



**TECHNICAL INFORMATION**  
**BULLETIN**

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**TiL Model:** TDFM-600/6000/7000 transceivers with Type I or Type II modules.

**TiL P/N:** 011210-1,-2,-3,-4,-5 and -6 all model variations

**Affected S/No:** ALL

**Purpose:** This document is a brief overview on the programming procedures pertaining to the CPS software used to program our TDFM600/6000/7000 series of FM transceivers.

## **INTRODUCTION**

This document is a brief overview on the programming procedures pertaining to the CPS software used to program our TDFM600/6000/7000 series of FM transceivers. The document is divided into two sections **Type I** and **Type II** modules. All of the transceiver's RF modules/bands must be programmed individually through the CPS software. Refer to Technical Bulletin (TIBFM 12-01 or TIBFM-15-01) for the applicable software and cables required.

Keep in mind through the programming process that the settings for the band modules are done in four stages.

1. The **Menus** are defined
2. The **Features** are assigned to the function buttons
3. The **Personalities** are set up
4. The **Zones** have the personalities assigned to them

## **TYPE 1 MODULES**

### **1.0 SETUP**

For the Initial programming of the band modules:

- Connect the SmartRIB interface cable up between the transceiver and RIB box, this cable includes the 28volt input lines required to power up the radio on the bench
- Connect the computer interface cable up between the radio and computer's com-port
- Start the XTS3000 software on your computer
- Select the band you wish to program by pushing the band knob on the front of the radio
- Read the radio band frequency file and save. Motorola refers to this radio file as a **codeplug**

The codeplug can then be modified and then programmed back into the band module. Once the codeplug has been saved onto the computer then it will not need to read again to make any future changes. Simply load the file in the CPS, edit any changes and then program them to the module.

## 1.1 READING THE CODEPLUG FROM BAND MODULE

To read the codeplug from the band module click on “FILE” then click on “READ DEVICE”.

This can take a minute or so. After this is done a window will open in the programming environment. The window will show a tree listing of different areas that can be expanded to edit the radios features.

## 1.2 EDITING THE CODEPLUG FILE MENUS ITEMS, BUTTONS AND SWITCHES

### 1) FILE MENU ITEMS

- Go to the “RADIO CONFIGURATION” section of the codeplug tree
- Open the “DISPLAY + MENUE” pull down box
- Click on “MENU ITEMS” and observe the four lists
- Select the desired items from the right box and add them to the left box

**Note:** The order in which these items are selected will determine what items are displayed from left to right. Only three items can be displayed at one time, this also applies to the trunking menus. If additional menus were selected you can access them by using the UP and DN buttons on the radio’s keypad.

**2) FUNCTION BUTTONS:** The second step is to define the function buttons located on the front of the radio. There are four buttons “F1”, “F2”, “F3” and “F4”. The TOP BUTTON in the software represents “F4”. The SIDE BUTTONS in the software represents “F1”, “F2” and “F3”.

- Go to the “RADIO CONFIGURATION section” of the codeplug tree
- Open the “CONTROL” directory
- Open the “BUTTONS” pull down box and select the desired option to represent each button

**\* Note:**

- *The “F1” button is usually programmed for manual squelch override for conventional channels. A brief press of the “F1” button will cause the squelch to open for ¼ of a second. The squelch can be forced open by pressing and holding the “F1” key for 2 seconds. To close the squelch briefly push “F1” again.*

- The “**F3**” button is usually assigned for the “DIRECT TALK AROUND” feature, which is used on channels that are programmed for repeaters. This feature allows the radio to transmit on the same frequency as the repeater output when in close proximity but does not use the repeater, therefore the radio “Talks around” the repeater. To enable, press the “**F3**” button. A “↑” indicator will be displayed in the lower right hand portion of the radios display. To switch back to normal, press “**F3**” again.

**3) SWITCHES:** Third step is to define the both the “ESW” and “TSW” switch found on the right side of the radio’s keypad

- Go to the “RADIO CONFIGURATION” section of the codeplug tree
- Open the “CONTROL” directory
- Open the “SWITCHES” box
- Go to the “TWO POSITION CONCENTRIC” pull down windows to define the “ESW” switch
- The “∅” symbol on the radio’s display is represented by position “**A**” in the software
- The “**O**” symbol on the radio’s display is represented by position “**B**” in the software
- Typical application of the “ESW” switch is for selecting “SECURE” or “CLEAR” mode for radios with encryption. The “ESW” symbol on the display during “SECURE” will change to “∅” and “**S**” will also appear. The “ESW” symbol on the display during “CLEAR” will change to “**O**” and the “**S**” will disappear. To toggle between “SECURE” and “CLEAR” press the “ESW” switch
- The “TSW” switch has three positions represented by “A”, “B” and “C” defined in the “THREE POSITION TOGGLE” pull down windows
- Typically the “C” position is programmed as the “SCAN” function but only when scan lists have been created in the radio’s personalities

**\* Note:** The rotary control should *always* be set to “**CHANNEL SELECT**” to insure that The rotary knob will change channels when the radio is in “**CHAN**” mode.

### 1.3 CONFIGURING PERSONALITIES

The radio's personalities are defined by frequencies, tones, modulation type and bandwidth for each individual channel.

To program the personalities:

- Click on "CONVENTIONAL" in the tree
- Click on "CONVENTIONAL PERSONALITY" There may be one or more personalities listed
- Double-click on the first personality. A dialog box will appear
- Click on the "GENERAL" tab to program receive and transmit frequencies
- For receive select the squelch type desired. If no tone is required, then set squelch to "CSQ" for "CARRIER SQUELCH". If a "PL tone" or "CTCSS" tone is required, then set squelch to "PL". Then select the tone required in the "PL Freq (Hz)" box
- For no Transmit tone set TX Squelch to "DISABLED". If a PL tone is required, set TX squelch to "PL" and set "PL Freq (Hz)" to the desired tone from the pull-down list. If DPL is needed on this channel, then set both of the squelch types for "DPL" and set the "DPL Code" in the pull-down list to the right of the frequency

### 1.4 SETTING RECEIVE PARAMETERS

The set-up parameters for modulation and squelch settings are:

- Click on the "RECEIVE OPTIONS" tab
- "UNMUTE/MUTE TYPE": Set to "UNMUTE" or "MUTE"
- "RX VOICE/SIGNAL TYPE": Set to "NON ASTRO" for analog FM or "ASTRO" for P25 CAI modulation
- Set to "MIXED MODE" to make the receiver automatically decode P25 modulation or analog FM
- "RX UNMUTE DELAY": This governs how fast the receiver opens the squelch when a signal is received. Factory default is 1 for "NO DELAY". It is not recommended to alter this setting
- "SQUELCH (FINE TUNE)": This is the carrier squelch setting for this channel. The default setting is "6" but it can be tightened up if desired
- "RX EMPHASIS": Should always be checked
- "BUSY LED": Should always be checked

## 1.5 SETTING TRANSMIT PARAMETERS.

The set-up parameters for transmit are:

- Click on the “TX OPTIONS” tab
- “TIME OUT TIMER”: set to 3 (Factory default) for maximum of 60 seconds of continuous transmit time. If no Timer is desired set this to 1 for “infinite” or no time limitation on transmit. It is recommended that a timer be programmed.
- “TRANSMIT DEVIATION”: This is where the transmit deviation is set. If in analog and wide is desired then set this to 5 kHz. If narrow is required set this to 2.5 kHz analog. If the receive options have been set to “ASTRO or “MIXED MODE” then set this to 2.5 kHz.
- Transmit “DEVIATION T/A”: Set this the same as above.
- “CHANNEL SPACING”: This is automatically adjusted when the transmit deviation is set. The user cannot modify this box.
- “TX VOICE/SIGNAL TYPE”: This sets the type of transmit modulation. If the receive options has been set to “NON ASTRO” then, this box will show the same. If the RX options have been set to “ASTRO”, then this box will show this too. This is normally not modifiable. If the receive options have been set to “MIXED MODE” then this box can be modified to select either “NON ASTRO” for analog FM or “ASTRO” for P25 CAI modulation.
- “TRANSMIT EMPHASIS”: Should be checked.
- “REVERSE BUSRST”: Checked
- “HOT KEYPAD”: Checked if you want “DTMF” dialing on front panel when transmitting.
- “TRANSMIT POWER LEVEL”: This is the default power setting for this channel. The setting can be later modified with the “PWR” setting programmable through the front of the radio.

\* **Note:** You will have to set up a new personality for every channel you want to program into the radio. If you have 25 channels then you will have to configure 25 personalities as described above.

## 1.6 ASSIGNING PERSONALITIES TO ZONES

After the personalities are defined, they will have to be assigned to “ZONES”. A “ZONE” is a group of channels or channel bank.

This software must be configured such that some or all of the personalities are grouped

into “ZONES”.

All of the personalities can be programmed to one zone or some of them can be assigned to more than one zone to do this follow the procedures below:

- Click on “ZONE CHANNEL ASSIGNMENT”, and then click on “ZONE CHANNEL ASSIGNMENT 1”. A box will appear showing the “ZONE NAME” eg: “Z1”.
- Click on “CHANNELS”. A table showing “CHANNEL NAME”, “PERSONALITY TYPE” & “PERSONALITY NUMBER” will be displayed.
- Select channel 1 “PERSONALITY #” and select the personality that is desired in channel 1 position on the radio. Select from the pulldown menu.
- Click on the “PERSONALITY TYPE” for channel 1. There are 2 choices: “CNV” for “CONVENTIONAL PERSONALITY” and “TRK” for “TRUNKING PERSONALITY”. Select “CNV” for any personalities defined under “CONVENTIONAL” as per above.
- Type in a custom channel name in the “CHANNEL NAME” spot for channel 1. (Up to 9 characters of text and/or numbers).
- If more channels are desired, click on the “+” to add another channel and assign the name and personality as described above. Repeat for as many channels as desired. Up to 255 channels can be programmed. If it is desired to have some of the channels in other zones, then a new zone will have to be added.
- To add a new zone, click on the “ZONE” tab and then click on the “+” on the bottom of the box. This will add a new zone.
- Assign a name for the new zone then go to “CHANNELS” and assign the personalities to the channels as described above.
- Save the codeplug under a different name.

## **1.7 PROGRAMMING THE CODEPLUG INTO THE BAND MODULE**

To program the current codeplug into the band module, click on “FILE” then “WRITE DEVICE”. This may take a minute or two. The radio will show either “1 CSQ” or “SERVICE” while its being programmed or read. Series II radios display “PROGRAMMING MODE”. When the programming is complete the CPS will display a message “WRITE SUCCESSFUL”.

If programming a different radio with the same options then use the “CLONE” feature by following the procedure below:

- With the codeplug open click on “TOOLS” then “CLONING” then “CLONE RADIO”
- Click on “READ SERIAL NUMBER” tab and wait for serial number to change
- Click on “PROGRAM RADIO” tab and wait for “WRITE SUCCESSFUL” popup

The band module is now programmed with the new information. To have the display return back to normal you reset the module first by pushing one of the other band knobs and then push the previous band knob. Resetting the module on the TDFM7000 series just requires cycling the power.

This entire process will have to be repeated for each band module in the TDFM 600/6000/7000 series radios. After you have completed programming the radio, verify that the radio is working on the channels as expected.

## **2.0 TYPE II MODULES**

### **2.1 SETUP**

Type II radios are programmed very similar to the Type I radios. There are a number of differences that are highlighted in this section.

The hardware used to program the Type II radio is different and does not require a Smart Rib Box. The RIB box and associated cable has been replaced with a programming cable that interconnects the radio to the computer direct.

The next difference is that Type II radios require Motorola CPS for XTS 5000, please refer to Technical Information Bulletin TIBFM 12-01 or TIBFM 15-01 for the applicable software and cables required.

**\*Note:** *Type II radios cannot be programmed using the XTS 3000 CPS.*

### **2.2 PROGRAMMING**

The methodology described previously covers most of the general programming for Type II radios. Certain programming parameters are entered in different places using the XTS 5000 or Astro 25 Portable CPS. Some of the information stored in the “PERSONALITIES” for Type I radios is now stored in the “CHANNEL ZONE



## ASSIGNMENT TABLE”.

Personalities still have to be created for every channel first using the same method above.

Fill in the information as required. You will note that the “GENERALTAB” is missing compared to the Type I CPS. Also the Transmit bandwidth options are no longer listed in the “TRANSMIT OPTIONS” tab.

Programming of the “ZONE CHANNEL ASSIGNMENT” can occur once the conventional personalities are completed. It is recommended that a personality be created for every channel that needs to be programmed.

Open the “ZONE CHANNEL ASSIGNMENT” and click onto “CHANNELS” to reveal more field options attached to a channel. These include “TX FREQUENCY”, “RX” “FREQUENCY”, “TX & RX TONE TYPE”, “TX TONE”, “RX TONE”, “TX & RX NAC”, & “TX BANDWIDTH”.

After this information is entered, assign a personality to the channel and type a channel name.

Save the codeplug after you have entered all your data. Then download the file to the band required as described above (**1.7 PROGRAMMING THE CODEPLUG INTO THE BAND MODULE**). Test & verify the programming.

### **Notes:**

- Type II modules have 850 memory positions rather than the 255 memory positions that the Type I modules support.
- However Type II modules with the FPP (front panel programming) option are restricted to a total of 240 memory positions.
- Memory locations in modules with FPP are organized in 15 zones of 16 channels. It is not possible to deviate from this template.
- The FPP option is available on the VHF, UHF LO and UHF HI Type II modules however not on the 800MHZ module