E-Soar Plus for ETHOS

Version 1.1

Setup Guide

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E-Soar Plus control layout (Mode 2 shown)

CONTENTS

1 INTRODUCTION

1.1 DESCRIPTION

E-Soar Plus is a full-feature template for full-house electric-powered gliders. It provides all the mixing needed for F5J competition, yet is easy to configure.

Key mixers may be adjusted in flight and special attention has been paid to motor safety.

PLEASE READ THROUGH THESE INSTRUCTIONS ONCE BEFORE STARTING!

1.2 REQUIREMENTS

The following are required:

- Transmitter running Ethos 1.0.12 or above
- USB cable TX <-> PC

1.3 PACKAGE CONTENTS

Filename	Description
esp-ethos_11_setupguide.pdf	Setup guide
esp-ethos_11x_reference.xls	Programming reference
esp-ethos_11x.bin	Model file (configurable for X- or V-tail)
*.wav	Sound files

2 OVERVIEW

2.1 CONTROL ASSIGNMENTS

Any stick mode (1-4) may be used.
The default control assignments are as follows:

Control	Assigned to
Throttle stick	Crow
Throttle trim	Crow compensation adjust (Landing mode) Motor compensation adjust (Power mode)
Rudder trim	Aileron diff adjust
Slider left	Motor
Slider right	Camber adjust (Thermal mode)
SA	Flight mode selector
SH	Cancel CAL mode, Motor arming options 1, 2
SF	Motor arming option 3

2.2 FLIGHT MODES

There are 5 flight modes: POWER, LANDING, THERMAL, CRUISE and SPEED. In the event of a conflict, POWER has highest priority, then LANDING, then THERMAL/ CRUISE/SPEED.

Flight Mode	Ethos ID	Activated by	Priority
Power	FM2	Slider left↑ (motor must be armed)	High
Landing	FM3	Throttle ↓	Mid
Speed	FM5	SA ↑	Low
Cruise	FM4	SA —	Low
Thermal	D	SA ↓	Low

2.3 FM/MIXER MATRIX

The table shows the mixers which are active in each flight mode.

Flight mode	Ail→ Flap	Ail→ Rud	Motor Compensation*	Crow compensation*	Rev diff	Camber*	Snapflap	Reflex	Diff*
Power	✓	✓	✓				✓		✓
Landing	✓	✓		✓	Y		✓		✓
Speed	✓	✓				✓	✓	✓	✓
Cruise	✓	✓					✓		✓
Thermal	✓	✓					✓		✓

* adjustable in flight.

2.4 CAL MODE

CAL mode is a special flight mode for calibrating the servos. When CAL is active, mixers and trims are ignored.

To activate CAL mode:

1. Apply full left aileron and full up elevator, and hold.
2. Pull and release **SH.**
3. Release sticks.

There are three sub-modes for specific tasks, selected via switch **SA**:

- SA—: for calibrating servo end points, and balancing the flaps. The flaps move in 25% increments.
- SA↓ for calibrating flap neutral.
- SA↑ for calibrating with 50% aileron travel. The flaps move to their neutrals.

To exit CAL mode, pull **SH**.

2.5 CHANNEL ASSIGNMENTS

Channels are assigned as follows:

Channel #	Vtail	Xtail
1	Right aileron	
2	Left aileron	
3	Right flap	
4	Left flap	
5	Right Vtail	Elevator
6	Left Vtail	Rudder
7	Motor	

The left and right channels are *not* interchangeable – make sure your servos are plugged in correctly!

2.6 OVERVIEW OF MIXING, TRIMS, RATES

Rates and expo

- Rates/expo may be set globally or per flight mode.

Trims

- Aileron trim is global across all flight modes.
- Elevator trim is per flight mode.
- Rudder and throttle trims are repurposed (see below).

Camber and reflex

- Camber is adjustable in thermal mode using right slider.
- Reflex (fixed) may be specified for Speed mode.

Aileron-to-flap mix

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

Crow->elevator compensation

- A variable mix which compensates for pitch changes as crow is deployed.
- Adjustable in flight, via the throttle trim. Non-linear compensation may be adjusted via a curve

Motor->elevator compensation

- Variable mix which compensates for pitch changes as power is applied.
- The amount of compensation can be adjusted via the Throttle trim.

Differential

- Diff is applied to ailerons and flaps.
- Adjustable in flight using the rudder trim, per flight mode

Roll rate enhancement

- Aileron diff is suppressed, as crow is deployed.
- 'Reverse' diff can be applied to further lower the down-going aileron

Aileron to Rudder mix

- Aileron to rudder mix is global or per flight mode.

Elevator-to-flap ('snapflap')

- Snapflap may be set globally or per flight mode

2.7 MOTOR OPERATION

To arm the motor:

1. Motor lever to idle (**left slider↓**).
2. Apply full right-aileron and full up-elevator, and hold.
3. Pull **SH** and hold for 1 second until the startup sound.
4. Release **SH.**
5. Release stick(s).

The motor is now active!

To disarm the motor, pull **SH** for 1 second until you hear the 'motor disarmed' alert.

Power mode

POWER mode is activated automatically when the motor is running. This allows you to set different rates, expo etc.

Failsafe

☠ The arming system does not protect against signal loss. Remember to set the failsafe, so the motor is commanded to 'off' (-100) on loss of signal.

2.8 FLIGHT TIMER

Timer1 is configured as an automatic flight timer.

- To reset: arm the motor.
- To start: advance motor.
- To stop: disarm the motor.

The duration of the flight is played when the timer stops.

3 PREPARING THE TRANSMITTER

☠ Make sure that the motor is disconnected before proceeding.

3.1 TRANSFER FILES TO TRANSMITTER

1. Unzip the files in the package to your computer's hard drive.
2. Switch on the transmitter in bootloader mode and establish a USB connection.
3. Copy the model file **esp-ethos_11?.bin** to the \models folder on the SD card.
4. Locate the.wav sound files, select all and copy to the \audio folder on the SD card. (Do NOT copy to the 'en' subfolder!)
5. Disconnect USB and restart the transmitter.

Activate the model as follows:

6. Go to the MODEL SELECT menu and find the model 'esoar-plus-11?'.
7. Click and choose 'Set current model'.
8. Go to the EDIT MODEL menu and change the name as desired.

3.2 CONFIGURE THE HARDWARE

Configure the hardware:

1. Do a hardware stick calibration if in any doubt (SYSTEM→HARDWARE→ANALOGS CALIBRATION).
2. Configure the transmitter RF module (MODEL→RF SYSTEM).

3.3 FAMILIARISATION

Using the transmitter on its own, practice the following:

- Activate CRUISE, THERMAL, LANDING, POWER and SPEED modes (see Section 2.2).
- Activate CAL mode and sub-modes (see Section 2.4).
- Verify that the sounds are working correctly. If not, check that the sound files are in the correct location (see section 3.1).

4 CHOOSE X- OR V-TAIL

The first task is to choose the tail type. This is done in the MIXERS menu, via the *weight* parameter.

Mixer	Description	Mixer weight
60V_IsVtail	Tail type	0 = X- or T-tail (default) 1 = V-tail

5 CALIBRATE SERVOS

In this section, you will

- Set servo directions.
- Calibrate servo limits.
- Equalise left and right sides (compensate for mechanical differences).

This section must be completed before configuring the mixers.

5.1 SET SERVO DIRECTION

The first task is to set the servo direction. This must be done in CAL mode.

1. Switch on the transmitter (do not power up the receiver yet).
2. Set **throttle stick** to centre, **SA** to middle.
3. Enter CAL mode.
4. Switch on the receiver.
5. Go to the OUTPUTS screen.
6. While still in CAL mode, check the servo directions as per the table below. *Pay attention to the notes regarding aileron and elevator!*

Stick command	Control surface	Notes
Aileron stick right →	RtAil goes up ↑ LtAil goes up↑	In CAL mode, the ailerons **move up together**. This aids visual calibration later.
Thr stick forward ↑	RtFlap goes up↑ LtFlap goes up↑	
V-TAIL only: Ele stick forward ↑	RtVee goes up ↑ LtVee goes up ↑	In CAL mode, elevator operates in **reverse direction to normal.**
X-TAIL only: Ele stick forward ↑	Ele goes up ↑	
X-TAIL only: Rud stick right →	Rud goes right →	

To reverse a servo,
- To to the MODELS→OUTPUTS screen
- Click on the relevant channel to open the edit menu
- Change the Invert option from 'Normal' to 'Inverted'.

7. Exit CAL mode and enter NORMAL mode.
8. Move the aileron, elevator and rudder sticks, and for normal operation. **Note that the flaps will not function yet**!

5.2 SET SERVO LIMITS AND CENTRES

In this section, you will (a) set the servo limits and centres and (b) compensate for linkage differences between the left and right sides.

- All adjustments in CAL mode.
- Set servo limits to the maximum possible - just a little less than the linkage/hinge limits.
- Adjustments are made using curves. **Do not alter min, max or Subtrim!**
- You may need to experiment to see which point to adjust, as explained in each note.

Target	Calibration procedure

CH 4: LtFlap	Set the end points and centre for the left flap servo.
	1. Switch **SA** to middle
	2. Enter CAL mode
	3. In the OUTPUT menu, open CH4:LtFlap
	4. Skip to the 'curve' field, and open the curve editor
	  Throttle stick back (↓), then adjust the absolute lower limit with curve point 1 or 3 (whichever works).
	  Throttle stick forward (↑), adjust absolute upper limit with point 3 (or 1).
	  Adjust point 2 so it's on the straight line through points 1 and 3. *Do not worry about the flap neutral position, it will be set later via a mix.*
	5. Move throttle stick from one end to the other, observing step intervals. If necessary, you can adjust point 2 to make the response more linear.

CH 3: RtFlap	Next, calibrate the right flap. A 5-point curve is used, using the left flap as a reference.
	1. Enter CAL mode
	2. Switch **SA** to middle
	3. In the OUTPUT menu, open CH3:RtFlap
	4. Skip to the 'curve' field and open the curve editor. Adjust the points to exactly match the left flap. Note: *the order of the curve points may be reversed, if the first point doesn't work, try the alternative (in brackets).*
	  stick fully back, adjust point 1 (or 5) for the lower limit of travel.
	  stick ½-back, adjust point 2 (or 4)
	  stick to centre, adjust point 3.
	  stick to ½-forward, adjust point 4 (or 2)
	  stick fully forward, adjust point 5 (or 1) for the upper limit of travel
	To match the end points on left and right sides, it may be necessary to the end points for the left flap (see previous step).
	Do a final check. Pay particular attention the points adjacent to flap neutral.

Flap neutral	Next, you'll set the flap neutral, by applying an offset mix. 1. Enter CAL mode 2. Open the MIXERS menu 3. Scroll to mix 55 V_FlapNeutral 4. Switch **SA** down, and listen for 'calibrate flap neutral'. 5. Adjust mixer weight for correct neutral. If the flaps are not perfectly in line with each other, then redo the calibration for CH3:RtFlap above, paying particular attention to the two points adjacent to the neutral position.

Target	Calibration procedure

V-Tail
CH 5: RtVee
CH 6: LtVee
	For V-tail only
	1. Enter CAL mode (position of SA is not critical.)
	2. In the OUTPUT menu, open CH5:RtVee
	3. Skip to the 'curve' field, and open curve editor
	  Ele stick to centre, adjust point 2 for correct neutral
	  Ele stick forward (↑), adjust end point 3 (or 1) for **upper** (↑) travel limit.
	  Ele stick back (↓), adjust point 1 (or 3) for **lower** (↓) limit.
	4. Repeat for CH6:LtVee
	5. Check equal travel up/down; left and right surfaces match

X-Tail
CH 5:Elev
	For X/T tail only
	1. Enter CAL mode. (Position of SA is not critical.)
	2. In the OUTPUT menu, highlight CH5:Elev/RtVee
	3. Skip to 'curve' field, open curve editor
	  Ele stick to centre, adjust point 2 for correct neutral
	  Ele stick forward (↑), adjust point 1 (or 3) point for **upper** (↑) limit
	  Ele stick back (↓), adjust point 3 (or 1) for **lower** (↓) limit
	4. Check travel is equal up & down

X-Tail **CH 6:Rudd**	***For X/T tail only*** 1. Enter CAL mode (position of SA is not critical.) 2. In the OUTPUT menu, highlight CH6:Rudd/LtVee 3. Skip to 'curve' field, open curve editor 4. Rudder stick to centre, adjust point 2 for neutral 5. Rudder right (→), adjust end point 1 (or 3) for right limit 6. Rudder left (←), adjust end point 3 (or 1) for left limit 7. Check equal travel left/right

CH 1:RtAil
CH 2:LtAil
	Finally, calibrate ailerons:
	1. Enter CAL mode
	2. Set switch SA to down position. The flaps will go to their calibrated neutrals.
	3. In the OUTPUT menu, go to CH1:RtAil and open the curve editor
	  Aileron stick to centre. Set Point 2 for correct centre
	  Move aileron stick right (→). Set point 3 (or 1) for desired upper limit.
	  Move aileron stick left (←). Set point 1 (or 3) so that down-travel=up-travel. If down-travel is limited and you cannot complete this step, then move SA to **up** position – this reduces aileron movement by 50% during calibration; retry the calibration remembering that you will get double the movement when you exit CAL mode.
	Don't worry if down-travel is excessive when you exit CAL – later adjustments to aileron rate and diff will reduce it.
	4. Repeat for CH2:LtAil
	5. Check same travel up/down, and check left and right ailerons match. Readjust if necessary.

Check operation as follows:

1. Exit CAL mode.
2. Move the sticks, checking that aileron, elevator and rudder move in the correct sense. Note that **the flaps will not function yet** – they will be configured in the next section.
3. Don't worry that the travel of the ailerons and elevator are excessive – they'll be reduced in the next step.

WELL DONE - CALIBRATION IS COMPLETE!
PLEASE BACK UP YOUR SETUP NOW.

6 CONFIGURE MIXERS

In the final step, you will finalise the stick rates, and configure the mixers.
Most of adjustments are in 'VAR' mixes – these are grouped at the head of the mixer list.

6.1 RATES AND EXPO

This section is for setting rates (also known as 'control travel') and expo on the main flight controls.

Mixer	Adjusts	Notes
37 V_AilRates 38 V_EleRates 39 V_RudRates	Rates / control surface travel	Refer to the instructions for your model for the recommended travel. Set the default rate by adjusting *weight.* You can override the defaults for specific flight modes by adding extra weight lines, one per flight mode. To do this, 1. Click 'Add new weight' 2. Click adjacent down arrow 3. Select category 'Flight modes', and choose the flight mode 4. Set the desired rate
40 V_AilExpo 41 V_EleExpo 42 V_RudExpo	Expo	Go to the *expo* field, and set the default expo. You can override the default expo by adding extra curve lines, one per flight mode. To do this: 1. Click 'Add new curve' 2. Click adjacent down arrow 3. Select category 'Flight modes', and choose the flight mode 4. Set the desired expo

6.2 CROW BRAKES

This section is for setting up crow brakes.

Mixer	Adjusts	Notes
43 V_CrowtoAil	Crow to ailerons up	To configure: 1. Enter Landing mode. 2. Deploy full crow. 3. Adjust *weight* for desired upward movement of ailerons.
44 V_CrowToFlap	Crow to flaps down	*-- as above, for downward movement of flaps --*
45 V_CrowComp	Max elevator compensation	Sets the limit of adjustment for elevator compensation for crow brakes. The default is 50% of elevator travel and should be sufficient for most models, but you can increase this if necessary.
54 V_RevDiff	Reverse diff	In this step, you can adjust the travel of the down-going aileron when both full crow and full aileron are applied. This can improve roll response at full crow. To configure: 1. Activate LANDING mode. 2. Apply full crow and full aileron. 3. Adjust mixer weight so that the down going aileron is a little below the neutral position. NOTE: this measure for improving roll response is in addition to the suppression of aileron diff as crow is deployed (this is done automatically).

Optimising pitch trim in Landing mode

The total trim in LANDING mode is made up of the base trim + compensation. During flight tests, optimise the trim as follows:

1. Activate LANDING mode.
2. Apply *minimal* crow. Adjust base trim with *elevator* trim lever.
3. Apply *maximum* crow. Adjust compensation with *throttle* trim lever. Zero comp is with the trim fully back.

You can also adjust the compensation curve CV:CrowComp. Adjust points 2 to 4 only (do not adjust end points). The default curve has a typical 'S' shape.

6.3 AILERON => FLAP

This mixer causes the flaps to behave like ailerons in response to roll commands.

Mixer	Adjusts	Notes
46 V_AilToFlap	Aileron to flap mix	Adjust mixer weight for the default aileron=>flap mix. You can over-ride the default for specific flight modes – use same method as rates (see section 6.1). When configuring, concentrate on the upward flap movement only (downward movement will be affected by the diff setting, adjusted with the rudder trim).

6.4 AILERON => RUDDER

This mix is useful for improving turn response, especially in LANDING mode.

Mixer	Adjusts	Notes
47 V_AilToRud	Aileron to rudder mix	Adjust weight for default aileron=>rudder mix. You can over-ride the default for specific flight modes - same method as rates (see section 6.1)

6.5 CAMBER

The camber mix is for slow flight (THERMAL mode)

Mixer	Adjusts	Notes
48 V_CambToAil 49 V_CambToFlp	Camber	Camber is active in THERMAL mode, and adjusted via the right slider. Adjustment range = nominal camber +/- 50%. For example, if nominal camber is 4 degrees (slider at centre), the camber range will be 2 to 6 degrees. The ailerons and flaps are configured separately. To set nominal camber. 1. Enable THERMAL mode. 2. Move right slider to centre position. 3. Adjust mixer weights for required camber. Check camber range by moving slider forward and back.

6.6 REFLEX

The reflex mix can reduce drag when flying fast (SPEED mode only)

Mixer	Adjusts	Notes
50 V_RflxToAil 51 V_RflxToFlap	Reflex	Reflex is active in SPEED mode. Ailerons and flaps are configured separately. To set the reflex, enter SPEED mode and adjust mixer weights to suit.

6.7 ELE => FLAP ('SNAPFLAP')

Snapflap is a mix to reduce drag when pitching up. Pull back on elevator stick to activate.

Mixer	Adjusts	Notes
56 V_SnapToAil 57 V_SnapToFlap	Snapflap amount	Aileron and flaps are configured separately. Adjust VAR weights for default mix amount. Over-ride the default for specific flight modes - same method as rates (see section 6.1)

6.8 MOTOR TO ELEVATOR (COMPENSATION)

This is a 'compensation' mix, to counteract pitch changes due to the motor. Compensation is adjustable when the motor is running, using the throttle trim.

Mixer	Adjusts	Notes
52 V_MotorComp	Maximum compensation	Sets the limit of compensation adjustment available from the throttle trim. The default is 50% of elevator travel and should be sufficient for most models.

Optimising pitch trim with motor

When the motor is running, the total pitch trim = base trim + compensation. During flight tests, optimise the trim as follows:

1. Apply *minimal* power. Adjust base trim with *elevator* trim lever.
2. Deploy *maximum* power. Adjust compensation with *throttle* trim lever. Zero comp is with the trim in the centre.

7 SAFETY CHECKS

Before the first flight, check the motor channel system:

1. Disconnect the motor.
2. Go to the OUTPUTS screen.
3. Check the value of CH7 is -100 with motor off, +100 at full power.
4. Set the motor compensation to zero (pretend to apply power, and move the throttle trim to the centre).

WELL DONE, YOU ARE NOW ABLE TO FLY! PLEASE BACK UP YOUR WORK NOW.

8 SUMMARY OF TRIMS

Summary of the trim functions:

Trim	Flight mode	Adjusts	Notes
Rudder trim	[Any]	Aileron Diff	Diff is set per flight mode, Default range is 0 - 70%. Trim centre corresponds to 35% diff
Throttle trim	Landing	Crow=>Ele compensation	Zero crow comp is with throttle trim *fully back*.
	Power	Motor=>Ele compensation	Zero motor comp is with throttle trim in *centre*.
Aileron trim	[All]	Aileron Trim	Aileron trim is global across all flight modes.
Elevator trim	[Any]	Elevator trim	Elevator trim is stored per flight mode.

9 CUSTOMISING YOUR SETUP

This section describes the optional customisations. You can make these changes at any time. Before making changes, backup your setup (clone it from the MODEL SELECT menu).

9.1 REASSIGNING THE FLIGHT MODE SWITCH

The default mode switch is **SA.** However you can specify another 3-position switch, and/or change the order:
Go to the FLIGHT MODES menu, then:

- Set the switch for CRUISE mode (3 pos switch, any position)
- Set the switch for SPEED mode (same switch as above, but different position)

THERMAL will be selected with the switch in the third (unassigned) position.

9.2 REASSIGNING AND REVERSING CROW, MOTOR AND CAMBER CONTROLS

Crow, motor and camber may be reassigned to any suitable control. To do this, go the MIXERS menu, and skip to the relevant mix as shown below, then change the source to a spare control of your choice.

Function	Assign to	Menu point	Default
Crow	Throttle stick, slider, or 3p switch	MIXERS → **17CrowCtrl** → source	Throttle stick
Motor	Throttle stick, slider, or 3p switch	MIXERS → **18MotorCtrl** → source	Left slider
Camber	Throttle stick, slider, or 3p switch	MIXERS → **20Camber** → source	Right slider

You can also reverse any of these controls:

1. Open the mixer editor, and highlight the 'source' field.
2. Long press {Enter}.
3. Tick the 'negative' option.

9.3 ADJUSTING CROW STICK DEADBAND

The crow stick response incorporates some deadband at the idle end to help prevent accidental deployment. The default value should be fine for most pilots; however it can be adjusted as follows:

1. Go to CURVES menu.
2. Open CV:CrowControl.
3. Adjust point2→X. Default value is 90.

9.4 CONFIGURING THE LOW BATTERY ALARM

The low battery alert is disabled by default. When enabled, it sounds a "receiver battery low" alert every 3 seconds, as long as the voltage is below a configurable threshold.

To configure and activate the low battery alarm:

1. Go to the LOGICAL SWITCHES menu, open LSW41:RXBAT_LOW.
2. Set the source to 'LiPo' or 'RxBat' as required (you may need to discover sensors)
3. Set *Value(X)* to threshold voltage.
4. Go to the SPECIAL FUNCTIONS menu, open SF15 (Play Track RXBAT_LOW).
5. Set *State* to 'enabled' and set the repeat interval.

9.5 SUPPRESSING 'MOTOR IS ARMED' ALERTS

By default, an alert is sounded every 15 seconds when the motor is armed but idle. If you're confident with motor operation, you can suppress the repeats. To do this:

- Go to the Special Functions menu
- Locate SF11 (condition = 'ARMED')
- Press {long enter} to open the editor
- Set state to 'disabled.

The alert will now sound once only, immediately after the motor is armed.

9.6 SELECTING THE ARMING METHOD

You can choose between three arming methods as follows:

Method 1(default): Push stick in corner and pull momentary.

This method is the default.
To arm: motor lever off. Full back on elevator stick, full right aileron, pull SH and hold until confirmation.
To disarm: pull SH until disarm confirmation.

Settings:

- LSW2 - Value1= momentary switch (default SH↓). *Do not use a regular switch (safety)!*
- LSW4 - Value1 = ARM_GEST_1
- LSW5 - Value1 = DISARM_GEST_1

Method 2: Pull momentary switch

This method is secure, and better suited if you need to disarm and re-arm in flight.
To arm: motor lever off. Pull SH until arming confirmation
To disarm: pull SH until disarming confirmation

Settings:

- LSW2 - Value1= momentary switch (default SH↓). *Do not use a regular switch (safety)!*
- LSW4 - Value1 = ARM_GEST_2
- LSW5 - Value1 = DISARM_GEST_2

Method 3: Smart switch

This method uses a smart switch. It offers fastest arming/disarming. At startup, the motor will be disarmed regardless of the position of the switch, so switch checks are not required. *This method is inherently less secure than methods 1 and 2, and is for experienced flyers.*

To arm: motor lever at idle position, then SF↓ (if SF is down at startup, move switch up then down).
To disarm: SF↑

Settings:

- LSW3 - Value1= 2-p or 3-p switch (default is SF↓)
- LSW4 - Value1 = ARM_GEST_3
- LSW5 - Value1 = DISARM_GEST_3

9.7 RE-ASSIGNING THE MOMENTARY SWITCH

Momentary switches ***must*** be used for (a) CAL mode and (b) for motor arming.

By default, both functions are assigned to SH↓, however you can reassign them to other momentary buttons if your radio allows (for example the X20 has momentary buttons SI and SJ). To reassign these functions:

1. Go to the LOGICAL SWITCHES screen.
   - For motor arming, edit LSW2:SW_MOM_ARM
   - For CAL mode, edit LSW1:SW_MOM_CAL
2. Set *Value1* to the switch of your choice.

10 MAKING 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. Recommended workflow as follows:

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

11 DISCLAIMER

Although this setup is 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 Ethos.

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

If in doubt, DON'T FLY!!

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.

Safe flying!

Mike Shellim