E-Soar Plus for Taranis

Version 1.1

Setup Guide

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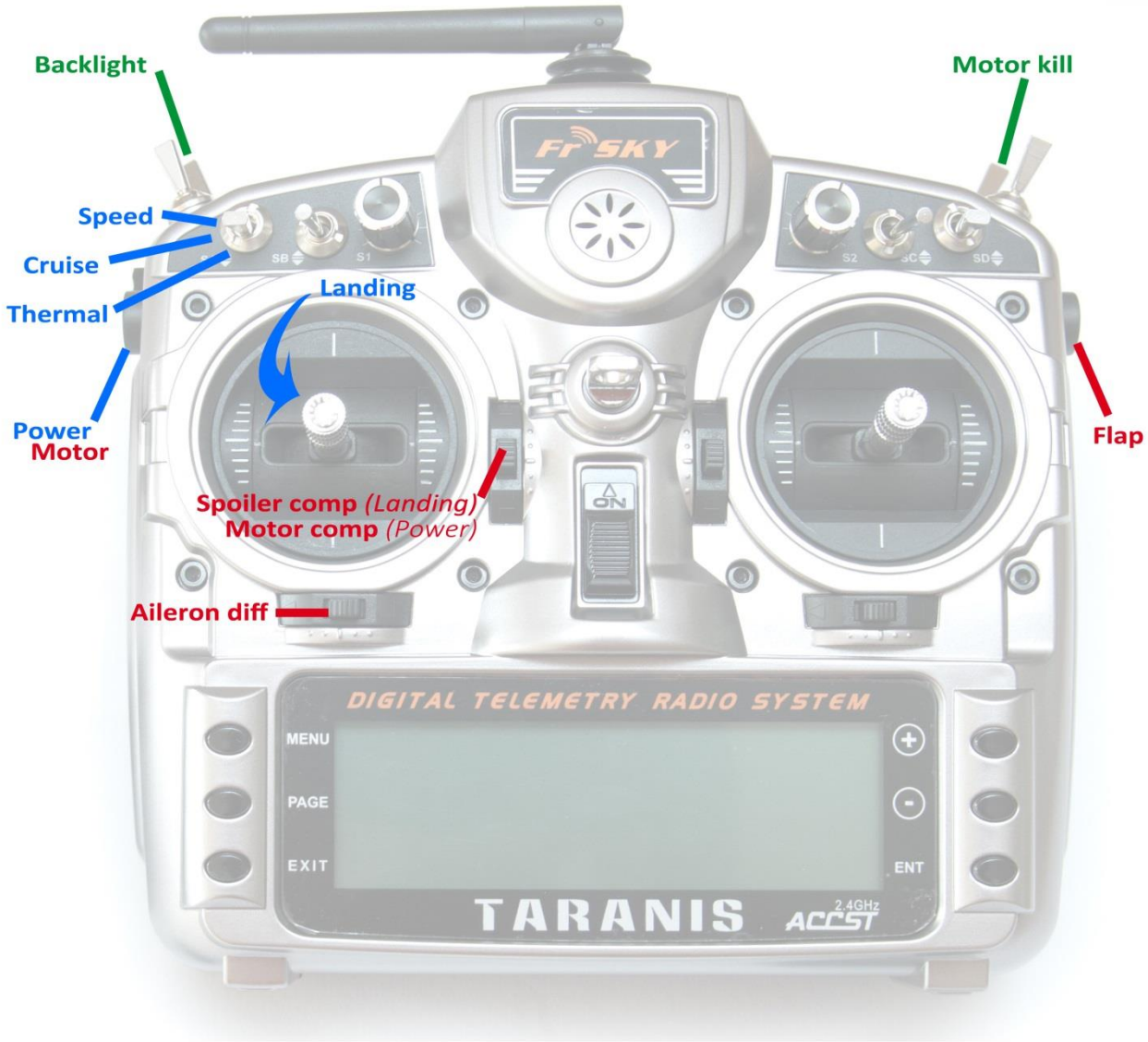


1 Introduction

E-Soar Plus is a full-feature setup for electric-powered gliders with four wing servos. Suitable models include the Radian Pro, MPX Cularis, MPX Heron, Pulsar Pro etc.

The setup has all the mixers required for competition, yet is easy to setup and operate. Key mixers may be adjusted in flight, allowing for rapid trimming of your new model.

Special attention has been paid to motor safety, by means of a simple and secure arming/kill system.

Application

- For electric gliders with 4 wing servos
- Versions for X/T and V tails
- Supports all stick modes

Flight modes

- Power, Thermal, Cruise, Speed, Landing
- Voice confirmation

Motor

- Variable motor control
- Simple arming and kill system ***(improved in v1.1)***
- Motor/elevator compensation

In-flight adjustments

- adjuster for aileron diff
- adjuster for spoiler compensation
- adjuster for motor compensation

Spoiler

- Aileron differential suppression
- Spoiler/elevator compensation
- Reverse differential for better roll response
- Adjustable deadband

Camber (flap) functions

- Variable camber (Thermal mode)
- Reflex in (Speed mode)

Control surface calibration

- Special 'CAL' flight mode for easy calibration
- 5-point balancing curve for flaps
- Full rotation on flap servos

Misc

- Combi mix
- Channels 8-9 free for other functions

Please read through the instructions once carefully before starting.
☠ Make sure the motor is disconnected during setup.

1.1 Requirements

The following are required:

- FrSky Taranis transmitter flashed with OpenTx 2.x (see change log for recommended versions)
- OpenTx Companion software + USB cable.
- A good familiarity with OpenTx's menu navigation and data entry.

1.2 Package contents

E-Soar Plus is provided as a compressed ZIP archive containing the following files:

Filename	Description
esoarplus_11_SetupGuide.pdf	Setup Guide
esoarplus_11_SettingsRef.xls	Settings Reference
esoarplus_11x.eepe	EEPROM image with two setups: ESOARPxxx_**V** – for **V**-tail ESOARPxxx_**X** – for **X**- and **T**- tail
esr_xxxx.wav	Sound files

1.3 OpenTx 2.0 versus 2.1

There are some minor differences in naming and menu layout between OTX versions 2.0 and 2.1, chief of which is the Servos menu which has been renamed 'Outputs'. This document will use the 2.1 naming.

2 Overview

2.1 Stick and switch assignments

Rudder, Elevator, Aileron and Throttle controls are as specified in **MODEL SETUP → STICK MODE**.
Other controls assignments as follows:

Control	Function
Throttle stick	Spoiler
Throttle trim	Spoiler compensation adjust *(Landing mode)* Motor compensation adjust *(Power mode)*
Rudder trim	Aileron diff adjust
SA	Flight mode selector
LS	Motor control
RS	Flap adjust *(Thermal mode*)
SH	Cancel calibration mode Kill motor
SF	Backlight

2.2 Flight modes

There are four flight modes Power, Landing, Thermal, Cruise and Speed. In the event of clashes, Power has highest priority, then Landing, then Cruise/Thermal/Speed. A change in flight mode is accompanied by a voice alert.

Flight Mode	OpenTx ID	Activated by	Priority
Power	**FM2**	**LS ↑**	**High**
Landing	**FM3**	**Throttle stick ↓**	**Mid**
Speed	FM5	SA ↑	Low
Cruise	FM4	SA --	Low
Thermal	FM0	SA ↓	Low

A special Calibration flight mode is also provided for calibrating the control surfaces.

2.3 Flight mode/ function matrix

Flight Mode	*Motor*	*Camber*	*Spoiler*	*Combi*
Power	X			X
Landing			X	X
Cruise				X
Thermal		variable flap		X
Speed		fixed reflex		X

2.4 Channel assignments

Channel #	Function
1	Right aileron
2	Left aileron
3	Right flap
4	Left flap
5	Elevator RtVee
6	Rudder LtVee
7	Motor
8	*[free]*
9	*[free]*

3 Motor Operation

This section describes operation of the motor and the arming system.

3.1 Arming the motor system

The system is initially disarmed i.e. motor forced off. To arm the system:

1 Set motor control to 'off' (LS↓)
2 Apply full right-aileron & full up-elevator, and hold
3 Pull SH and hold for ~1 second until the startup sound
4 Release SH
5 Release stick(s)

A warning beep sounds every 12 seconds to indicate that the system is active. It's recommended not to disable the beep, until you get into the habit of disarming after each flight.

3.2 Operating the motor

Moving LS upwards (↑)selects **POWER** mode.

- If the system is armed, the motor will operate.
- If the system is disarmed, a "motor control disabled" alert is sounded; **POWER** mode will still be active (with relevant trims and mixers enabled), but the motor will not operate.

NOTE: the idle end of LS incorporates some deadband, to help prevent accidental operation of the motor.

3.3 Killing the motor

NEW IN v1.1. To disarm the motor switch and kill the motor, **pull SH for 1 second until you hear the 'motor control disabled' alert**.

> ☠ The arming system will not protect against loss of signal. **It's therefore imperative to set the failsafe on your transmitter, so the motor is commanded to 'off' on loss of signal**!
>
> ☠ To minimise the chance of accidental spin-ups, **arm the system immediately before launching, and kill immediately after landing**.

4 Calibration' mode

A special **CAL** flight mode is provided for calibrating the control surfaces. All mixers and trims are disabled in this mode.

To enable CAL mode:

1. Apply full left aileron and full up elevator, and hold
2. Pull SH
3. Release SH
4. Release stick(s)

When **CAL** mode is enabled, the transmitter emits a beep every 5 secs and a voice alert every 15 secs.
To exit **CAL** mode, pull SH.

In Calibrate mode, the response of the throttle stick is stepped at 25% increments. This is to aid calibration of the flaps.

5 Setting up your transmitter

Adjustments should be made in the sequence shown. Use the tick boxes to record your progress.

> ☠ Make sure that the motor is disconnected before proceeding beyond this point.

5.1 Preparing your transmitter

The first task is to prepare your transmitter's EEPROM and file system.

- ☐ While pressing inwards on the horizontal trims, switch on your transmitter. The bootloader menu appears.
- ☐ Using a suitable USB cable, establish a connection with your computer. The transmitter's SD card should appear on your computer as a removable drive.
- ☐ From your computer, copy the sound files to the /SOUNDS/{language} to the SD drive. E.g. if the SD card drive is 'L:' and the language setting is 'English', then copy the files to the **'L:/SOUNDS/en'** folder.
- ☐ Using OpenTx Companion
  - Open the esoarplus .eepe file (**FILE OPEN**).
    If you're using OpenTx 2.1, ignore the alert "Your EEPROM is from an old version of OpenTx".
  - Open your transmitters EEPROM (**READ MODELS AND SETTINGS FROM RADIO**).
  - Drag an ESOARP variant ('X' or 'V') into an empty slot in your EEPROM.
  - Close the esoarplus.eepe window.
  - In your working EEPROM, right click your model, then choose "Use as Default"
  - Upload your working EEPROM back to the tx (**WRITE MODELS AND SETTINGS TO RADIO**).
  - Close OpenTx Companion without saving
  - On your transmitter, exit the bootloader. The transmitter will re-boot into OpenTx.
- ☐ **IMPORTANT**: perform a hardware stick calibration on your tx **now**, [long MENU], [PAGE] x 7. Remember to calibrate all sticks, sliders and pots. *Accurate hardware calibration is essential!*
- ☐ **X9E Users *only***: Open the Mixers menu, and using the mixer editor:
  - Change the source of CH18 to 'LS'
  - Change the source of CH20 to 'RS'
- ☐ Using the transmitter on its own, familiarise with the flight modes and motor arming. Use the voice alerts to guide you. At the end of this step, you should be confident with:
  - **THERMAL**, **CRUISE**, **POWER**, **SPEED** and **LANDING** modes
  - **CAL** mode
  - Arming and killing the motor

5.2 Calibrating the control surfaces

The goal of this step is

- Set absolute travel limits for the control surfaces
- Equalise travel between left/right sides.

You'll use **CAL** flight mode for most of the steps.

NOTE: the travel limits you set in this section are limited *only by servo/linkage geometry.* The operating travels will be adjusted in a later step.

5.2.1 Calibrate flaps (CHs 3,4)

Start by calibrating the flaps.

> 🔔 In CAL mode, the response of the throttle stick is stepped at 25% increments, to aid calibration of the right flap.

5.2.1.1 Set rotation of flap servos

First, set the direction of rotation of the flap servos:

- ☐ Switch on the transmitter (don't switch on the receiver just yet).
- ☐ Enable **CAL** mode. The tx will chirp every five seconds.
- ☐ Move throttle stick to centre.
- ☐ Switch on the receiver.
- ☐ Go to the **OUTPUTS** menu.
- ☐ Check direction of the flap servos: As you move the throttle stick forwards, both flaps should move **upwards**. If either flap moves down, then reverse the servo - highlight the *Direction* arrow and press [Enter]. Be careful not to press twice otherwise the setting will revert. NOTE: Ignore any "INVERT THROTTLE" warning.
- ☐ With the stick in the centre, note the position of the flaps. They will probably be between neutral and approximately 30 degrees down. If not, don't worry unduly, any problems will become apparent in the next couple of steps.

5.2.1.2 Calibrate left flap

The goal of this step is (a) to set the operating range of the left flap surface, and (b) to make the response approximately linear with respect to stick movement.

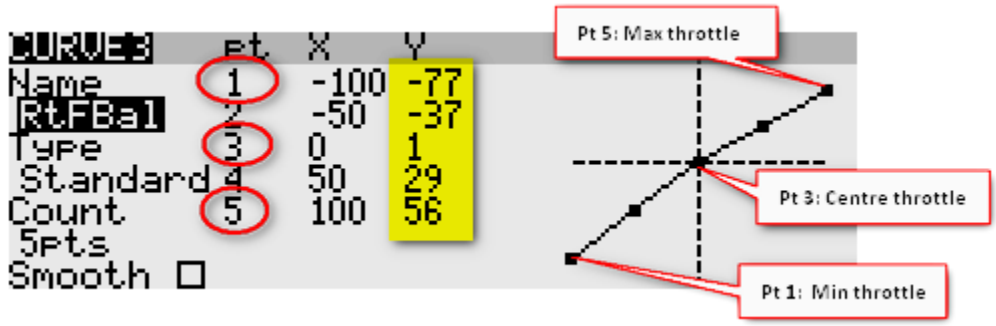
NOTE: We are not concerned with setting the flap neutral position – that will be set later.

- ☐ Check you're still in **CAL** mode, re-enter **CAL** mode if not.
- ☐ In the **OUTPUTS** menu, select 'LtFlap' servo
- ☐ Move the throttle stick fully **forward**. The left flap will move **upwards**. NOTE: the flap will move in a series of steps, this is to aid calibration of the right flap in the following step.
- ☐ Adjust *Max* until the linkage just starts to bind (i.e. hits a mechanical limit), then back off a little.
- ☐ Move the throttle stick fully **back**. The left flap will move **down**.
- ☐ Adjust *Min* until the linkage just starts to bind, then back off a little.
- ☐ Move the throttle stick forwards and check again for free movement.
- ☐ Move the stick to the centre position (use the middle gimbal marking as a guide). Now adjust *Subtrim* so that the flap position is half way between the upper and lower limits that you have set previously.
- ☐ Finally, move the throttle stick steadily from top to bottom, and check that the calibration intervals are approximately constant throughout the range of travel. Perfection is not possible or necessary, but this will give you an idea of the linearity of your flap response. Don't worry that the flap neutral remains floating, you'll fix this later.

5.2.1.3 Calibrate the Right flap.

Now calibrate the right flap. The goal is to match the response with the left flap, using a 5-point curve.

- ☐ Check that you're still in **CAL** mode, re-enter **CAL** mode if not.
- ☐ In the **OUTPUTS** menu, select the RtFlap servo.
- ☐ Leave *Subtrim, Min,* and *Max* at the defaults values (0, -150, 150).
- ☐ Go to the curve column (**CV5)** and press [long ENTER]. The curve dialog will open. Adjust as follows:
  - move throttle **back**, adjust point **1** to match left flap exactly:
  - move throttle to **25%**, adjust point **2**
  - move throttle to **centre**, adjust point **3**
  - move throttle to **75%** pos, adjust points **4**.
  - move throttle **forward**, adjust point **5**



NOTE: to get flaps to match at extremes (points **1** & **5**), it may be necessary to reduce one or both end points for the left flap.

- ☐ The flaps should now match perfectly throughout the range of throttle stick travel. Check now, paying particular attention around the flap neutral position.
- ☐ Exit CAL mode

5.2.1.4 Set flap neutral and spoiler (crow) travel

In this step, you'll (a) set the flap neutral position, and (b) set flap travel for crow brakes. For these adjustments you'll leave **CAL** mode and make some adjustments to the mixers.

- ☐ Activate the **CRUISE** flight mode (LS↓, throttle stick↑, SA in middle).
- ☐ Enter the **MIXER** menu
- ☐ Adjust flap neutral:
  - Scroll down to CH11 (FlapCm)
  - Select the 'Neutral' mix line (displayed in the right-most column), and open the mixer editor.
  - Make sure that the spoiler stick is fully forward
  - Adjust *Weight* so that the flaps line up with the wing profile.
  - Exit the mixer editor.
- ☐ Adjust flap travel:
  - Still with CH11 (FlapCm), select the 'Splr' mix (displayed in the right-most column)
  - Pull back fully on the spoiler stick. The flaps will move downwards.
  - In the mixer editor, adjust *Weight* until you achieve the correct travel. (Don't worry about over-driving the flap servos - you've already calibrated the servos so they'll stop dead before doing any damage.)
  - Exit the mixer editor.

☐ Check the transition between **LANDING** and **CRUISE** modes as follows:
- Move the spoiler stick forward and back. The transition between **LANDING** and **CRUISE** modes will be indicated by a voice alert – the flaps should transition smoothly at this point.
- If there is a sudden jump, then almost certainly you skipped the stick calibration, or did not complete it correctly - calibrate the sticks now, and the re-start the setup procedure.

5.2.2 Calibrate ailerons (CHs 1, 2)

The goal of this step is to set the end points and centre of the ailerons.
NOTE: **in CAL mode, both ailerons move together in the *same* direction**. This makes it easy to match the ailerons, simply by sighting down the fuselage.

☐ Enable **CAL** flight mode. The tx should chirp every five seconds.

☐ Go to the **OUTPUTS** menu

☐ Move the aileron stick to the **right** and check that **both ailerons move *upwards together.*** Reverse servo(s) as necessary by skipping to the *Direction* column and pressing [ENTER] (make sure to press once only).

☐ For each servo, leave stick at centre and adjust *Subtrim* so that the ailerons line up with the trailing edge.

☐ Adjust the aileron servos for *maximum possible* travel as limited only by the linkage geometry. For each servo:

- ☐ Hold the aileron stick fully to the **right**. Increase *Max* until the linkage just start to bind in the **up** position. Back off slightly.
- ☐ Hold the aileron stick fully to the **left**. Decrease *Min* until the linkage just start to bind in the **down** position, then back off slightly.
- ☐ Re-adjust *Min* or *Max*, so that the travel is the same either side of the centre.

☐ Finally, equalise the travel on both ailerons, while still maintaining the equal up/down travel on each. Again, this may require backing off some adjustments.

☐ Check, and check again: *equal up/down on each aileron, and left and right ailerons match!!*

Note: On some models, the downward travel of the aileron may be restricted because of the hinge design. If so, it may not be possible to complete the calibration as described without limiting upward movement as well.
If this is a problem, then you can modify the calibration procedure so that less down movement is required to complete the calibration. The mod requires altering the Diff values in the aileron CAL mixes:

1. Enter the MIXERS menu, and skip down to CH1(RtAil)
2. Select the 'CAL' mixer line, and press [long ENTER] to open the mixer editor.
3. In the Diff field, set diff value to +50%.

Repeat steps 1-3 for the Ch2(LtAil)

For each aileron, you can now adjust *Min* so that the down-going travel **is 50%** of the up-travel.
Note: The 50% diff only applies in **CAL** mode. Once out of CAL mode, aileron diff is controlled by the rudder trim alone. Later, you'll can adjust rates and diff in order to avoid binding (no need to worry now!)

☐ Exit **CAL** mode

☐ Enter **CRUISE** mode

☐ Check the ailerons move in the correct sense.
NOTE: The down-going movement will be affected by the value of *Diff*, adjustable using the rudder trim. We'll adjust travel and diff in a later step.

5.2.3 *[V-TAIL only]* Calibrate V-tail (CHs 5,6)

- [ ] Enable **CAL** mode. The tx should chirp every five seconds.
- [ ] Calibrate the V-tail servos, following the same steps as above for the aileron servos (see §5.2.2), but note: when in **CAL** mode, pushing **forward** on the elevator stick should cause both elevators should move ***upwards.*** **Note that this is the opposite of normal operation!!!** It's for calibration only.
  Reverse one or both servos if necessary, by toggling the *Direction* column with the ENTER key (take care to press ENTER once only).
- [ ] Exit **CAL** mode
- [ ] Check that the V-tail surfaces respond correctly to rudder and elevator inputs.

5.2.4 *[X/T tail only]* Calibrate rudder (CH 6)

- [ ] Enable **CAL** mode. The tx will chirp every five seconds.
- [ ] Go to the **OUTPUTS** menu, select Rudder servo
- [ ] Move the rudder stick to the right**;** the rudder should move to the right. If not, then reverse the servo by toggling the *Direction* parameter.
- [ ] Adjust *Subtrim* to centre the rudder.
- [ ] Set the servo end points. These will correspond to the 'never exceed' positions of the rudder, i.e. the furthest the rudder can travel before damaging the linkage. These are the steps:
  - [ ] Hold the rudder stick fully right, and increase *Max* until the linkage just start to bind, and then back off slightly.
  - [ ] Hold the rudder stick fully left, and adjust *Min* so linkage just starts to bind, then back off slightly.
  - [ ] Finally, equalise rudder movement left and right. You may need to back off either *Min* or *Max.*
- [ ] Exit **CAL** mode.

5.2.5 *[X/T tail only]* Calibrate elevator (CH 5)

- [ ] Enable **CAL** mode. The tx should chirp every five seconds.
- [ ] Calibrate the Elevator servo. The steps are the same as rudder (§5.2.4), but with the following difference: Pushing **forwards** on the elevator stick should cause the elevator to move ***upward***. **NOTE: this is the opposite of normal operation**, and is only for calibration. If the elevator moves downwards*,* toggle the *Direction* parameter*.*
- [ ] Exit **CAL** mode
- [ ] Check the elevator works in the correct direction for normal flight.

5.3 Backup the EEPROM

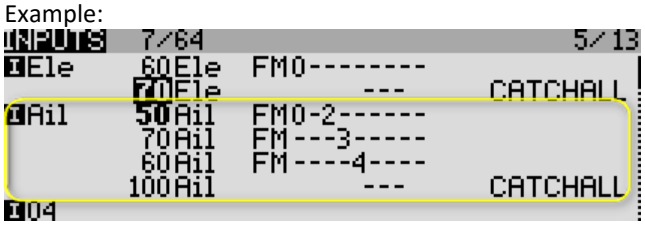
Well done, the calibration phase is complete. This is a good time to back up your EEPROM.

- [ ] Exit to the main Info screen
- [ ] Press [long MENU], then [PAGE] till the Version menu appears, then press [long ENTER].

There may be a short delay while the EEPROM is written.

5.4 Adjust control travel and mixing

In the final section, you'll adjust the control travel and mixing. Most of the adjustments will affect more than one control surface. As they have been calibrated, they will track correctly!

Control / mix	Adjustment point	Adjustment notes
☐ Aileron travel, and expo	**INPUTS**→Ail	Adjusts the travel and expo of the ailerons. Each line in the **INPUTS** menu defines a rate/expo for one or more flight modes. To adjust the rate, open the editor and adjust the *weight* parameter. To adjust expo, highlight the *diff* field, press ENTER, select *expo*, then set required value in adjoining field. **How it works** Starting with the first Input line, OpenTx skips down the list of Inputs, stopping at the first line where the active flight mode is enabled. OpenTx uses the rate and expo from that line. *Important note:* If OpenTx can't find a line with a matching flight mode, the ailerons will not operate at all! Therefore *the last line should have all 8 flight modes ticked*, in case a flight mode is missed in the lines above. This acts as your default or 'catchall'. Example:  *Key to flight mode numbers:* FM0 = **THERMAL** FM2 = **POWER** FM3 = **LANDING** FM4 = **CRUISE** FM5 = **SPEED** NOTE: make sure that the *Diff* parameter is zero in all lines (*Diff* in the **INPUTS** affects *stick* diff, not control surface diff!!).
☐ Elevator travel	**INPUTS**→Ele	*As above*
☐ Rudder travel	**INPUTS**→Rud	*As above*
☐ Spoiler→Aileron	**MIXERS**→CH10 (AilCm) →Spoilr	Adjust upward aileron movement due to spoiler: 1. Enable **LANDING** mode 2. Move throttle stick fully back (max spoiler) 3. Open **MIXER** menu and scroll down to CH10 4. Select the 'Spoilr' line (as shown in right column) 5. Adjust *Weight* for required up-aileron movement
☐ Aileron→flap	**GLOBALVARS**→GV5("Ail2FL")	Adjust aileron to flap ("flapperon") mixing for each flight mode. 1. Open **GLOBALVARS** menu, highlight GV5("Ail2FL"). 2. Adjust aileron to flap mix as follows: -Enable **POWER** mode, adjust GV5/FM2 -Enable **THERMAL** mode, adjust GV5/FM0 -Enable **LANDING** mode, adjust GV5/FM3 -Enable **CRUISE** mode, adjust GV5/FM4 - Enable **SPEED** mode, adjust GV5/FM5 Note: movement of down-going flap will be affected by *Diff* setting (adjusted via rudder trim, see later).

Control / mix	Adjustment point	Adjustment notes
□ Camber (flaps)	**GLOBALVARS**→GV1("Cm2Ail") **GLOBALVARS**→GV2("Cm2Fl")	Camber is adjustable +/- 50% using lever RS. For example if the nominal camber is 4 degrees (RS at centre), the total range will be 2 – 6 degrees (RS at end points). In this step, you will set the nominal camber. Start with flaps: 1. Enable **THERMAL** mode 2. Move RS to centre position. 3. Open **GLOBALVARS** menu, scroll down to GV2/FM0 4. Adjust value for desired camber For ailerons, repeat 2-4 above using GV1/FM0. Finally, check camber range by moving RS up and down.
□ Motor compensation	**GLOBALVARS**→GV3("CmpMax")	Motor compensation is used to counteract pitch changes due to motor thrust. Compensation can be adjusted in flight, via the throttle trim: - Forward trim = pitch down - Centre trim = zero compensation - Back trim = pitch up The adjustments should be made with the motor disarmed. 1. Open GlobalVars menu, highlight GV3/**FM2** 2. Enable **POWER** mode (with motor control disabled) 3. Push LS *fully forward (*max motor). 4. Move throttle trim *fully forward (*max down-compensation) 5. Adjust GV for required *max down compensation* 6. Move throttle trim to centre prior to flight tests During flight testing, enter **POWER** mode. Move throttle to idle end, and use elevator trim to adjust pitch trim. Then apply full motor thrust and use the throttle trim to adjust for level flight.
□ Reflex	**GLOBALVARS**→GV1("Cm2Ail") **GLOBALVARS**→GV2("Cm2Fl")	In **SPEED** mode, you can specify reflex (negative) camber. To set up reflex, start with the flaps: 1. Enable **SPEED** mode. 2. Open **GLOBALVARS** menu, highlight **GV2/FM5** 3. Adjust for required reflex To set up for ailerons, repeat 1-3 above using **GV1**/FM5
□ Reverse diff	**GLOBALVARS**→GV6("RevDif")	Reverse diff is used to improve roll response under braking by increasing the down-going movement as aileron is applied. It's an optional adjustment. 1. Open **GLOBALVARS** menu, highlight GV6/FM3 2. Enable **LANDING** mode 3. Apply full spoiler and full left or right aileron 4. Adjust GV6/FM3 so that the *downgoing* aileron is at the desired position (normally a little below the neutral position) NOTE: this measure for improving roll response is in addition to aileron diff suppression, which is automatically applied.

Control / mix	Adjustment point	Adjustment notes
□ Spoiler→Ele compensation	**GLOBALVARS**→GV3("CmpMax")	Compensates for pitching when spoiler is deployed. Compensation is adjustable in flight using the throttle trim. It works like the elevator trim, i.e.: - Centre trim = zero compensation - Forward trim = pitch down - Back trim = pitch up Set the range of adjustment of the throttle trim: 1. Enable **LANDING** mode. 2. Deploy max spoiler by pulling throttle stick fully back 3. Move throttle trim fully forward (max downwards comp) 4. Open **GLOBALVARS** menu, highlight GV3/FM3 5. Adjust setting for maximum required downward pitch trim. 6. Move throttle trim to correct setting for flight. If not known, set trim to centre (zero compensation). During flight tests, apply full spoiler. Note any pitching tendency and cancel using throttle trim. For non-linear compensation, adjust curve 'SpComp' after initial flight tests.
□ Combi rudder	**GLOBALVARS**→GV7("Combi")	The Combi mix generates some complementary rudder movement in response to aileron inputs. A small amount can helps smooth turns without the need to coordinate rudder and aileron controls. Combi can be set per flight mode. Adjust as follows: 1. Open **GLOBALVARS** menu, highlight GV7("Combi") 2. Adjust GV7 per flight mode as follows: - Enable **POWER** mode, adjust GV7/FM2 - Enable **THERMAL** mode: adjust GV7/FM0 - Enable **LANDING** mode: adjust GV7/FM3 - Enable **CRUISE** mode: adjust GV7/FM4 - Enable **SPEED** mode: adjust GV7/FM5

6 Summary of in-flight adjusters

Target	Adjuster	Flight mode	Notes
Aileron Diff	Rudder trim	*[All modes]*	*Diff* is stored per flight mode Default range is 0 - 70% Trim centre corresponds to 35% diff
Spoiler→Ele compensation	Throttle trim	Landing	Adjust compensation with full spoiler deployed
Motor→Ele compensation	Throttle trim	Power	Adjust compensation with motor at full power
Aileron Trim	Aileron trim	*[All]*	Aileron trim can be adjusted in any flight mode but is global, i.e. the same trim value is shared by all flight modes.
Elevator trim	Elevator trim	*[All]*	Elevator trim is stored per flight mode

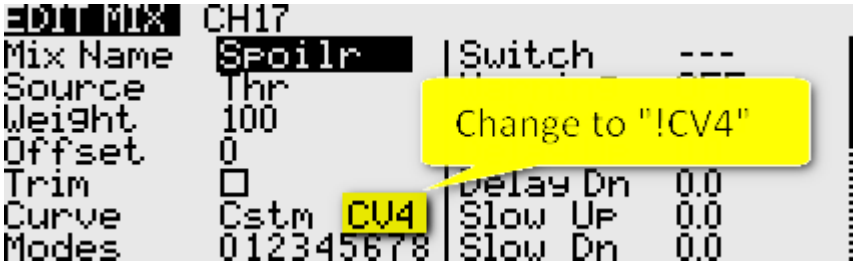
7 Customisations

This section describes various simple customisations you can make. *Apply these only after the basic setup is complete!* These customisations will not affect other settings above.

7.1 Reversing the spoiler stick

By default, zero spoiler corresponds to throttle stick fully-forward. To reverse the behaviour:

1. Open the **MIXERS** menu
2. Skip down to CH17 (RawSpl)→Spoilr
3. Open the mixer editor
4. Change the curve from 'CV4' to '**!**CV4' (note leading exclamation mark).



7.2 Altering minimum SH duration for motor arm/kill

SH must be pulled for a minimum duration in order to arm or kill the motor.
To increase or decrease the minimum durations:

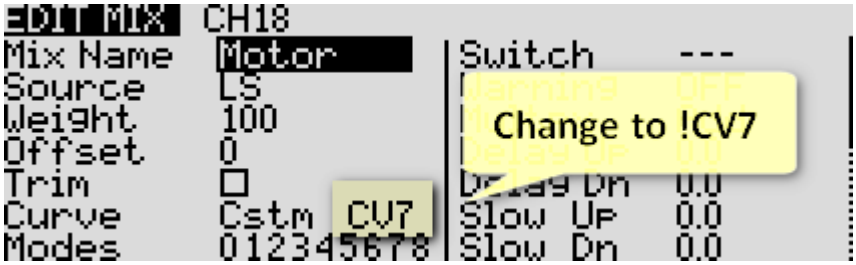
1. Open the Logical Switches menu
2. To alter arming duration, edit L8. Default = 1.2 secs
3. To alter the kill duration, edit L11. Default = 1.1 secs

Note: For reliable operation, the kill duration must be less than the arming duration.

7.3 Reversing the motor lever

By default, motor off (idle) corresponds to LS fully back. To alter so that motor off is with LS fully forward:

5. Open the **MIXERS** menu
6. Skip down to CH18
7. Open the mixer editor
8. Change the curve from 'CV7' to '**!**CV7' (note leading exclamation mark).



NOTE: the transition point for the Power flight mode will change as well.

7.4 Changing the assignments of Spoiler, Motor and Flap

Spoiler, motor and flap functions may be assigned to any suitable control. Recommended options for the Taranis X9D are as follows:

Function	Assign to	Default	Menu point
Spoiler	Thr, LS, or RS	Thr	MIXERS→CH17
Motor	Thr, LS, RS, or 3p switch	LS	MIXERS→CH18
Flap	Thr, LS, RS, or 3p switch	RS	MIXERS→CH20

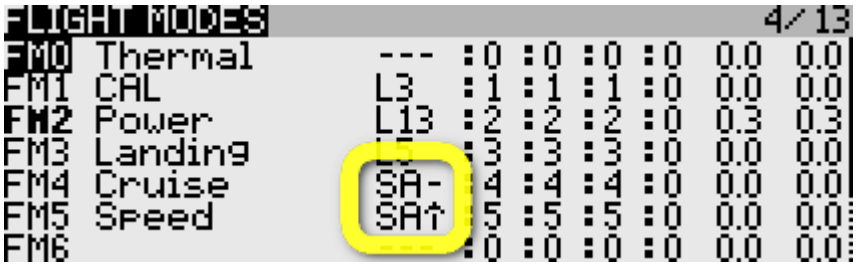
To reverse the motor and/or spoiler controls, follow the procedures in §7.1 and §7.3.

7.5 Changing the flight mode switch

By default, selection of flight modes is via SA. You can specify another switch ***Sw*** instead, as follows:

1. Choose ***Sw*** from any unused 3-position switch (available switches for the X9D are SA, SB, SC, SD, SE or SG).
2. In the **FLIGHTMODES** menu, set the switches as follows:
   - FM4 (**CRUISE**): ***Sw***-middle
   - FM5 (**SPEED**): ***Sw***-up

   NOTE: **THERMAL** mode will be ***Sw***-down (there is no need to explicitly set this).

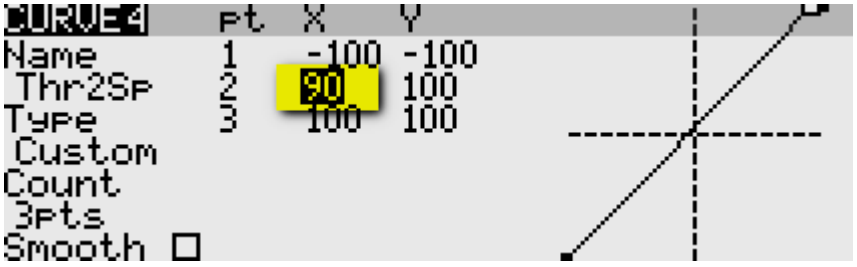


7.6 Adjusting spoiler stick deadband

The spoiler stick response incorporates some deadband at the idle end to help prevent accidental deployment. A small amount of deadband is also desirable to allow for pot drift and ratchet slip.

The default deadband should be fine for most pilots; however it can be adjusted as follows:

1. Go to **CURVES** menu
2. Open Curve 4 ('Thr2Sp')
3. Adjust pt2 -> X. Decrease value to increase the deadband. Default value is 90.



8 Applying your own modifications

If you wish to make your own modifications, please study the Excel documentation carefully and make sure you understand the implications of any changes. The recommended workflow is as follow:

1. Setup your model first, as described in this manual
2. Backup your work
3. Apply your modifications incrementally, testing and backing up as you go along.

9 Pre-flight checks

Before flying with this setup for the first time, make sure you

- Train your ESC to recognise the motor off/on states – consult your ESC documentation.
- Set the battery alarm threshold to suit your battery chemistry, for both the tx and rx.
- Set the failsafe

10 Disclaimer

Pretty obvious really, but worth repeating: although this setup is well tested, it's up to the pilot to make sure that the controls respond correctly under all conditions. The author can't be held responsible for any bugs in the setup or documentation. Remember to test your setup thoroughly before flying!

11 Contact

If you have any queries or suggestions, or if you find any errors in the documentation, or just want to say hello, then please contact me at http://rc-soar.com/email.htm.

Happy flying!
Mike Shellim