TBS TANGO 2 Radio

Revision 2022-04-20

Compact all-in-one Remote Control Radio with TBS CROSSFIRE System



The TBS TANGO 2 remote control is an all-in-one system made for R/C enthusiasts. It features a built-in TBS CROSSFIRE Micro TX radio module. Input controls are provided by full-size hall gimbals. A bright display shows the radio status and telemetry.

Key features

- Compact and ergonomic All-in-one (AIO) radio
- Integrated TBS CROSSFIRE Micro TX - up to 2/ 250mW (rev3/ revision1+2)
- Runs TBS FreedomTX, a temporary OpenTX fork
- Industry's lowest latency - only achievable with an AIO solution!
- Travel and beginner friendly
- Full-size digital hall gimbals
- Unconventional low-profile switches for transportability, reliability, and durability
- Foldable antenna - also doubles as a kickstand
- TBS CLOUD ready (future proof)
- Digital trims (compatible with traditional R/C aircraft)
- Solid build with quality components
- Multi-module capable (rev2 + 3)

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  - Self-holding switches (Switch E and F)
  - Instant trim
- Main Board revision
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FAQ

Specifications

Type:	All-in-one (AIO) integrated radio
RC system:	Built-in TBS CROSSFIRE Micro TX
Output power:	25mW to 1W
Frequency Bands:	868MHz (EU, Russia), 915MHz (USA, Asia, Australia)
Antenna:	Standard full-size TX antenna Switchable antenna polarization - horizontal / vertical Optional external SMA port
Holding style:	Pinch, thumb, and hybrid friendly
Default stick mode:	Mode 2, throttle and yaw left (user-changeable)
Display:	High-resolution 1.2” OLED-panel, 128 x 96 pixels
Models:	Standard and Pro model. PRO model has folding gimbals
Battery:	Lithium-polymer 3.7V 5000mAh internal battery pack, USB-C charging
Runtime:	Approx. 8 hours
Channels:	8- or 12-channels (CROSSFIRE, selectable in receiver menu)
Operating range:	Variable depending on output power and radio environment
Gimbals	Full-size hall sensor gimbals, Adjustable vertical range, Adjustable spring tension, Foldable sticks (PRO version only), m3 threading
Controls:	2x Quad full-size hall gimbals 2x Two-position switches 2x Three-position switches 2x Lower-shoulder momentary buttons 3x Configuration buttons 1x Rocker switch 1x Power-on button
Ports:	3.5mm headphone audio-jack for OpenTX voice support USB-C for software updates and charging
Neck-strap mounting:	Screw on mount - sold separately
Speaker:	1W, for OpenTX voice support
Simulator compatibility:	Yes, over USB-C
Working temperature:	0 - 40°C
Size:	W 157 x L130 x H70 mm (H50 mm folded)
Weight:	345 grams
Kit contents:	1x TBS TANGO 2 Radio Controller, 1x SD-card pre-setup

Attention

These Long Range Systems are capable of radio frequency transmissions and output power that may be not allowed in your country.

Please always check your local RF legislation to set the frequency and output power according to the regulation.

A general rule for RC aircrafts is that they must be controlled always under sight of view, check your RC regulation to keep up to date with regulations.

Getting ready

Getting set up and ready to fly is a quick and simple task. In most cases plug&play when using TBS equipment.

FAQ

If you got any questions left after reading this manual you should visit the TBS FAQ section

Note

This manual is written based on *FreedomTX 1.31, CROSSFIRE 6.10, and WiFi 2.04*. If some functions are not available for you, please update your system to these or later versions.

How-To Videos

A short playlist on how to backup and update the sd card, CROSSFIRE, and the TANGO 2 FW, as well as how setup the switch warnings can be found here

Updating

To update and configure your TANGO 2 and the in-build CROSSFIRE, you need the TBS AGENT DESKTOP or WEB.

To update your cevices, connect it to the USB port of the transmitter and run the update by AGENT DESKTOP or WEB.

Overview

The following diagrams indicate the essential input controls (green) and features (red) of the radio.



Detailed overview



Power button, status LED, neck-strap hook, and OLED display



Left gimbal and configuration menu buttons



Radio control buttons



Rocker switch, power button, ports, and speaker



Left two-position (A/L1) and three-position (B/L2) switch



Right two-position (D/R1) switch and three-position (C/R2) switch

Start with your radio

Getting set up and ready to fly is a quick and simple task. In most cases plug&play when using TBS equipment.

Power up

Press and hold the Power button for three seconds until the animation completes. The TBS TANGO II screen will welcome you and the power button lights up yellow.

USB Joystick

Plug in a USB-C cable and a menu will appear where you can activate USB joystick mode. This mode will work with the most common simulators available.

SD card content

The latest SD card content for sound files and scripts can be found on the TANGO 2 shop page. Scroll down to the *Download* section and select the content for your FreedomTX version.

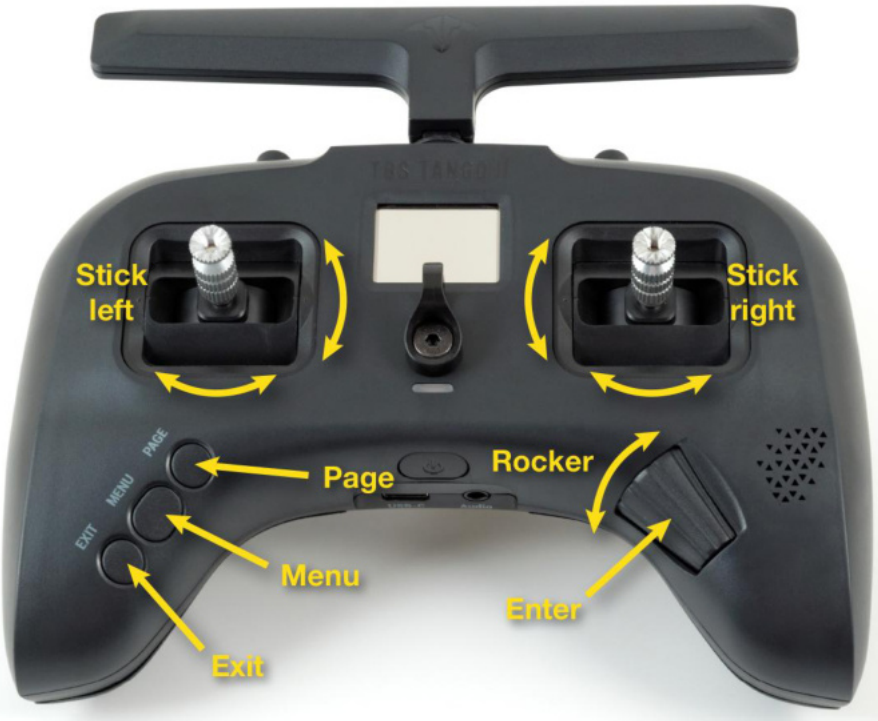
How to update the sd card (video). Make sure you download the correct content for your FreedomTX version.

The maximum allowed size is 32GB. Cards with higher capacity must also be formatted in FAT32 format (only 32GB will be available then).

Configuration controls

To navigate and configure the radio, the left-side buttons and right-side selector wheel are used. These are the control inputs for the configuration menu system:

- **Menu**
  - Quick-press enters the model setup
  - Long-press enters the radio configuration
- **Page**
  - Quick-press skips through the different configuration views
  - Long-press enters the telemetry view or navigates to the previous page (in the menu)
- **Exit**
  - Go backward or exit the configuration menus
- **Enter**
  - Single-press engages a configuration menu item
  - Double-press enters stick trim menu
  - Long-press enters the model select menu
- **Rocker**
  - Scroll through the available menu items or setting options



Setup

The radio comes ready to go. Simply bind (push MENU, enter CROSSFIRE TX menu, and select the BIND command) to your favorite model and you're ready to fly. However, if you are not a Mode 2 (throttle left) pilot, you will need to make some changes.

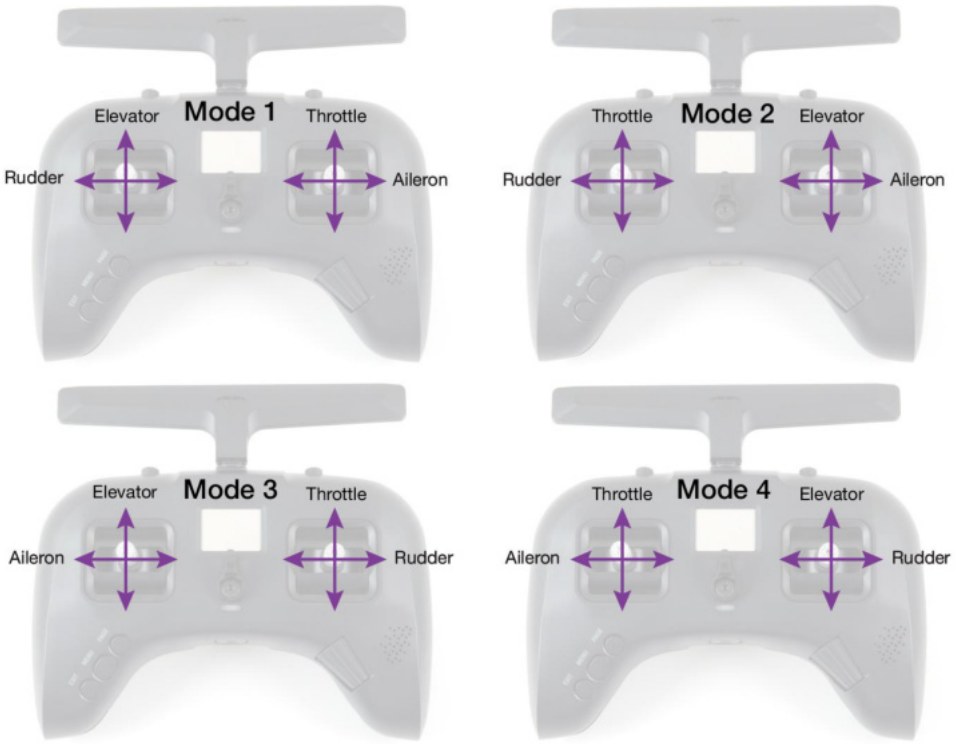
Changing stick mode

When talking about stick modes we are referring to how the remote is configured to control the airplane i.e. which sticks operate which controls the aircraft. You can swap the stick gimbals by opening up the remote, covered later on in the manual.

By default, the remote is set up with Mode 2, which is the most common type used.



1. Long-press the Menu button to enter the Radio Setup
2. Scroll down to the end using the Rocker-switch
3. Change the Mode to the desired type
4. Follow the instructions later in the manual to change the throttle stick to the other side, if required



Changing channel mixing and end-points

For detailed channel mixing, rates, and end-point settings, it is recommended to set up these on the flight controller side (CleanFlight, BetaFlight, RaceFlight, APM, PX4, Pixhawk, etc.), for anything else than flying wings.

Flying Wings

The TBS TANGO 2 supports channel mixing for flying wings. The mixing, end-point, and reverse settings can be configured in channel settings after you have set up a new flying wing model.



1. Quick-press the Menu button to enter the Model Setup
2. Change to the Mixer screen by pressing the Page-button
3. Use the Rocker and Enter-switch to select a channel

More information can be found in relevant online tutorials explaining the operating and mixing principles of OpenTX

If you create a new model, you can follow the wizard which will help you set it up by selecting *Delta* as type.

Radio configuration menu

Changing settings on the TBS TANGO 2 is done using the OLED display and controlled using the Rocker-switch/Enter-button. **Long-press the Menu button** to enter the radio configuration menu.



Tools



Browse your LUA tools

- Here you can quickly access your LUA tools scripts like BetaFlight or Kiss LUA.
- To be listed in this place they need to be located under *SD card\SCRIPTS\TOOLS*

CROSSFIRE Menu is missing

With FredomTX 1.25 the OpenTX *Tools* menu was introduced and the old *CROSSFIRE* menu in the model menu got removed. To bind your receiver open the *Tools* menu and start Agent Lite. From there on it is the same as before.

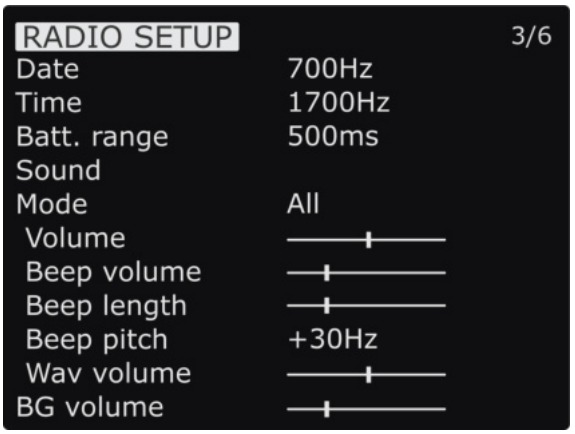
Memory card



Browse and look up the contents of the SD-card

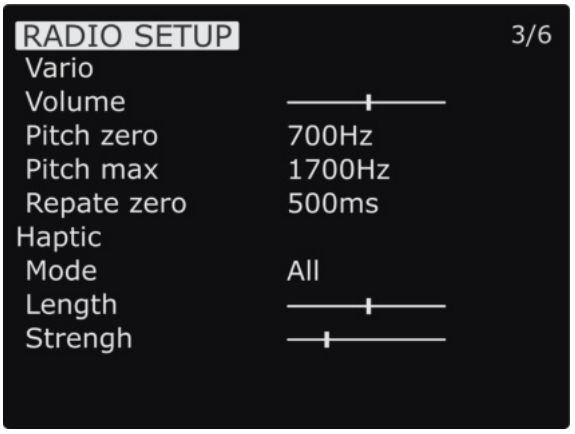
- Use the **Rocker-wheel** and **Enter-button** to browse
- You can update the SD card contents by connecting the USB and selecting the SD card operation mode. The SD card will be recognized as mass storage. For the latest SD card contents, visit the TBS Shop Page.

Radio setup



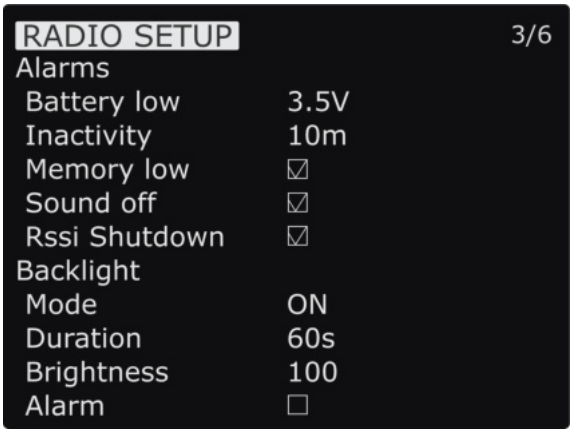
Configures the major features of the radio

- **Date** - Current date
- **Time** - Current time, no timezone or daylight
- **Battery range** - Span of the graphical radio battery meter on the main views, must be 3.4 to 4.2V for TANGO II
- **Sound** - Mode, Master volume, individual volumes of all mixed sources (Beeps, sound files, variometer, background music), beep duration, and pitch



Continuation of radio setup

- **Vario** - Generates the tone/sound of a glider variometer, uses altitude or vertical speed telemetry data
- **Haptic** - For physical tactile feedback



Continue of radio setup

- **Alarms** - Audible alarms
    - **Battery low** - Beep when the battery reaches this threshold
    - **Inactivity** - Reminder if you have forgotten to turn the radio off
    - **Memory low** - Be notified when the SD-card runs low on memory
    - **Sound off** - If the alarms inadvertently have been turned off
    - **RSSI shutdown** - Warning is announced when the radio is being shut down with a receiver on and connected
    - **Backlight** - When the Display should turn on. Do not use *ON* to avoid burn-in



Continuation of radio setup

- **Splash screen** - How long to display the start-up screen
- **PWR off delay** - How long you need to hold the power button to start the radio
- **PWR on delay** - How long you need to hold the power button to shut the radio down
- **Time zone** - specifies Universal Time Coordinated (UTC) offset for local longitudinal time zone
- **Adjust RTC** - Correct built-in real-time clock by GPS
- **GPS cords** - GPS format for telemetry sensor
- **Voice language** - Which audible package to use for alerts
- **Units** - Metric and imperial units for

telemetry values

- **Play delay** - Delays for playing any sound
- **USB mode** - Set which mode to use when the USB-C cable is connected



Continuation of radio setup

- **RX channel order** - Determines the order in which the four primary controls (Rudder, Elevator, Aileron, and Throttle) are inserted on channels 1-4 when creating a new model
- **Mode** - Determines which sticks move which controls the airplane
- **Invert Rotary** - inverter the way the rotary works when selecting stuff (not the general menu navigation)

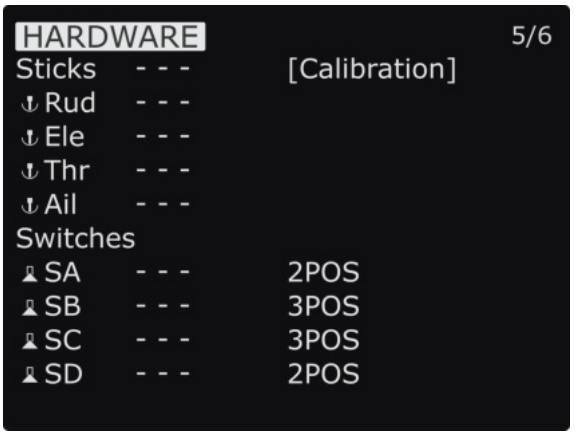
Global functions



This is the place where switches can be used to trigger special functions such as soundtrack playback, speech output of variables, etc.

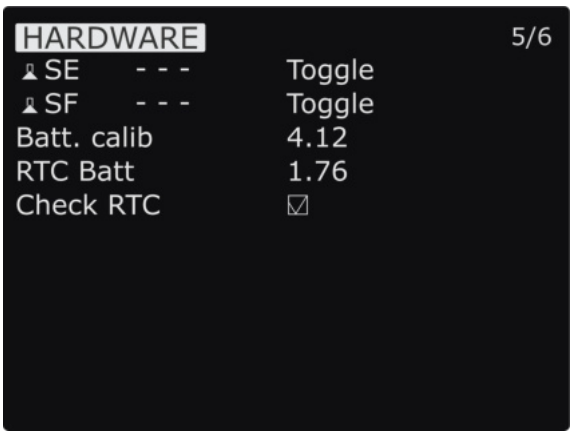
- Global functions are special functions that are applied across all planes.

Hardware



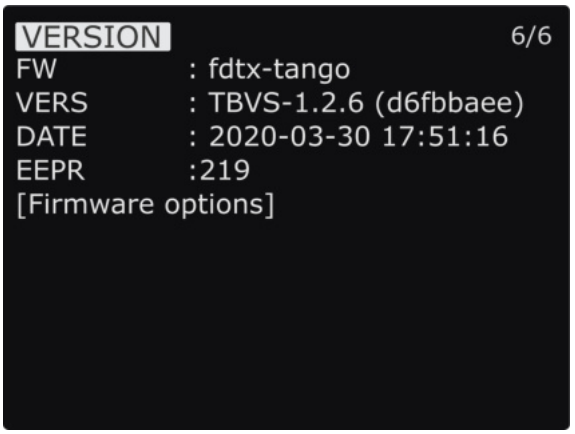
Configure all the installed input sticks, switches, and buttons

- **Calibration** - Starts the stick calibration
- **Sticks** - Perform the calibration of the hall-effect magnetic gimbals
- **Switches** - Sets the type of switches



- **Battery calibration** - Use a multimeter to measure and input the voltage
- **RTC battery** - shows the actual RTC battery voltage
- **Check RTC** - checks the voltage of the RTC battery

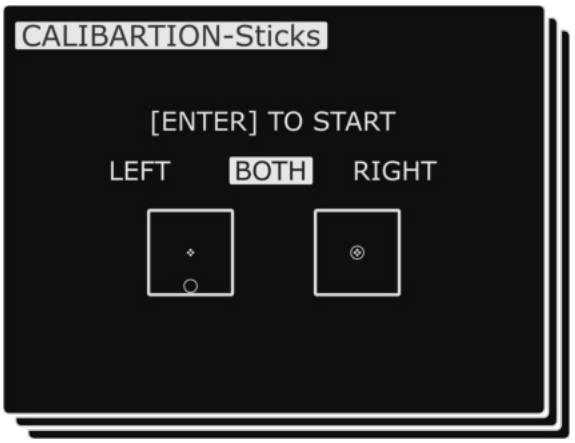
Version



Current build and version of the OpenTX firmware

- As the TANGO II is a branch of the OpenTX codebase it needs its specific build
- **Firmware Options** - shows the included software modules

Calibration



Re-perform the gimbal stick calibration

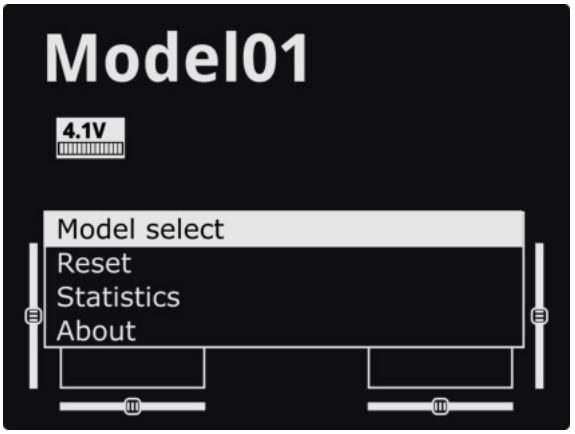
- The calibration can be entered on page 6 *[CALIBRATION]*
- If the initial calibration was incorrect, re-do it by pressing the Enter-button and follow the instructions
- **IMPORTANT**: on the final step, do NOT move the sticks to their combined extremes (e.g. top-left, top-right, bottom-left, bottom-right). **Move the sticks in a "+" pattern**

Model selection/ configuration menu

All the model-specific settings are accessible by pushing the Menu button. Here you configure the currently active model (name visible on the home screen).

To change the active model, **long-press Enter** and choose the “Select Model” view.

General overview



Perform model actions and see metrics

- **Model Select** - Create/select/delete models
- **Reset** - Clear flight, timers, and telemetry
- **Statistics** - Metrics on the model and radio

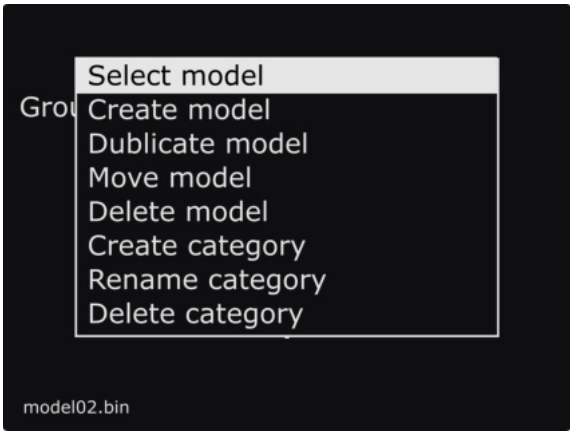
Model select



Manage your models and categories

- **Left column** - Lists categories, navigate through them with **PAGE**
- **Right column** - Lists individual models for your quads, airplanes, deltas, etc.

Manage models

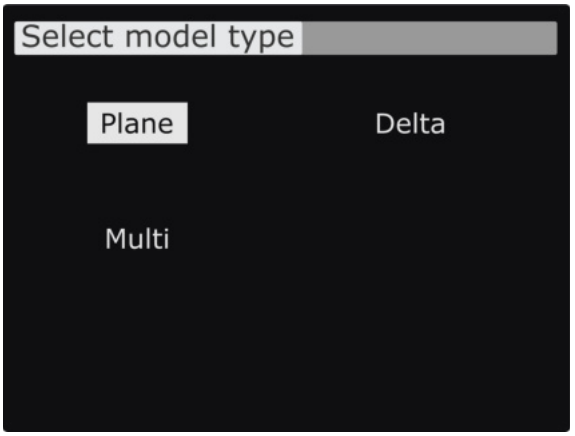


Manage your models and categories

- **Select model** - Activate the selected model
- **Create model** - Initiate the new model wizard
- **Duplicate model** - Copy the selected model
- **Move category** - moves the selected model to a new category
- **Delete model** - Remove the selected model
- **Create category** - Make a new category ‘folder’

- **Rename category** - Give the selected category a new name
- **Delete category** - deletes the category, only possible when there is no model in it

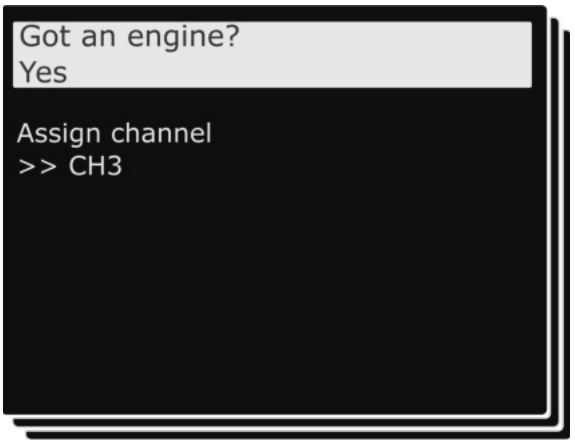
Create models



When creating a new model the wizard guides you through step-by-step. This can be aborted any time by pressing **EXIT**

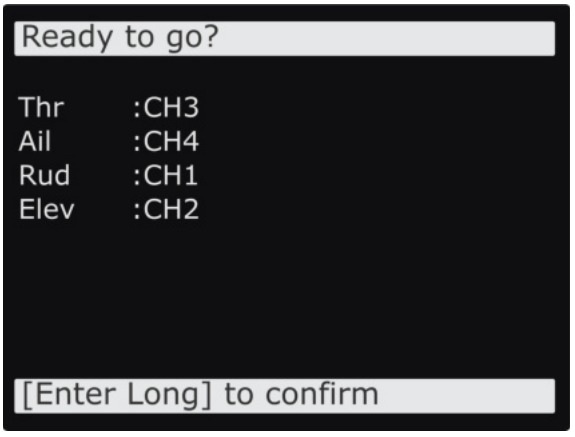
Press the Page-button to go to the next screen

- **Select model type** - Pick the base for the new model, the type of aircraft



Answer each step to generate the final model base

- **Got an engine** - Determines whether to assign throttle - select which channel to use, here CH3.



Summary of the selections made can be changed afterward

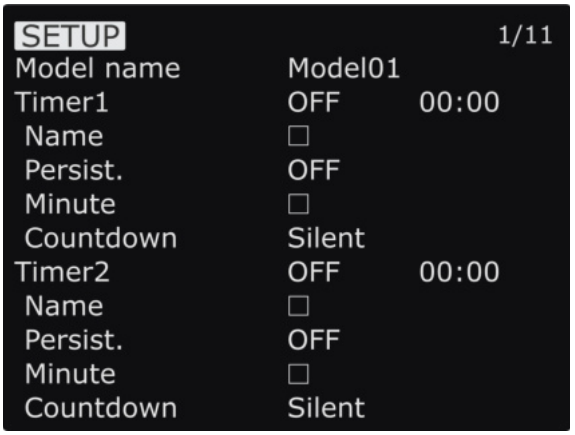
- **Control surface** - Assigned to the designated channel

OpenTX configuration menu

Changing detailed OpenTX settings can be done in the main OpenTX configuration menu. **Quick-pressing the Menu-button** to enter the configuration menu and switch screens with the Page-button.



OpenTX setup

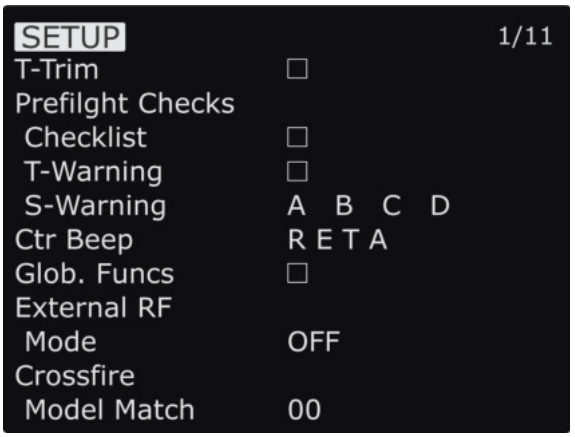


Configures the general OpenTX features

- **Model name** - Specify profile name
- **Timer1/Timer2/Timer3** - Countdown timers
  - **Name** - Specify timer name
  - **Persistent** - When the timer will be set to 0
  - **Minute** - Notification every minute passed
  - **Countdown** - notification style when the time is over



- **Extended limits** - Allows servo travel past 100%
- **Extended trims** - Allows trims to cover the full stick range
- **Show trims** - Display trims on main screen
- **Trim step** - Graduality of trims
- **T-Reverse** - Throttle direction reversed



- **T-Source** - Throttle input control source
- **T-Trim** - Throttle trim allowed
- **Preflight** - Trigger alert when the following checks fail
    - **Checklist** - Display contents of a text file
    - **T-Warning** - Throttle high warning
    - **S-Warning** - Defined switch state warning
- **Center beep** - Beep when passing the center position of the sticks
- **External RF-** Settings when an external module is connected, select the protocol for your module

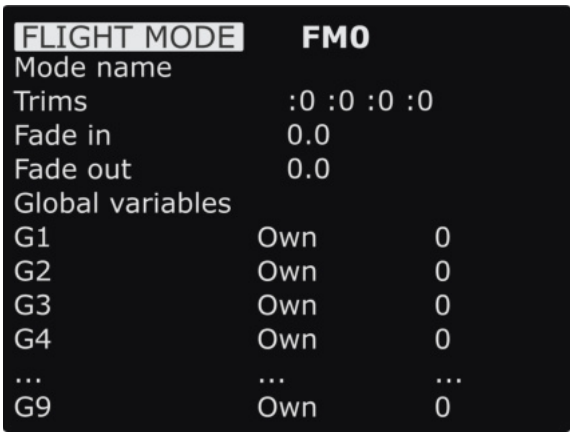
  Off when internal CROSSFIRE is used
- **Global functions** - Use global functions
- **Model Match** - allows you to bind a receiver to just this model**.**

Flight modes



Create flight presets that can activate a particular attitude or characteristics of the model

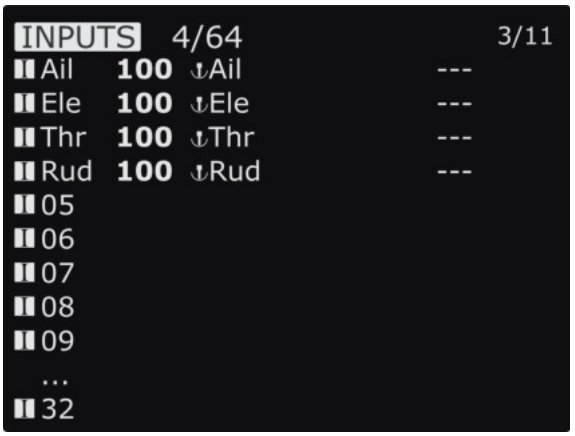
- **FM0-FM8** - Flight mode slots
    - Each of the flight mode slots can be named, has a selectable activation switch (physical or logical), a trim selection array, and slow up/down parameters for smooth transitions between modes.



Configure the selected flight mode

- **Mode name** - Identifiable name
- **Trims** - R, E, T, A when shown mean the mode has its own trim setting for that control
- **Fade in** - Smooth transition time in-between mode change
- **Fade out** - Same delay for transition out
- **Global variables** - Commonly shared values
    - **G1-G9** - Specific configuration screens

Inputs



Allows setting one or more input formatting rules to each stick axis

- **Rud/Ele/Thr/Ail** - Specific input configuration screens

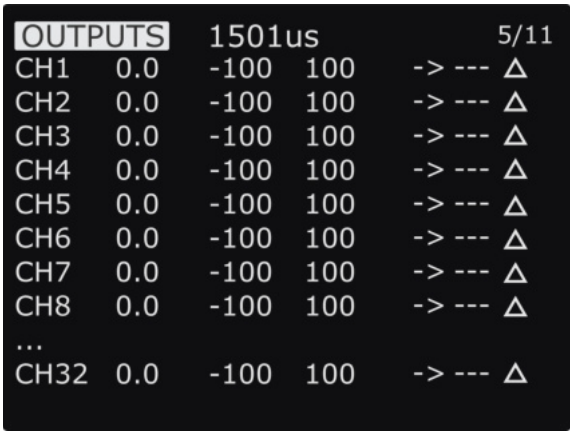
Mixer



This is where the actions on the controls will be mapped to servos

- **CH1-CH32** - Servo/output control channel, specific configuration screens
- Note: If no mixer is set up you will not see any stick movement on the receiver side

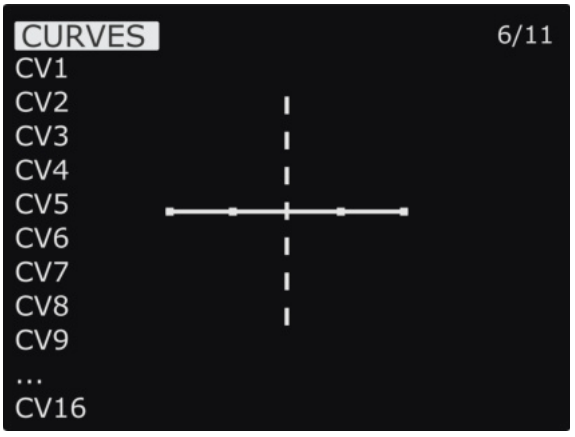
Outputs



On the output screen, each channel can be adapted to the mechanical characteristics of the model

- **CH1-CH32** - Servo/output control channel, specific configuration screens

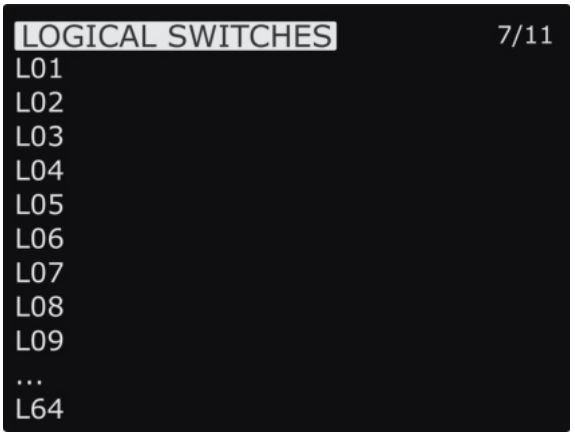
Curves



Custom curves can be used either in input formatting or mixers

- **CV1-CV16** - Curves, specific configuration screens

Logical switches



These are logic switches that are used to compare values and combine various conditions

- **L01-L64** - Logical switch, specific configuration screens

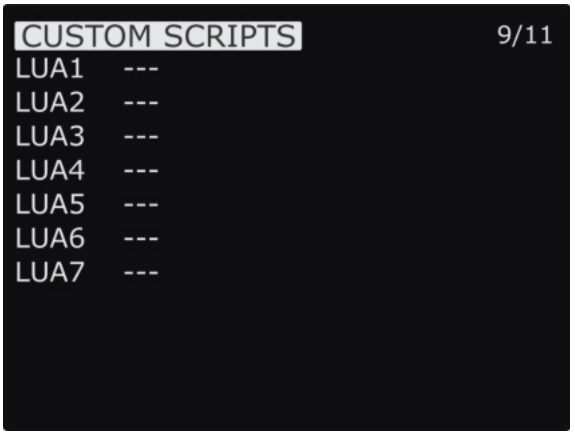
Special functions



This is the place where switches can be used to trigger special functions such as soundtrack playback, speech output of variables, etc.

- **1-64** - Special function, specific configuration screens

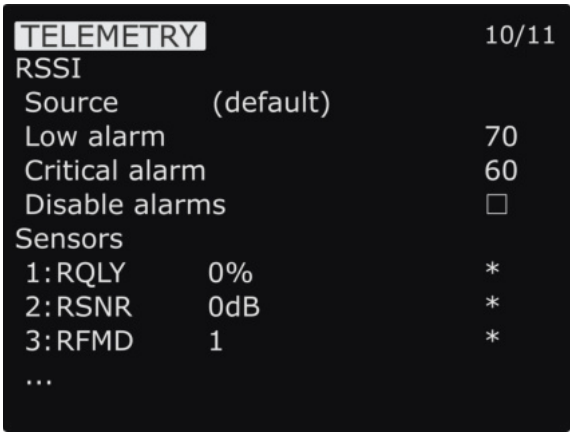
Custom scripts



Select and configure LUA scripts and their inputs, these can be used to perform complex mixes

- **LUA1-LUA7** - LUA script, specific configuration screens

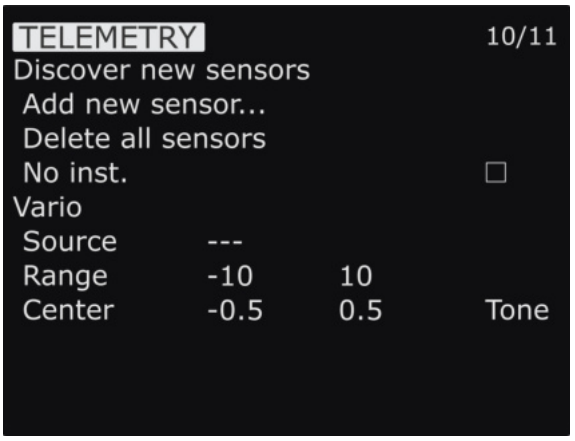
Telemetry



This groups all the basic telemetry-related settings.

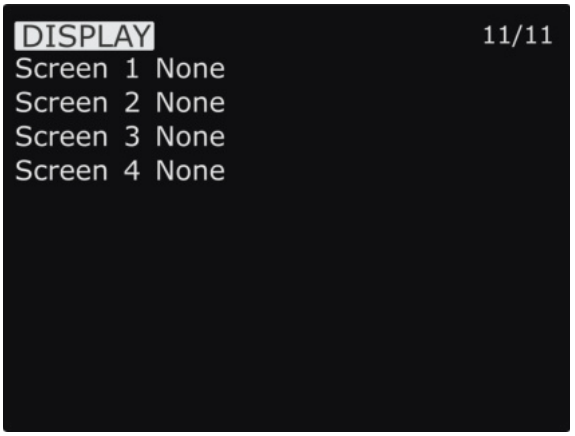
- **RSSI** - Receiver Received Signal Strength Indicator
    - **Source** - Specify data source
    - **Low alarm** - Threshold low
    - **Critical alarm** - Threshold critical
    - **Disable alarms** - Inhibit alarms
- **Sensors** - Detailed information on the CROSSFIRE related Sensors can be found in the CROSSFIRE manual

Set the Warning/ Critical level to 75 and 65



    - **Start/ Stop discovery** - Start/ End sensor search
    - **Add a new sensor** - Manually add sensor
    - **Delete all sensors** - Remove all
    - **No insta.** - disable it for the TANGO II
- **Vario** - Generates the tone/sound of a glider variometer
    - **Source** - Specify data source
    - **Range** - Usable signal range
    - **Center** - Equilibrium value

Display



The display screen is where the telemetry view screens are configured

- **Screen 1-4** - Specific telemetry values or scripts
- Show them by long-pressing the page button on the main screen

Usage

Neck-strap

The optional neck strap hooks into the center of the radio. It is made of metal, so it will last a lifetime. You will need to purchase the neck-strap hook to attach to the radio, and then you can use a neck strap of your choice. We recommend the ETHIX neck strap, which is available from TBS or your favorite FPV dealer.



Bind

Connecting to a new CROSSFIRE receiver is simple and done via Agent Lite.

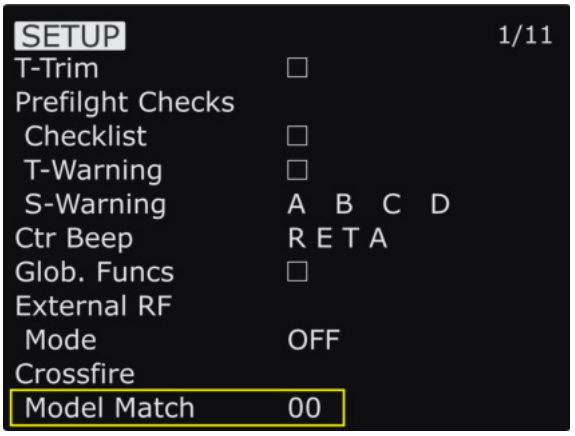


1. Press and hold the Menu button and select *TBS Agent Lite*, then select *TANGO II XF/ Bind*
2. Connect power to the CROSSFIRE receiver and press the Bind-button on the unit
3. Select the Bind-menu item and wait for the binding process to complete

If you have issues during the binding, check the CROSSFIRE manual as well as the FAQ section for other problems.

Model ID

When you bind a receiver you can set up if it should only bind to a specific receiver. This feature is useful if you use a Model without a flight controller or different FC types or model settings. The ID must be set up **before** the binding! Otherwise, you need to rebind your receiver.



1. Navigate to the model settings
2. Scroll down to Receiver ID
3. ID = 0...99: this model will only bind to receivers previously bound to this id

The details on the Model ID/ receiver Number can be found in the CROSSFIRE manual

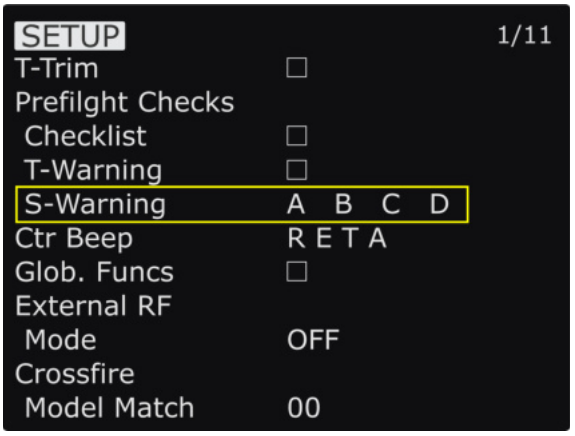
Set failsafe

Configuring the CROSSFIRE failsafe state settings is done via Agent lite. Your model needs to be bound and running for the failsafe setting to work. This setting is only needed on models without FC. On all other models, navigate in the receiver settings to failsafe type and set it to CUT.



1. Press and hold the Menu button and select *TBS Agent Lite*, then select *TANGO II XF/ Set Failsafe*
2. Arrange the switches and sticks into the desired failsafe state
3. Select the Set failsafe-menu item and wait for the failsafe to be stored on the receiver

Set up switch warning



1. Press the Menu button and navigate with the PAGE button to the SETUP page
2. Scroll down to the switch warning setup (S-Warning)
3. Bring all your switches in the position you want them to be monitored
4. Hold the Enter button. Now the positions are saved
5. To disable it on certain switches, short press enter
6. With the scroll wheel, you can navigate to the switch
7. Hit the enter button to disable this switch warning or enable it again

A previously disabled switch will not be activated again by these steps. You need to enable it by yourself.

CROSSFIRE functions

For detailed information on the functions of the in-build CROSSFIRE model, please check out the CROSSFIRE manual. In there you can find wiring examples, an in-depth explanation of the telemetry sensors, and many more.

Status indicator



When the remote is powered on, the LED behind the button will show the actual status of the remote. The built-in LiPo battery is charged every time a 5V power source is connected to the USB-C connector.

Button LED indicator	Status
Pulsing	Ready, trying to connect to a receiver or no down-link established
Green	Solid link, 150Hz or 50Hz link mode active
Blue	OTA Update of the receiver is running
Slow blue blinking	Update confirmation required
Fast green flashing Fast blue flashing	Transmitter bootloader active Green till 6.17, blue since 6.18
Fast red flashing	Warning, a message is shown on the OLED display/ LUA Script
Red/ blue flashing	Transmitter firmware corrupted, reload FW byAGENT DESKTOP or WEB
Purple	Firmware validation running (before OTA update) If stuck here, reload the CROSSFIRE FW by AGENT DESKTOP or WEB
Blue	Race mode active (150Hz locked, 25mw), if no update is running!
Teal	Race mode active (150Hz locked, 100mw)

** for further information, please see the TBS CROSSFIRE manual*

Stick trim

Adjusting the stick trim while in use is easy. Double-press the Rocker-switch/Enter-button, audible feedback will sound and the corresponding stick direction will highlight on the display. Just the rocker switch to adjust the trim. Double-press to change to a different stick direction. Press Exit when finished.



If you got a new airplane or wing, you can set up a special function to write the actual stick position to the trims by the push of a button. Details can be found here.

Battery protection

The battery protection in the remote is based on nominal voltage, as follows:

Battery voltage	Condition
3.81V and over	Battery level 4, fully charged
3.71V	Battery level 3
3.61V	Battery level 2
3.41V	Battery level 1, beep tone, and battery icon flashing
3.38V	Power on allowed, critical level, beep tone, and battery icon flashing
p3.34V	Shutdown voltage, 20 seconds countdown prompt, recharge as soon as possible

The TANGO II can be charged during the flight. In case your battery becomes empty while you are in the air, simply connect a power bank with 2a power output.

Alert prompts

The remote will raise an alert when one of the following events happen:

1. Battery low alert - described in the previous section
2. Telemetry data about the low RSSI
3. Telemetry lost alert
4. When a timer is expired
5. Inactivity alarm

More alerts can be programmed by the OpenTX “Special Function” menu.

Inside the radio

To change the battery, stick mode, travel range, throttle ratchet, or gimbals, you will need to open up the remote control. Warranty will remain intact, of course.

First, remove the two rubber covers on the backside by using a plastic spudger to lift the tabs out of the housing.





Then remove the six (6) screws, as indicated in the following photo with an M1.5 hex driver. Now, the back housing lifts off.



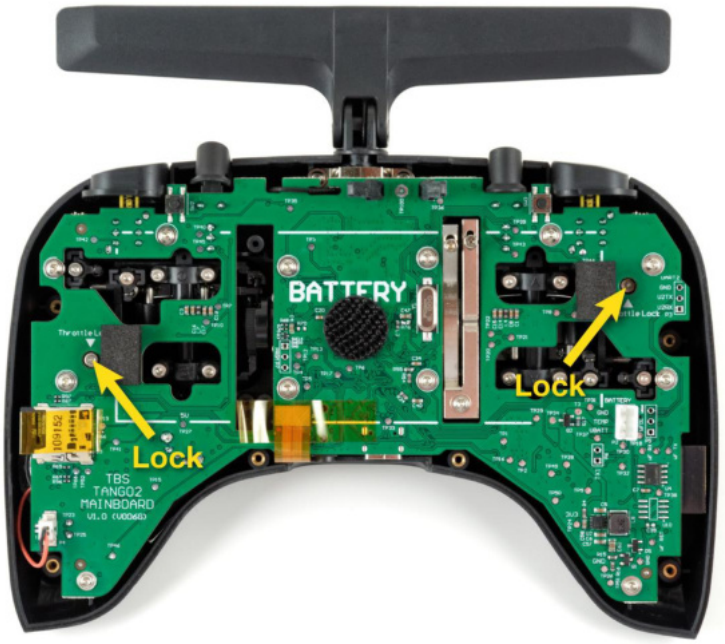
Removing the battery

The battery is attached to the radio using a special hook & loop pad - making it easily removable to service the internals. It has a temperature sensor to keep it safe while in use and charging. If your battery is broken, you can get a replacement from TBS (or make a custom one) and install it directly in place of the original pack. The stock battery provides 5000mAh for approx. 8 hours of runtime.



Changing the flight stick mode

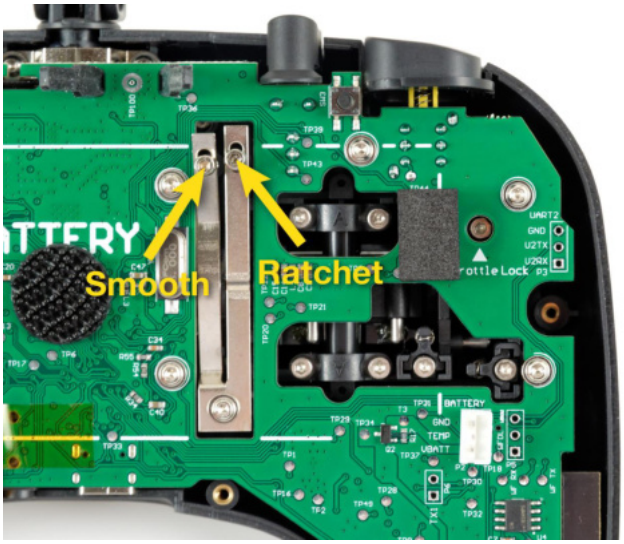
Different flight modes will have the throttle on either the left- or right-side, requiring it to be non-sprung. Modifying it is a matter of screwing in the throttle-lock screw and loosening the other. The rest is changed in the radio configuration menu.



Adjusting throttle ratchet strength

The radio comes with a smooth throttle from the factory. Adjusting how easy it moves can be adjusted by using a screwdriver and turning the left screw on the metal bracket, as shown in the following photo. Counter-clockwise to decrease the tension and clockwise to increase the tension.

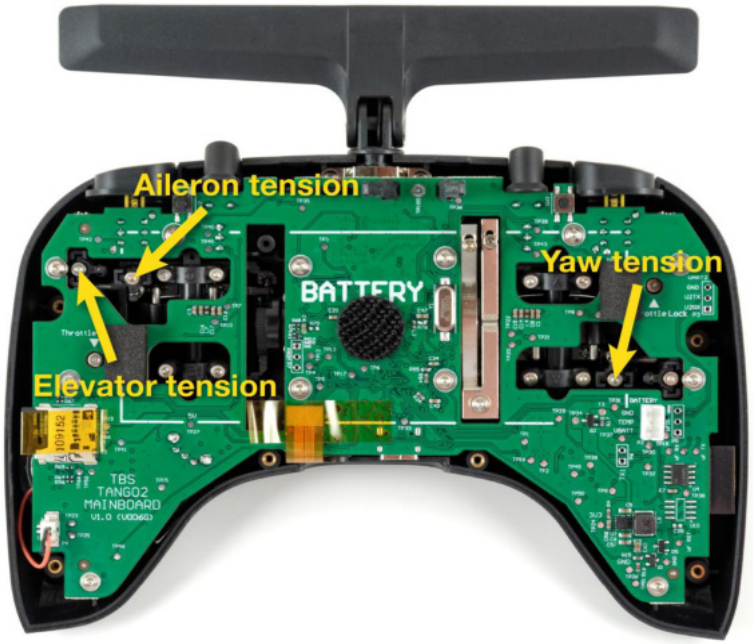
If you rather prefer a ratchet/clicking stick, loosen the left screw entirely and increase the tension of the right screw.



Adjusting stick tension

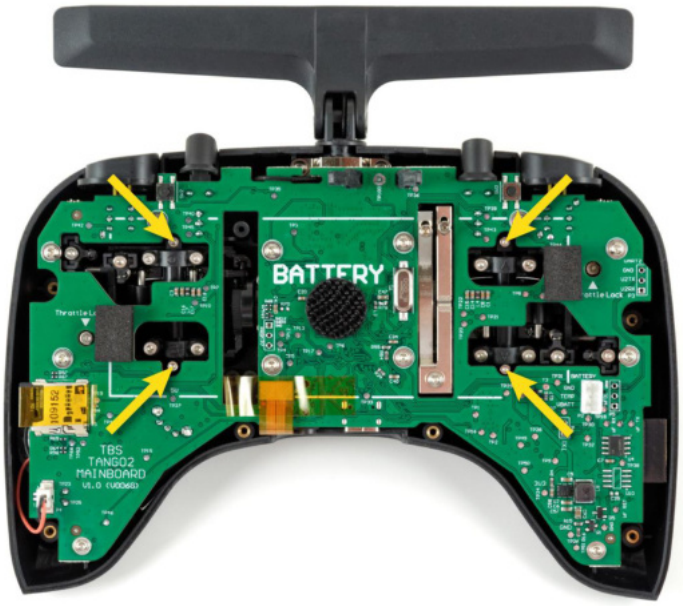
If the sticks feel too rigid or too soft, the tension of the springs can be changed by adjusting the tensions screws. The locations are shown in the following photos.

Turn clockwise to increase the tension (more rigid), counter-clockwise to decrease the tension (softer).



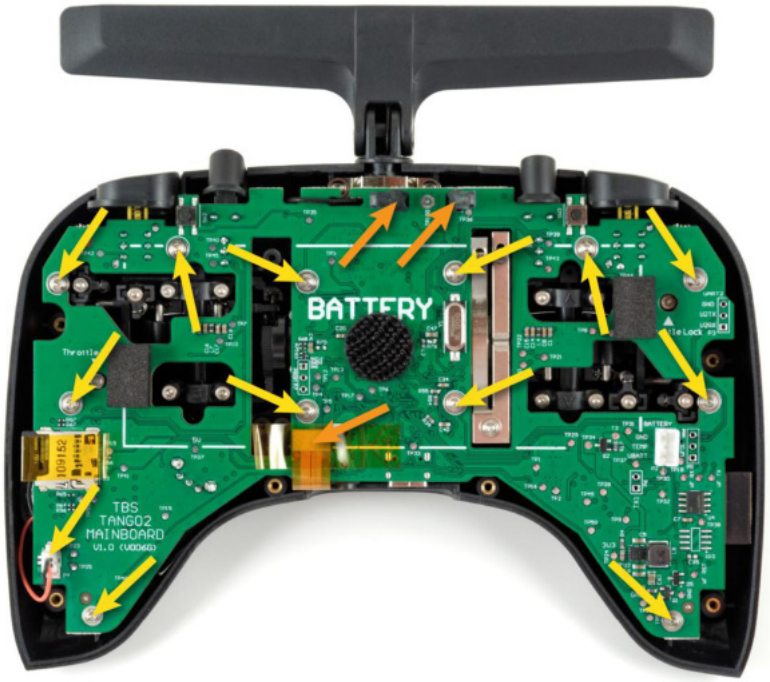
Adjusting stick range

The range of motion of the elevator and throttle can be adjusted (on the standard model, the range screws need to be purchased separately.) The default is no limit. Adjust the screws shown in the following photo. Clockwise to increase the limit. There are 2x M1.4x6 machine thread screws included with every TANGO 2 PRO. Recalibration is required after the adjustment!

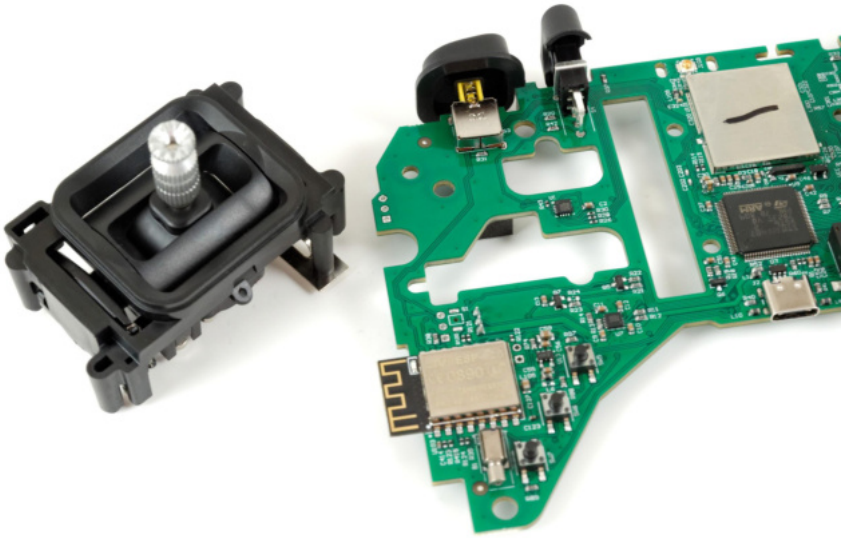


Upgrading / changing the gimbals

Remove the twelve (12) screws holding the mainboard to the housing and gimbals, disconnect the speaker cable battery, display flex-cable. It is also recommended to disconnect the antenna rubber-strap and the u.FL connector to the antenna. Extra care is required if not disconnected!



Lift the mainboard along with the gimbals out of the housing. The gimbal support pegs are inserted on the mainboard holes and easily pulls out. Insert the new gimbal(s) and re-assemble the radio. There are no electrical connections between the gimbal and the remote. Recalibration will be required after this step!



Changing gimbal springs

The radio comes with a set of softer springs (pro only, on the standard they need to be sold separately) that provide less tension sticks. The difference from the stock springs is that these are approx. 20-30% less stiff, giving a smooth soft response.



Left: stock, right: soft

Remove the gimbals from the radio and unscrew the spring tension holder, as shown in the following photo. Unhook the stock springs and re-attach the new ones. This can be a bit tedious and only recommended for experienced users. A special trick is to first attach the springs to the lever, keeping tension on it with a tweezer, and then installing back the plastic holster and looping in the spring. This can be performed without removing the gimbals from the radio, but it is recommended to disassemble the radio for this step.



Swapping antenna type

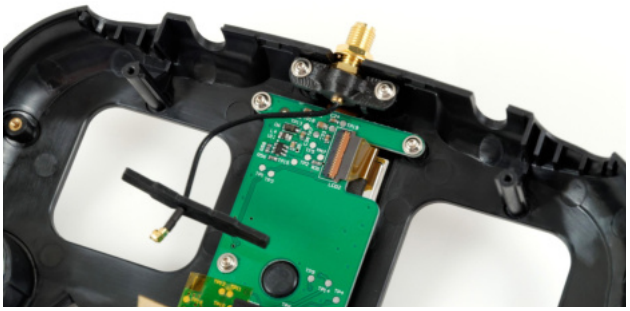
The radio comes with a built-in antenna, but it can be changed to an external SMA connector so different antennas can be used. Remove the mainboard from the housing to expose the housing - be careful when unhooking the U.FL antenna connector, remove the rubber retainer first.

Unscrew the two screws holding the stock antenna in place, remove the antenna and metal bracket. Put the rubber retainer on the new connector and put the plastic adapter on the back of the SMA connector.

Screw the new SMA connector in place using the same screws and re-assemble the radio.









Additional information

TBS CLOUD

All TBS CROSSFIRE transmitters and the FUSION video receivers include a built-in WiFi module that allows you to connect all your gear through the TBS CLOUD. This allows using features like VTX follow, dynamic VTX power with a FUSION module, and other upcoming features.

Menu

- **WiFi Client**
    - **AP Mode:** enables/ disables the WiFI module
    - **Default SSID:** enables/ disables the SSID broadcast of CROSSFIRE TX hotspot
    - **SSID:** SSID/ name of the selected external hotspot
    - **Password:** password for the externally selected hotspot
    - **Connect:** manually connect to the network. Only necessary when a new network is chosen in the *SSID* option
    - **Scan:** scans for WiFI networks. Found networks can be chosen under *SSID*, manually reconnect by *Connect* is required
    - **Forget WiFi:** erases all saved networks and their passwords
    - **Upgrade:** starts the self-update for the WiFi firmware. **FW 2.03 or later required**
- **MAVLink (UDP/ TCP)**
    - **MAVLink:** select the protocol (UDP or TCP) or turn the MAVLink stream off.
    - **Port:** change the UDP/ TCP port where the telemetry will be sent (WiFi 2.03 sues TCP)
    - **UPLINK CNT etc:** Status of the MAVLink stream, works only with TCP
- **WebUI**
    - **WEB UI:** enables/ disables the WEB UI
    - **AP Lock:** enables/ disables password authentication for CROSSFIRE TX internal WiFi hotspot
    - **Password:** set up a password for CROSSFIRE TX internal WiFi hotspot
    - **Login:** enables/ disables password authentication for CROSSFIRE TX internal Web Ui
    - **Password:** set up a password for CROSSFIRE TX internal Web Ui
- **PRO**
    - **WiFI Power:** power level of the WiFI module
    - **TBS CLOUD:** enables/ disables the TBS CLOUD connection
    - **Autoscan:** enables/ disables the scanning for previously bound Hotspots

- **About**
    - **WiFi:** name of the WiFi hotspot/ Network your CROSSFIRE is connected to
    - **IP:** IP address the CROSSFIRE module was assigned by the WiFi network
    - **Server:** connection status
    - **firmware: the** version number of the WiFI firmware
    - **Hardware:** hardware revision of the WiFI module
    - **Bootloader:** the version number of the WiFi Bootloader firmware
    - **Serial Number:** serial number of the WiFi module

Initiate the WiFi module

To use the CLOUD functions, you need to initiate the WiFi module first:

- Download and unpack the firmware files for the WiFi module from TBS
- Connect the CROSSFIRE TX to your radio and power it up
- On your PC or phone search for a new WiFi network like “TBS_XF_AP_xxxxxx”
- Connect your pc with this network. On Windows machines, this can take up to one minute
- Open your browser and enter IP in the address bar: 192.168.4.1
- Click on *Select file* and search for the unpacked firmware files you downloaded before



- Hit *Update* and wait for the website to reload
    - **Do not shut down your radio during the WiFi module updating process**
- Now you can see the WiFI module of your CROSSFIRE TX in the *menu/ LUA script and AGENT DESKTOP or WEB*

Here you can find the whole process as video

Connection to a WiFi hotspot

Once your WiFI module is initiated, you can now connect to an external hotspot. The easiest way is to connect it by the **Web-UI**:

- Connect the CROSSFIRE TX to your radio and power it up
- On your PC or phone search for a new WiFi network like “TBS_XF_AP_xxxxxx”
- Connect your pc/ phone with this network. On Windows machines, this can take up to one minute
- Open your browser and enter IP in the address bar: 192.168.4.1
- Open the *WiFI* tab
- Click on Scan to search for available WiFi hotspot/ networks
- Click on the name of the found network you want to connect to - the name will be entered for you
- Enter your password and hit Connect/ Disconnect
- When you refresh the WebUI page after a few seconds, you will see the IP address assigned by the WiFi network for CROSSFIRE TX

Note: if WIFi hotspot/ network has no internet connection, CLOUD-based features will not work.

AGENT DESKTOP or WEB/ M/ Lite menu works as well:

- Connect the CROSSFIRE TX to your radio and power it up
- Navigate in the CROSSFIRE menu to *WiFI/ General*
- Hit *Scan* to search for available networks
- Under *SSID* you can select the found network
- Enter the password for the selected WiFI hotspot/ network in the *Password* option
- Select *Connect* to start the manual connection to the selected WiFI hotspot/ network
- Done

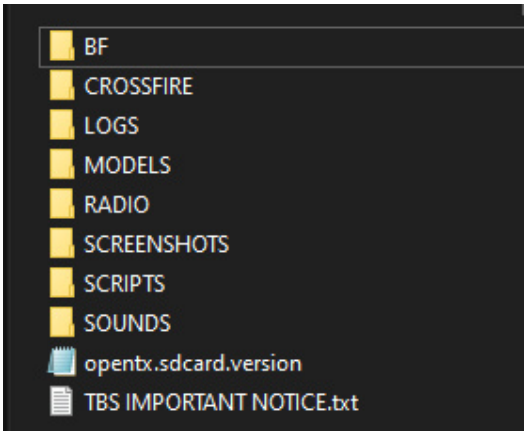
Firmware upgrade

Download the AGENT DESKTOP or WEB installer from team-blacksheep.com/products/prod:agentx (Windows7/8/10 and macOS) - no drivers are needed to use the application, but an Internet connection is required to download the latest firmware versions. **Make sure you use the AGENT DESKTOP or WEB version 2.0.33 or later.**

Detailed information on how to use AGENT DESKTOP or WEB can be found here.
A video series on how to upgrade your radio can be found here.

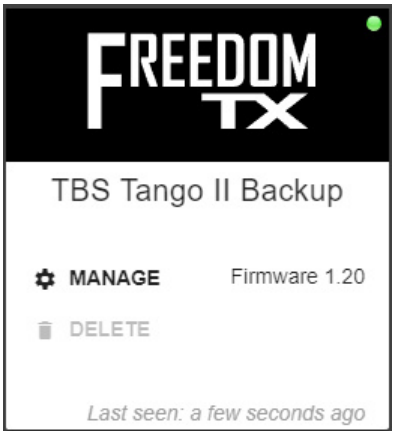
Backing up the SD-card content

This backup is not necessary for the update itself, but it can save you some trouble if something goes wrong. Keep it safe on your pc.



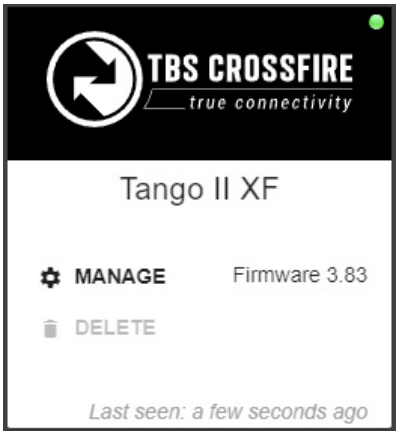
1. Power up your TANGO 2 and connect it by USB-C
2. In the prompt, select *USB Storage (SD)*
3. Wait for your pc to mount the drive
4. Copy the following folders to your pc:
    - **/Models**
    - **/Radio**
    - **/CROSSFIRE**
    - **/Logs**

Update FreedomTX



1. Power up your TANGO 2 and connect it by USB-C
2. open the AGENT DESKTOP or WEB
3. In the prompt, select *USB Agent (HID)*
4. Wait for the TANGO II to show up (green/ orange dot
5. Click on *Manage*
6. Navigate to the *Firmware* tab
7. Select a firmware version an click on *Upgrade/ refresh/ downgrade*
8. Hit *Update* and wait for the Agent to finish it

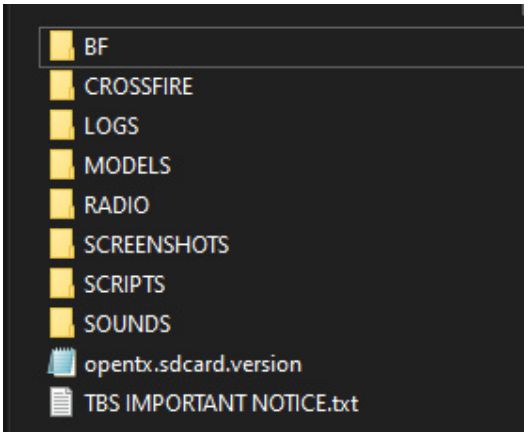
Update the build-in CROSSFIRE



1. Power up your TANGO 2 and connect it by USB-C
2. In the prompt, select *USB Agent (HID)*
3. Wait for the TANGO II XF to show up (green/ orange dot
4. Click on *Manage*
5. Navigate to the *Firmware* tab
6. Select a firmware version an click on *Upgrade/ refresh/ downgrade*
7. Hit *Update* and wait for the Agent to finish it

Update the SD card content

You can download the content manually from the TANGO 2 shop page when you scroll down - make sure to select the correct version depending on your FreedomTX version.



1. Power up your TANGO 2 and connect it by USB-C
2. In the prompt, select *USB Storage (SD)*
3. Wait for your pc to mount the drive
4. Copy the complete content into the SD card of the TANGO 2 and override the existing files

Update from FreedomTX 1.XX to 1.2X or later

Due to the massive changes coming with FreedomTX 1.2X, the update process from a lower version differs from the normal update routine:

- Update FreedomTX
- Now the update process stops at *Verification* and the T2 Display shows *Pls update CROSSFIRE*
- When you leave the FreedomTX overview in AGENT DESKTOP or WEB you'll find the Micro TX in Bootloader mode - update the CROSSFIRE to 4.00 or later
- This will take only a few seconds and the radio will then boot up normal
- Now update the CROSSFIRE Micro TX again - in the first time only the transmitter firmware sent to the radio - now you also the receiver firmware are transferred
- Update your SD card content

Once you are on 1.2X or later, this is no longer necessary.

Firmware dependencies

Certain firmware versions require other devices to have a minimum version to work properly:

- FreedomTX 1.1X -> CROSSFIRE 3.XX
- FreedomTX 1.2X -> CROSSFIRE 4.00 (or later)
- FreedomTX 1.25 -> CROSSFIRE 4.10 (or later)
- FreedomTX 1.29 -> CROSSFIRE 4.11 (or later)

OpenTX mixer bypass (Gimbal destination)

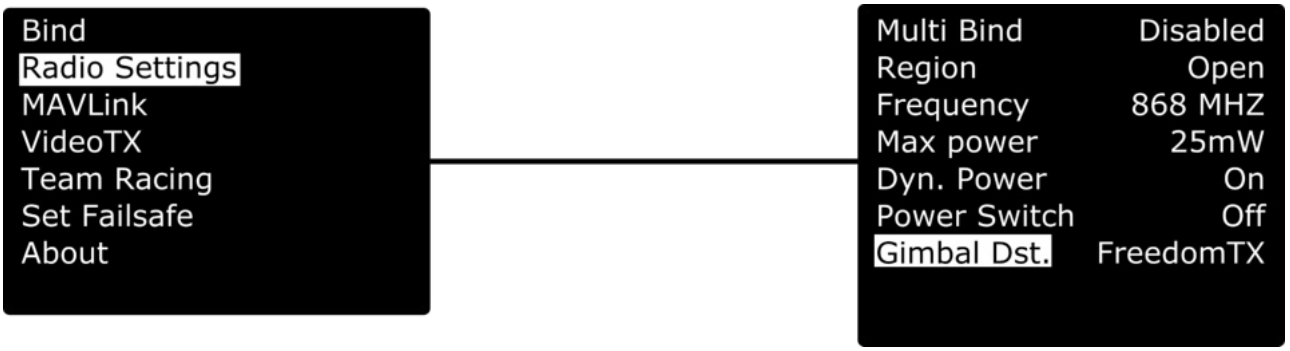
Exclusively on the TBS radios, you can bypass all OpenTX mixer settings to save an additional millisecond.

When activated, all mixer settings like endpoints, channel order (for the first 4 channels), stick order, trims, etc are ignored.

With an active bypass, the channel order for the first four channels is **AETR** - Aileron, Elevator, Throttle, Rudder. Use this sequence when configuring your flight controller. You can activate it under *CROSSFIRE TX/ Radio Settings/ Gimbal Dst.*

Idle-Up for KISS was introduced in Crossfire FW 6.13

#todo



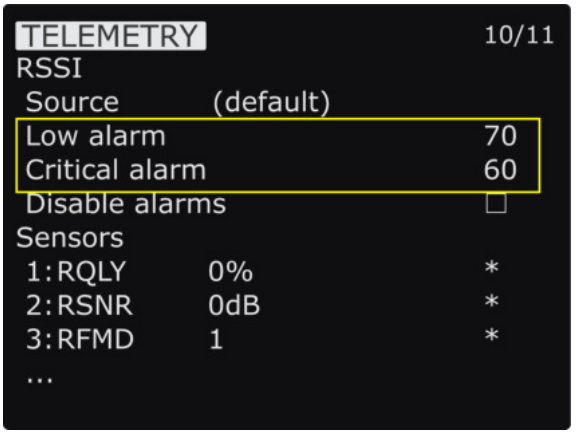
- **FreedomTX:** FreedomTX mixer active, bypass deactivated
- **XF Mode 1-4:** Bypass active. Setup the number according to your stick mode (Mode 2 for most users)
- #todo fc type

Programming examples

The required sensors only show up once they were found by the sensor search on the telemetry page.

LQ warning (audio)

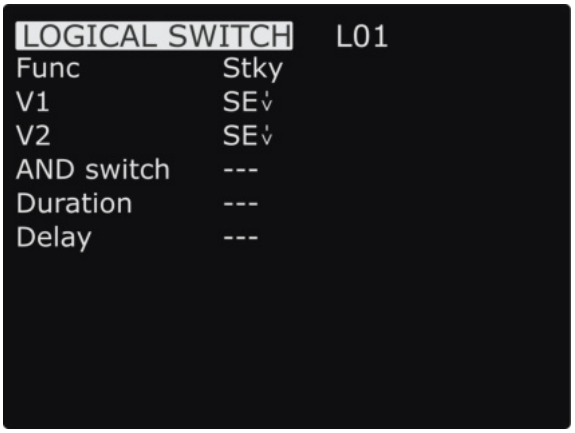
FreedomTX will warn you based on the LQ sensor. There is no extra setup required. The warning level can be set up in the *Model settings/ Telemetry*



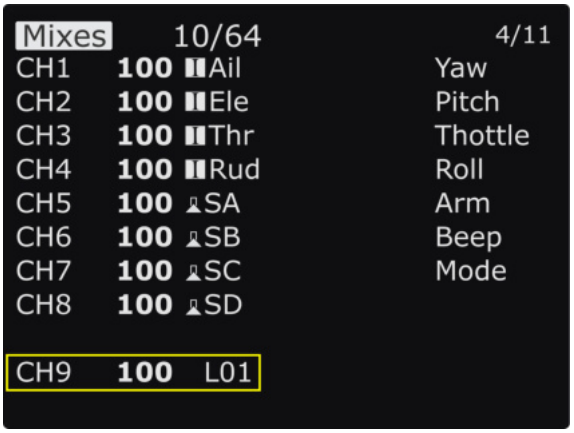
Self-holding switches (Switch E and F)

If you want the momentary switches E and F to behave like switch A and D, you can set up the *Sticky* function in the *Special Functions* page:

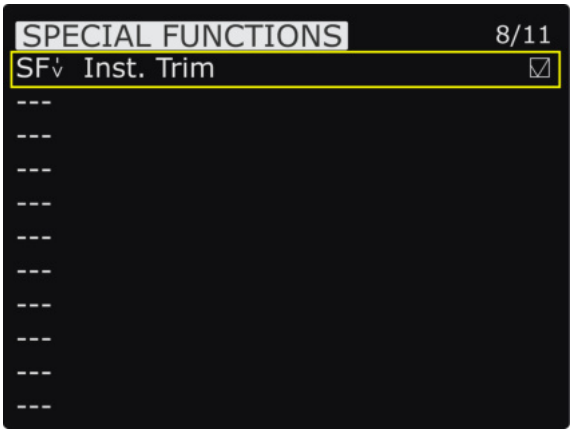




When this is done, you can use the LSx you created in the mixer instead of the button:



Instant trim



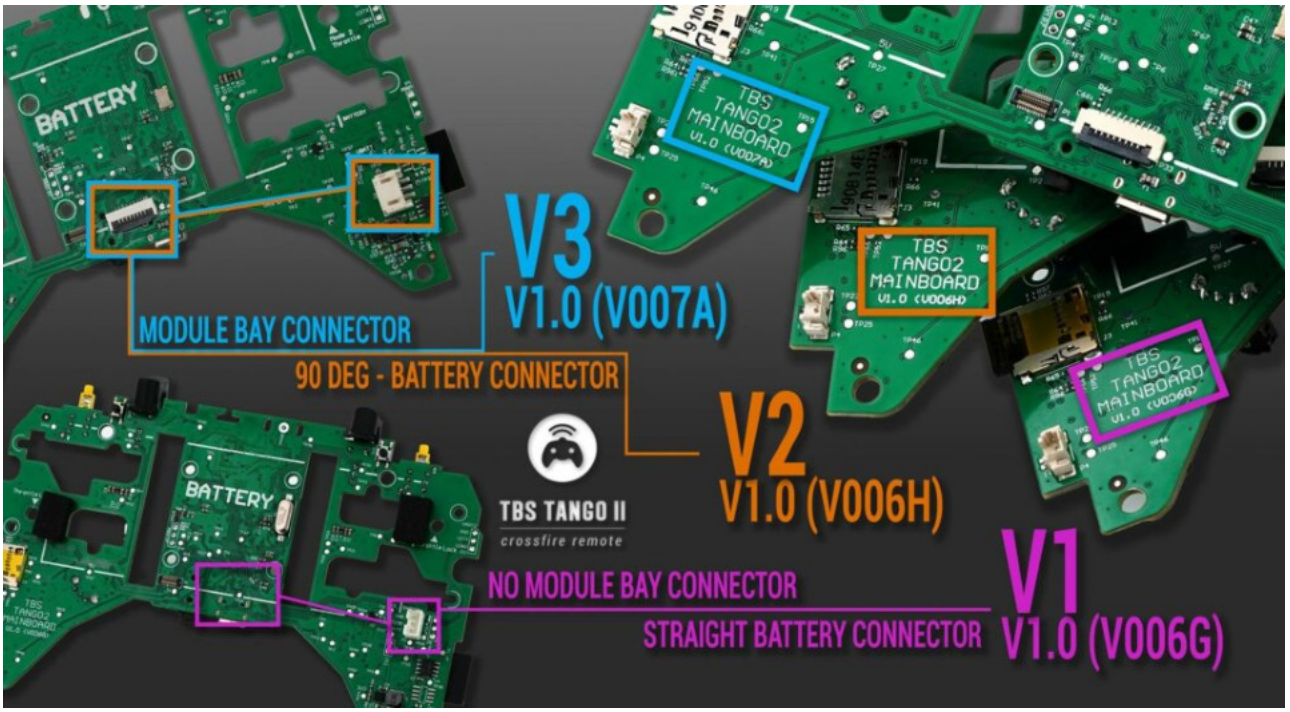
How does it work

Hold the sticks in the position where your plane is flying leveled and hit the button where you have assigned the function to. Now the stick position will be used to set the trim values

Main Board revision

Since the TANGO 2 started there have been some improvements as the community requested it. You can identify the board version by opening the TANGO 2 and look for the print below the speaker connector or by looking in the CROSSFIRE LUA/ CROSSFIRE TX/ About

- V1 - About page/ Version *1.01*, PCB label *V006G*
    - Initial release, 250mW max power, no module bay connector
- V2 - About page/ Version *1.2*, PCB label *V006H*
    - 250mW max power, module bay connector
- V3 - About page/ Version *2.0*, PCB label *V007A*
    - 1W max power, module bay connector
- V4 - About page/ Version *2.2*, PCB label *V007c or later*
    - Same as v3, minor changes



Multi-module bay addon

As requested by the community we now include the option for a mini-module bay add-on. To use this module bay you need your TANGO 2 to be on hardware revision 2 or later (which version do I own?).

You can get the stick-on module bay including the required parts at the TBS shop. Follow the steps in the picture below. This is an easy task and can be done within 10 minutes easily.

Important note:

The FrSky XJT mini module does **NOT** work with the TANGO 2! The Multi-Protocol-Modules that are available work fine. The JR-bay version does work without any issues.

You can get an MPM from TBS which will give you the highest available output power at our shop.



FAQ

- My TANGO does not bind to the receiver - both are blinking slowly green
    - Update your build-in CROSSFIRE to 3.73 (beta) or later and retry
- After binding, the receiver shows a double pattern and I get no signals in BF/ iNav/ …
    - This is an authentication error on the CROSSFIRE. To solve it:
        - Shut down your drone and the TANGO
        - Power up the TANGO
        - Set it in Bind-mode
        - Power up the receiver
        - Push the bind button on the receiver
    - After a few seconds, the green led on the receiver should switch to a constant green light

- I get movements BF/ iNav/ … on the 4 sticks but not from any switch
    - You need to assign the switches in the "Mixer" page of your model to a channel you'd like it to be. For detailed information on the mixer page, have a look at Painless360's OpenTX video series
- The switches on channel 9 and following do not show any movement in BF
    - Open the *Agent Lite/ CROSSFIRE receiver/ General/ Mode: 12Ch*

- I can no longer see the Frequency setting and the output power is limited
    - Your CROSSFIRE is in a region-lock mode. This mode makes sure that non-allowed settings are not available. If you have set it the by accident, here is how you can unlock it

- In AGENT DESKTOP or WEB/ M/ Lite the CROSSFIRE and WiFi modules do not show up
    - Navigate in the Model settings, page 1 and disable the external module

Manual written and designed by ivc.no in cooperation with TBS and Kamikatze-fpv.de.