



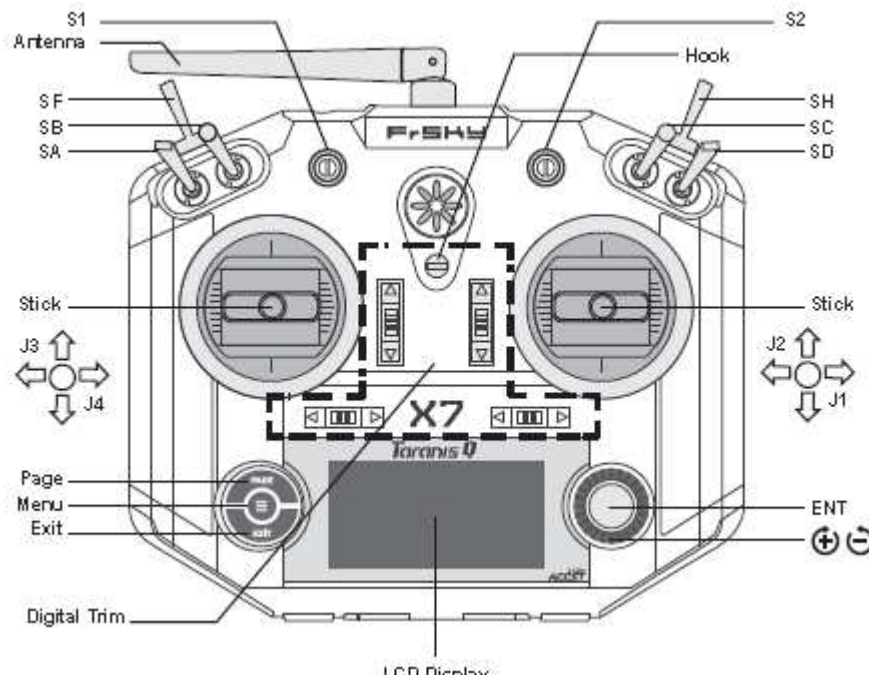
FrSky Taranis Q X7

INITIAL SETUP & BASIC UNDERSTANDING GUIDE
by Alex Datos



Suppose you've just received your new FrSKY Taranis Q X7 radio and want to get the most out of it. For this, you'd have to follow some initial steps to familiarize yourself with the basic functions and core procedures. This radio features OpenTX - very flexible and functional open-source firmware powerful enough to send astronauts to space. Learning all of its functionality would take quite a time but thanks to OpenTX development team – it is easy to get familiar with and very logical in structure. Understanding some core moves would open a whole new world for you in terms of ways to setup your models in the most effective way.

Some terms:



In this document I would focus on the following:

1. Battery choice for your transmitter
2. Removing spring load tension from Throttle stick
3. Installing OpenTX Companion to your PC
4. Setting up OpenTX Companion for the further upgrading process
5. How to check and upgrade your radio firmware (FW, here and after)
6. How to check and upgrade your radio module FW (built in XJT module, if necessary)
7. Initial radio setup
8. Setting initial model
9. Some common practices
10. Upgrade your S.PORT equipped receivers and telemetry sensors using Taranis Q X7
11. Related Links

It is supposed that you already have Taranis Q X7 in working state (with the battery and microSD card installed) in order to successfully follow this document.

****microSD card is better to be formatted as FAT32, could be class2 – class10 (not the UHS). 1GB – 8GB is totally enough capacity to retain all the necessary data and logs.***

****there are more than one way to upgrade you radio to the latest FW version. But I would focus on the one that would also cover working with OpenTX Companion software because this software is very useful and absolutely a must...***

1. Battery choice for your transmitter

I would not focus on this aspect. Any battery that fits into the compartment (*W: 92mm (remember that you have to fit wires also there) x H: 55mm (would be tight) x D: 17,5mm*) and has 2S JST balance plug and full voltage of up to 15V would do.

2. Removing spring load tension from Throttle stick

Follow this video to get it done. <http://www.youtube.com/watch?v=ui0pmlBxlt8>

3. Installing OpenTX Companion to your PC


OpenTX Companion is a PC/MAC/Linux based software that allows you to:

- Upgrade and backup your radio FW
- Setup and backup your radio and models
- Simulate your radio and models functions
- View recorded logs
- And many other features


Having this program installed is initial point and absolutely a must for any OpenTX FW based radio user.

To get the latest version of OpenTX Companion for FrSKY Taranis Q X7 you should visit OpenTX official website: <http://www.open-tx.org/>


FrSKY Taranis Q X7 is designed to run OpenTX 2.2 (and up). It has initially been released with OpenTX 2.2 nightly build preinstalled. While OpenTX 2.2 is still in beta stage, the latest version is listed in NEWS section (title page) on the official OpenTX website (OpenTX 2.2.0 RC10 (N362) as of today).

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Welcome to OpenTX Improving your Tx



OpenTX is open source firmware for RC radio transmitters. The firmware is highly configurable and brings much more features than found in traditional radios. The daily feedback from the thousands of users ensures the continued stability and quality of the firmware. [Read more about which radios are supported.](#)



The team also develops the OpenTX Companion transmitter support software. OpenTX Companion is used for many different tasks like loading OpenTX firmware to the radio, backing up model settings, editing settings and running radio simulators. OpenTX Companion is available for Windows, Apple OSX and Linux.



There are two applications available for creating and managing the soundfiles used by OpenTX. OpenTX Speaker is used to generate voice files for OpenTX by using synthetic speech. OpenTX Recorder is used to record voice files via a microphone. Both programs can generate sound files for all OpenTX voice languages. Every radio message, including system messages, can be changed. OpenTX Speaker and OpenTXRecorder are available for Windows7.

Installation

The first step to upgrade your radio with the latest OpenTX version is to install OpenTX Companion on your computer. Then you select the firmware configuration you want and let OpenTX Companion download and install it to your radio. You find the latest OpenTX Companion versions in [Downloads](#).

News

- [OpenTX 2.2.0 RC10 \(N362\) \(2017-01-27\)](#)
- [OpenTX 2.2.0 RC9 \(N361\) \(2017-01-25\)](#)
- [Liens vers des documents édités en français \(2017-01-04\)](#)
- [OpenTX 2.2.0 RC8 \(N360\) \(2016-12-03\)](#)
- [OpenTX 2.1 For Taranis PDF Documentation \(2016-11-18\)](#)
- [Notice OpenTX pour Horus \(Jan 2017\) \(2016-11-06\)](#)
- [OpenTX 2.2.0 RC7 \(N359\) \(2016-10-16\)](#)
- [OpenTX 2.2.0 RC6 \(N358\) \(2016-09-21\)](#)
- [OpenTX 2.2.0 RC5 \(N357\) \(2016-09-15\)](#)
- [OpenTX 2.1.9 \(2016-09-15\)](#)
- [OpenTX 2.0.20 \(2016-09-15\)](#)
- [OpenTX 2.2.0 RC4 \(N356\) \(2016-09-06\)](#)
- [OpenTX 2.2.0 RC3 \(N353\) \(2016-09-03\)](#)
- [OpenTX 2.2.0 RC2 \(N352\) \(2016-09-02\)](#)
- [OpenTX 2.2.0 RC1 \(N351\) \(2016-09-01\)](#)

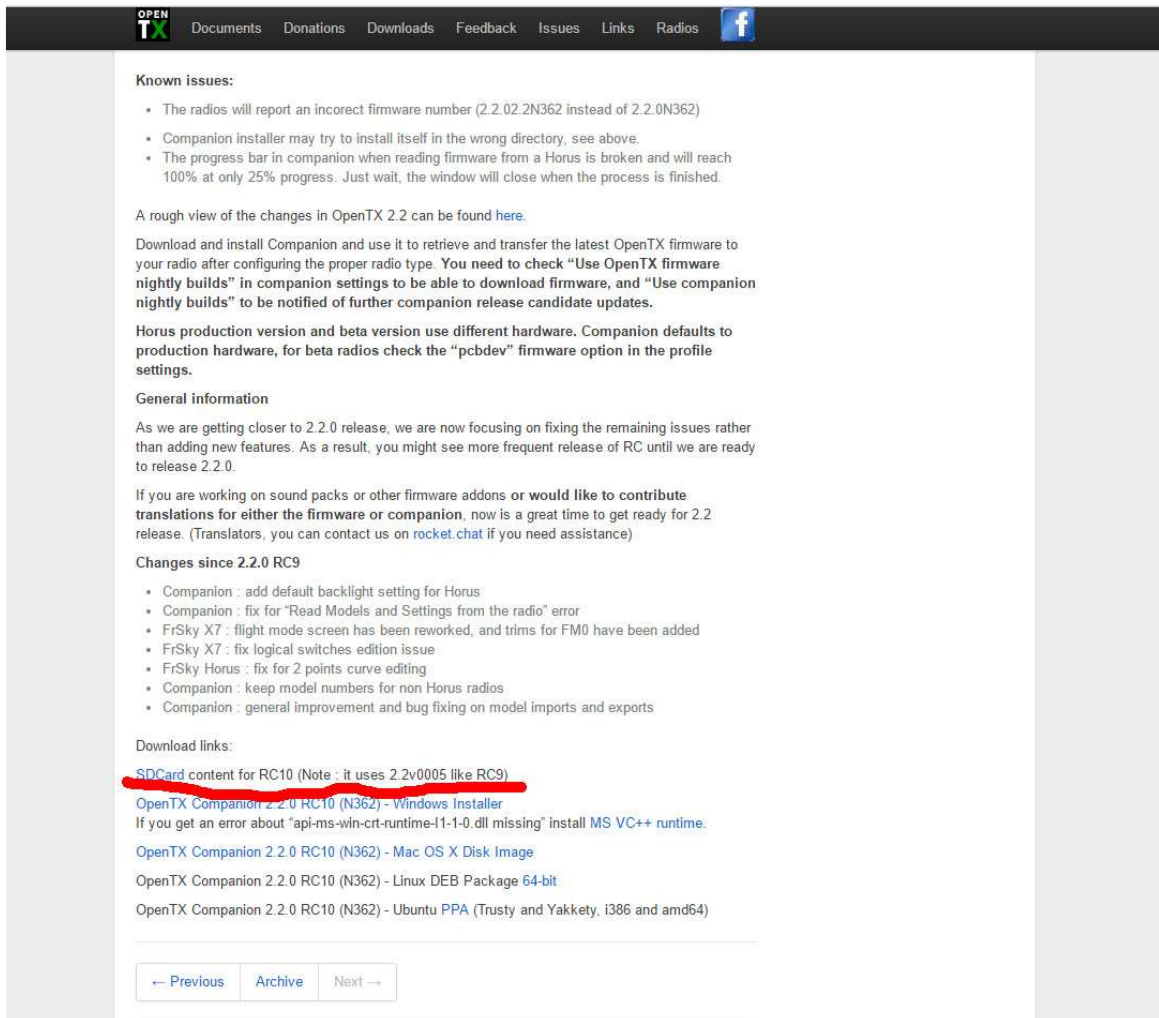
As soon as OpenTX 2.2 would acquire stable release – the latest download would be located on **DOWNLOADS** page, under OpenTX 2.2 branch. Don't forget to check the news from time to time to keep your radio updated with the latest release version. Moreover, OpenTX Companion would notify you about the newer releases available.

Make: download current OpenTX 2.2 release.

There is something more you have to download in order to get your radio up and running – SD card contents. SD card contents are the resources that should be located on Taranis Q X7 SD card – sounds and other files that create the proper SD card folder structure. Later, as you would use your radio, some of the folders would be populated with the corresponding files of your models, logs and other resources.

You should remember that SD card contents structure might change sometimes and some newer OpenTX FW versions might require to update the structure. Usually, it is stated on the download page of the release.

Current SD card structure version is 2.2v0005 and can be located on the OpenTX 2.2.0 RC10 (N362) download page.



Known issues:

- The radios will report an incorrect firmware number (2.2.02.2N362 instead of 2.2.0N362)
- Companion installer may try to install itself in the wrong directory, see above.
- The progress bar in companion when reading firmware from a Horus is broken and will reach 100% at only 25% progress. Just wait, the window will close when the process is finished.

A rough view of the changes in OpenTX 2.2 can be found [here](#).

Download and install Companion and use it to retrieve and transfer the latest OpenTX firmware to your radio after configuring the proper radio type. You need to check "Use OpenTX firmware nightly builds" in companion settings to be able to download firmware, and "Use companion nightly builds" to be notified of further companion release candidate updates.

Horus production version and beta version use different hardware. Companion defaults to production hardware, for beta radios check the "pcbdev" firmware option in the profile settings.

General information

As we are getting closer to 2.2.0 release, we are now focusing on fixing the remaining issues rather than adding new features. As a result, you might see more frequent release of RC until we are ready to release 2.2.0.

If you are working on sound packs or other firmware addons or would like to contribute translations for either the firmware or companion, now is a great time to get ready for 2.2 release. (Translators, you can contact us on [rocket chat](#) if you need assistance)

Changes since 2.2.0 RC9

- Companion : add default backlight setting for Horus
- Companion : fix for "Read Models and Settings from the radio" error
- FrSky X7 : flight mode screen has been reworked, and trims for FM0 have been added
- FrSky X7 : fix logical switches edition issue
- FrSky Horus : fix for 2 points curve editing
- Companion : keep model numbers for non Horus radios
- Companion : general improvement and bug fixing on model imports and exports

Download links:

SDCard content for RC10 (Note : it uses 2.2v0005 like RC9)

[OpenTX Companion 2.2.0 RC10 \(N362\) - Windows Installer](#)
If you get an error about "api-ms-win-crt-runtime-1-1-0.dll missing" install MS VC++ runtime.

[OpenTX Companion 2.2.0 RC10 \(N362\) - Mac OS X Disk Image](#)

[OpenTX Companion 2.2.0 RC10 \(N362\) - Linux DEB Package 64-bit](#)

[OpenTX Companion 2.2.0 RC10 \(N362\) - Ubuntu PPA \(Trusty and Yakkety, i386 and amd64\)](#)

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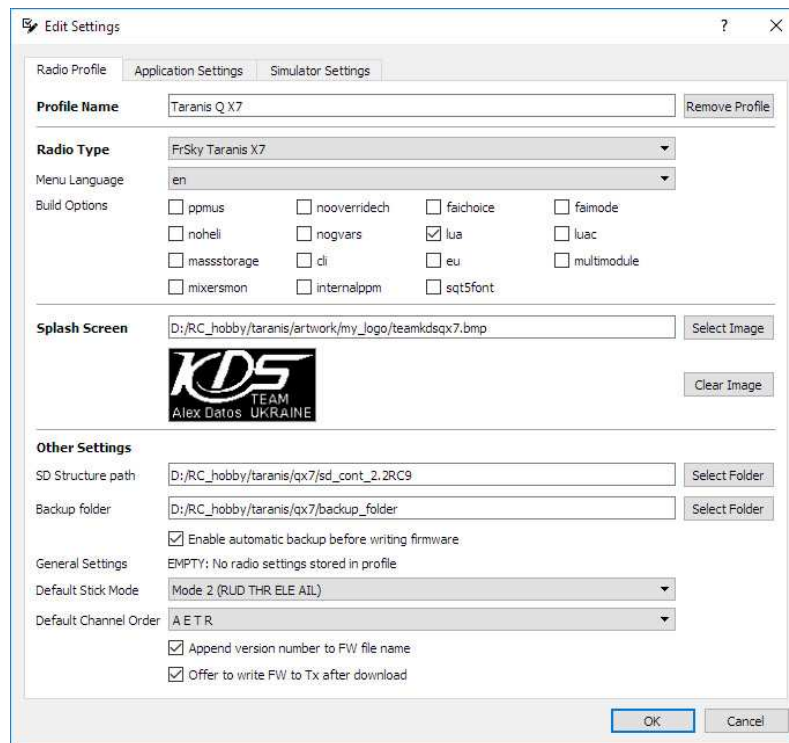
Make: download SD card contents. Extract it from archive to the root folder of SD card that would be used in your radio.

4. Setting up OpenTX Companion for the further upgrading process

Make: install OpenTX Companion to your PC/MAC/Linux. Just follow the install wizard and run the software at the end.

When OpenTX Companion is launched:

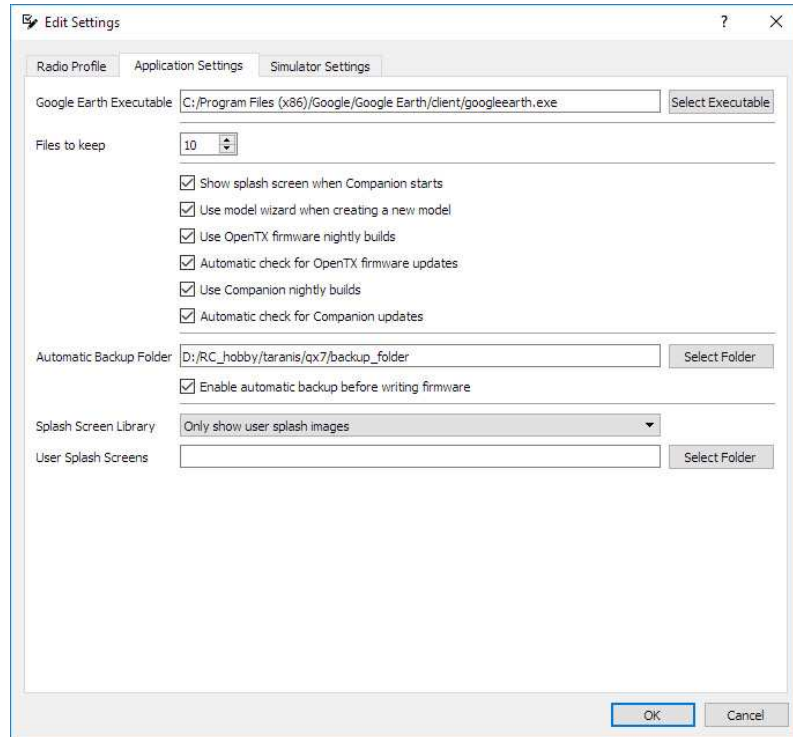
Step 1: Go to Settings -> Settings and setup 1st tab (Radio Profile).



The most important settings are:

- Radio Type which should be set to "FrSKY Taranis X7"
- Menu language (choose the one appropriate for you)
- Build options (you can leave it by default for now, but I prefer to check "Lua" to be able to run Lua scripts afterwards). If you would check "EU" box – you would not have D8 mode option (older, D-series receivers) in "BIND" process.
- Default stick mode (choose the one appropriate for you)
- Default channel order (usually, it should be A E T R order as first 4 channels)

Step 2: Go to 2nd tab (Application Settings).



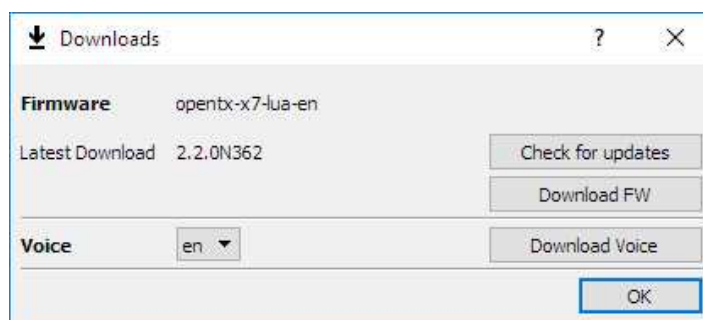
The most important settings are:

- Check "Use OpenTX firmware nightly builds"
- Check "Use Companion nightly builds"
- Leave the rest by default for now

5. How to check and upgrade your radio firmware (FW, here and after)

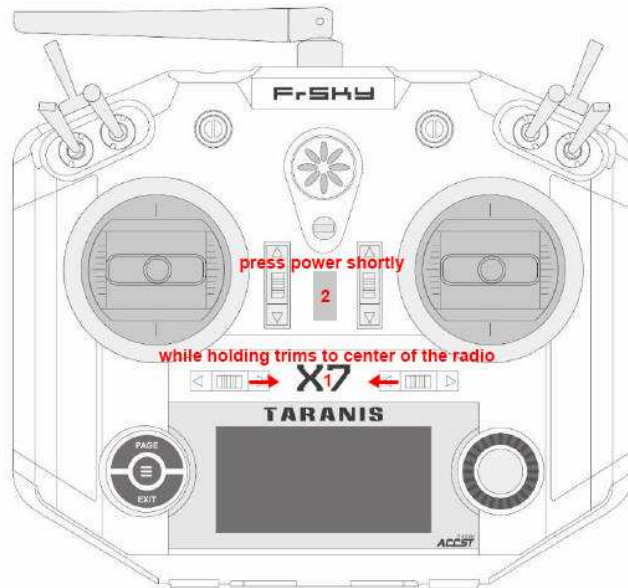
Now, you are ready to download the latest FW version and flash your radio. For this:

Step 1: Go to File -> Download

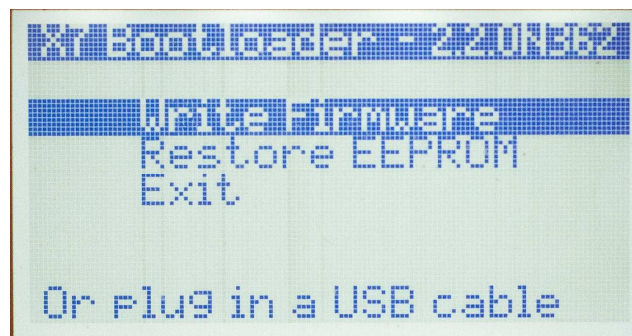


OpenTX Companion would show the version it would download from the online repository. Hit "Download FW" button and note where are you downloading this file to. You would need this file later.

Step 2: When the download process is complete, install the microSD card into your radio and with the radio in "OFF" state push both rudder and aileron trims to the center of the radio and while holding it – shortly press power ON button.



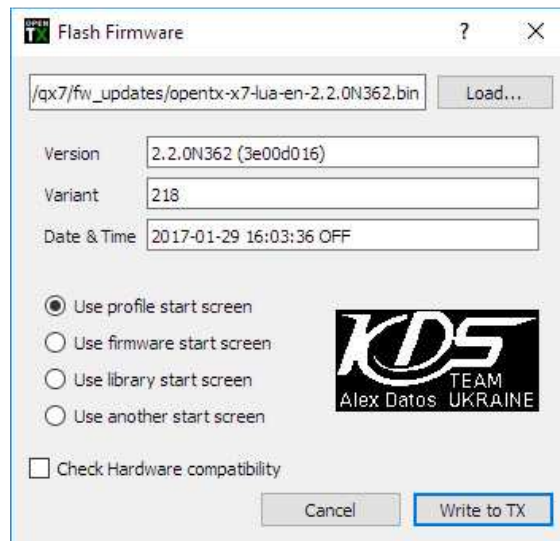
this would bring you to the bootloader screen:



**note that the version of the bootloader may vary depending of what you have updated it to last time.*

Step 3: Connect miniUSB cable to your radio and PC. On Windows PC you would see that there are 2 new drives are mounted: "Taranis" and removable SD card storage. The first one should not be changed by a user. But you can work with the second one - SD card folder. If you haven't extracted SD card contents to your SD card before – this is a good time to do that.

Now, with your radio connected to PC, go to "READ/WRITE" -> "Write Firmware to Radio"

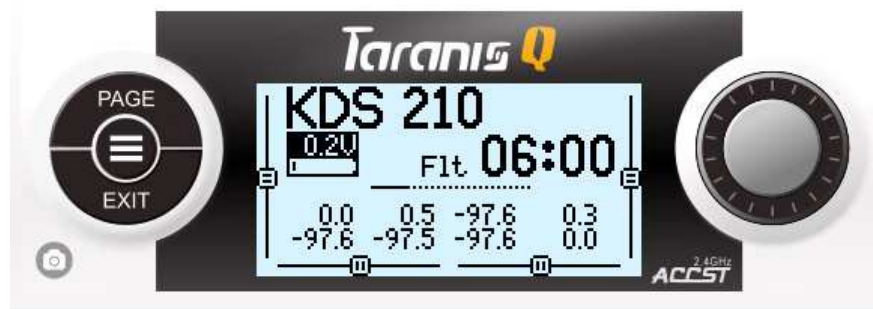


it would show you the file it is going to upload to Taranis, its version and variant. Just hit "Write to TX" and wait for the upgrade process to finish. Your radio is updated now to the latest OpenTX FW version.

Step 4: Without disconnecting the radio from PC, locate the FW file you've downloaded at step 1 and copy it to mounted SD card drive, "FIRMWARE" folder. You would need it later to update bootloader to the current version.

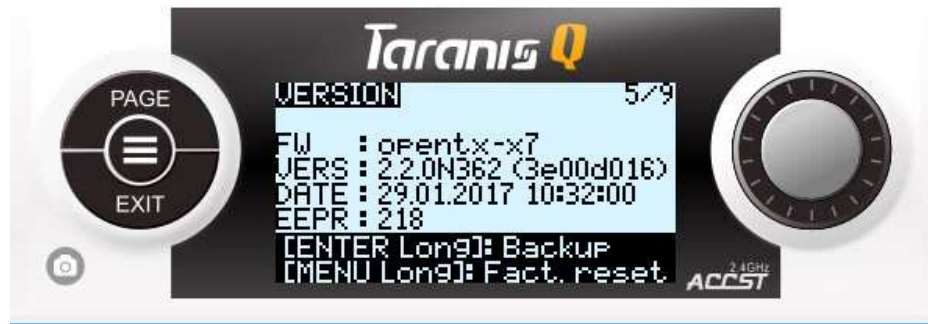
Step 5: In Windows tray, safely remove all mounted drives, disconnect USB cable from PC, using rotary dial on the radio navigate to "EXIT" and hit "ENTER" (center press on rotary dial). Your radio would reboot.

Step 6: After the reboot process, you would see the main flight screen:



if you don't see the main flight screen and have some warnings – just press "EXIT" button until you'll get to the main flight screen.

Step 7: Now, long press "MENU" button (left center) – you would get into "RADIO SETUP" screen (page 1/9). Press "PAGE" button 4 times until you would get to "VERSION" screen (page 5/9).



here you can check the FW version you currently have on the radio. "VERS" should correspond to the version you've just uploaded.

**note: long press "MENU" from the flight screen would always bring you to the "RADIO SETUP" which is the 1st page (9 pages in total) of SYSTEM setup menu.*

Step 8: Press "PAGE" button several times to go to the "SD CARD" screen (page 2/9).



with the right rotary dial navigate to "FIRMWARE" folder, press enter, navigate to the FW file you have here, long press "ENTER" (center rotary dial press) and select Update bootloader. Now, you have your bootloader up to date and with the version corresponding to the radio FW file. Hit "EXIT" several times to get back to the main flight screen.

That is it. Your radio FW and bootloader version are updated.

6. How to check and upgrade your radio module FW (built in XJT module, if necessary)

FrSKY Taranis Q X7 features the latest inbuilt XJT radio module that supports V8II, D, X and LR series receivers. But there are some important notes:

- XJT module could have either EU LBT FW inside (for use in Europe, supports only X and LR series receivers) or FCC FW (for use in any countries other than Europe, supports V8II, D, X, LR series receivers). EU LBT and FCC are just FW versions that can be changed from one to another by upgrading process.
- Moreover, it is better to upgrade XJT radio module version from time to time to ensure that you've got the latest FW.

To upgrade XJT FW or swap the versions from EU LBT to FCC and vice versa, you have to visit FrSKY official website, "DOWNLOAD" -> "FIRMWARE" page (http://www.frsky-rc.com/download/index.php?sort=Firmware&cate_id=0&pro_id=0) and locate "Firmware-XJT" page. This page has the latest XJT EU LBT and FCC FW versions.

Make: download the one you need.

The upgrade process is easy (assume that you have already familiarized yourself with the navigation and menus needed for this step from the previous operation):

1. Go to the bootloader mode in your radio (remember – trims to the center of the radio, short press power on) and connect it to PC.
2. Put the downloaded XJT FW file into "FIRMWARES" folder on your SD card. Make sure that the file name is not too long. You can rename it whatever you like but keep the file extension unchanged.
3. Safely remove mounted drives from your PC, navigate to "EXIT" and press it. Let your radio reboot.
4. Navigate to "SD CARD" -> "FIRMWARE" folder -> XJT FW file and long press "ENTER". Select "Flash internal device".

When the process is done – your XJT module is upgraded to the latest FW version.

7. Initial radio setup

In this section I would focus on setting up your radio transmitter using the radio itself instead of OpenTX Companion. Yes, you can go through the same setup in the PC software, but knowing how to do it in the radio itself would familiarize you with the navigation and functions even better.

Turn on your radio, long press "MENU" button. Now, you are on the "RADIO SETUP" screen. This screen is scrollable and has lots of functions. I would go through each one briefly.

Navigation, selection, changing values and commit are all done by rotary dial and "ENTER" (center rotary dial press).

*note: if you want to familiarize yourself with other terms, fields and values not described in this document – read documents in this post: <http://openrcforums.com/forum/viewtopic.php?f=45&t=8724>



- Setup date
- Setup time
- Battery range: this is important function that tells the radio the full range of your battery inside the radio. For 6-cells NiMH the range should be 6 – 8.4V. For 2-cell LiPO 6.6 – 8.4V and so on. This would affect the correct visualization of the battery icon on the main flight screen and system battery warnings.
- Sound -> Mode: this tells in which cases we would hear the sounds.
- Sound -> Volume: master volume
- Sound -> Beep, Wav, Bg – individual volumes for different sources
- Vario: Volume, Pitch and Repeat of variometer sensor function
- Haptic: Mode, Length, Strength for haptic feedback function
- Contrast: screen contrast settings – I prefer 12 as the maximum value
- Alarms: set the system alarms for Battery low (means radio battery, for LiPO 2S it should be 7.2-7.4V, for 6-cells NiMH – about 6.4V). Inactivity alarm, Memory low and Sound off alarms.
- Backlight: Mode (how the screen backlight reacts to different inputs), Duration, Brightness (I prefer value of 50), Alarm (backlight would flash when an alarm sounds)
- Splash screen: whether to show it or not at the radio boot up.
- Time Zone: common sense
- Adjust RTC: according to the time zone set
- GPS Coords: format in which GPS coords are shown if you have GPS telemetry sensor on the model
- Country Code: I prefer to stick to US with FCC FW. It would ensure the maximum power output for the radio module.
- Voice language: here you can change to other than English voice language if you have the right SD card sound contents.
- Units: common sense
- Play delay: common sense, keep it default.
- RX channel order: I prefer to have first 4 channels to be AETR. This affects how the mixes are added upon the new model creation. You can change the order of channels here on in the model setup afterwards. **Currently, you cannot change this field in radio. You should change it in OpenTX Companion on your PC (this is a bug that would be solved). Go to “*note” section on the next page of this document to get it done. If you can do it even there and need it very much – you can downgrade to RC9 release, change CH order and upgrade to RC10 again. This bug is fixed in RC11.**
- Mode: common sense (sticks behavior). I use Mode2.

That is it for the initial radio setup. Some more important points are:

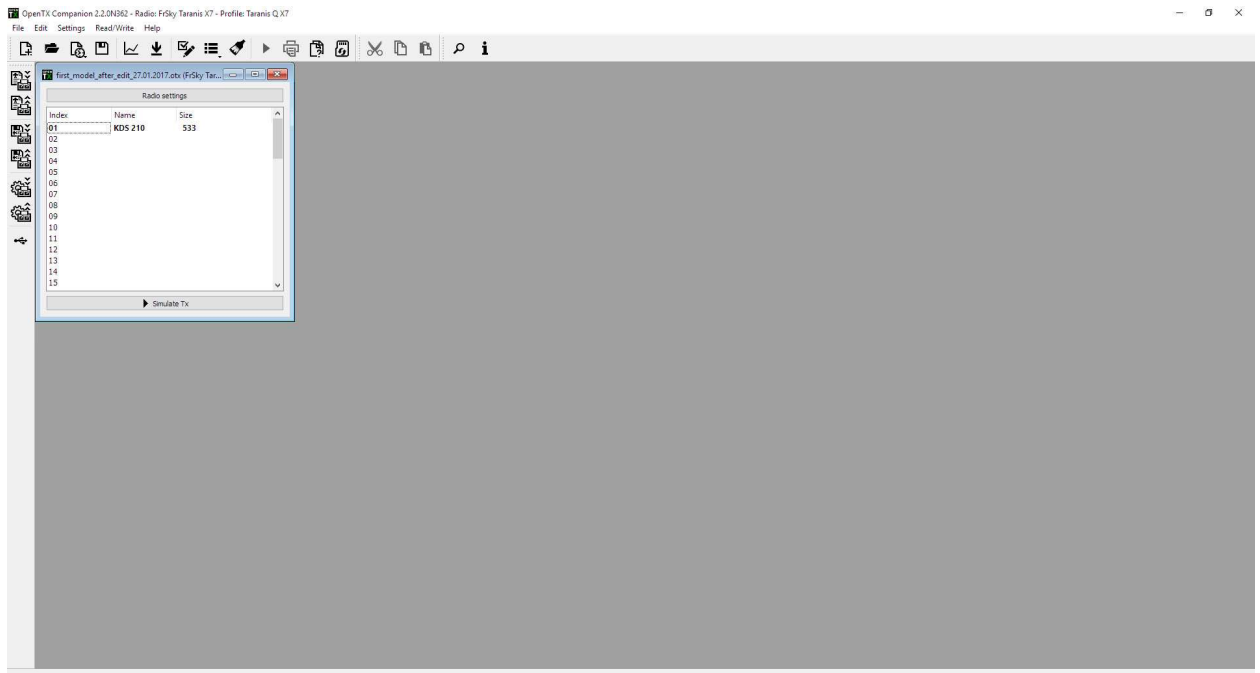
- Sticks calibration: from the main flight screen - long press "MENU", press "PAGE" several times until you are at "CALIBRATION" screen (page 9/9). Follow the instructions on the screen to calibrate your analog inputs.



- Radio battery calibration: it might happen so that the readings from your battery acquired by voltmeter and radio are different. If you trust your voltmeter – check the battery voltage with it, from main flight screen long press "MENU", several "PAGE" press to navigate to "ANALOGS" screen (page 7/9) and check the battery voltage shown at the bottom of the screen. You can highlight and change this value to ensure that the readings in radio correspond with such of your voltmeter.



**note: you can make the same radio setup or check all the settings in OpenTX Companion on your PC. Go to bootloader mode on your radio, connect it to PC. In OpenTX Companion go to "READ/WRITE" -> "Read models and settings from radio". You would see such document:*



hitting "Radio settings" top button would lead you to the radio setup tabs. If you want to change anything here – do so and go to "READ/WRITE" -> "Write models and settings to radio" to save the changes.

8. Using OpenTX to setup your models

In this section I would focus on setting up the first model in your radio itself. Same settings can be done using OpenTX Companion on your PC. But in order to understand how to change settings in field – I would go over radio screens instead of using a PC.

**note: my example would cover FPV copter model based on F3 BetaFlight board + XSR (SBUS, telemetry receiver). I assume that you have already assembled your model and connected FrSKY receiver to the corresponding UART port of F3 board using SBUS signal.*

Step 1: Turn ON your radio. From the main flight screen, shortly press "MENU" button to get to "MODELSEL" screen (page 1/13). Using the rotary dial and long center "ENTER" press select or create your model. To select the model you have to highlight it long press "ENTER". To create the new model you have to highlight the empty model number and long press "ENTER".



**note: if you would create a new model – it would automatically have 1st 4 channels in the order as you have stated in "RADIO SETUP" menu (in my case AETR). That is why we needed to set this channel order in "RADIO SETUP" according to our preference. The default model that you have on the radio from the factory has another 1st 4 channels order. I prefer to delete such models and create a new one.*

**note: short press "MENU" from the flight screen would always bring you to the "MODELSEL" which is the 1st page (13 pages in total) of MODEL setup menu.*

Step 2: If you have just created new model, make sure that it is selected (it should have "*" sign in front of its name)



Step 3: Press "PAGE" to get to "SETUP" screen (page 2/13).



This screen is scrollable. Let's go over each function briefly:

- Model name: enter your model name using rotary dial and center "ENTER" press. You can switch between capital and small letters by "ENTER" long press
- Timer1 -> OFF: this would tell the radio how flight timer1 should be treated. It can have many ways to launch and to stop it. But I would show you how to make it run when your model is armed. For now, just set the "00:00" field for any time you like. And leave it like this.
- Timer1 -> Name: you can name your timer
- Timer1 -> Persist: whether this timer would be persistent or not. Set it to OFF for now.
- Timer1 -> Minute: whether to enable minute notification or not
- Timer1 -> Countdown: whether to enable voice, beeps, haptic timer countdown or not

- Timer2 and Timer3: exactly the same. You can set Timer2 to be persistent, with silent countdown, without minute call. I would explain later why we have to do that.
- E.Limits, E.trim, Show trim, Trim Step: leave it default
- T-reverse: whether to reverse Throttle input or not
- T-source, T-trim: leave it by default
- Preflight checks -> Checklist: you can have a .txt file on your SD card to be shown on the screen of the radio every time you select the model.
- Preflight checks -> T-warning: whether to warn about Throttle not idle or not
- Preflight checks -> S-warnings: set the default switch position ("0" represents the current switch state. 0 – from you or upper position, 1 – center, 2 – towards you or down position). Any switch position other than stated would result in a warning upon model selection or radio ON. To set the default switch positions – physically set all switches to their desired positions, navigate to "<" sign and long press "ENTER".
- Ctr Beep: whether to make a beep when passing central point of the input. You can highlight any of those inputs.
- Glob.Funcs: whether to use global functions for this model or not. Better to set the check mark. We would create some global functions later.
- Internal RF -> Mode: this is the mode your in-built XJT module would work at. D16 – for all X-series, SBUS and telemetry equipped receivers (set it to this option for now). D8 – all V8II and D-series older non-telemetry and telemetry receivers. LR12 – for long range L-series receivers. OFF – means that module would not work. This is useful in case if you use this radio to control PC simulators.
- Internal RF -> Ch.Range: how many channels to broadcast. For F3 flightboards it is enough to have 10 channels. CH 1-10.
- Internal RF -> Rx.Num: RX unique identity number. Every model in your radio should have its unique id.
- Internal RF -> Bnd: press to start BIND procedure. Do not do it yet.
- Internal RF -> Rng: press to start RANGE CHECK procedure.
- Internal RF -> FailSafe: here you can set outputs for FS state. For F3 boards (since it has its own FS state) it should be set to "NO PULSES". But for other models you would have to set some FS channel positions manually or to "HOLD" last position.
- External RF: this is for the external radio module that you can use in the JR-type bay. Same as above but with some changes in MODE: it could be also PPM or other types of communications between your radio and external module. Depends of the module you use and the type of communication it needs to work correctly.
- Trainer Port: common sense

Step 4: Press "PAGE" several times to get to "MIXER" screen (page 6/13).



This screen is a core of all model channel behavior. Whenever we want to make any changes to the way the channel outputs are functioning – we would have to create or edit our mix for the corresponding channel. Now, if you have followed this document – you see the same mixes as shown on the screenshot. Only 4 mixes for 4 1st channels in AETR order. This shows us that first 4 channels are already working... Let me explain how it interprets. Let's take the first line:

CH1 of the receiver would receive 100% (full range) of Aileron stick input.

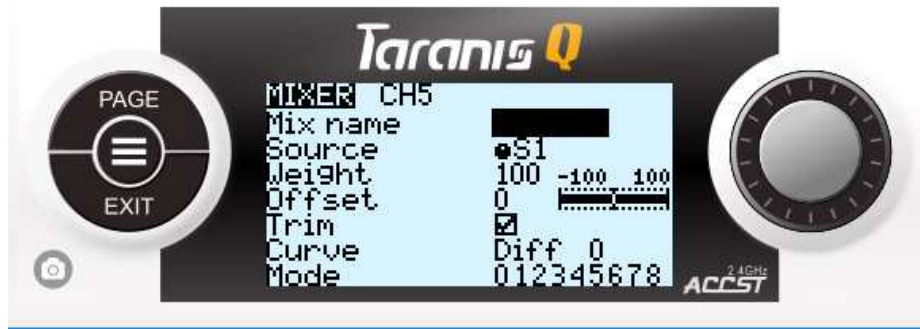
You can interpret all other 3 channels similarly but with the corresponding stick inputs.

First 4 channels are OK for our FPV F3 based quad setup. We do not touch those channels. But what we would have to do is to add some more channels and mixes to have control over some additional functions: ARM/DISARM state, FlightMode selection, Beeper activation, PID tuning activation, PID tuning input. So, we would add another 5 channels to the existing 4.

**note: when connected over SBUS, BetaFlight/CleanFlight boards have a free choice of input CH assignment to any function. It doesn't really matter in which order the channels would arrive from your RX to the F3 board. Let's assume that first 4 channels are AETR as stated above but the rest might follow in any order you like. Later, you would assign those incoming AUX channels to any function in F3 boards. Receiver tab in BetaFlight/CleanFlight would show you which channels are active.*

Adding ARM/DISARM state control:

Let's add this control to CH5. And let's make this control to be our upper left 2-POS switch (SF switch). Using rotary dial Highlight CH5 and press "ENTER" to go inside the mix.



- Name: give any name to this mix
- Source: highlight, press "ENTER" so that this value would flash and move your SF switch to any position. The value would change to "SF". Press "ENTER" again to stop the input.



hit "EXIT" a couple of times until you'd get back to "MIXER" screen.



Interpretation: CH5 of the receiver would receive 100% (full range) of SF switch input (-100 (negative endpoint) signal at SF switch at down (far from you) position and +100 (positive endpoint) signal at SF switch at up (close to you) position).

That is it for ARM/DISARM channel. Later, you would be able to locate which AUX channel changes on F3 board on Receiver tab when you move this switch and consequently you'd also be able to assign this AUX channel to ARM function on the Modes tab of F3 board.

Adding Flight mode selection channel:

Let's add this control to CH6. And let's make this control to be our right (closer to the center of the radio) 3-POS switch (SC switch). Using rotary dial Highlight CH6 and press "ENTER" to go inside the mix.

- Name: give any name to this mix
- Source: highlight, press "ENTER" so that this value would flash and move your SC switch to any position. The value would change to "SC". Press "ENTER" again to stop the input.
- hit "EXIT" a couple of times until you'd get back to "MIXER" screen.



Interpretation: CH6 of the receiver would receive 100% (full range) of SC switch input (-100 (negative endpoint) signal at SC switch at upper position, 0 (center) signal at SC center position and +100 (positive endpoint) signal at SC switch at down position).

That is it for FlightMode channel. Later, you would be able to locate which AUX channel changes on F3 board on Receiver tab when you move this switch and consequently you'd also be able to assign this AUX channel to any FlightMode function on the Modes tab of F3 board.

Adding Beeper activation channel:

Let's add this control to CH7. And let's make this control to be our left (furthest from the center of the radio) 3-POS switch (SA switch). Using rotary dial Highlight CH7 and press "ENTER" to go inside the mix.

- Name: give any name to this mix
- Source: highlight, press "ENTER" so that this value would flash and move your SA switch to any position. The value would change to "SA". Press "ENTER" again to stop the input.
- hit "EXIT" a couple of times until you'd get back to "MIXER" screen.



Interpretation: CH7 of the receiver would receive 100% (full range) of SA switch input (-100 (negative endpoint) signal at SA switch at upper position, 0 (center) signal at SA center position and +100 (positive endpoint) signal at SA switch at down position).

That is it for Beeper channel. Later, you would be able to locate which AUX channel changes on F3 board on Receiver tab when you move this switch and consequently you'd also be able to assign this AUX channel to Beeper function on the Modes tab of F3 board.

Adding PID tuning activation channel:

Let's add this control to CH8. And let's make this control to be our left (closer to the center of the radio) 3-POS switch (SB switch). Using rotary dial Highlight CH8 and press "ENTER" to go inside the mix.

- Name: give any name to this mix
- Source: highlight, press "ENTER" so that this value would flash and move your SA switch to any position. The value would change to "SB". Press "ENTER" again to stop the input.
- hit "EXIT" a couple of times until you'd get back to "MIXER" screen.



Interpretation: CH8 of the receiver would receive 100% (full range) of SB switch input (-100 (negative endpoint) signal at SB switch at upper position, 0 (center) signal at SB center position and +100 (positive endpoint) signal at SB switch at down position).

That is it for PID tuning activation channel. Later, you would be able to locate which AUX channel changes on F3 board on Receiver tab when you move this switch and consequently you'd also be able to assign this AUX channel to PID tuning selection function on the Flight Adjustments tab of F3 board.

Adding PID tuning input channel:

Let's add this control to CH9. And let's make this control to be our right (with center detent) pot (S2). Using rotary dial Highlight CH9 and press "ENTER" to go inside the mix.

- Name: give any name to this mix
- Source: highlight, press "ENTER" so that this value would flash and rotate your S2 pot. The value would change to "S2". Press "ENTER" again to stop the input.
- hit "EXIT" a couple of times until you'd get back to "MIXER" screen.



Interpretation: CH9 of the receiver would receive 100% (full range) of S2 pot input (from -100 (negative endpoint) signal at S2 full to the left to +100 (positive endpoint) signal at S2 full to the right. With 0 (center) signal at center detent point).

That is it for PID tuning input channel. Later, you would be able to locate which AUX channel changes on F3 board on Receiver tab when you move this pot and consequently you'd also be able to assign this AUX channel to PID tuning input function on the Flight Adjustments tab of F3 board.

That is it. Your mixes are set for the BetaFlight|CleanFlight boards. Now, you can BIND your receiver to the radio and check F3 board Receiver tab to see how channels work.

Step 5: BINDING

From the main flight screen, press "MENU" to get to "SETUP" (page 1/13), set your Internal-RF to D16 mode, navigate to "BIND", press "ENTER". Your radio would start to make binding beeps.



Press and hold BIND button on your receiver, power it up. Release BIND button. Power off the receiver. Press "EXIT" on the radio to leave the BIND mode. Power on your receiver again. This time the green led on the receiver should be constantly lit indicating that there is a connection to the radio.

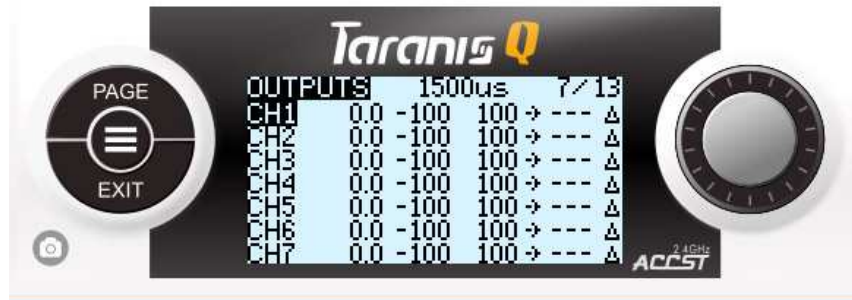
**note: keep your radio at least 1m away from your receiver during the bind process.*

Step 6: Setting F3 Subtrims and Endpoints

Now, you can connect to F3 board with your PC and check Receiver tab in BetaFlight|CleanFlight configuration software. The channels should move according to the stick, switch and pot inputs.

The last thing that is left to do in order to have everything set up for the F3 use – is to adjust channel endpoints and subtrims (centers) on the radio so that it would show “1000” at min. – “1500” at center – “2000” at max. values in BetaFlight|CleanFlight channels monitor on the Receiver tab.

To do that: while looking at the BetaFlight|CleanFlight channels monitor on the Receiver tab, from the main flight screen of your radio press “MENU” and “PAGE” several times until you are at “OUTPUTS” screen (page 7/13).



I would take CH1 (Aileron) as an example: highlight this channel, press “ENTER” to go into the edit.



- Highlight “SUBTRIM” value, press “ENTER”. While looking into the channels monitor of F3 board, start turning rotary dial until Aileron channel would show “1500”. Press “EXIT” when the value is reached.
- Highlight “Min” value, press “ENTER”. Hold Aileron stick full to the left. While looking into the channels monitor of F3 board, start turning rotary dial until Aileron channel would show “1000”. Press “EXIT” when the value is reached.
- Highlight “Max” value, press “ENTER”. Hold Aileron stick full to the right. While looking into the channels monitor of F3 board, start turning rotary dial until Aileron channel would show “2000”. Press “EXIT” when the value is reached.

Repeat those 3 steps for all assigned channels (from CH1 to CH9). This would ensure that channel range of all channels correspond to 1000 at min, 1500 at center and 2000 at max, of F3 board controls input map.

Assign all AUX channels to the necessary and corresponding functions of F3 board.

Now, you are good to go with F3 board.

Step 7: Adding Special Functions and Logical Switches

In this section I would cover the creation of such popular functions as:

- Timers setup
- Timer1 reset
- Special Function voice output
- Telemetry sensors discovery and viewing
- Flight battery warning setup

Timer setup:

When you want to ensure that your flight timer is triggered right and under certain circumstances you might end up with a bit complicated setup. I would cover here how to trigger Timer1 when:

- F3 board is ARMED + Throttle is not at idle + Timer1 runs until reset

So, at least 2 conditions that should be met to start the timer and 1 condition to finish. Such conditions can be created in "LOGICAL SWITCHES" and/or "SPECIAL FUNCTIONS" of the MODEL MENU.

From the main flight screen, press "MENU", press "PAGE" several times to get to "LOGICAL SWITCHES" screen (page 9/13). Highlight any L number, press "ENTER" and "EDIT".

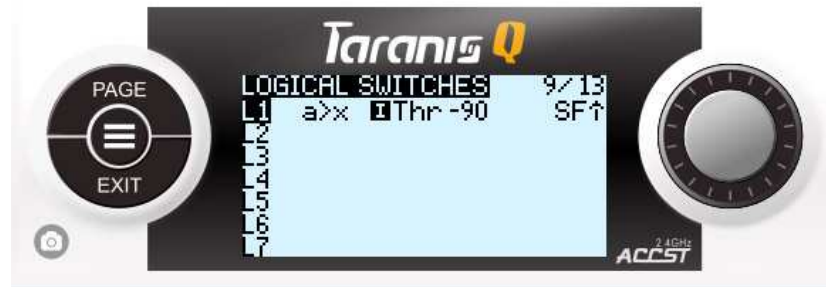


- FUNC: set it to "a>x".
- V1: set it to "Thr"
- V2: set it to "-90"
- AND switch: set it to "SF ↑"



Interpretation: logical switch L1 would be activated if: Thr input is more than -90 and if SF switch (ARM) is at furthest from us (minimum, ON is you set it right in the F3 board) position.

Now, hit "EXIT" several times until you would get back to "LOGICAL SWITCHES" screen.



With the Logical Switch L1 we have created our conditions to trigger Timer1. Now, we have to create another Logical Switch to create a condition for our Timer1 to stop only when it is needed. If we would leave it like this – our Timer1 would run when SF switch is in ARM position and Thr channel is more than -90. But it would stop running when Thr channel would be less than -90. To avoid this condition, we would have to create another one that would force our Timer1 to run even if the Thr channel is less than -90. To do this, we would create another Logical Switch that would compare our countdown time to the Timer1 desired time.

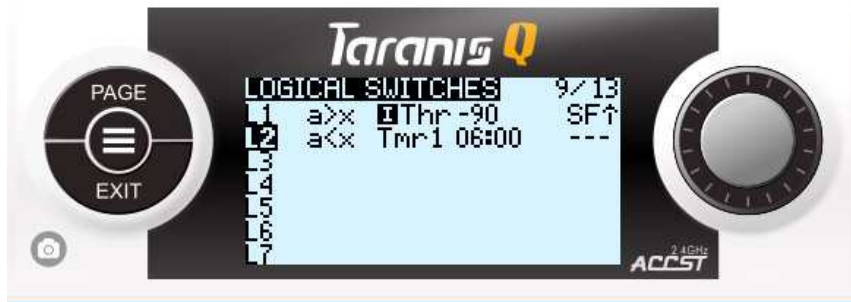
Highlight L2, "ENTER" to edit.

- FUNC: set it to "a<x".
- V1: set it to "Tmr1"
- V2: set it to "06:00" (6 minutes or any other time you want your timer to be)



Interpretation: logical switch L2 would be activated if: Tmr1 current countdown time is less than the max. desired time of of the timer1. So, this Logical Switch would work all the way from 05:59 and down to -xx:xx time unless we would reset our timer1 to 06:00.

Now, hit "EXIT" several times until you would get back to "LOGICAL SWITCHES" screen.

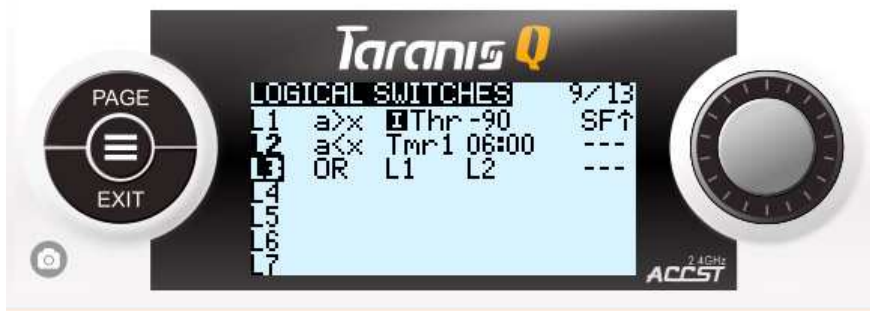


Now, we have to combine L1 and L2 switches and tell that we want L3 to be activated if L1 OR L2 are activated.

Highlight L3, "ENTER" to edit.

- FUNC: set it to "OR".
- V1: set it to "L1"
- V2: set it to "L2"

Hit "EXIT" several times until you would get back to "LOGICAL SWITCHES" screen.



Now, when all conditions for Timer1 are set, with "PAGE" button go to "SETUP" (page 2/13).



- Timer1: set it to "L3" trigger and 06:00 time (or whatever you entered as max. desired time in Logical Switches)
- Minute: set a checkbox
- Countdown: set it to be "Voice".

**note: you can also set Timer2 similar to that with L3 as a trigger but don't set time, tell it to be persistent with no countdown and minute call. This would also show a second timer on the flight screen that would represent the model total flight time.*

Timer1 Reset:

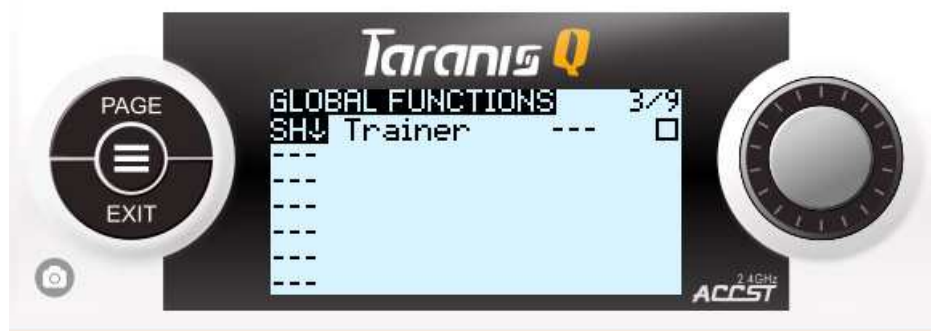
The last thing about Timer1 that is left to do is to set how we would reset it.

**note: you can do it in two different ways – either in "Special Functions" of the model itself (a function dedicated for the model) or in the "Global Functions" of the radio setup. I prefer to do it in the global radio functions because those functions would be available for all models that you would create. Since Timer1 reset is a common function for all models – it is better to be available for all models in future. I would prefer to use momentary switch (right, top switch) SH to reset the timer.*

From the main flight screen, long press "MENU", press "PAGE" several times to get to "Global Functions" screen (page 3/9).



Highlight the first empty line, press "ENTER" and move SH switch towards you to get "SH ↓" reading, press "ENTER" again to save this value.



Select next field to the right and set the value to "RESET" and third field value to Tmr1. And put a checkbox in the next field. Press "EXIT" to return exit the line edit.



Interpretation: global function of line1 would act as Timer1 reset to the max. desired time set in "SETUP"->"Timer1" model menu when you pull SH momentary switch towards you (max. value).

Special Function voice output:

At this point, let's add voice notification for Timer1 reset.

Highlight the next empty line, press "ENTER" and move SH switch towards you to get "SH ↓" reading, press "ENTER" again to save this value.

Select next field to the right and set the value to "Play Track" and select audio track from the list in the third field value (by this time you should have something like "reset" audio file on your SD card or set any other sound you like).



Now, hit "EXIT" until you would get to main flight screen and check how Timer1 and Timer2 perform. Timer1 would start to run when you ARM with SF switch and move Thr stick up to more than -90. It would run until you would pull SH (momentary) switch that would reset Timer1 to 06:00 (or whatever time you have set) and play audio file "reset" or whatever file you have set for this function.

Timer2 would be triggered by the same SF switch to ARM + Thr > -90 and act as advancing timer. It would not be reset with SH switch pull. It represents the total flight time of the model.

**note: you can experiment with creating other Global Functions necessary for the models to run. For example, in Global Functions we would usually add the following since it is common for all models:*

- *SD card logs trigger and voice notification assigned to any unused switch*
- *Screenshot trigger and voice notification assigned to any unused switch*
- *Volume change assigned to any unused pot*
- *Backlight ON/OFF trigger assigned to any unused switch*

Similarly to that, you can create any other unique Special Functions dedicated for the model on the "Special Functions" screen of model setup (page 10/13). Those would work only for the model selected. Usually, we would add there some functions like:

- *Voice notification for SC switch position that changes flight modes*
- *Some telemetry sensors warnings*
- *Etc.*

Telemetry sensors discovery and viewing:

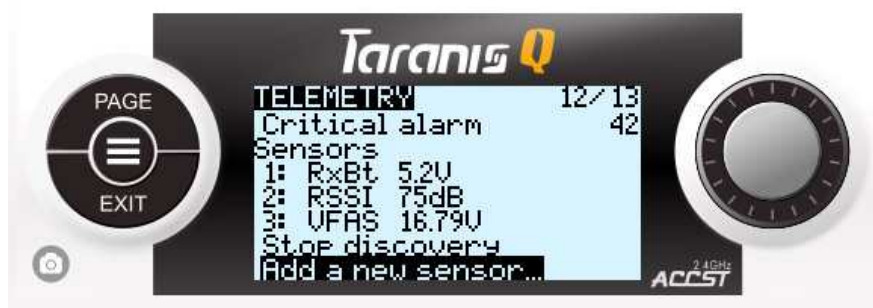
Suppose, we have a telemetry receiver that sends some telemetry values to our radio. And suppose we want to monitor our flight battery readings and have some audible warnings as our battery reaches low level.

First, we have to discover which sensors and readings are available for us to work with.

From the main flight screen, press "MENU", press "PAGE" several times to get to "TELEMETRY" screen (page 12/13)



Turn on your flight model, navigate to "Discover new sensors" and hit it.



You should end up with something like this. But there might be much more sensors and it would depend from what sensors are present on your model. But we would focus now on VFAS value (total cells flight battery voltage).

When all sensors are discovered, you can hit "Stop discovery" option.

**note: you can highlight any available sensor and press "ENTER" to go into edit mode for this sensor. There, you would be able to rename it and do many other changes and calculations to bring the data to the desired form. Try to experiment with that to understand how it works. But I would not recommend to change anything in VFAS sensor except for the name. One of the main options there is "Log" checkbox. If it is set – this value would be saved to the log file.*

Now, let's show VFAS sensor value on screen:

Press "PAGE" to move from "TELEMETRY" screen to "DISPLAY" screen (page 13/13).



Set "None" value of Screen 1 to be "Nums"

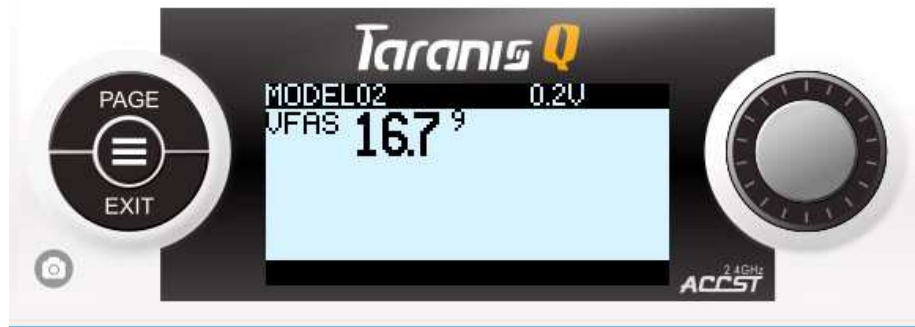


Select first empty field and set it to be VFAS value.



**note: you can also add to the next empty field "VFAS-" value which would show the lowest registered VFAS value during the session. It is sometimes important to know what was the minimum total cell voltage of the battery pack.*

Now, hit "EXIT" several times to get to main flight screen. Long press "PAGE" to get to the telemetry screen 1 dedicated to the chosen model.



This screen shows you the telemetry values of the sensors that you have added to display on the previous "DISPLAY" page. Add all other telemetry values you want here. Note that each "Nums" screen can display up to 8 values and there could be 4 screens like that assigned to the model. So, 32 sensor values in total for the model. Press "PAGE" to switch between telemetry screens whenever there are more than 1 screen available. Press "EXIT" to back to the main flight screen.

Flight battery warning setup:

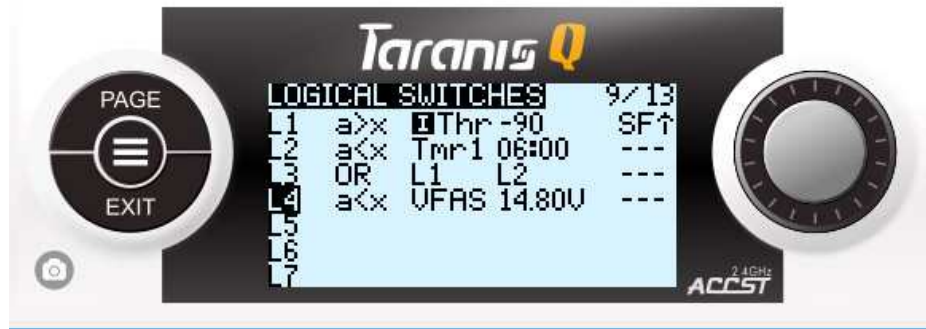
Seeing VFAS value is good but hearing its warning is even better because we do not have time to look at the screen when flying.

From the main flight screen, press "MENU", press "PAGE" several times to get to "LOGICAL SWITCHES" screen. Select empty switch number, press "ENTER" to start editing it.

- FUNC: set it to "a<x".
- V1: set it to "VFAS"
- V2: set it to "14,80" V (or set any other minimum total voltage appropriate for your flight battery)

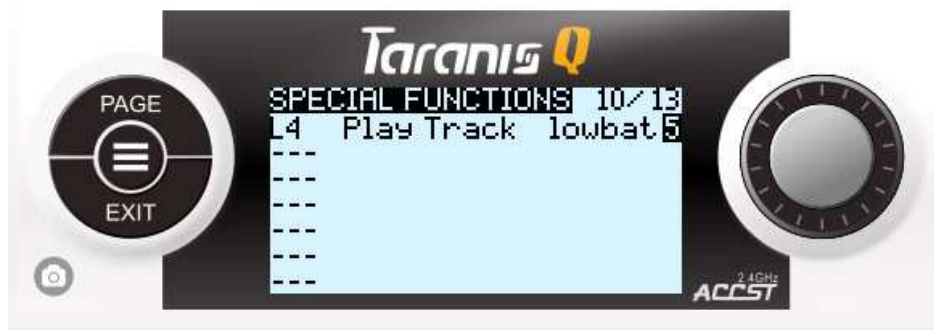


Press "EXIT" to get back from the edit screen.



Interpretation: logical switch of line4 would activate when VFAS value would be less than 14.80V

Press "PAGE" to get to the "SPECIAL FUNCTION" screen. Highlight any empty field and set: L4 | Play Track | lowbatt | 5



Interpretation: this special function would act (lowbat track would be played) when L4 logical switch would activate. And the track would be played repeatedly each 5 seconds.

Adding LUA script for PID tuning BetaFlight boards:

This step requires having telemetry receiver connected to your BetaFlight FW flightboard and assumes that you have the telemetry feedback from the board to your radio. It also assumes that you have OpenTX FW in the radio with Lua box checked in radio profile settings.

- Download this Lua script:
<https://www.rcgroups.com/forums/showatt.php?attachmentid=9741163&d=1485902488>
- Unzip it and place it in "SCRIPTS" folder of your radio SD card.
- Turn on your radio and quad model
- From the main flight screen, long press "MENU", press "PAGE" several times to get to the "SD CARD" screen (page 2/9).
- Navigate to "SCRIPTS" folder, locate your Lua file script, long press "ENTER", select "EXECUTE".
- You would see such screen with PID fields filled with current PID numbers.

```

Betaflight setup: PIDs
Roll   Pitch  Yaw
P: --- P: --- P: ---
I: --- I: --- I: ---
D: --- D: ---
          No telemetry

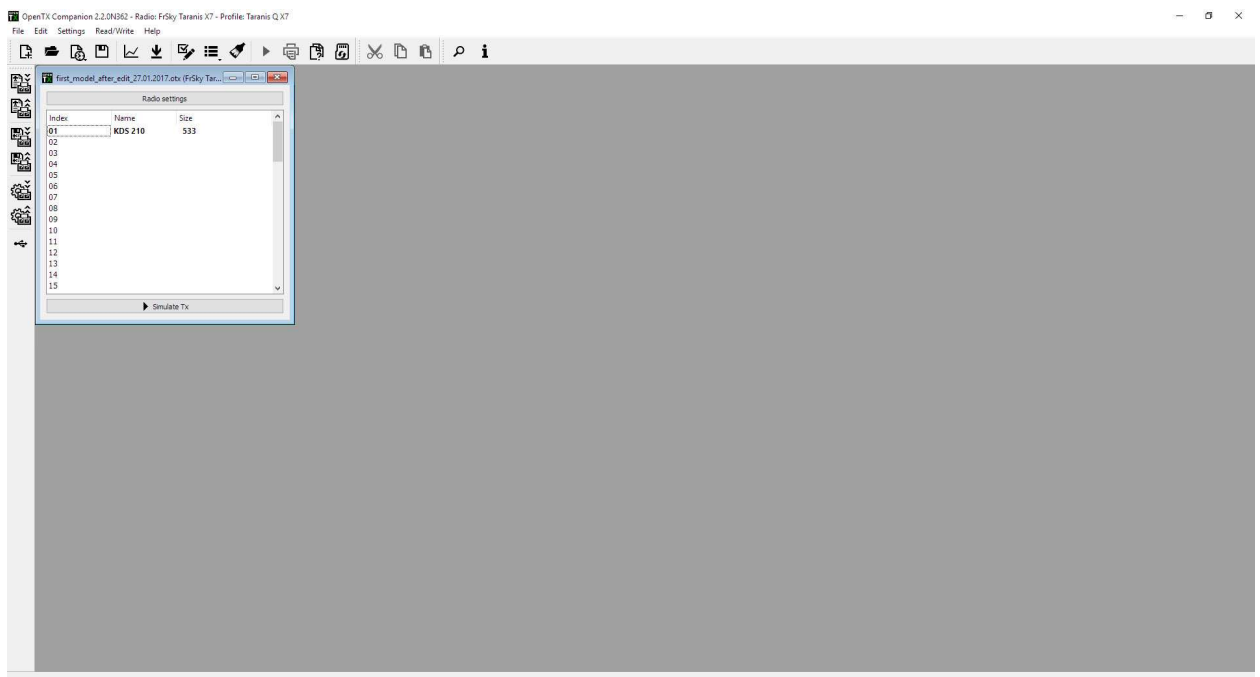
```

- You can highlight any number, change it and long press "MENU" to save the new values to the board.
- You can check PID on the board by refreshing PID tab in BetaFlight configurator.

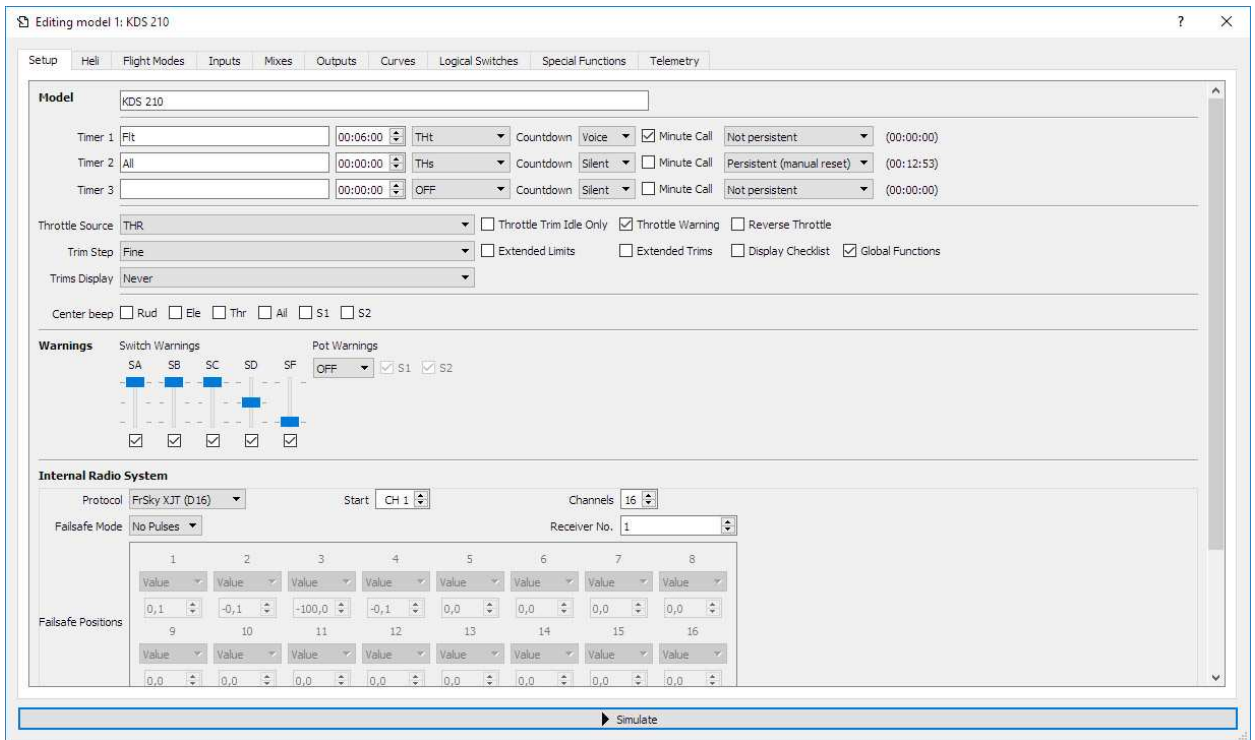
**note: later, when OpenTX 2.2 FW for Q X7 would get to stable version – such Lua script would get a possibility to be attached to the model in "DISPLAY" screen (page 13/13) of model setup as one of the 4 telemetry screens. Therefore, instead of having to execute it from the SD card browser, you would be able to run this script by long pressing "PAGE" button from the flight screen of the corresponding model.*

9. Some common practices:

- Almost everything of above initial model settings could be performed in the OpenTX Companion on your PC.

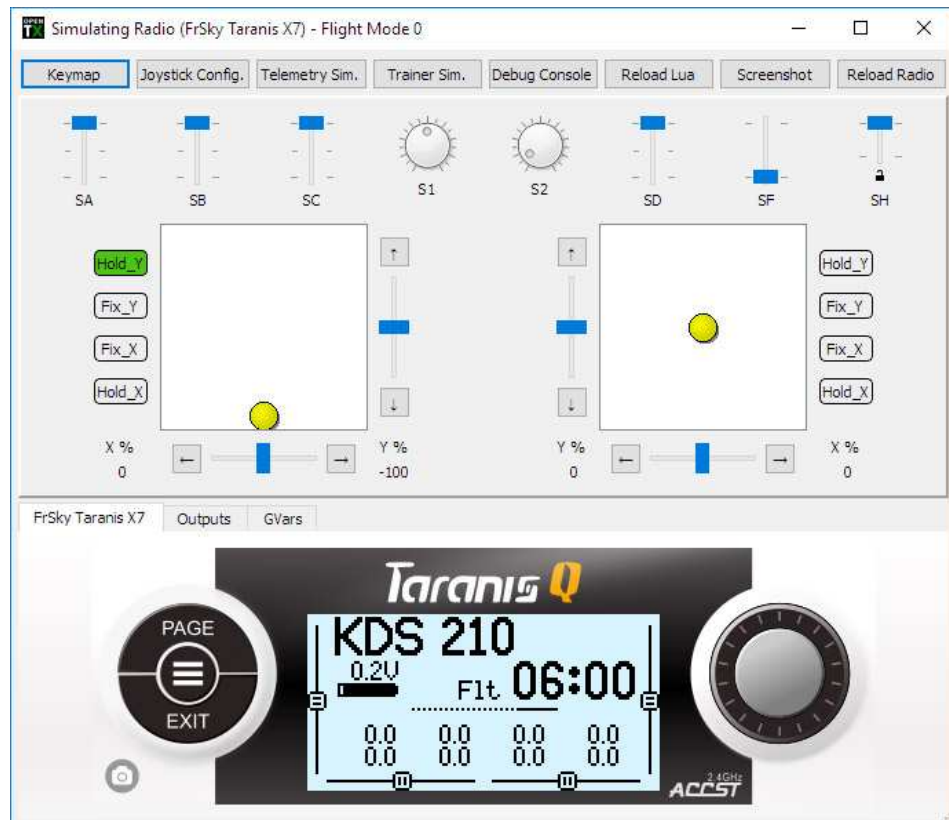


After performing READ/WRITE -> "Read models and settings from radio", double clicking on the model name would lead you to the model setup tabs that cover most of the functions we have just went through. Something is easier to set up on PC and something easier to setup in the radio itself. Experiment with it to get the full understanding. Hit READ/WRITE -> "Write models and settings to radio" to save your changes to radio.



Moreover, you can save this model and radio settings document to your PC. Just press File -> Save as and choose a location to save the file. You would be able to review this file later without connecting your radio to PC.

- One of the best functions of the OpenTX Companion is an ability to simulate the radio and model behavior on your PC. Just go inside the model (double click on it) and press "Simulate" at the bottom of the model file window.



- If you have some flight logs recorded to your SD card, you can review log data by pressing File -> "View log file" and navigating to the log file on your radio (if it is connected and there is a mounted SD card drive) or to the log file saved on your PC if you have copied it from the radio SD card.



- You can change default audio files to more pleasing ones like Amber voice sound pack. Those files cover much more instances. You can download Amber voice archive here: <https://www.dropbox.com/s/3t7p9t6ykufhsfx/Amber22.rar?dl=0>

Extract the files to any location. Copy extracted "EN" folder contents to the "EN" folder of your radio SD card (inside "SOUNDS" folder).

- When your radio is in normal working state, connecting it to PC with the USB cable would lead to adding USB joystick to your PC OS. This would make possible to use Taranis Q X7 in different flight simulators. But you would have to create another model for that (turn RF module off) and follow the instructions/wizards of simulation software.

10. Upgrade your S.PORT equipped receivers and telemetry sensors using Taranis Q X7

Despite the fact that there are such HW S.PORT upgrade tools as FUC cable and Upgrade STK, OpenTX team created a way to upgrade your S.PORT equipped receivers and sensors with the help of the radio itself.

WARNING: The latest Q X7 radios would be equipped with bottom S.PORT upgrade port (under the rubber cover). If your radio happen to have it – use only this port to upgrade your S.PORT devices.

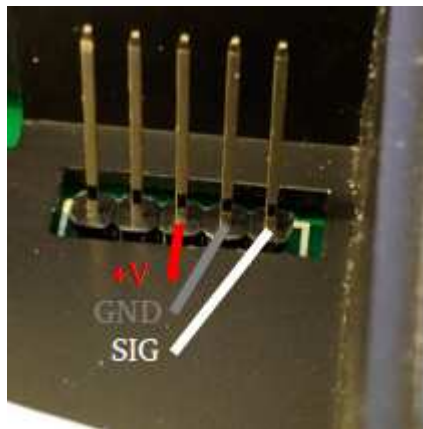
If you have dedicated S.PORT at the bottom – skip “step 5” of the following instruction list.

If you don't have this port on your radio and really need to upgrade - you can still use external module pins as long as you FW version allows you to do that. **WARNING: DO IT AT YOUR OWN RISK**

This procedure also helps to change from EU LBT to FCC FW and vice versa if your radio module and RX do not correspond to each other in terms of versions.

1. Make sure that you have no external module installed.
2. Make sure that you have a regular servo cable
3. Make sure that you have downloaded the latest FW for the S.PORT device you want to upgrade. Use this link to find the appropriate FW: http://www.frsky-rc.com/download/index.php?sort=Firmware&cate_id=0&pro_id=0
4. Make sure that you have copied the downloaded FW to the FIRMWARE folder of your radio SD card (the name might be too long, you can rename it to whatever you like without touching the file extension).
5. Modifying servo cable (skip this step if you are using S.PORT dedicated port at the bottom of the radio):

Warning: external module pins have a specific pinout scheme:



bottom pin is SIGNAL, middle pin is GROUND, upper pin (middle of all 5) is +Vbattery

So, your servo cable red and brown (or black) should be swapped to fit the pinout of external module pins connection. Other side of the servo cable should correspond to the S.PORT device pinout (usually +5V in the middle).

6. Upgrading: Turn on your radio, connect servo cable to the external module pins or dedicated S.PORT bottom pins (if you have one). Connect the other end of the servo cable to your S.PORT device (receiver or sensor).

7. From the main flight screen, long press "MENU", press "PAGE" several times to get to the "SD CARD" screen (page 2/9). Navigate to "FIRMWARE" folder of your SD card, highlight the desired FW file and press "ENTER". Select "Flash external device".

When upgrade process would end – you have upgraded your S.PORT device successfully.

7. Related links:

You can familiarize yourself with OpenTX terms, fields and value descriptions not covered by this document here:

<http://openrcforums.com/forum/viewtopic.php?f=45&t=8724>

You can start to attend this thread for Taranis Q X7 radio:

<https://www.rcgroups.com/forums/showthread.php?2818003-FrSKY-Taranis-Q-X7-FAQ-discussion-info-the-younger-full-featured-radio>

Official OpenTX website: <http://www.open-tx.org/>

Good website to learn OpenTX features: <http://open-txu.org/>

FrSKY official website: <http://www.frsky-rc.com/>

FrSKY Taranis Q X7 large review: <https://goo.gl/rH1f7s>

frSKY Taranis Q X7 video review: https://www.youtube.com/watch?v=v_wYHsfRk4M