Ahi template
for OpenTX and EdgeTX

Version 1.1

Setup Guide

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CONTENTS

1 INTRODUCTION

The *Ahi* template is designed for 4-channel aerobatic slope soarers, for example the *Ahi*, *Phase 6*, *Voltij* etc. It offers quick setup, simple operation, and in-flight adjustments of key mixes. Before starting, please:

- read through this document once
- visit the support page to see if there are any issues affecting this setup.

1.1 REQUIREMENTS

Minimum requirements as follows:

- Transmitter with
  - one momentary switch,
  - one 3-position switch,
  - one 2- or 3-position switch
- OpenTx 2.3.15 or EdgeTX 2.7.1 (or later)
- Companion + USB cable

1.2 PACKAGE CONTENTS

Filename	Description
ahi_11_userguide.pdf	This document
ahi_11_reference.xls	Settings reference
ahi_11?.otx	Model file for Companion
*.wav	Sound files

1.3 STICK ASSIGNMENTS

Sticks are assigned according to MODEL SETUP → STICK MODE. All available stick modes are supported.

1.4 CHANNEL ASSIGNMENTS

Channel	Function
1	Right aileron
2	Left aileron
3	Elevator
4	Rudder

Note: Channel order is important – please make sure that your aileron servos are connected correctly. Left and right are from the point of view of a pilot looking forwards.

1.5 SWITCH ASSIGNMENTS *(NEW IN 1.1)*

All switches are 'soft' in order to cater for different transmitters – actual switches will be assigned later (see section 2.2).

Short name	Function
swFM	Select flight mode
swRate	Select high/low rates
swMom	Select CAL mode (Momentary switch)

From this point on, all switches will be referred by their short names.

1.6 FLIGHT MODES

There are four flight modes selected by switches **swFM** and **swRATE**

- **swFM** selects between climb, speed and aero
- **swRATE** selects aero-lo or aero-hi.

Flight Mode	swFM	swRATE	Description
SPEED	↑	[any]	Reflex for speed
CLIMB	↓	[any]	Camber to aid thermalling
AERO-HI	Mid	↑ or —	High rates with snapflap
AERO-LO	Mid	↓	Low rates with snapflap

1.7 MIXERS

Table below shows flight mode/mixer matrix, with adjusters for each mix:

FM	Snapflap	Camber	Reflex	Ail to Rudder	Diff
CLIMB		Thr Trim		*(preset)*	Rudder trim
AERO-HI	Thr Trim			*(preset)*	Rudder trim
AERO-LO	Thr Trim			*(preset)*	Rudder trim
SPEED			Thr Trim	*(preset)*	Rudder trim

1.8 TRIM CONTROLS

Trims are shared between flight modes as follows:

- Aileron trim is shared across all flight modes.
- Elevator trim is stored per flight mode.
- The rudder trim lever is repurposed for diff adjustment.
- Throttle trim is repurposed for camber and snapflap adjustement

1.9 CALIBRATION MODE

A special CAL mode is provided for calibrating the servos. When active, all mixing and trims are disabled. To activate CAL mode:

1. Apply full left aileron and full up elevator
2. Press and release **swMOM**
3. Release stick(s). The transmitter cheeps at 3 second intervals

To exit CAL mode, pull **swMOM**.
Note: In CAL mode, the ailerons travel together, and the elevator is reversed.

2 INSTALLING THE TEMPLATE

This section describes the installation of the template and associated files to your transmitter. Please follow in the correct sequence – this will ensure that your existing models and settings are preserved.

Establish communication with your PC

1. Enter Bootloader mode. (For most transmitters press inwards on horizontal trims while switching on.)
2. Connect to the computer via USB cable. The SD card and/or internal memory will show as new drives.

Copy sound files

3. In the tx's drives, look for an existing folder called \SOUNDS
4. Copy the sound (.wav) files to the \SOUNDS\{language} folder. For example, for English, copy .wav files to the folder "\SOUNDS\en". (Do *not* copy to the system subfolder.)

Transfer the template to your transmitter

5. Start Companion
6. Open the .otx file provided.
7. From the READ/WRITE menu, choose '*Read Models and Settings from Radio*'. Your existing models appear in a second window.
8. Drag the Ahi model into an empty slot in the model list. A popup will appear with a list of warnings, ignore these as they will be fixed later when you assign the controls and switches.
9. Close the Ahi window.
10. Right-click the new model and choose '*Use as Default*'
    From the READ/WRITE menu, choose '*Write Models and Settings to Radio*'.
11. Close OpenTx Companion

2.1 CALIBRATE THE STICKS

Please make sure that your sticks are calibrated (SYSTEM > HARDWARE menu). Remember to calibrate all knobs and sliders.

2.2 ASSIGNING THE SWITCHES (*NEW IN 1.1*)

Each type of transmitter will have its own switch layout and switch id's. It's important therefore to check and, if necessary, modify the switch assignments:

1. Open the INPUTS menu
2. Skip to Input #6
3. Using the table below, check each assignment. Check that the *Source* field is filled with a valid switch type.

Switch	Description	Input name	Switch type	Suggested physical switch			
				X9D/TX16S	Zorro	Pocket	Your tx
swFM	Flight mode select	**SFM**	3-position	**SA**	**SB**	**SB**	?
swRate	High/low rate select	**SRt**	2- or 3-position	**SB**	**SE**	**SC**	?
swMom	CAL switch	**SMo**	Momentary (*safety!*)	**SH**	**SA**	**SE**	?

To edit a switch assignment:

1. Highlight the corresponding input
2. Press **[long Enter]** and select *Edit*
3. Skip to the Source field
4. Change *Source* to a suitable physical switch, as per table above.

2.3 FAMILIARISATION

Using the transmitter on its own, familiarise with the flight modes using the sound callouts as confirmation. At the end of this step, you should know how to activate:

- Climb, AERO-HI, AERO-LO and SPEED modes
- CAL mode

If the sounds are not working, check (a) sound files copied to correct folder (see above), and (b) check the volume in the Radio Setup menu.

3 SETTING SERVO DIRECTIONS

In this section, you will set the direction of each servo (don't worry about servo end points, you'll set those in a later step).

1. Switch on the transmitter and receiver.
2. Move the sticks and check the direction of control surfaces

To reverse a channel:

1. Open the OUTPUTS menu and highlight the channel
2. Go to the *Direction* column
3. Press **[Enter]**, and immediate **[Exit]**. The arrow will change direction.

4 CALIBRATING SERVO CENTRES AND LIMITS

In this section you'll adjust the servo centres and limits. All adjustments are made in CAL mode.

- When setting limits, adjust for **maximum possible deflection** subject to left/right and up/down symmetry.
- Centres and limits are adjusted using curves - **do not alter Min, Max or Subtrim**.

Note that In CAL mode:

- the ailerons move up and down *together*
- the elevator is reversed

Channel	Calibration procedure
CH 1:RtAil CH 2:LtAil	First calibrate the right aileron: ***Note:* in CAL mode, ailerons travel together!** 1. Enter CAL mode. 2. In the OUTPUT menu, highlight **CH1:RtAil** 3. Skip to curve field **RtA**, then press **[long ENTER]** to open curve editor • Aileron stick to centre. Set Point 2 for correct centre • Move aileron stick right (→). Set point 3 to desired upper limit. • Move aileron stick left (←). Adjust point 1 so that down-travel = up-travel. Left aileron: repeat steps above for **CH2:LtAil** Check: constant rate up/down for each aileron, and check left and right ailerons match. Readjust if necessary.
CH 3:Ele	Calibrate elevator 1. Enter CAL mode. **In CAL mode, elevator is reversed!** 2. In the OUTPUT menu, highlight **CH3:Elev** 3. Skip to curve field **Ele**, press **[long ENTER]** to open curve editor • Ele stick to centre, adjust point 2 for correct neutral • Ele stick forward (↑), adjust point 3 to upper limit • Ele stick back (↓), adjust point 1 for to lower limit 4. Check equal travel up & down

CH 4:Rudder	Calibrate rudder 1. Check you're still in CAL mode 2. In the OUTPUT menu, highlight **CH4:Rudd** 3. Skip to curve field **Rud**, press **[long ENTER]** to open curve editor • Rudder stick to centre, adjust point 2 • Rudder right (→), adjust point 3 • Rudder left (←), adjust point 1 4. Check equal travel left/right

Well done, calibration is complete!!

- Exit CAL mode
- Check that surfaces respond to commands. **Don't worry that the movements are excessive, they'll be reduced in the next section.**
- Make a backup copy of your template now.

Now here's a tip!

CAL is not just for initial configuration. Use it to identify drifting servos or knocked linkages by doing a quick CAL:

- at the start of a flying session
- after a hard landing
- after swapping out a faulty servo for a new one
- whenever you suspect drifting neutrals

5 ADJUSTING CONTROL TRAVEL AND MIXING

This is where your model comes to life!

Setting	Menu point	Description
Ail rate/expo	INPUTS→Ail	In this section, you'll set high and low rates. First, set the low rate. This applies to all flight modes except aero-hi 1. Activate aero-lo flight mode 2. Open the INPUTS menu 3. Scroll to the In `IAil` section (3rd group) Highlight 'CATCHALL' line 4. Press **[long ENTER]** and open INPUTS editor. 5. Adjust *weight* for required upward travel. *Note:* ignore down-travel, it will be adjusted via diff setting. 6. To set *expo*, click on Curve field, choose 'expo', and set value. *Note:* do not try to set aileron diff here (it will affect stick diff, not servo diff). 7. Exit the input editor 8. Finally, set the high rate for aero-hi flight mode: repeat steps 1-8, except activate **aero-hi** flight mode and edit the '**Hi Rate**' input line.
Rud travel/expo	INPUTS→Rud	*As above*
Ele travel/expo	INPUTS→Ele	*As above*

Aileron diff	Rudder trim	The effect of diff is to reduce the travel of the down-going aileron in response to roll commands. Diff is adjusted using the rudder trim. To increase diff (less down-going travel), move the trim to the left. For less diff (more travel) move it to the right. The range of diff adjustment is 0 – 50 %. Diff is stored per flight mode. *Remember to adjust diff individually for each flight mode!*
Camber preset	GVARS→Cmb	Camber is available in CLIMB mode and is adjustable in flight via the throttle trim. In this step, you (a) will set the limit of adjustment and (b) the operating setting. 1. Activate CLIMB mode 2. Move throttle trim fully back (max camber) 3. Open the GVARS menu 4. Go to GV2:Cmb, skip to column FM2:Climb 5. Adjust GVAR until you reach the desired limit of camber adjustment. 6. Finally, adjust throttle trim for desired initial camber setting
Reflex	GVARS→ Cmb	Reflex is available in SPEED mode and is adjustable in flight via the throttle trim. In this step, you (a) will set the limit of adjustment and (b) the operating setting. 1. Activate SPEED mode 2. Move throttle trim fully forward (max reflex) 3. Open the GVARS menu 4. Go to GV2:Cmb, skip to column FM3:Speed 5. Adjust GVAR for desired max reflex. 6. Finally, adjust throttle trim for desired initial reflex setting
Snapflap	GVARS→Cmb	Snapflap (elevator to flap mixing) is active in AERO-HI and AERO-LO modes. The amount can be adjusted independently using the throttle trim. In this step, you'll set the limit of adjustment. Then you'll set the operating snapflap for each flight mode. 1. Activate AERO-HI mode 2. Move throttle trim fully back (max snapflap) 3. Open GVARS menu, select row GV2:Cmb, skip to column FM0 4. Hold full up elevator (full back on the stick) 5. Adjust GVAR for desired limit of snapflap adjustment. *Note:* This setting is shared with AERO-LO mode. 6. Adjust the throttle trim for the desired initial setting. 7. Activate AERO-LO mode, and adjust throttle trim for desired initial snapflap setting.
Ail to rudder	GVARS→A2R	Aileron to rudder mix is set per flight mode. 1. Open GVARS menu, select row GV1:A2R 2. Activate the flight mode to be adjusted. The column is highlighted. 3. Skip to highlighted column. 4. Adjust GVAR for required aileron to rudder mix.

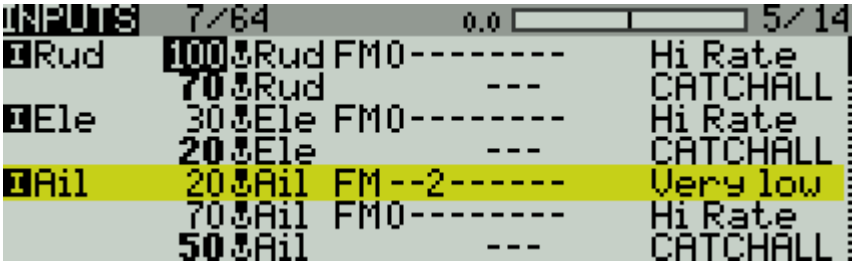
Congratulations, you've finished setting up your model! Please back up your work now.

6 OPTIONAL CUSTOMISATIONS

The next section describes optional customisations. Mixer settings etc. will not be affected by these changes. Remember to backup your setup before making changes.

6.1 SPECIFYING ADDITIONAL RATES

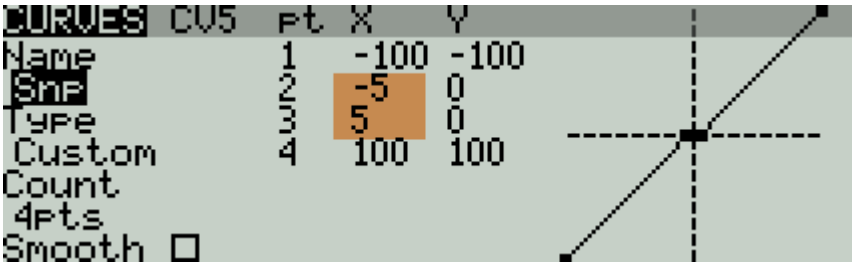
The INPUTS menu is where you specify control rates. You can assign specific rates for individual flight modes. In the example below, CLIMB mode (FM2) has been assigned a 'Very Low' aileron rate of 20%.



***Safety note**:* the last input line in a group should act as the default, with all flight modes checked. See the 'CATCHALL' lines in the example above.

6.2 ALTERING THE SNAPFLAP CURVE

The snapflap response is defined by curve CV5:Snp. By default, the curve applies some deadband to reduce unwanted flap action when making minor pitch corrections. To alter the deadband, go to the CURVES menu, scroll to CV5:Snp, and edit p2->x and p3->x. Do not alter p1 or p4.



You can also add extra points between p1 and p4, for example to set a non-linear response, and/or to limit the snapflap at a certain point in the elevator travel.

7 MISCELLANEOUS

7.1 FIELD NOTES

The table below shows the adjustments you can make on the field. 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 - 50%, trim centre = 25%. Stored independently for each flight mode.
Snapflap volume	Throttle trim	AERO-HI AERO-LO	Trim fully forward = zero snapflap, trim back to increase Stored independently for each flight mode
Camber	Throttle trim	CLIMB	Trim fully forward = zero camber, trim back to increase
Reflex	Throttle trim	SPEED	Trim fully back = zero reflex, trim forward to increase

7.2 Fail safe and battery alarm

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

- Set the failsafe
- Set the tx battery alarm threshold to suit your battery chemistry.

7.3 Making your own modifications

Before making your own modifications, please study the Excel documentation carefully and make sure you understand the implications 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.

7.4 Safety/disclaimer

Pretty obvious really, but worth repeating: **it's up to the user to make sure that the controls respond correctly under all conditions**. The author will not be responsible for the consequence of any bugs in the setup or documentation.

Test your setup thoroughly

If in doubt, DO NOT FLY!!

7.5 Contact

Feedback and suggestions are always appreciated. Please contact me via http://rc-soar.com/email.htm

Happy aerobating!

Mike Shellim