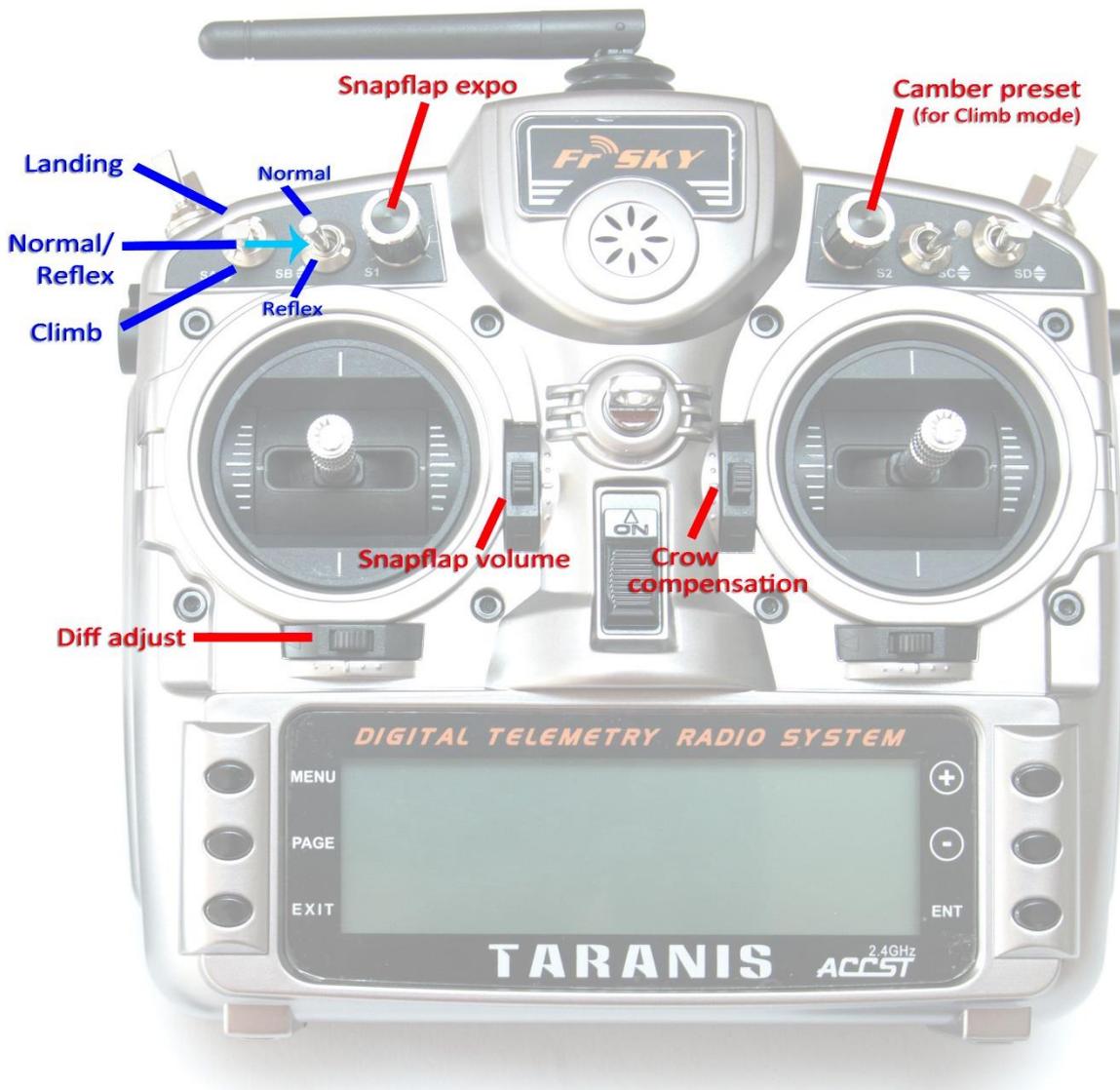


F3F template for OpenTX

Version 6.0

Setup Guide

Mike Shellim
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1 INTRODUCTION

1.1 DESCRIPTION

F3F is a template for slope racers with 6 servos. It's well proven in competition both in the UK and abroad. It features quick setup, simple operation, and easy trimming. An integrated CAL mode ensures precise tracking of control surfaces.

APPLICATION

- For 6-servo gliders
- V-tail and X-tail versions
- Any stick mode

FLIGHT MODES

- Normal, Reflex, Climb, Pump and Landing
- Voice confirmation
- Flight mode switch layout can be customised

IN-FLIGHT ADJUSTERS

- Adjuster for snapflap volume
- Adjuster for snapflap expo
- Adjuster for camber preset
- Adjuster for crow-to-elevator compensation

CROW FUNCTIONS

- Choice of deployment methods
- Automatic differential suppression
- Reverse diff
- Crow/elev compensation with multi-point curve
- Adjustable deadband on crow control

CONTROL SURFACE CALIBRATION

- Special 'CAL' mode for adjusting servo centres and limits
- 5-point balancing curve for flaps
- Full rotation can be used for flap servos

(OPTIONAL) ADVANCED SNAPFLAP MIX

- In-flight adjustable snapflap deadband via Lua script

Before you begin your journey to a great F3F setup, please observe the golden rules for success:

- **PLEASE READ THIS GUIDE ONCE, BEFORE STARTING**
- **FOLLOW THE INSTRUCTIONS IN SEQUENCE**

1.2 REQUIREMENTS

The following are required:

- Transmitter with two or more knobs or sliders
- OpenTX 2.3.5 or later
- OpenTx Companion software
- USB cable

1.3 PACKAGE CONTENTS

What's included in the ZIP file:

Filename	Description
F3f_60_userguide.pdf	This document
F3f_60_reference.xls	Settings reference
F3f_60?.otx	Model file with two templates: 'X' for cross- and T-tail, 'V' for V-tail
*.wav	Sound files
snp410.lua	(optional) advanced snapflap script
snp410InstallGuide.pdf	Install guide for advanced snapflap mix

2 OVERVIEW

2.1 CONTROLS AND SWITCHES

The stick mode is defined in **RADIO SETUP → MODE** menu. All stick modes are supported by the template. The default control and switch assignments are as follows:

Function	Control/switch	To change
Crow brakes	Throttle stick	Section 7.5
Diff adjust (per flight mode)	Rudder trim	
Snapflap vol (PUMP, NORMAL, REFLEX modes)	Throttle trim	
Crow compensation (LANDING mode)	Elevator trim	
Main flight mode switch	Switch SA	Section 7.1
NORMAL/REFLEX mode	Switch SB	Section 7.1
Camber adjust (CLIMB mode)	S2	Section 7.7
Snapflap alerts	Switch SC	Section 7.8
Snapflap expo adjust	S1	Section 7.6
Snapflap lower deadband	<i>If advanced Lua script installed</i>	LS
Snapflap upper deadband		RS

2.2 FLIGHT MODES

There are 5 primary flight modes: NORMAL, CLIMB, PUMP, REFLEX and LANDING. Operation is shown in the table below (using the default switch assignments).

Flight Mode	Number	Activation switches (defaults shown)	
NORMAL	FM0	SA —	SB↑ or SB—
REFLEX	FM3		SB↓
LANDING	FM2	SA ↑	
CLIMB/PUMP	FM6/FM5	SA ↓	

PUMP mode is disabled by default. For info on setting up, see section 7.4.

2.3 MIXER TABLE

The table below shows the mixers active in each flight mode. Mix adjusters in brackets.

Flight mode	Crow	Crow comp	Snapflap	Camber	Reflex	Ail to Rudder	Ail to Flap
Climb				✓ (S2)		✓	✓
Pump			✓ (Thr trim)			✓	✓
Normal			✓ (Thr trim)			✓	✓
Reflex			✓ (Thr trim)		✓	✓	✓
Landing	✓	✓ (Ele trim)				✓	✓

2.4 SERVO ASSIGNMENTS

Channel #	V-tail	X-tail
1	Right aileron	
2	Left aileron	
3	Right flap	
4	Left flap	
5	Right Vtail	Elevator
6	Left Vtail	Rudder
7-12	<i>free</i>	

The left and right channels are not interchangeable – please ensure they are connected correctly! Channel assignments can be changed using the author's [ChannelChanger](#) script.

2.5 CAL MODE

CAL mode (FM1) is a special flight mode for calibrating the outputs. When CAL is activated, mixers and trims are disabled, and the stick values are passed directly to the outputs. To activate CAL mode:

1. Apply full left aileron and full up elevator, and hold.
2. Pull and release SH
3. Release sticks.
4. Listen for voice confirmation that CAL mode is activated.
5. Choose the submode
 - **SA—**: for calibrating end points, and flaps. The flaps move in 25% increments.
 - **SA↓**: for calibrating flap offset
 - **SA↑**: using 50% aileron movement (to avoid damage to linkages)

To exit CAL mode, pull SH.

2.6 BASIC OPERATION

This section describes the main features of the template.

Aileron, rudder and elevator trims

- Aileron trim is shared across all flight modes.
- Elevator trim is per flight mode (but see section 6.1 for LANDING mode).
- Rudder and throttle trims are repurposed (see below).

Camber and reflex

- In CLIMB mode, camber is adjustable via S2.
- In REFLEX mode, reflex is preset.

Aileron to flap mix

- Aileron-to-flap mixing may be set per flight mode.

Brake compensation (brake=>elevator)

- Counteracts pitch-up due to brakes.
- Adjusted using elevator trim.
- Compensation curve can be fine tuned.

Aileron differential

- Adjustable per flight mode, via the rudder trim.

Roll rate enhancement

- Aileron diff is suppressed as brakes are applied, for improved roll response.
- The aileron drop with full brakes can be further increased via a 'reverse diff' setting

Aileron=>rudder mix

- Aileron=>rudder mix may be set per flight mode.

Snapflap

- Snapflap is available in NORMAL, REFLEX and PUMP modes.
- Snapflap volume is per flight mode, adjustable via the throttle trim.
- Expo is adjustable via S1, for all flight modes.
- Audio alerts at 5% and 95% snapflap, to aid tuning.
- [optional] Advanced snapflap Lua script permits dynamic adjustment of upper and lower deadband.`

Pump mode

- PUMP mode is optional, for 'pumping' during the 30-second climbout in an F3F comp.
- Having a dedicated PUMP mode allows specific rates to be set for pump manoeuvres.
- PUMP mode is disabled by default.

3 PREPARING THE TRANSMITTER

3.1 TRANSFER TEMPLATE TO TRANSMITTER

Start by transferring the template to your transmitter. The model is not needed for this step.

Establish a USB connection

1. Enter Bootloader mode (the exact method will depend on your transmitter).
2. Connect to PC via USB. The tx's SD card should appear as an external drive.

Copy sound files

1. Copy the supplied sound files to the */SOUNDS/{language}* folder on the SD card. For example, the English folder is */SOUNDS/en*.

Transfer template to transmitter

1. Start the Companion software, using the correct profile for your transmitter
2. Open supplied file *F3F_60.otx*. Versions for X and V tails are displayed.
3. If you're using a transmitter other than the X9D, you may see a window with translation errors and warnings. You can safely ignore these unless you're using a Q X7 or other radio without sliders LS and RS..
4. If you have a Q X7 or other radio without sliders, there may be critical errors for sliders LS, RS in CH24 and CH25. Open the Mixers menu, then delete the mixers for CH24 and CH25. **IMPORTANT: delete the mixers before saving the .OTX file!** This only needs to be done for the version (X- or V-tail) that you are using. (The deleted channels are for the optional advanced snapflap script.)
5. From the File menu, choose *Read Models and Settings From Radio*. The models from the radio are displayed in a second window.
6. Drag one of the F3F models into an empty slot in the model list.
7. Close the *F3F_60.otx* window.
8. Right-click the new model and choose "Use as Default"
9. From the File menu, choose *Write Models and Settings to Radio*.
10. Close OpenTx Companion

3.2 HARDWARE CALIBRATION

The transmitter hardware (sticks, sliders etc.) must be properly calibrated, so do so now if you haven't already calibrated or are not sure. To do a hardware calibration:

1. Open the **RADIO SETUP** menu and page to *Hardware -> Calibration (Horus)* or *Calibration (Taranis)*
2. Calibrate all sticks, knobs and sliders.

3.3 TELEMETRY

Check that your transmitter is receiving telemetry (if supported by the protocol and module). If you encounter problems, try rediscovering your sensors as follows:

1. Open the **TELEMETRY** menu
2. Choose 'Delete all sensors' then 'Discover sensors'

RSSI low/critical warning thresholds are 45/42 by default, as recommended for FrSky ACCST. If using ACCESS protocol, change to 35/32.

3.4 FAMILIARISATION

Using the transmitter on its own, practise the following:

- Activate **NORMAL**, **CLIMB**, **PUMP** (if enabled), **REFLEX** and **LANDING** (see Section 2.2).
- Activate **CAL** mode and sub-modes (see Section 2.5)
- Verify that the sounds are working correctly. If not, check that the sound files are in the correct location.

4 CALIBRATING THE OUTPUTS

In this section you will set the rotation and operating range of the servos.

4.1 SET SERVO ROTATION

First, set the rotation of each servo:

1. Switch on the transmitter (do not power up the receiver yet)
2. Crow stick to centre
3. Enter **CAL** mode
4. Switch **SA** to middle.
5. Power up the receiver
6. Open the **OUTPUTS** menu
7. Set the servo rotations according to table below.

IMPORTANT: pay special attention to the notes below – some surfaces behave differently in CAL mode.

Stick command	Control surface	Notes
Aileron stick right →	Ailerons ↑	Both ailerons move up together
Thr stick back ↓	Flaps down ↓	The stick response is stepped
V-tail only Ele stick forward ↑	Vee surfaces ↑	Elevator operates in reverse to normal
X-tail only Ele stick forward ↑	Ele up ↑	
X-tail only Rudder stick right →	Rud goes right →	

To change the direction of an output:

1. Go to the *direction* field
2. Press {enter}, and immediately {return}

OUTPUTS	1500us	Direction	7/14
CH1 RtAil	0.0 -150.0 - 150.0	←	RtA 1500Δ
CH2 LtAil	0.0 -150.0 - 150.0	→	LtA 1500Δ
CH3 RtFlap	0.0 -150.0 - 150.0	↔	RtF 1500Δ
CH4 LtFlap	0.0 -150.0 - 150.0	→	LtF 1500Δ
CH5 Elev	0.0 -150.0 - 150.0	→	Ele 1500Δ
CH6 Rudd	0.0 -150.0 - 150.0	→	Rud 1500Δ
CH7	0.0 -100.0 - 100.0	→	--- 1500Δ

Do a final check:

1. Exit CAL mode, enter CRUISE mode.
2. Check for correct direction of aileron, elevator and rudder.

Important note: The flaps will not function yet!!

4.2 ADJUST SERVO END POINTS AND CENTRES

The next task is to set the operating limits of the servos. At the same time, you will compensate for linkage differences between the left and right sides of the model. **All adjustments are made in CAL mode.**

When making the adjustments:

- Set the servo end points to the *maximum possible as limited by the linkages and hinges*. You may need to refine the adjustments to achieve symmetry – how to do this is described at each step.
- Adjustments are made using curves. **Do not alter min, max or subtrim!**

Channel	Calibration procedure
<input type="checkbox"/> CH 4 – Lt Flap	<p>Start with the left flap (it will be used as the reference when calibrating the right flap):</p> <ol style="list-style-type: none"> 1. Enter CAL mode 2. SA to middle 3. Go to OUTPUTS menu 4. Highlight left flap channel (default CH4) 5. Skip to curve field LtF, and press {long enter} to open curve editor 6. Throttle stick fully back (↓), adjust point 1 for <i>lower</i> end point. 7. Throttle stick fully forward (↑), adjust point 3 for <i>upper</i> end point. 8. Adjust point 2 so it lies on the straight line between points 1 and 3. Do not worry that the point 2 does not correspond to the airfoil centre line – that will be fixed later. <p>Move throttle stick from one end to the other, observing step intervals. If they are grossly unequal, adjust point 2 to for better linearity.</p>
<input type="checkbox"/> CH 3 – Rt Flap	<p>Next, CALibrate the right flap so it precisely matches the left flap:</p> <ol style="list-style-type: none"> 1. Return to OUTPUTS menu 2. SA to MIDDLE 3. Highlight the right flap channel (default CH3) 4. Skip to curve field RtF, press {long enter} to open curve editor <p>Adjust points 1 – 5 to exactly match the left flap:</p> <ol style="list-style-type: none"> 5. Stick fully back, adjust point 1 6. Stick ½-back, adjust point 2 7. Stick to centre, adjust point 3 8. Stick to ½-forward, adjust point 4 9. Stick fully forward, adjust point 5 <p>To match the end points on left and right sides, it may be necessary to reduce one or other end points for the left flap.</p>

Channel	Calibration procedure
Flap offset	<p>Next, CALibrate the flap offset. This must also be done in CAL mode.</p> <ol style="list-style-type: none"> 1. Return to OUTPUTS menu 2. Page to GLOBALVARS menu. 3. SA down – listen for ‘calibrate flap neutral’ 4. Go to cell GV5:Fnu→FM0 5. Adjust offset so that flaps follow the neutral profile <p>If flaps are not in line, redo the calibration of the right flap (see previous step), paying attention to the two points either side of the neutral position.</p>
V-Tail CH 5: RtVee CH 6: LtVee	<p>Next, CALibrate V-tail (V-tail version only)</p> <ol style="list-style-type: none"> 1. Return to OUTPUTS menu 2. Highlight right Vee channel (default CH5) 3. Skip to curve field ERv, press {long ENTER} to open curve editor 4. Ele stick to centre, adjust point 2 for correct neutral 5. Ele stick forward (↑), set point 3 to upper limit 6. Ele stick back (↓), set point 1 to lower limit. <p>Repeat for left Vee channel (CH6) and curve RLv</p> <p>Check equal travel up/down; left and right surfaces match</p>
X-tail CH 5 – Ele	<p>CALibrate elevator (X-tail version only).</p> <p>IMPORTANT: in CAL mode, the elevator moves in reverse to normal.</p> <ol style="list-style-type: none"> 1. Go to the OUTPUTS menu 2. Highlight the Ele channel (default CH5) 3. Skip to curve field Ele, press {long enter} to open curve editor 4. With Ele stick at centre, adjust point 2 so elevator is central 5. Move Ele stick forward (↑), then adjust point 3 for upper limit 6. Move Ele stick back (↓), then adjust point 1 for lower limit 7. Check elevator travel is equal up & down, reduce one or other side as necessary.
X-tail CH 6 – Rudder	<p>CALibrate the rudder (X-tail version only)</p> <ol style="list-style-type: none"> 1. Return to the OUTPUTS menu 2. Highlight the rudder channel (default CH6) 3. Skip to curve field Rud, press {long enter } to open curve editor 4. With stick in centre, adjust point 2 so rudder is central 5. Move Rudder stick right (→), then set point 3 for max right movement 6. Move Rudder stick left (←), then set point 1 for max left movement 7. Check equal travel left/right, reduce one or other side if necessary.
<input type="checkbox"/> CH 1 – Rt Ail <input type="checkbox"/> CH 2 – Lt Ail	<p>Finally, CALibrate ailerons:</p> <p>IMPORTANT: in CAL mode, the ailerons move together.</p> <ol style="list-style-type: none"> 1. Return to the OUTPUTS menu 2. SA down – listen for ‘calibrate flap neutral’. 3. Highlight CH1:RtAil 4. Skip to curve field RtA, then press {LONG ENTER} to open curve editor 5. With aileron stick centred, adjust point 2 for correct centre. 6. Move aileron stick right →, then set point 3 to desired upper limit. Allow enough movement for simultaneous crow and aileron inputs. 7. Move aileron stick left (←), then set point 1 so that down-travel = up-travel. If you cannot get sufficient down movement due to geometry, then <ol style="list-style-type: none"> 1. Move SA up (↑) – this reduces aileron movement by 50%. <i>Note: this reduced rate applies only in CAL mode!</i> 2. Now try again: Move aileron stick left (←) and adjust point 1 so down-travel = (reduced) up-travel. Full rate will be restored when you exit CAL; don’t worry if down-travel is excessive – later adjustments in the INPUTS menu, and to aileron diff, will reduce the movement. <p>Repeat all steps for left aileron (CH2)</p> <p>Check for equal up/down movement, and that left and right ailerons match.</p>

Check operation:

1. Exit CAL mode
2. Move the sticks, checking that aileron, elevator and rudder control surfaces move in the correct sense.
Note that the flaps will not function yet (it will be configured in the next section).
3. The travel will be excessive – don't worry, it'll be dialled down in the next section.

5 CONFIGURING TRAVEL AND MIXERS

In the final section, you'll set the control travel ('rates') and mixers. Watch your model come to life!

Note: Transmitters with small mono screens (TX12, X-Lite, X9 Lite etc.) do not have a GLOBALVARS menu. Instead, GVARs are accessed through the **FLIGHT MODES** menu.

5.1 AILERON, ELEVATOR AND RUDDER TRAVEL (INPUTS MENU)

Following calibration, the travel of the control surfaces may be excessive. In this section, you'll reduce the input rates to achieve the required travel.

1. Enter NORMAL mode
2. Open the **INPUTS** menu
3. Scroll down to [I]Ail, [I]Ele or [I]Rud as required
4. Press {LONG ENTER} and choose Edit
5. Skip to the *weight* field
6. Adjust weight for required travel.
7. To add expo, skip to *Curve* field, choose 'Expo' as the curve type. Set required value. *Do not set diff here!*

When adjusting aileron travel, consider upward travel only (downward travel will be adjusted in the next section.)

5.2 AILERON DIFF (RUDDER TRIM)

Aileron differential reduces the downward travel of the ailerons in response to roll commands. Diff is adjusted using the rudder trim. Diff varies from 70% to 0% as the trim is moved from left to right, in other words the downward travel increases as the trim is moved to the right - think of it as a roll rate control!

Diff settings are stored independently for each flight mode - *make sure to set diff for all flight modes!*

5.3 CROW BRAKE TRAVEL (GV: ACm, FCm)

Set the brake=>aileron and brake=>flap travel as follows:

1. Open **GLOBALVARS** menu
2. Enable LANDING mode
3. Move throttle stick back (full brake)
4. Go to row 'FCm', column FM2:Landing
5. Adjust value for required down flap movement
6. Go to 'ACm', column FM2:Landing
7. Adjust value for required up aileron movement

5.4 AILERON=>FLAP MIX (GV:A2F)

This mix increases the roll rate by moving the flaps as ailerons. Adjust per flight mode as follows:

1. Open **GLOBALVARS** menu, go to row 'A2F'
2. Activate flight mode to be adjusted - the column is highlighted
3. Adjust value in highlighted column

5.5 CAMBER/REFLEX PRESETS (GV:ACM, FCM)

Camber and reflex are independently adjustable in **CLIMB** and **REFLEX** modes.

Ailerons and flaps are configured separately as follows:

1. Open **GLOBALVARS** menu
2. Go to row 'ACm' (for ailerons)
3. Activate the flight mode to be adjusted (**CLIMB** or **REFLEX**)
4. Adjust value in highlighted column.
5. Repeat for row 'FCm' (for flaps)

5.6 AIL=>RUDDER (GV:A2R)

This mix can help the model during the turn. Adjust per flight mode as follows:

1. Open **GLOBALVARS** menu, go to row 'A2R'
2. Activate flight mode to be adjusted - the column is highlighted
3. Adjust value in highlighted column

5.7 SNAPFLAP (CH13->SNAP, CH14->SNAP)

Snapflap consists of two mixers: Ele=>flap, Ele=>aileron. Snapflap is active in **NORMAL**, **REFLEX**, and **PUMP** modes. The amount can be adjusted independently for each flight mode, using the throttle trim.

First, set the snapflap limits for flaps and ailerons. These apply across all flight modes

1. Activate **NORMAL** mode
2. Move throttle trim fully back (maximum snapflap)
3. Open **MIXERS** menu, go to CH14
4. Select the 'Snap' line
5. Press {long ENTER} to open mixer editor and highlight *weight* field.
6. Hold full up elevator
7. Adjust *weight* to set the limit of snapflap adjustment.
8. For the ailerons: repeat steps 3-7 but using CH13.

Finally, set the snapflap for each flight mode:

9. Enter **NORMAL** mode, adjust throttle trim
10. Repeat step (9) in **REFLEX** and **PUMP** modes.

5.8 REVERSE DIFF (CH27->AILUP)

To enhance the roll rate under braking, the template suppresses differential so that full down movement is restored with full crow. You can further increase the down-going aileron travel as follows:

1. Open **MIXERS** menu,
2. Scroll to CH27, first line ('AilUp')
3. Press {long Enter} to open mixer editor
4. Apply full brakes and full aileron
5. Adjust *weight* from the default 100% until the required down movement is achieved.

For best roll response, the down-going aileron should be a little below the aerodynamic neutral.

6 FLYING NOTES

6.1 ADJUSTING CROW COMPENSATION (NEW IN VERSION 6)

New in version 6 is a simple way of adjusting crow compensation, using the regular elevator trim.

The procedure as follows:

1. Enter **NORMAL** mode
2. Adjust trim as normal, using the elevator trim.
3. Enter **LANDING** mode and deploy 75% - 100% brake
4. Adjust compensation, *also using the elevator trim.*
 - Trim fully back = zero compensation
 - Trim fully forward = max compensation (80% down elevator)

Note: when the trim is fully back, you'll hear 'trim centre' in addition to 'minimum trim reached'. This is due to a quirk in OpenTX and is not a cause for worry.

Technical note:

- In Landing mode, (a) the 'base' trim is obtained from **NORMAL** mode, and (b) the elevator trim is repurposed to adjust the crow compensation mix.

Crow compensation curve.

The compensation curve is defined in CV11:CrC. The default is a typical 'S' shape which should provide good results on most F3/5X models. If necessary, edit the intermediate points only (do not alter the end points).

7 CUSTOMISING YOUR SETUP

This section describes how to customise your setup. You can customise at any time without breaking the setup.

7.1 CHANGING THE FLIGHT MODE SWITCHES

The flight mode switch assignments are 'soft' and specified via logical switches L05–L09.

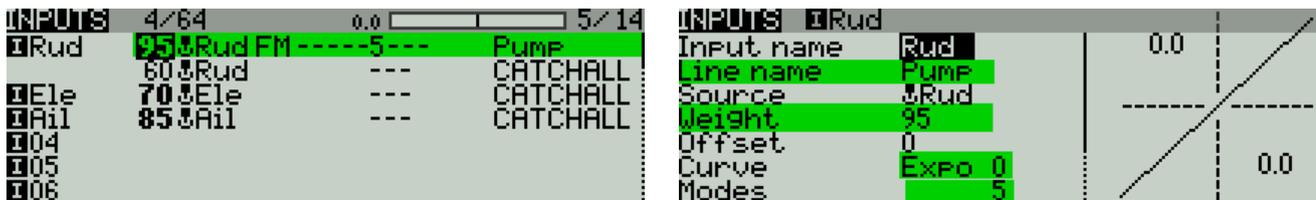
Flight mode	LS	V1 (Default assignment shown)	Notes
CAL & PUMP modes	L05	SH↓	Must be 2P spring switch (safety!)
LANDING mode (or Reflex mode if Autocrow enabled)	L06	SA↑	Main flight mode switch. Specify the same 3P switch but with different positions (↑↓−)
NORMAL mode	L07	SA−	
CLIMB mode	L08	SA↓	
REFLEX mode (if Autocrow disabled)	L09	SB↓	Regular (non-spring) 2- or 3P switch.

7.2 ADDING RATES

Rates are managed in the **INPUTS** menu. To add a new rate:

1. Go the **INPUTS** menu.
2. Highlight the last line in the Ail, Ele or Rud group.
3. Press {long Enter}, choose 'Insert Before'
4. Create a new input line.
5. Set source = Ail/Ele/Rud as appropriate
6. Set *weight* to the required rate.
7. Set *expo* as required
8. Tick applicable flight modes FM0=**NORMAL**, FM2=**LANDING**, FM3=**REFLEX**, (FM4 not used), FM5=**PUMP**, FM6=**CLIMB**.

The example below shows changes required to add high rudder rate (95%) for Pump mode (FM5):



Alternatively, you can specify a switch to select rates directly rather than by flight mode.

Note that the last (or only) line in each input should have all flight modes checked, and switch = '---'. This provides a safe fallback in case none of the previous lines is selected, perhaps due to a data entry error.

7.3 CONFIGURING 'AUTOCROW'

Autocrow allows you to activate LANDING mode by pulling on the Crow stick instead of via a switch. Many pilots prefer this style. When the Autocrow option is enabled, the following changes take place:

- LANDING mode is activated by pulling the crow stick
- REFLEX mode is assigned to the previous landing mode switch position (default SA↑)
- The previous reflex mode switch (default SB) becomes free for re-use.

Autocrow is enabled in the LOGICAL SWITCHES menu:

Option	Logical switch	Description
AUTOCROW	L02 Disable: 99 Enable: 100	Enables or disables Autocrow

7.4 CONFIGURING PUMP MODE

PUMP mode is disabled by default. When enabled, PUMP mode is activated as follows:

1. Enter CLIMB mode
2. Quick pull SH↓

PUMP mode is cancelled when another flight mode is active. Optionally, it can also be toggled on/off via SH↓.

PUMP mode is configured as follows:

Option	Logical switch	Description
PUMP	L03 Disable: 99 Enable: 100	Enables or disables PUMP flight mode for this template.
TOGGLE_PUMP	L04 Disable: 99 Enable: 100	Allows PUMP mode to be toggled on/off using SH↓.

7.5 CONFIGURING THE CROW STICK

The crow stick incorporates some deadband to prevent accidental deployment. The amount of deadband can be adjusted as follows:

1. Go to the Curves menu and open CV7 ('Cdb')
2. Edit the 'X' value in point 2. Decrease X to increase the deadband. Recommended value is ~85.

To reverse the crow stick:

3. Open the mixer editor for CH18→CrDdB
4. Skip to the Curve field
5. Change the curve from 'Cdb' to '!Cdb' (note leading exclamation mark).

7.6 CONFIGURING THE SNAPFLAP EXPO ADJUSTER

By default snapflap expo is assigned to S1. You can assign it to a different control as follows:

1. Open the mixer editor for CH20→SnpExp
2. Change the source as required.

To reverse the adjuster, change the sign of weight.

You can also disable the adjuster and use a preset expo value. To do this, edit mixer CH20→SnpExp, setting *source*=MAX and *weight*={desired expo}. This frees up the adjuster for other use.

7.7 CONFIGURING CAMBER PRESET ADJUSTER

By default the camber preset adjustment is assigned to S2. You can alter this as follows:

1. Open the mixer editor for CH13, 'Camber' line
2. Change the source as required.
3. Repeat for CH14

To reverse the direction, change the sign of weight in each mix.

7.8 CONFIGURING SNAPFLAP ALERTS

To aid optimisation of snapflap, alerts can be sounded in normal, reflex and pump modes.

- A short beep as snapflap starts (> 5%)
- A longer beep as snapflap approaches the maximum (>95%)

Beeps are enabled by switch SC↓. The thresholds and switch can be changed by editing logical switches L31 and L32.

7.9 ADVANCED SNAPFLAP SCRIPT (OPTIONAL)

A Lua script *snp410.lua* is provided for advanced snapflap tuning. Its use is optional – it's designed for competition tuning and is not necessary or recommended for sport flying. The script offers dynamic adjustment of snapflap deadband. This is in addition to volume and expo adjustments provided with the default setup. Separate instructions are provided.

Note:

- To use the script, OpenTx must be built with the 'Lua' build option (in Companion Settings->build options)
- The script parameters are supplied via channels 24 and 25. If the script is not required, these can be deleted.

8 OTHER ITEMS

8.1 FIELD NOTES

The table below shows the adjustments you can make from the transmitter. Take a copy to the slope!

Adjustment	Adjuster	Flight modes	Notes
Aileron Diff	Rudder trim	[all]	Trim right = more roll response/less diff. Trim left = less roll/more diff. Range of adjustment = 0 - 70%, trim centre = 35%. Stored independently for each flight mode.
Crow compensation	Elevator trim	LANDING	Trim fully back = zero comp, trim forward to increase For non-linear response adjust points 2-4 of curve CV11:CrC
Snapflap volume	Throttle trim	NORMAL, REFLEX, PUMP	Trim fully forward = zero snapflap, trim back to increase Stored independently for NORMAL, REFLEX and PUMP modes
Snapflap expo	S1	NORMAL, REFLEX	Centre=linear. Clockwise = late, CounterCW = early
Camber	S2	CLIMB	Clockwise = more camber

8.2 FAIL SAFE AND BATTERY ALARM

Before flying with this setup for the first time, remember to:

- Set the failsafe
- Set the battery alarm threshold to suit your battery chemistry, for both the tx and rx.

8.3 MAKING YOUR OWN MODIFICATIONS

Before making your own modifications, please study the Excel documentation and make sure you understand the impact of any changes. The recommended workflow is:

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

8.4 IDENTIFYING ERRORS

Companion offers a useful 'Compare files' tool for tracking down errors. If you suspect an error:

- 1 Start Companion
- 2 Open the original unedited file
- 3 Open your working file
- 4 Click on **FILE->COMPARE FILES** to open the Compare window, then drag the corresponding models into it.

8.5 DISCLAIMER

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 will not be responsible for the consequences of any bugs in the setup or documentation or as the result of changes in OpenTx.

Remember to test your setup thoroughly before the first flight and after any modifications!

If in doubt, don't fly!!

If you find any errors in this document, or have any queries, please contact me at <http://rc-soar.com/email.htm>.

Safe flying!

- Mike Shellim