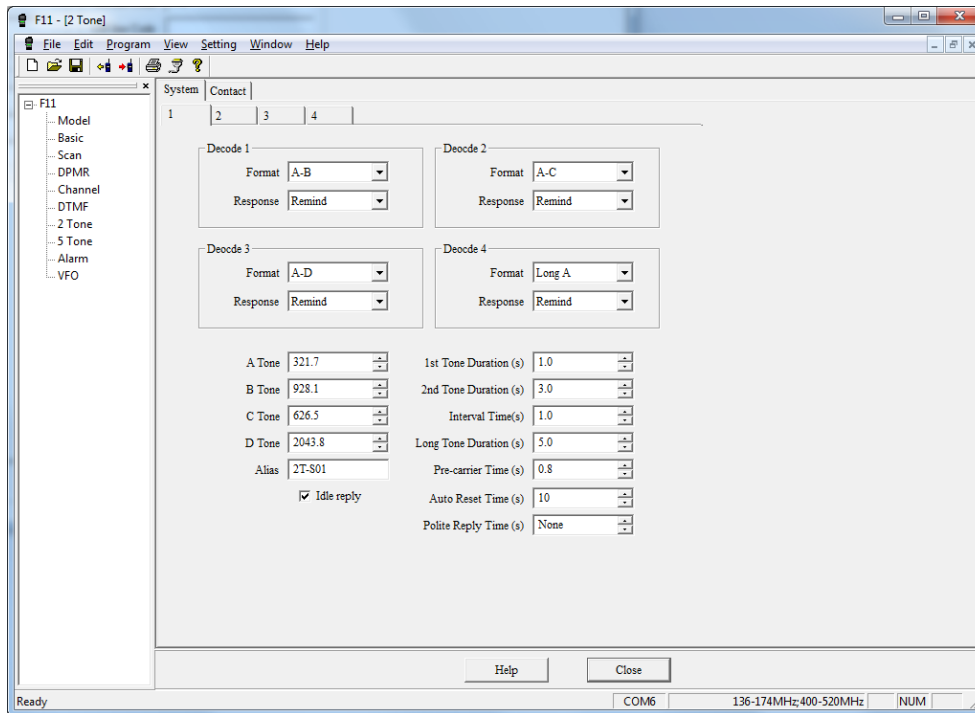
In Two-tone sequential signaling, receiving radio's decoder look for a valid first tone followed by a valid second tone within a defined length of time. A decoder detecting a valid first tone will allow up to 2 seconds for a valid second tone to be decoded. If no valid second tone is decoded within 2 seconds, the decoder resets and waits for another valid first tone.

The user can set the radios to monitor all system traffic or remain muted until called, depending on the settings. When the radio receives the correct tones in the proper sequence, it will shortly beep an alert. The radio can also be set to respond with acknowledgement to the caller's radio. After this, the radio's receive audio will be activated

The radio can both encode and decode 2TONE signaling.

### System

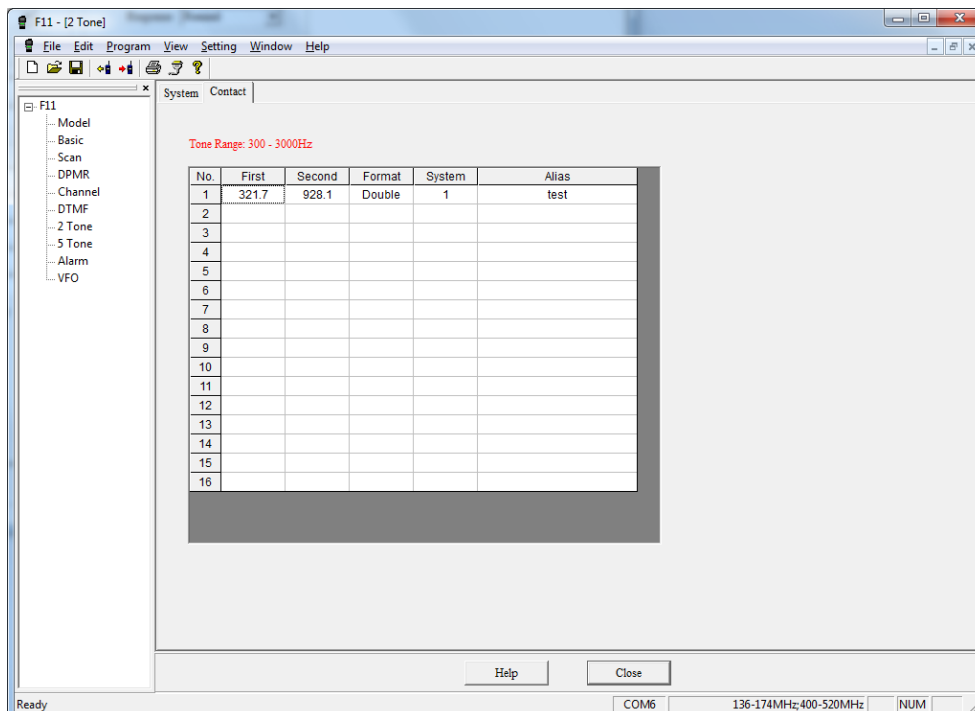
In this section, the user can set maximum of 4 predefined 2TONE codes parameters and other 2TONE specific signaling settings.



This part of document will be completed later after more experiments with the 2TONE settings.

### Contact

In this section, the user can set maximum of 16 predefined 2TONE contacts and contact specific settings.



This part of document will be completed later after more experiments with the 2TONE settings.

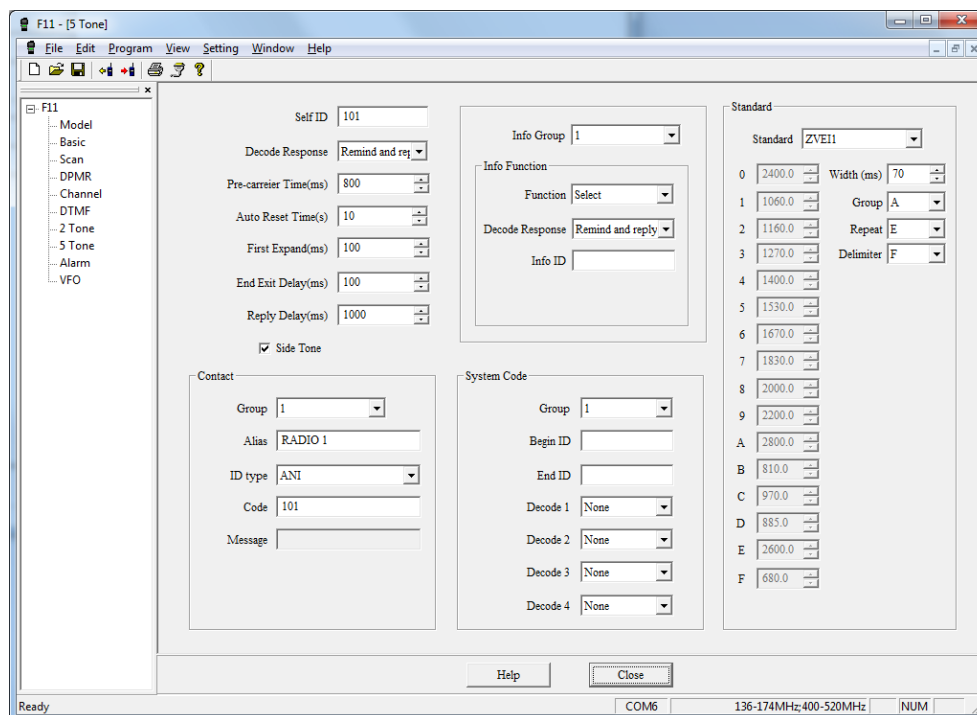
### 5.8.3 5TONE

In 5TONE selective calling, the radio is alerted by a sequence of tones. The procedure is very similar to DTMF signaling. The sequence is dialed from a transmitting radio automatic encoder.

The user can set the radios to monitor all system traffic or remain muted until called, depending on the settings. When the radio receives the correct sequence, it will shortly beep an alert. The radio can also be set to respond with acknowledgement to the caller's radio. After this, the radio's receive audio will be activated.

The radio can both encode and decode 5TONE signaling.

All setting for 5TONE selective calling are defined in the 5 Tone section of the software. The section displays all 5Tone protocol settings as well as contact lists.



## General

The general 5Tone settings are defined in the top left part of the screen. These settings define the identity of the radio as well as behavior of 5Tone encoder and decoder.

The description of individual fields is following:

Self ID	This is the radio ID, which is used for selective calling of this particular radio. Each radio should have different ID assigned.
Decode Response	This settings defines the behavior of the radio after successful 5Tone decoding is performed for a matching sequence programmed in the radio. <ul style="list-style-type: none"> <li>• <b>None</b> - no response on the radio, only the speaker of the radio is un-muted and the communication is possible.</li> <li>• <b>Remind</b> - on the receiving radio, an audible tone (beeps) is heard from speaker after the decode success. After that, the speaker of the radio is un-muted and the communication is possible</li> <li>• <b>Reply</b> - the receiving radio transmits its own 5TONE identification as a reply to signal decode success. After that, the speaker of the radio is un-muted and the communication is possible.</li> <li>• <b>Remind and reply</b> - on the receiving radio, an audible tone (beeps) is heard from speaker after the decode success. Then the receiving radio transmits its own 5TONE identification as a reply to signal decode success. After that,</li> </ul>

	the speaker of the radio is un-muted and the communication is possible
Pre-carrier Time(ms)	This setting defines the interval of silence between the start of transmitting and start of 5TONE sequence. This setting is particularly useful when the receiver radio uses some kind of power-saving feature, because it allows the receiving radio receiver to "wake up" and prepare for 5TONE sequence decoding.
Auto Reset Time(s)	This setting defines the interval of user inactivity, after which the radio speaker will mute again and the radio will only be activated after successful decoding of another 5TONE sequence. This parameter is an analog equivalent to Private/Group Hold time in the digital mode.
First Expand(ms)	This setting defines the time between the first and the second tone in the sequence. <b>To be verified/completed.</b>
End Exit Delay(ms)	This setting defines the interval of silence between the end of 5TONE sequence and the end of transmitting.
Reply Delay(ms)	This setting defines the time interval between the successful decoding of a 5TONE sequence and TX response from the receiving radio. This parameter is only valid, when the " <b>Reply</b> " or " <b>Remind and reply</b> " <b>Decode response</b> is enabled.
Side Tone	When this setting is enabled, the transmitted 5TONE sequence is also heard in the radio speaker. When disabled, the sequence is only transmitted on-air.

### Info Function

There is another unnamed box to the right of the above settings, which starts with the Info group field. This section is used to assign different functions to specific 5TONE sequences.

This box defines the behavior of the **receiving radio** after successful decoding of a 5TONE sequence.

The description of individual fields is following:

Info Group	This is the number of the function. Only 16 functions can be programmed - each function is assigned to a specific contact with the same number.
Function	There are four possible functions, which can be triggered when the 5TONE sequence is successfully decoded: <b>Select</b> - this is the basic and most common function. Setting the function to Select allows the radio to use the selective signaling - the radio un-mutes the speaker and communication is possible. <b>Stun</b> - when activated by the corresponding 5TONE sequence, this function will temporary disable all radio functions. It can be remotely enabled again by using the Wake command. <b>Kill</b> - when activated by the corresponding 5TONE sequence, this function will permanently disable all radio functions. It can't be remotely enabled, the only way to reactivate the radio is connecting the radio to the computer and using the software. Use with caution! <b>Wake</b> - When the Stun sequence temporary disables the radio, other radio can enable it again by sending the Wake sequence.
Decode Response	This setting has the same options as the general "Decode response" setting in the radio-wide setting, but this time an individual behavior can be programmed to each of the 16 pre-defined functions.
Info ID	User can define additional text (alias) in this field, which will be used to display on the radio display, when a specific sequence is initiated. <b>This description must be confirmed</b>

## Contact

The contact section is used to define 5TONE signaling contacts - predefined tone sequences which can be assigned by a name/alias for better identification. It is an analog equivalent to the digital contact list.

This section defines the parameters, which will be used when **transmitting** specific 5TONE sequence.

The description of individual fields is following:

Group	Although this option is called Group, it is more a contact number. Only 16 contacts can be programmed - each contact on the transmitting radio (e.g. RADIO1) can then be assigned to a specific function in the Info function section on the receiving radio (e.g. RADIO2) for best match of the 5TONE selective calling features.
Alias	User can define additional text (alias) in this field, which will be used to identify this contact in the radio contact list on the radio display.
ID Type	This setting defines the type of the contact. It can be set to: None - ANI - Message - <b>This description must be completed</b>
Code	In this section, the user will enter the specific 5TONE sequence used for this contact. This sequence must match to the receiving radio programming to enable successful 5TONE decoding.
Message	When the ID Type field is programmed to Message, the user can define the Message text in this section.

## System code

**This description must be completed after more experiments with the 5TONE settings.**

## Standard

In this section, the user can define different 5TONE selective calling standards to achieve compatibility with different radio systems from different manufacturers.

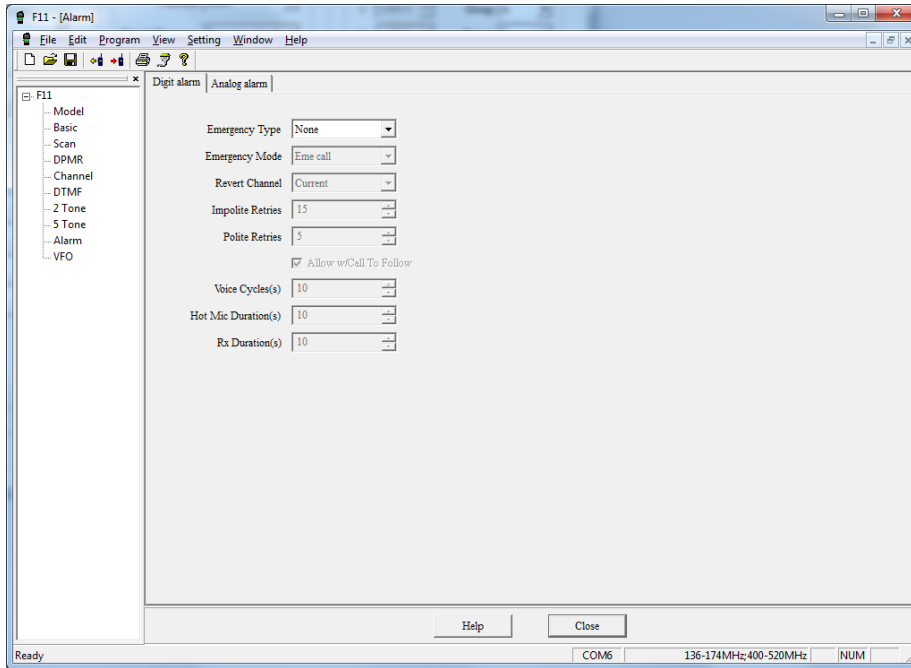
There are 15 predefined factory standards, which are used by different manufacturers and one user-defined standard, which can be completely used defined.

## 5.9 Alarm setup

In this section the specific alarm function can be programmed to both analog and digital modes. The alarm function can be user-activated from the radio, it can be assigned to a specific quick key. For the procedure to assign the function to a specific button, see section **Key** in the **Basic setup**. **This section must be completed after more experiment with the alarm system.**

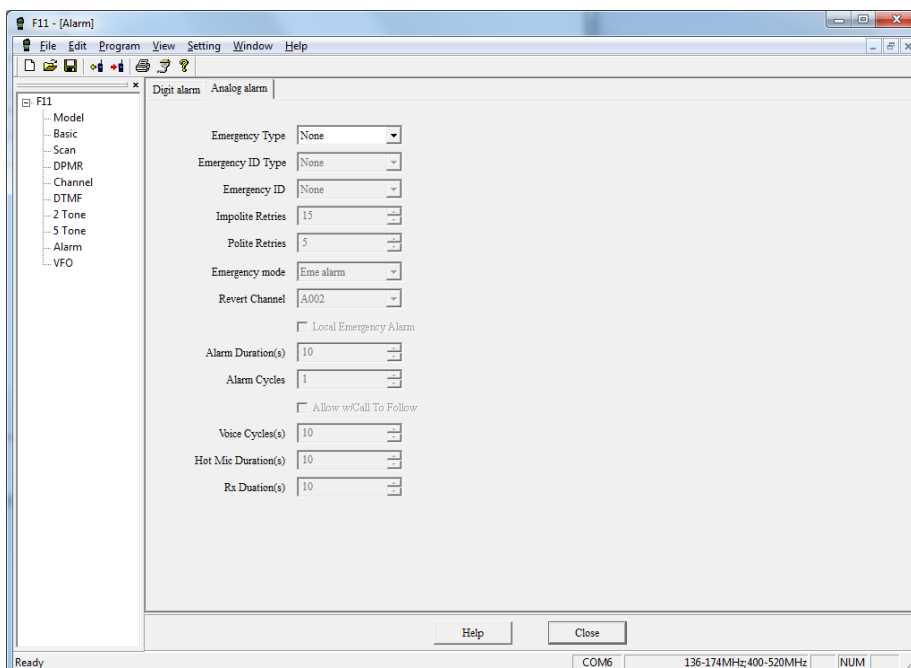
### Digit alarm

In this section, the digital alarm features are defined.



### Analog alarm

In this section, the analog alarm features are defined.

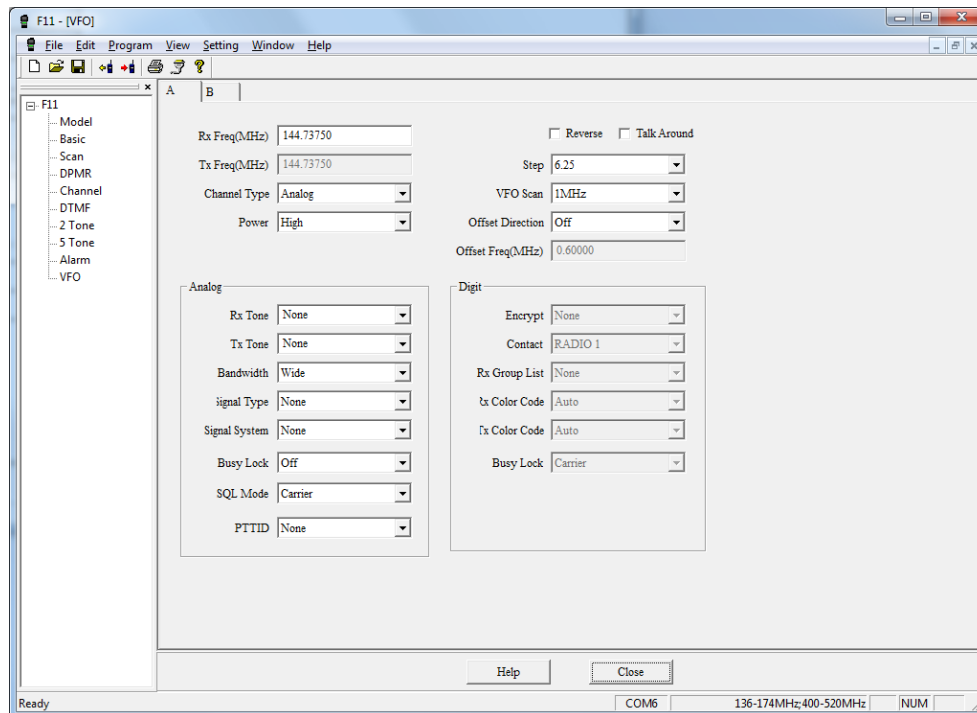


## 5.10 VFO setup

In the VFO setup section, the user can define parameters of the two VFOs (VFO-A and VFO-B) in the radio. These settings are only applied when the radio is in the VFO mode.

The setting is the same for VFO-A and VFO-B, so only VFO-A is described in this manual.

Only the top part of the VFO programming screen will be described in this chapter. The bottom part of the VFO programming screen (Analog and Digital sections) is identical to the Analog and Digital sections in channel programming part, for the description of these sections please see the **Edit** part in the **Channel setup** chapter.



The VFO settings are described in this table:

Rx Freq(MHz)	Sets a frequency (in MHz) on which the signal is received for the current channel. Can be set in range of 136-174MHz and 400-520MHz.
Tx Freq(MHz)	This option is grey and cannot be edited. The TX frequency is always the same as RX frequency in the VFO mode, unless a <b>shift</b> function (see below) is enabled. So the TX frequency is programmed via <b>Offset Direction</b> and <b>Offset Freq</b> settings.
Channel type	Configures the channel working in <b>digital</b> or <b>analog</b> mode. The other options can be Auto(Digit) and Auto(Ana), in which the channel will RX both digital and analog calls but will transmit in digital or analog mode only. Recommended setting is either Analog only or Digital only.
Power	Sets the radio transmission power level for this channel. It can be set to high (5W) or low (1W) High Power: Used when a stronger signal is needed to extend transmission distances. Low Power: Used when communicating in close proximity, and to preserve battery.
Reverse	When checked it allows the user to select the <b>Reverse</b> function, which uses the receive frequency of the channel instead of the transmit frequency when transmitting. The <b>Reverse</b> feature can be toggled via a programmable button, when the <b>Reverse</b> function is assigned to the button. <b>To be verified</b>
Talk Around	When checked, it allows the user to select the <b>Talk Around</b> function, which uses the receive parameters of the channel instead of the transmit parameters when transmitting. This feature enables communication between radios in close proximity

	without the use of a repeater, even when the particular channel is programmed as a repeater channel. The <b>Talk Around</b> feature can be toggled via a programmable button, when the <b>Talk Around</b> function is assigned to the button. <b>To be verified</b>
Step	Defines the incremental frequency step used in the VFO mode. The step setting is used to allow the VFO to work in different band plans. It can be set to 5, 6.25, 12.5, 25, 50 and 100 kHz.
VFO scan	VFO scan defines the frequency range to be scanned in the VFO scan mode. The scan is activated from the radio via the user defined scan button. The VFO scan setting can be set to: 1MHz - the radio scans $\pm$ 1MHz around the active frequency 2MHz - the radio scans $\pm$ 2MHz around the active frequency 5MHz - the radio scans $\pm$ 5MHz around the active frequency Whole - the radio scans the whole frequency band (136-174MHz or 400-520MHz).
Offset Direction	Offset is the difference between receive and transmit frequencies. Most commonly it refers to the separation between the input frequency and output frequency of a repeater or other type of full duplex system. For example, a radio receives on 146.94 and transmits on 146.34 in order to operate on a repeater. The offset is then $146.94 - 146.34 = 0.6$ MHz. Since in this case the transmit frequency is lower than the receive frequency, it is said to have a <b>negative</b> offset. The offset setting can be set to: <b>None</b> - the TX frequency is the same as the RX frequency. Used for direct mode without repeater. - <b>(negative)</b> - the TX frequency is lower than RX frequency. + <b>(positive)</b> - the TX frequency is higher than RX frequency.
Offset Freq(MHz)	This option is used together with the Offset direction setting. It defines the size of the offset, i.e. the frequency separation of RX and TX frequencies.



## 6 Basic programming tutorials

In this chapter, the very basic programming will be explained. The step-by-step guide includes tutorial and examples of general setup of a new radio, setting up basic analog and digital channels and setting up the messaging function.

Advanced features such as Off-Air-Call-Set-Up or Selective calling are described in the Advanced programming chapter.

### 6.1 System parameters

Let's assume you have three new out-of-box TYT DM-UVF10 radios lying on your desk and you want to program them for both analog and digital use. First of all, you should do some homework - you have to plan your radio system parameters.

This includes especially:

- type of use - recreational or HAM radio amateur or commercial
- type of operation - direct or repeater
- bands/frequencies, you want to use your radios on

Depending on the above questions, the programming might be significantly different.

Let's program these three radios for hobby use as an example. In this tutorial, we will program the radios for license-free bands (PMR analog and dPMR digital), we will also set up at least one channel for HAM amateur repeater and we will set up messaging. On the PMR channels, we will set the PL tone squelch on certain channels and we will set up the digital channels on the radios to communicate together.

#### **Analog PMR446:**

Analog PMR446 uses eight FM channels in the 446.0 - 446.1 MHz band, separated by 12.5 kHz from each other. Per regulation, maximum power is 500 mW ERP and equipment must be used on a mobile basis.

We will program 8 analog PMR446 channels.

#### **PL channels**

We will be using the radios for recreational use, so we won't need to listen to other radio user sometimes. This is why we will also program one main and one backup channel with the PL tone. Only radios with the same PL tone will be able to communicate together.

We will use for example 88.5Hz CTCSS tone for the main channel and D072N DCS tone for the backup channel

#### **Repeater**

Let's assume we have the HAM radio license and want to program one local repeater. For our example, this repeater will have these parameters: RX: 146.6750 MHz, Offset -0.6MHz and PL tone 88.5Hz. The repeater name will be for example OK0H.

#### **Digital dPMR446**

Digital dPMR446 uses sixteen digital voice channels in the 446.1 - 446.2 MHz band, separated by 6.25 kHz from each other with 4-Level FSK modulation at 3.6 kbit/s. Per regulation, maximum power is 500 mW ERP and equipment must be used on a mobile basis and the maximum TX session will not exceed 180 seconds.

We will program 8 digital dPMR446 channels.

*Because the TYT DM-UVF10 does not support 3.125kHz step, we will program channels in the 6.25kHz pattern*

### Digital groups

We will also want to program digital channels, on which only our three radios can communicate. So we will have to create a communication group and a channel, which has the preset contact set to this group. We will create one main digital channel and one backup digital channel.

### Encrypted communication

Last but not least, we will create one channel, on which we set the default communication to be encrypted and we also create one encryption key.

**So our goal is to program these channels:**

Channel number	Alias	RX Frequency (MHz)	Channel type	Note
B001	PMR1	446.00625	Analog	
B002	PMR2	446.01875	Analog	
B003	PMR3	446.03125	Analog	
B004	PMR4	446.04375	Analog	
B005	PMR5	446.05625	Analog	
B006	PMR6	446.06875	Analog	
B007	PMR7	446.08125	Analog	
B008	PMR8	446.09375	Analog	
B010	dPMR1	446.10625	Digital	
B011	dPMR2	446.11875	Digital	
B012	dPMR3	446.13125	Digital	
B013	dPMR4	446.14375	Digital	
B014	dPMR5	446.15625	Digital	
B015	dPMR6	446.16875	Digital	
B016	dPMR7	446.18125	Digital	
B017	dPMR8	446.19375	Digital	
A002	Main A	446.01875	Analog	Tone squelch 88.5Hz
A010	Backup A	446.06875	Analog	Tone squelch D027N
B051	OKOH rpt	146.67500	Analog	TX frequency 145.07500, TX tone 88.5 Hz
A001	Main D	446.11875	Digital	Default TX contact - GROUP
A015	Backup D	446.16875	Digital	Default TX contact - GROUP
A003	Encrypted	446.11875	Digital	Encrypted channel

*Note: the channel numbers can be selected differently.*

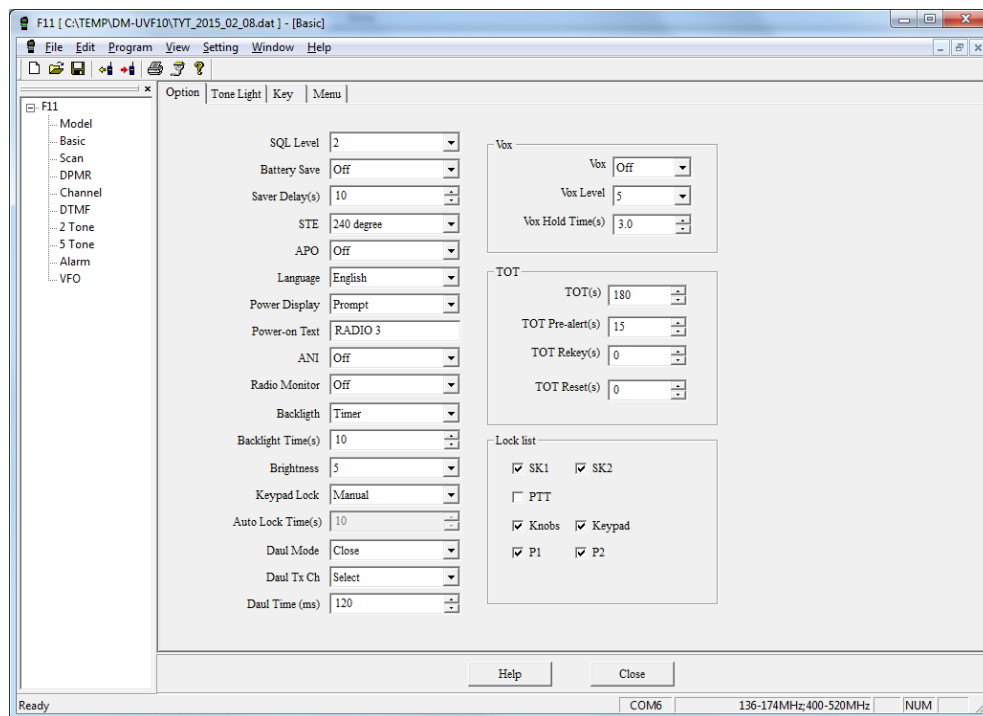
### Radio and group identification

In order to allow individual calls between the radios, we will have to identify each radio. Let's assume we name the radios RADIO1, RADIO2 and RADIO3, give them ID codes 101, 102 and 103 and also create one group called simply GROUP in the following way:

Radio	Alias	ID code	Group
1	RADIO1	101	GROUP
2	RADIO2	102	GROUP
3	RADIO3	103	GROUP

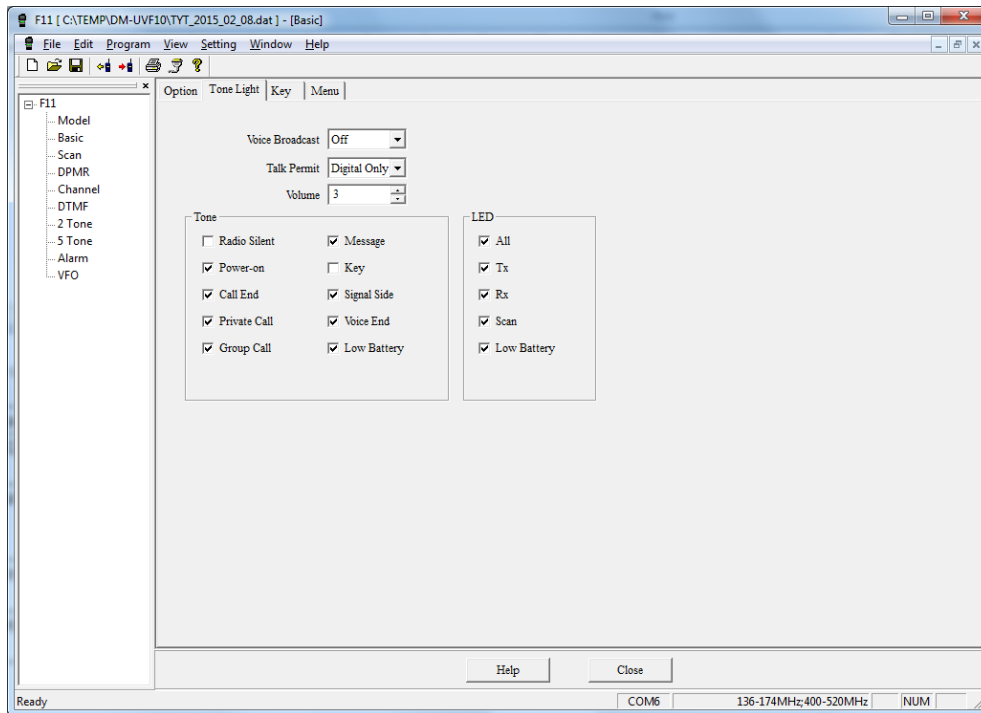
## 6.2 General setup

First of all, we have to set up the general parameters of the radio. Go to **Basic setup** and set the following parameters in the same way as on the screen:



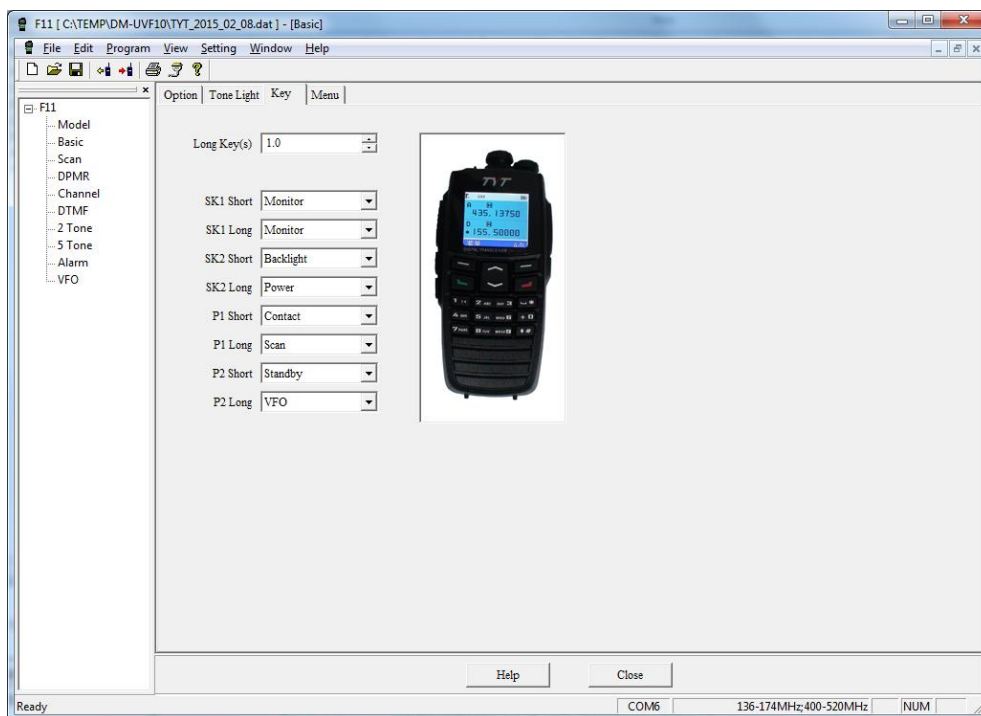
Some comments:

Parameter	Value	Comment
SQL level	2	We will set the squelch to quite sensitive level. If the background noise is a problem, set it to higher value.
Battery Save	Off	We don't want to enable battery save as we want immediate response of the radio receiver. When delay is not an issue, set it to 1:3.
Power-on Text	RADIO1	We want to display "RADIO1" text during power-up. Change this text to RADIO2 or RADIO3 for other two radios.
Brightness	5	Set to the highest level, even this is not sufficient in the direct sunlight



Some comments:

Parameter	Value	Comment
Volume	3	Set it to comfortable level. It can't be changed from the radio, so you may want to ask user, what is his desired level.
Radio Silent	disabled	In some cases, even when you disable this setting in the software, after programming the radio, it is enabled again. In such case, disable the Silent mode directly from the radio.



Some comments:

Parameter	Value	Comment
SK1 Short	Monitor	When you select Monitor function as a short-key shortcut, it is automatically assigned also to the long-press. This is specific to monitor function only and it is OK.

In the last screen select Menu Reset Time(s) to 20 seconds.

### 6.3 Analog channel programming

#### PMR446 Channels

Now we can program all Analog channels. Go to Channel section and select **Edit** button.

First, we program the PMR1 to PMR8 analog channels. Below is example for PMR1 channel, the other channels have only different TX/RX frequency and alias. Set the following parameters in the same way as on the screen:

Some comments:

Parameter	Value	Comment
Scan	Enabled	When you don't want the channel to be assigned to the scan list, disable this check-box

#### Main and backup analog channels with PL tone squelch

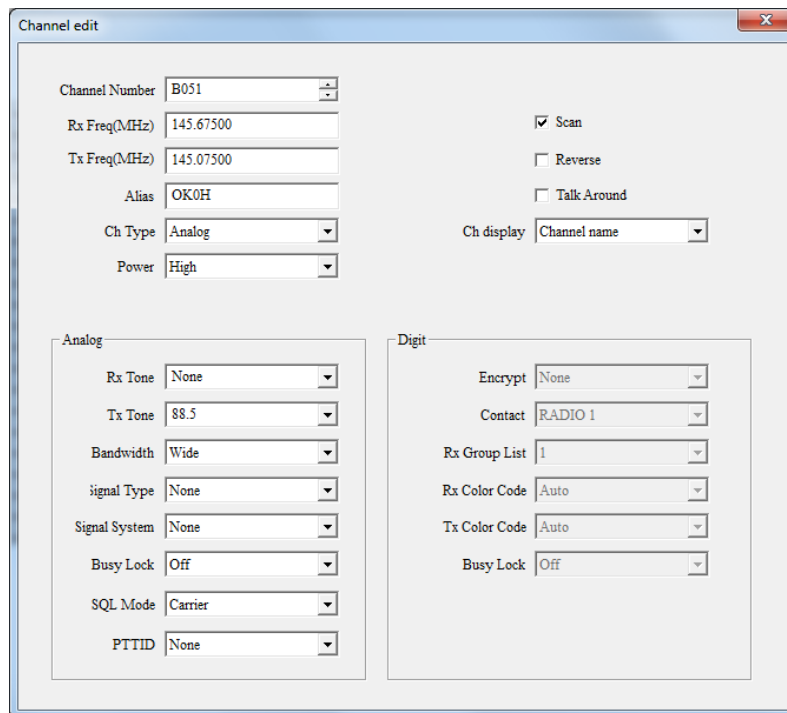
Now we program the main and the backup analog channels. As we decided before, these channels will have the PL tone squelch enabled. Below is example for **Main A** channel, the other channel has only different TX/RX frequency, alias and RX/TX tone. Set the following parameters in the same way as on the screen:

Some comments:

Parameter	Value	Comment
RX and TX Tone	88.5	Set both RX and TX tones on all radios to allow the radios to communicate together.
SQL Mode	Tone	Set SQL mode to tone to activate the radio speaker only when the correct PL tone is detected.

### **Repeater channel**

Now we program the analog repeater channel for OK0H repeater. As we mentioned before, the repeater parameters are RX: 146.6750 MHz, Offset -0.6MHz and PL tone 88.5Hz. Set the following parameters in the same way as on the screen:



Some comments:

Parameter	Value	Comment
RX Frequency	145.67500	This is the receiving frequency of the repeater
TX Frequency	145.07500	This is the transmit frequency of the repeater. Calculate it in the following way: $RX\_freq + offset = TX\_freq$ . (In this case, $RX\_freq=145.675$ , $offset=-0.6$ , so the $TX\_freq=145.075$ )
Rx Tone	None	There is no need to set the Rx Tone. When None is selected, the radio will operate in carrier squelch mode.
Tx Tone	88.5	Set Tx tone to 88.5Hz to be able to activate the input of the receiver.
Bandwidth	Wide	HAM radio on 2m band use 25kHz channel bandwidth. However, narrow setting will also work.
SQL mode	Carrier	Leave the SQL mode to carrier if you want use only the carrier squelch.

## 6.4 Digital channel programming

Before we start with the digital channel programming, we have to define the following:

- Digital contacts
- Digital RX Group List
- Encryption key

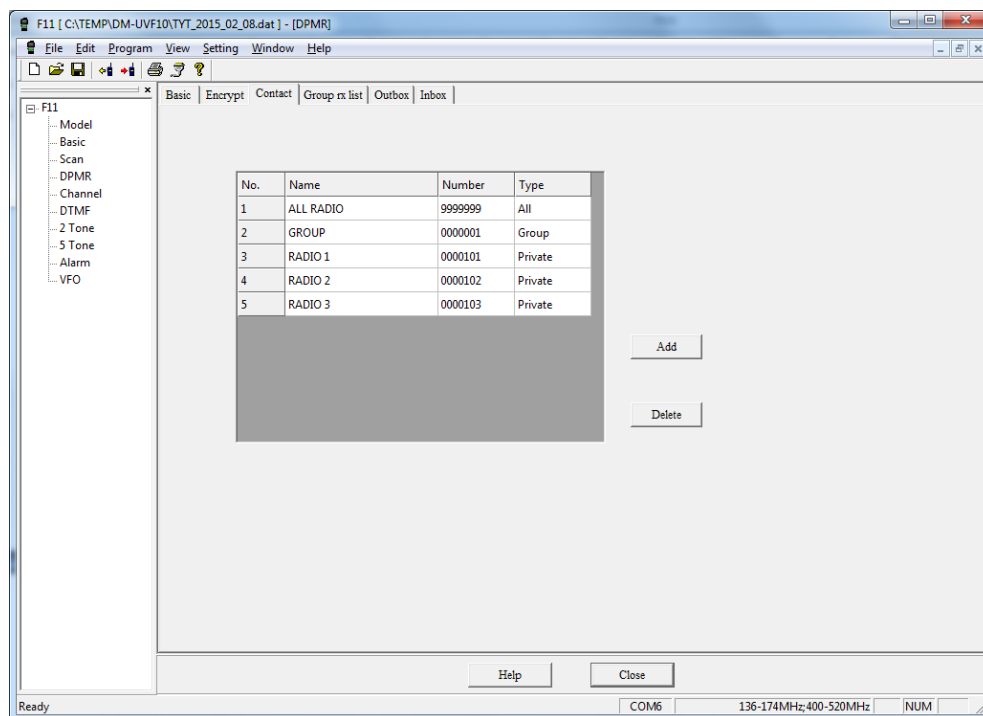
### 6.4.1 Digital contacts

As we described in the beginning, we will create a separate contact for each radio according to this table:

Radio	Alias	ID code	Group
1	RADIO1	101	GROUP
2	RADIO2	102	GROUP
3	RADIO3	103	GROUP

Because the group is also a type of contact, there will be separate record in the contact list for GROUP too. We also want to enable **All Call** on these three radios, so we create one more contact called ALL RADIO.

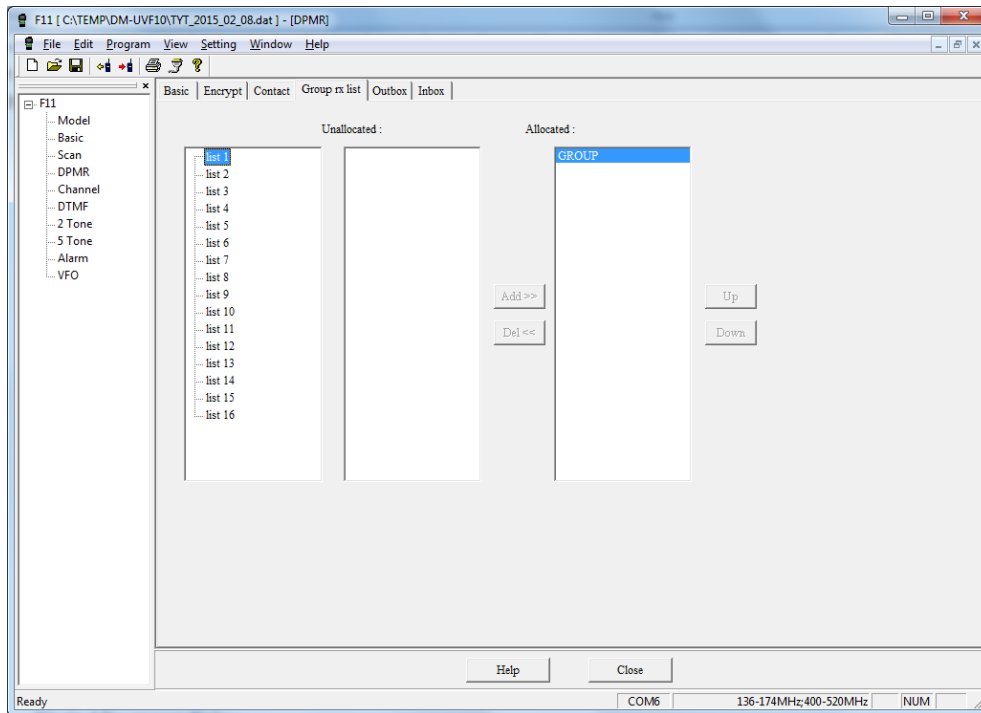
Go to the **DPMR** section and select **Contact** tab. Create three private type contacts for each radio and also create group type contact for GROUP and all type contact for All Call. The contact list will look in the same way as in the following screen:



#### 6.4.2 Digital Rx group list

Now we have to check the digital Rx Group list. Because we only have one group called GROUP, this group is already allocated to list 1. We don't need to change anything here unless we will create more groups. The **Group rx list** will look in the same way as in the following screen:

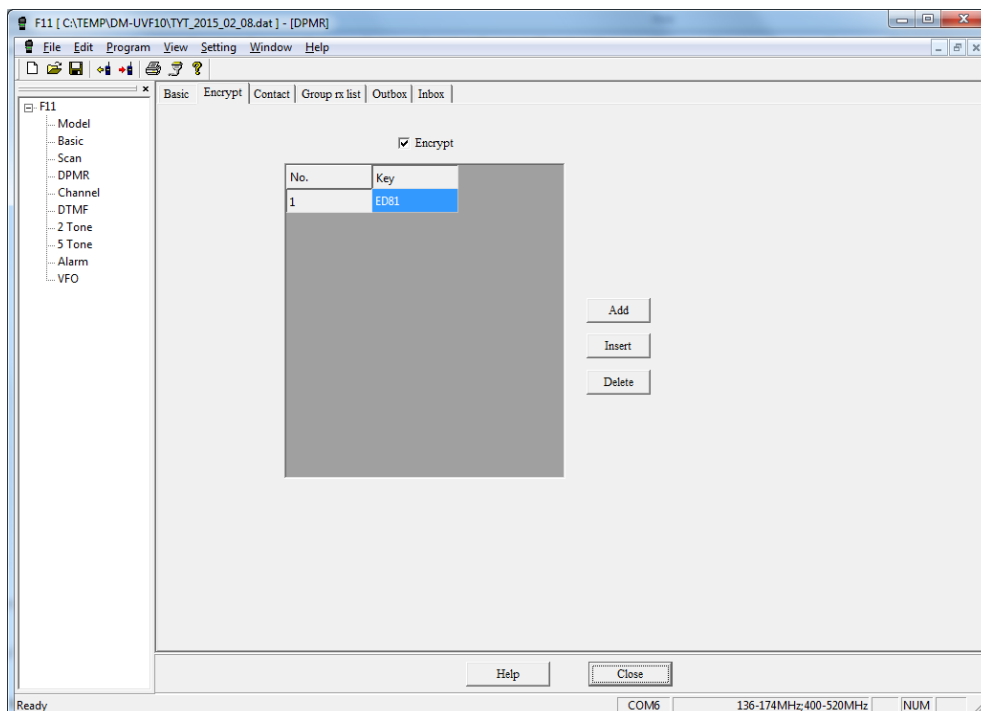




### 6.4.3 Encryption key

As we will also program one encrypted channel, we have to create at least one encryption key.

To do this, go to **DPMR** section and select the **Encryption** tab. Check the box **Encrypt** and then click **Add** to add an encryption key. Random encryption key is generated. **Write the key down** as you have to enter it to all radios, which will communicate on the same encryption channel. You can also create your own key, just click into the blue field to edit the key. Use the same way to edit the encryption key in the other two radios.



Now, we are ready to program digital channels.

## 6.4.4 Digital channels

### dPMR446 Channels

First we program the dPMR1 to dPMR8 digital channels. Below is example for dPMR1 channel, the other channels have only different TX/RX frequency and alias.

Some comments:

Parameter	Value	Comment
Contact	ALL RADIO	We are trying to program a general dPMR channel, on which we hopefully make contact with other unknown digital users. So we program the channel as a All Call channel, because most of the radios will receive this call type by default.
Rx Group List	None	We are trying to program a general dPMR channel, on which we hopefully make contact with other unknown digital users. So we do not program any specific Rx group list. Only All Call contacts and direct-dial private calls are enabled. We assume that the general communication between dPMR446 hobbyists will be using All Call feature.

### Main and backup digital channels with GROUP call

Now we program the main and the backup digital channels. As we decided before, we want to program digital channels, on which only our three radios can communicate. We already created relevant **Contacts** and set the **Group rx List**. Below is example for **Main D** channel, the other channel has only different TX/RX frequency and alias. Set the following parameters in the same way as on the screen:

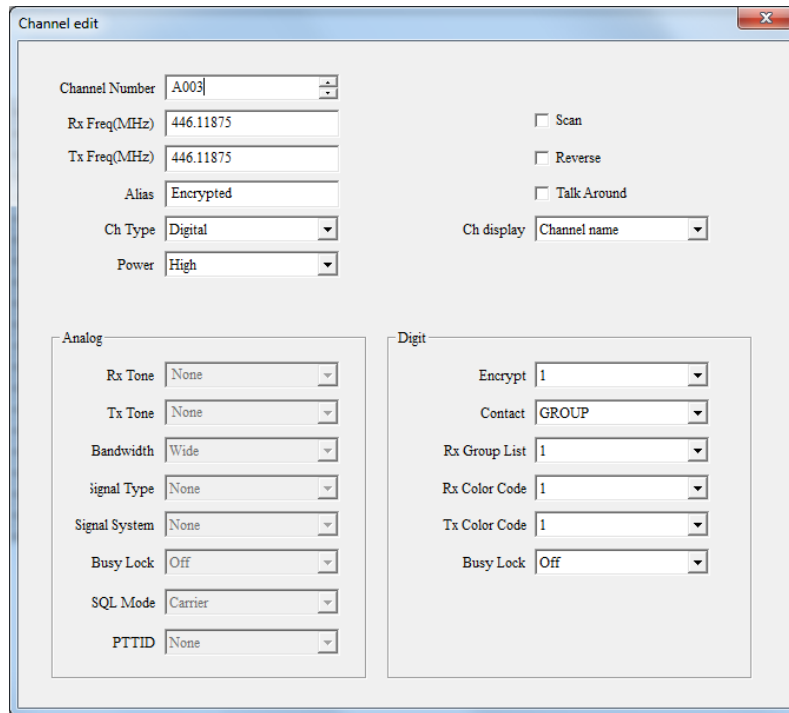
Some comments:

Parameter	Value	Comment
Contact	GROUP	In this case, we want to communicate <b>only</b> within our group called <b>GROUP</b> on this channel, so we select it in the default <b>Contact</b> .
Rx Group List	1	We do the same for the Rx Group List - we want to monitor calls from GROUP only and as the GROUP is allocated to the Rx Group List number 1, we select this 1 here.
RX/TX Color code	1	It is a good idea for closed groups to select other color code than Auto. However, the Auto will also work.

### Encrypted digital channel

We decided to create one encrypted channel because sometimes we want the encrypted communication. As the encryption adds another level of data processing, it might limit the effective radio range, so use it only when necessary.

We have already created one encryption key, so we can program the encrypted channel in the same way as described in the following screen. All settings are same as in the Main digital channel programming except the Encryption enabled:



Some comments:

Parameter	Value	Comment
Encrypt	1	In this field, you have to select the encryption key, we crated before. In our case, we only created encryption key 1, so select "1" here.

Now, we are done with the digital channel programming as well.

**Repeat all steps described in the General setup chapter and in the Digital and Analog channel programming chapters for RADIO2 and RADIO3 as well.**

**The only differences between RADIO1, RADIO2 and RADIO3 programming are listed below - everything else is the same:**

Menu	Setting	RADIO 1	RADIO 2	RADIO 3
Basic -> Option	Power-on Text	RADIO1	RADIO2	RADIO3
DPMR -> Basic	Alias	RADIO1	RADIO2	RADIO3
DPMR -> Basic	ID Code	101	102	103

This concludes the section about basic programming. You can now use the radios in both analog and digital modes and communicate together.

There are more functions available in the advance programming section.

## 7 Advanced programming tutorials

### 7.1 Signaling

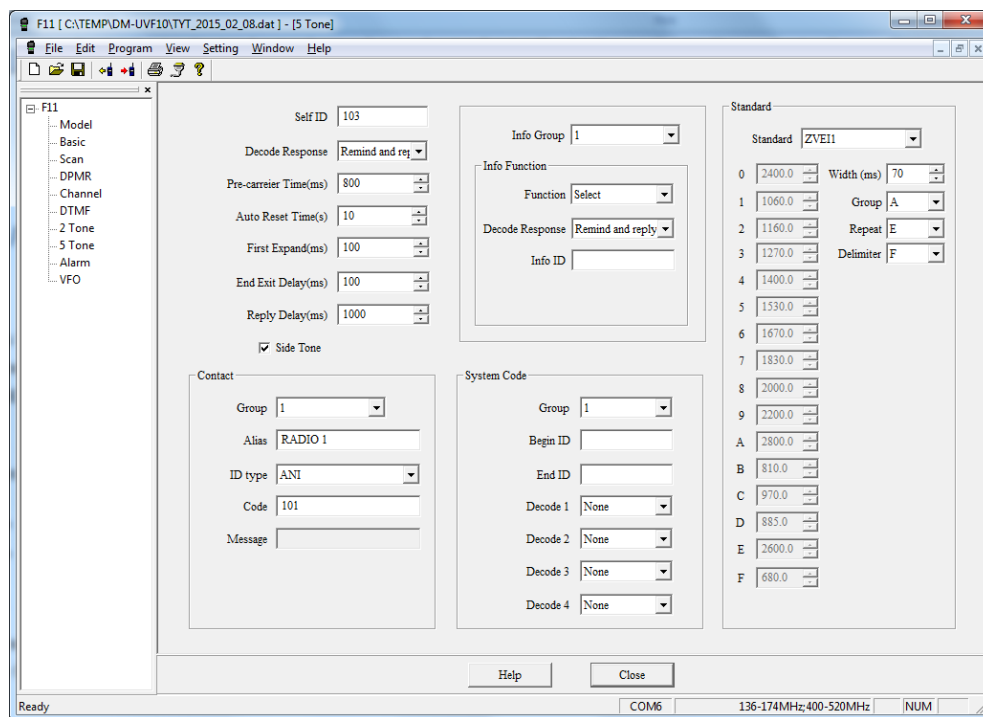
In this tutorial, we will show how to program the 5TONE signaling system to encode and decode for a specific channel. By default, the channel audio is muted and the speaker is activated only after decoding matching 5TONE sequence. We will also program the called radio to automatically respond to the callers radio after the call.

The programming consist of two steps:

- Set up the 5TONE signaling system
- Program an analog channel with the 5TONE selective calling

#### 7.1.1 Setting 5TONE signaling

First, we have to set up the 5TONE signaling system. Go to **5TONE** section and set up the parameters as shown in the following screen:



Some comments:

Parameter	Value	Comment
Self ID	103	This is the ID of the radio. It is similar to the digital ID Code, but this is for analog 5TONE calling. The 103 value is for RADIO3 so use 101 for RADIO1 and 102 for RADIO2.
Decode response	Remind and Reply	<p>We select <b>Remind and reply</b>, because:</p> <ul style="list-style-type: none"> <li>• We want the receiving radio to play an audible tone (beeps) from speaker after the decode success. This is <b>Remind</b> function.</li> <li>• We also want the receiving radio to transmit its own 5TONE identification as a reply to signal decode success. This is <b>Reply</b> function.</li> </ul> <p>After that, the speaker of the radio is un-muted and the</p>

		communication is possible.
Side tone	Enabled	We enable the Side Tone setting because we want to hear from the speaker the tone sequence the radio is transmitting. You may disable this feature by un-checking this setting.
Group	1, 2 and 3	Set the following parameters separately for Group 1, 2 and 3. <ul style="list-style-type: none"> <li>• First select the group - for example 1.</li> <li>• Set <b>Alias</b> - for group 1 it will be RADIO1</li> <li>• Set <b>ID Type</b> - select ANI for all groups</li> <li>• Set <b>Code</b> - set 101 for group 1, etc.</li> </ul> Repeat this for group 2 and group 3. Each radio has to have all three groups programmed. Imagine this as a contact list.
Info Group	1, 2 and 3	Set the following parameters separately for Info Group 1, 2 and 3. <ul style="list-style-type: none"> <li>• First select the group - for example 1.</li> <li>• Set <b>Function</b> - set <b>Select</b> for all groups</li> <li>• Set <b>Decode response</b> - select <b>Remind and reply</b> for all groups</li> <li>• You don't have to set info ID</li> </ul> Repeat this for group 2 and group 3. Each radio has to have all three groups programmed. Imagine this as a contact list.

### 7.1.2 Programming a channel with a 5TONE selective calling

Now we can program the channel with the selective calling feature.

Go to the **Channel** section, find a free channel, pres **Edit** and set the parameters according the following screen:

Some comments:

Parameter	Value	Comment
Signal Type	5 Tone	Set 5 Tone to use the 5TONE selective calling for this channel
Signal System	1, 2 or 3	Set 1 for RADIO1, 2 for RADIO2 and 3 for RADIO3
SQL Mode	Signal	Set to Signal to un-mute the speaker audio only after successful

		signal decode.
--	--	----------------

**Repeat all steps described in the Signaling chapter for all three radios - RADIO1, RADIO2 and RADIO3.**

The only differences between RADIO1, RADIO2 and RADIO3 programming are listed below - everything else is the same:

Menu	Setting	RADIO 1	RADIO 2	RADIO 3
5 Tone	Self ID	101	102	103
Channel	Signal system	1	2	3

### 7.1.3 Use of the 5TONE selective calling

Now, you can use the 5TONE selective calling.

1. On all radios, set the channel named **SELECT**
2. Use RADIO1 as a caller radio. Go to **Signal** and select **5-Tone List**
3. Move cursor over the RADIO2 label
4. Press PTT shortly
5. The RADIO1 will transmit 5TONE sequence for RADIO2
6. The RADIO2 will receive the sequence, beep and transmit the ACK sequence back to RADIO1 (the sequence can be heard from RADIO1 speaker).
7. Both radios are now connected and can communicate.

*Note: When you use the 5TONE signaling, the radio should mute again after Auto reset time elapsed (default 10 seconds). At least on my radios, this setting is not working. Changing the channel up and down helps, the radio mutes again. However, even in un-muted status, the radio can receive and acknowledge the 5TONE sequence repeatedly.*

This concludes the 5TONE selective calling tutorial.

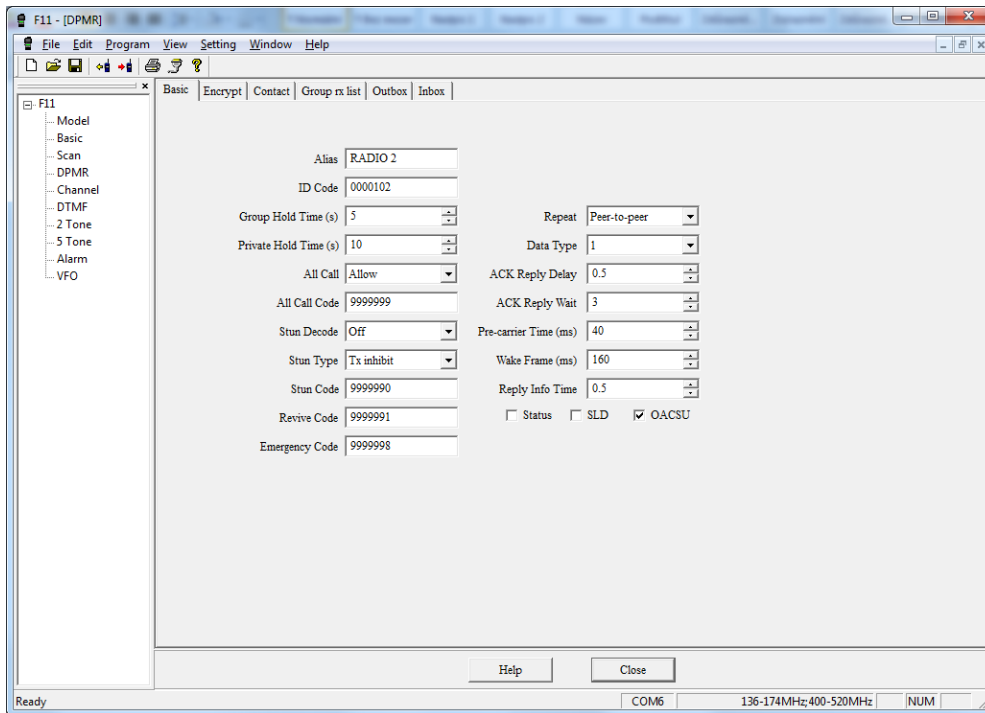
## 7.2 Off Air Call Set Up (OACSU)

OACSU is a call set up mechanism where the system checks for the presence of the called party radio, before allocating a channel.

When OACSU is disabled (default), the caller radio performs TX without checking the status of called radio.

When OACSU is enabled, the caller radio first checks the status of the called radio and establishes call only if the called radio is in range.

To enable and set up OACSU, you have to check the OACSU box in the DPMR tab and you also have to tweak two parameters - you have to set Pre-carrier Time to 40ms and Wake Frame to 160ms.



Now you can test the OACSU call set up in the following way:

1. Select individual call contact on RADIO1 to call RADIO2 (either by pressing "#" and entering private ID directly or by selecting the contact from Menu->Contact)
2. Push and keep pressed PTT on RADIO1
3. The RADIO1 sends a short TX burst and displays "RADIO2 Connecting..." (you still keep the PTT pressed)
4. After "Ack reply delay" (default is 0.5sec) the RADIO2 responds with its own short TX burst acknowledging its presence
5. Then the RADIO1 displays "RADIO2" (the "Connecting..." text disappears) and you can speak (you still keep the PTT pressed)
6. When you finish your transmission, release PTT on RADIO1
7. You can now start transmitting on RADIO2 by pressing PTT within defined time (Private hold time)
8. When you do not transmit on either radio for "private hold time" period, the radios beep and disconnect from private call and they both display "Call ended"

*note1: if the called radio (RADIO2) in step 4 is out of range or switched off, the RADIO1 keeps trying to connect to RADIO2 as long as the PTT on RADIO1 is pressed (the retry interval for TX burst is defined by "Ack reply wait" - default is 3sec) and keeps displaying "RADIO2 Connecting..."*

*note2: TYT DM-UVF10 has annoying bug - when you want to make a private or group call to a contact on a channel, which already has default contact set ("Contact" field in the "Digit" section of channel edit screen), the radio makes the first TX attempt to default channel contact and only after releasing PTT and pressing it again it calls the required contact.*