OpenTX 2.0 for FrSky Taranis - The Changes

By Andre Bernet - work in progress, last updated 14.04.27 for OpenTX 2.0.0

This document is intended to be a complement to the OpenTX for Taranis manual, to make all changes brought by 2.0 easy to find. It will eventually be merged into a new 2.0 full manual so that new users starting with the 2.0 release can find everything at the same place, but initially most of the users will be existing ones upgrading from r2940.

Back up your settings!

Before we start, please note that OpenTX 2.0 is a major upgrade that adds a lot of new features, but will also require you to change your habits to make use of it. The feedback we've had during the beta test period didn't show that users would lose their bearings, but at the same time these users that jumped in unfinished work are the more "adventurous" type who are less likely to be lost in the first place. So despite all the benefits, it is possible that 2.0 ends up not being for you. For that reason, we strongly recommend you to make a backup of your EEPROM using companion9x' "Read EEPROM memory to file" command, open that file in companion9x to make sure it's valid, and keep it safely on your hard drive before going further and doing the upgrade. If you do not have a copy of your current firmware anymore, it would be wise to back that up too using the "Read Flash Memory" command. With this in hand, you can always revert if you don't feel good.

Upgrading the firmware

To do the upgrade, you will do just as usual and described in the original manual, it can be done with your working companion9x 1.52 setup. The first time you power the radio up after flashing you will be prompted to confirm EEPROM upgrade. Press a key and wait for the end of the process, which will upgrade your old settings to the new format automatically.

PLEASE NOTE: Due to some rather deep changes, a few settings can not be converted and will need to be reconfigured. These include but may not be limited to:

- Trim settings in mixers. These have moved from the mixer to the Inputs layer, and as an input can control multiple mixer lines it’s not possible to know which mixer line should define the input’s general behavior. So any cross-trim settings, for example, will have to be reconfigured.
- Toggle switches and short/long press of the momentary SH switch in custom functions have been removed, and will have to be manually replicated using logical switches.
- The switch warning system has changed (see relevant section), and these will have to be reconfigured.

As a general guideline, thoroughly check each of your models for proper operation before flying after the upgrade!

Firmware-side changes

Flashing and USB connection

The first set of changes to the operation will revolve around flashing and PC connection. The image you just wrote to the radio now consists of 2 separate “applications”, the main radio firmware and the bootloader. The firmware runs as usual when you power up the radio normally, and is what you’ll be using most of the time. The bootloader is a minimalist application that **is called by holding both horizontal trims inwards while powering the radio up**, and that allows special purpose maintenance operations such as:

- USB access to the settings memory and SD card, which was previously done with the main radio firmware running. Simply connect the USB cable with the bootloader’s main screen displayed.
- Flashing a new firmware to the radio without the need for PC drivers to be installed, meaning the end of the problems some have been having with the Zadig driver installer and dfu-util configuration. Enter bootloader mode, plug the USB cable to access the SD card, copy the firmware file into the FIRMWARES directory (you might have to create it if it’s not yet present), unplug the USB cable, choose “Write firmware”, select the file and confirm. Note that only firmwares from 2.0 on can be flashed that way, it is not possible to use this method to rollback to a previous version.
- Restore an EEPROM backup. It is now possible to keep one or more complete dumps of your settings and model memory on the SD card in the EEPROMS directory, and restore it directly on the radio without requiring a computer. This can prove useful if you just noticed you deleted the wrong model, or erased some important setting you can’t remember. Note that you should cycle power twice after restoring a backup.

The “Exit” menu item or a long press of the EXIT key will exit the bootloader and launch the main firmware.
Note that there is no inactivity alarm in the bootloader, so remember to unplug the USB cable and turn the radio off when you’re done!

Joystick emulation

As seen above, settings and SD card access are now done from the bootloader, which means that this feature is not available in the main firmware anymore. So don’t panic if you don’t see any drives in “My computer” when the USB cable is connected when the radio is powered on normally, it’s normal.
The radio will instead be seen as a standard PC joystick, allowing usage with all PC games and simulators that support a standard joystick.

For such usage, you will typically create a new dedicated “model” in which you will turn both RF modules OFF so as to save power and avoid sending out RF unnecessarily.
The mapping is then simple:

- Channels 1-8 of the mixer will be presented to the computer as analog axes
- Channels 9-16 will be presented as buttons.

So by configuring the mixer how you want you can fully emulate up to 8 proportional axes and 8 buttons, with totally free assignment.

A firmware option selectable in companion (nojoystick) will restore previous behavior if desired, i.e. no joystick function and EEPROM/SD card access with radio firmware running..

General changes

A few items have been renamed for clarity:

- “Custom Switches” are now called “Logical Switches”, and abbreviated L1-L32 instead of CS1-CSW.
- “Custom Functions” are now called “Special Functions”, “Special” as in modifiers i.e. not essential for control.
- The PPM1-8 sources representing the trainer input channels have been replaced by TR1-16. Which of course means up to 16 channels are now supported.

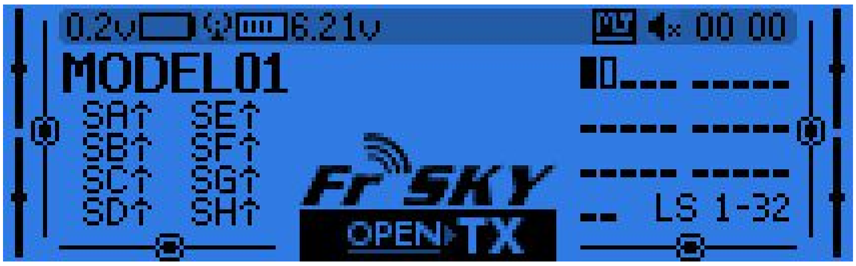
A few additions:

- Switch list: Addition of 8 new items “tRl, tRr, tEu, tEd,...” i.e. Rudder trim left/right, Elevator trim up/down etc, and of the Pxy positions of any configured multipos switches as described in the hardware section.
- Toggle switches and short/long press have been removed from the switch selection in Special Functions. These can now be recreated using the new logical switch capabilities, with the added benefit that these convenient entries are now available everywhere throughout the firmware.
- Support for display of text files and model notes. Simple .txt text files can be read from anywhere on the SD card using the SD browser, and any text file placed in the MODELS folder and named with the same name as an existing model will be recognised as notes attached to that model. These notes can then be displayed using a shortcut in the main views menu, from the MENU LONG menu in all model setup pages, and can be automatically shown on model load if the “Display Checklist” option is enabled in model setup.

Main views

The main views are relatively unchanged. The only differences are:

- The “SD card present” icon has been removed. As all radios are delivered with one, showing it’s there is useless and simply wasting screen space.
- The third view showing Logical switches by their letter (1-W) has been adapted to the new numbering, and improved to show unused switches. A logical switch that is configured but OFF is an empty rectangle, if it is ON it’s a full rectangle, if it’s not used (not configured) it’s a dash.
- The ENTER LONG menu has been rearranged with a submenu for all reset operations. Model notes can be viewed from there if present.



Radio setup

A few things on the radio setup page:

- 3 new parameters for the audio variometer. Pitch at Zero defines the tone for the low threshold of a climb, Pitch at Max defines the tone af max speed climb, Repeat at Zero is the repetition rate of the beeps at minimum climb.
- A range of durations can now be chosen for splash screen display, not just ON/OFF.

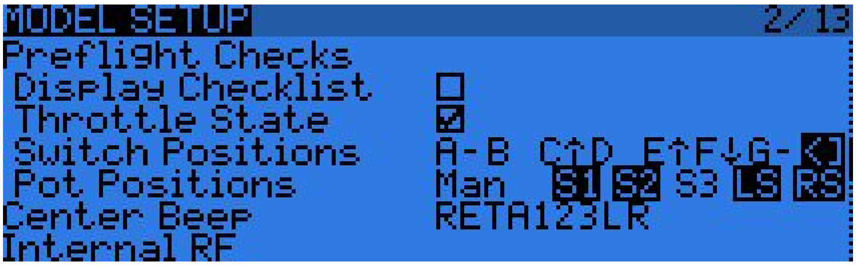
SD card browser

- Text files (*.txt) can be displayed, a “View Text” entry will appear when pressing ENTER on a text file. Useful for storing reminders you might need at the field for example.
- Lua scripts (*.lua) can be executed by choosing the relevant entry in the same Menu. More about scripting later.
- The bootloader can be upgraded from an OpenTX firmware .bin file, again using the contextual menu. This is normally not necessary, if useful or required it would be mentioned in a firmware version’s release notes.

Model setup

- Timer persistence now as 3 options, OFF, Flight and Manual Reset. With Manual Reset, the timer will not be reset when “ResetFlight” is chose.
- Timer Countdown now has 3 choices, Silent/Beeps which replicate the old choices, and Voice which will count down the last 10 seconds vocally.
- Trim Step is now Fine by default
- A few options grouped together, e.g all throttle-related settings, all preflight-related things.
- Display Checklist option, if model notes are found for the model and the option is checked model notes will be shown when the model is loaded.
- Switch warnings can skip checking unused switches. Pressing ENTER on a switch label will toggle the warning for that switch, the set position on its right disappears. Once you’ve selected which switches you don’t want to be warned about, store the positions of the others as usual by pressing ENTER LONG on the <] label after physically setting the switches where you want them.
- Pot positions can now be stored as well. When enabled there are 2 modes for this, “Auto” and “Man”. Auto will automatically store the pots’ positions when the radio is turned off or another model is loaded, while Man requires you to press ENTER LONG on the label of each pot you want to store a new

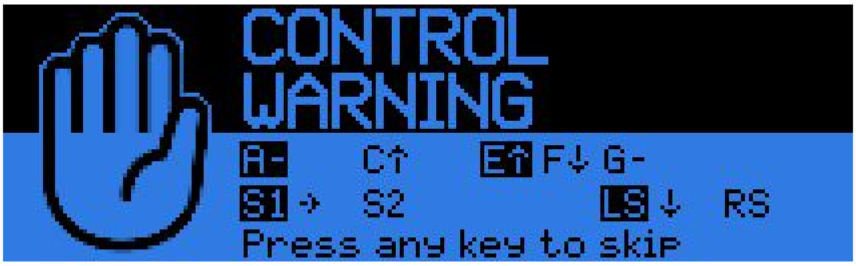
position for. Only pots that are highlighted are included in the check, ENTER on the label to toggle.



```
MODEL SETUP                               2/13
Preflight Checks
 Display Checklist        □
 Throttle State           ☑
 Switch Positions         A-B C↑D E↑F↓G-
 Pot Positions            Man S1 S2 S3 LS RS
Center Beep               RETA123LR
Internal RF
```

Startup Warning Screen

- The startup warning screen has obviously been updated to take account of the new settings, only selected switches and pots appear in the check, and those that are not where they should appear highlighted. The switch positions shown are where they “should be”, and the pots show an arrow to hint in which direction you should turn them to get to the preset position.

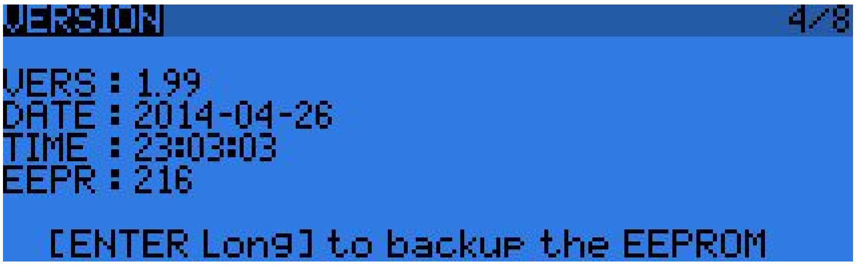


```
CONTROL
WARNING
A-      C↑      E↑ F↓ G-
S1 →    S2           LS ↓    RS
Press any key to skip
```

Version screen

The version numbering system has changed from using an svn revision number to a more “common” version number, starting at 2.0. Both the firmware and the companion will share the same version numbering scheme, making it easier to know if a given combination is compatible or not. Basically, everything that shares the same first 2 numbers (e.g. 2.0.x) is compatible, the last number would relate to bugfixes.

An extra function is now present, a LONG press of the ENTER key will dump a copy of the settings and models memory into the EEPROMS folder of the SD card. The file is named with the date/time of the backup, and can be reloaded from the bootloader if required.



```
VERSION                                   4/8

VERS : 1.99
DATE : 2014-04-26
TIME : 23:03:03
EEPR : 216

  [ENTER Long] to backup the EEPROM
```

Heli setup

The sources for the CCPM mixer are now the automatically created Ail and Ele Inputs. They should not be reordered or the behavior might be swapped too. Pitch curves should ideally now be entered as a “Pit” Input instead of a virtual channel..

Flight modes

The big change here is that trims now offer more flexibility. There are 4 modes:

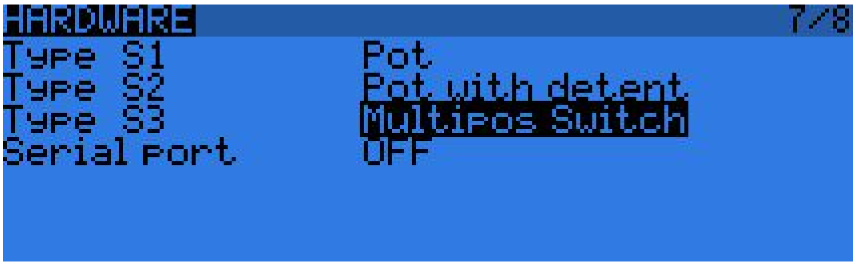
- Trim Off (--): Trim will not be active in this FM. The trim tabs will do nothing.
- Use trim of FMx (:x)
  - If x is the number of another mode then the trim is shared with that mode (and trimming of course adjusts FMx's trims).
  - If x is the number of the mode we're on, then trims are completely independent for that mode.
- Add own trim to trim of FMx (+x): Trim keys will only affect the current mode, but the current mode is also affected when FMx's trims are changed. For example you can have a thermal mode FM1 that you can base on the default FM0 (+0), you trim the model in FM0, you switch to FM1, have to trim to compensate for that mode's configuration. By doing so you won't affect FM0. But if for your next flight you've put the battery a bit differently and caused a change in CG that needs compensation, you only need to adjust the trim in FM0. As FM1's trim is added on top of it, it's been corrected too.

The defaults have changed too, all modes now use the same trims by default.

Hardware page

This is a new page that has been added to select your basic hardware configuration. Currently 2 items are supported:

- S1/2/3 can be selected as being either a standard pot, a pot without detent, or a multipos switch such as the 6-position rotary switch sold by FrSky. If it is set as a standard pot, the middle position will be ignored during calibration. If it is set as Pot with detent, then the center position matters and is stored during the neutral calibration phase. If it is set to multipos switch, the calibration procedure will recognise these positions and equalise their spacing over the full control throw, as well as create "virtual switches" named Sxy that correspond to position y of control x and are available anywhere a switch selection is possible.
- Serial port: Defines the function of the serial port in the battery bay. Currently supported choices are nothing, a copy of all telemetry data received from the internal RF module (S-port mirror), and D-type FrSky telemetry input from a 3rd-party external module (Telemetry).



HARDWARE 7/8

Type S1 Pot

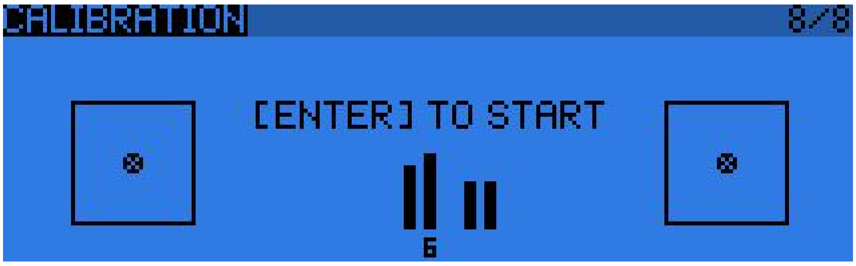
Type S2 Pot with detent

Type S3 Multipos Switch

Serial port OFF

Calibration page

Mostly unchanged except for showing the number of detected detents for multipos switches.



Inputs (formerly D/R)

TODO

Scripts (LUA)

OpenTX 2.0 added support for Lua (current version 5.2.2) user scripts.

Lua is a lightweight multi-paradigm programming language designed as a scripting language. More at Wikipedia

There are two types of Lua scripts used in openTX:

- **Model scripts** - these are run periodically and continuously, similar to mixers
- **One-time scripts** - these run one time when user selects/executes them from the menu
- **Telemetry scripts** - Up to 9 lua-programmed custom telemetry scripts can be added to the chain of telemetry screens.

Lua scripts must be placed on SD card in folder /SCRIPTS and have an extension .lua.

Documentation is divided into sub-pages:

- Lua Model Scripts describes continuously running model scripts
- Lua One-time Scripts describes one-time running general scripts
- Lua Script Reference detailed reference of openTX Lua implementation and interface
    - Lua General Functions general purpose functions
    - Lua Model Functions model manipulation functions
    - Lua Display Functions LCD display functions
- Lua Script Examples some example scripts with comments

Directory structure for LUA
TODO

How to use Lua fields

TODO:
- Menu on limits screen
- Inputs…
- Scripts

- Trims
- Telemetry changes (fas offset, mah etc)
- Other things broken by conversion?
- gvar popups
- Use of the EDGE command which replaces Hshort and Hlong
- What is Inputs and the difference between "[I]Source" and “Source" in mixes