Here are the programming tips. I chose to high-light some of the more critical parts which can pretty much be used for reference through the rest. They all basically follow the same pattern.

# I. FLIGHT MODES

Flight Modes	ETHOS	
Name	Active condition	
CRZ		
LAND		
LP4		
LP3		
LP2		
LP1		
Т2		
Т1		
S2		
S1		

The first step is to think of and name all the various flight modes you will need. This is created in the FLIGHT MODES (FM) menu. (Airplane icon at bottom of screen)

Ranked Highest priority from top to bottom, except for the default FM (Cruise for our case), which is always at the top

## **II. LOGIC SWITCHES**





Next is to scroll left to second page and assign switches to FM. I make every switch a logic switch, even a simple on/off one.

We have to put some thought into this since FM switches should correspond to what we are actually doing on the radio.

For instance, I have my launch sequence broken down into 3 parts, with 3rd part having additional FMs.

- 1. is to arm the motor (using SG)
- 2. is to turn on the motor at launch (using SF)
- 3. is motor control using Left Slider, broken down into 4 sections for:
- a. idle throttle Thermal 2 camber
- b. low to med Cruise camber
- c. med-high Speed 1 reflex
- d. high Speed 2 reflex for dashing
- III. OUTPUTS

< Out	puts		ETH	05		
		٠				
CH1 AIL1				CH2 FLP1		
	Channel				Channel	
	Mixer				Mixer	
CH3 FLP2				CH4 AIL2		
	Channel				Channel	
	Mixer				Mixer	
CH5 ELE				CH6 RUD		
	Channel				Channel	
	Mixer				Mixer	
сн7 мот				CH8 AUX		
	Channel				Channel	
	Mixer				Mixer	

In this menu we assign channel mapping and global servo throws (min and max end points). I set all control servo throws to 120% as explained in post 1.

Also, channel mapping is named from a perspective of top view, left to right. Hence:

- 1. first control surface is left ail (AIL1), followed by...
- 2. left flap (FLP 1)
- 3. right flap (FLP2)
- 4. right ail (AIL 2)
- 5. ELE
- 6. RUD

Tapping the CH# brings up the submenu of an output and the only thing to adjust here is the servo throws, subtrim, direction. Leave everything else alone. Do this for every control surface you have. Motor control can remain at +-100%.

< Channel2		
CH2 FLP 1		979
	-101.8%	A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER OWNE
	Mixer 84.8%	
Name		FLP 1 🚍
Invert	Norr	nal 🤍 Inverted
Min		-120.0%
Max		120.0%
Center/Subtrim		0.0%
	Restored and the second s	

#### IV. MIXER

< Mixer		ETHOS	0d8 🗬 8.0 v 2.46 🗬 1484tt	< Mixer		ETH <mark>OS</mark>	0.d8 🔮 8.0v 2.46 TaBatt
Name	Source	Channels	туре	Name	Source	Channels	+ Ail => Rud
Ailerons Crz	Aileron	1, 4	Active condition	Ail => Flaps Cr	Aileron	2, 3	Always On
Ailerons Land	Aileron	1, 4	100%	Ail => Flaps-S1	Aileron	2, 3	100%
Ailerons S1	Aileron	1, 4		Ail => Flaps S2	Aileron	2, 3	OX.
Ailerons S2	Aileron	1, 4		Ail => Flaps T1	Aileron	2, 3	
Ailerons T1	Aileron	1,4	-100%	Ail => Flaps T2	Aileron	2.3	-100%
Ailerons T2	Aileron	1, 4		Ail => Rud Crz	Aileron	6	
Ail => Flaps Cr	Aileron	2, 3		Ail => Rud LT4	Aileron	6	59789
<b>K</b> Mixer			0as 2 8.0v				0.48 <b>@</b> 8.0v
Name	Source	Channels	Camber				2.46 TxBatt
Ail=> Pud LTA		Cnanneis	+ Always On	Name	Source	Channels	+ Always On
Ail -> Pud S1	Alleron	6	100%	Camber LT1	LAUNCH T1	1, 2, 3, 4, 5	100%
Ail -> Pud S2	Alleren	0		Camber LT3	LAUNCH T3	1, 2, 3, 4, 5	
Ail-> Pud T1	Aileren	0	0%	Camber LT4	LAUNCH T4	1, 2, 3, 4, 5	0%
$Ail \Rightarrow Rud T2$	Aileron	0	-100%	Camber S1	S1	1, 2, 3, 4, 5	-100%
Butterfly Ail	Throttle	1 4	Flight Mode	Camber S2	S2	1, 1, 2, 3, 4, 5	Flight Mode
Camber LT1	LAUNCH T1	12845	5 6 7 8 9	Camber T1	11	1,2,3,4,5	5 6 7 8 9
				Camber 12	12	1, 2, 3, 5, 3	
< Mixer		ETHOS	0 да <b>(</b> 8.0 у-	Začest			
Name	Source	Channels	Elevators				
Camber T1	T1	12345	Always On	Name	Source	Channels	+ Always On
Camber T2	T2	12335	100%	Elevators T1	Elevator	5	100%
Camber Variable	e Slider right	12345		Elevators 12	Elevator	5	
Elevators Crz	Elevator		0%	Ele=> Camber (	Elevator	1, 2, 3, 4	0%
Elevators I T4	Flevator	5	-100%	Fle -> Camb S1	Elevator	1,2,3,4	-100%
Elevators S1	Elevator	5	Flight Mode	Ele => Camb T1	Flevator	1 2 3 4	Flight Mode
Elevators S2	Elevator	5	56789	Ele => Camb T2	Elevator	1, 2, 3, 4	56789
~							
A Standay							
< Mixer		ETHOS	<b>7.7</b> v				
Name	Source	Channels	+ Type				
Ele => Camb	T1 Elevator	1, 2, 3, 4					
Ele => Camb	T2 Elevator	1, 2, 3, 4					
Flap 1	Throttle	2	0%				
Flap 2	Throttle	3	-100%				
BF to ELE	Throttle						

This is where the bulk of the programming is done. In this menu, we define how every control surface will act and interact in each and every flight mode.

There many ways to do things in here and I tried to do it in the easiest, most intuitive way with the lowest number of MIXERS. So, for instance, just the AIL would have 10 mixers since we have 10 FM. In our program we use 6 since the throws are the same for a few of the flight modes. Of course, this is personal and you can use just 3 AIL mixers if you want since cruise, t1, sp1, have very small te camber deflections to begin.

I chose to make all ten since it's not that much more effort.

Take AIL deflections at T2 for example. Since the TE is already deflected down around 5° in T2, we need to have them travel up more than down (differential). Tapping this MIXER gets us into its submenu. From here we can assign:

	K Ail T2		
	Name	Ail T2 🕞	1
	Active condition	Always On 🔽	
	Flight Modes	5 6 Edit	
	Curve	+ Add a new curve	
	Weight / Rates	130%	
		+ Add a new weight	
	Differential	-40%	
•**	2 Announcement		
	< Ail T2		
		+ Add a new weight	
	Differential	-40%	
	Channels count	2	
	Output1	CH1 (AILERON 1) 🔽	
	CHL	Channel: 1.0% (1505us) Mixer: 0.8%	
	Output2	CH4 (AILERON 2) 🔽	
	CH4	Channel: -1.0% (1495us) Mixer: 0.8%	

- 1. FM it applies to
- 2. A curve (its linear @100% by default)
- 3. WEIGHT/RATES = The amount of throw
- 4. Differential amount.

A REAL PROPERTY AND A REAL		
< Ail=> Flaps T2	EIIH <mark>03</mark>	8.1
Name	Ail => Flaps T2 🕞	100
Active condition	AIL2FLP OFF 🔽	
Flight Modes	156 Edit	
Curve	LIN 50 🔽 Edit + Add a new curve	
Weight / Rates	-40%	
	≁ Add a new weight	
Differential	-30%	
	B Description of the spectrum	
▲ Ail → Flaps T2	CHIH03	8.1v
Ai1=>Flaps T2	ETHOS + Add a new weight	8.1v
▲il ⇒ Flaps T2 Differential	CTHOS + Add a new weight -30%	8 1v Trazan
Ail=>Flaps T2 Differential Channels count	ETHOS + Add a new weight -30% 2	<b>18.1</b> v Tiser 1009
Ail=> Flaps T2 Differential Channels count Output1	+ Add a new weight -30% 2 CH2 (Flaps 1)	8 J.v. Triton
Ail=>Flaps T2 Differential Channels count Output1 Guz Curve	CH2 (Flaps 1) H - 101.8% (979w) Mirer: 24.8%	1005
Ail=>Flaps T2 Differential Channels count Output1 ai2 Output2	CH2 (Flaps 2)	1095

Another Example – AIL to FLP MIXER in T2 (FLAPERONS)

Here, we are actually making a mix in the traditional sense. Since the FLP will travel much less than the AIL in this mix, we have to assign a non-default curve. DIFFERENTIAL can be adjusted and needs to be since in T2 the whole trailing edge is down by  $\sim$ 5° already.

One note here is that AIL to FLP mix turns off in LAND MODE when throttle stick deploys a settable amount.

You should adjust it so it works to about 10° of down flaps deployment

CAMBER is self-explanatory with the exception of Variable Camber. It's only variable in T1 settings.



For Variable CAMBER, create a MIXER and use the right slider. You can see in the picture that it is only active in FM 7 which correlates to T1.

< Camb Variabi		1v
Name	Camb Variable 🗃	100%
Active condition	Always On 🔽	
Flight Modes	7 Edit	
Input	Slider right 🔽	
Curve	🔽 -100%	
	+ Add a new curve	
Channels count		

### ELE to CAMBER



Channels count		4	1.00
Weight		-15%	
Output1	CH1 (AI	LERON 1) 🔻	0%
СНІ	Channel: 0.0% (1500us)	Mixer: 0.0%	
Weight	-	7%	
Output2	СН	2 (Flaps 1) 🔽	
CH2	Channel: -101.8% (979us)	Mixer: 84.8%	

Pretty Simple here. Various curves for the various conditions.

## BRAKES for LANDING - FLAP MIXER

<b>Flap 1</b>	ETH <u>es</u>
Name	Flap 1 🗃
Active condition	Always On 🔻
Flight Modes	D 1 2 Edit
Input	Throttle 🔽
Curve	FLAPS 1 🔽 Edit
	+ Add a new curve
Slow Up	0.0s
Flaw Dawn	
< Flap 1	ETH <u>os</u>
Slow Up	0.05
Slow Down	0.05
Channels count	1 100%
Weight	100%
Output1	CH2 (Flaps 1)

Ethos has a template called [B]BUTERFLY[/B] in which to work properly, needs 3 or more Butterfly Mixes. This is due to separate curves needed for the Flaps, AIL and ELE.

I chose not to use the canned mix, but rather a free mix for the brakes.

One of the things to note here is to have both flaps deploy the same amount when landing. If your mechanics are perfect (I rarely see this) you don't need this part. Otherwise, this is one way to program that.

I use a 21pt mix for each flap. Pretty self-explanatory here too.



I adjusted the curve to be a linear relationship to the stick. i.e. at 25% stick deployment it gives me 25% of flaps. So, if flaps drop 90°, the stick will:

@ 25% stick = 22.5°

@ 50% stick = 45°

@ 75% stick = 67.5°

@ 100% stick = 90°

Keep in mind that the stick itself has a 5% deadband, so keep the curve at the airfoil neutral side somewhat flat. In my curve, 100% stick is 85%, while 90% is only 84%. See pic more more clarity.

And, as noted earlier, Flaperons turn off at a set brake flap (throttle stick) deployment.

Brakes for AIL are labeled BF AIL. There are a few implementation options. You would adjust the curve for the desired response. I have it as # 2.

[B]1[/B]. Ail remains neutral while FLPs are deployed

[B]2[/B]. AIL follows FLP partially to whatever you like and remains in cambered position. (BF CURVE)
[B]3[/B]. AIL follows FLP to down, then back up through neutral to full up deflection (CROW CURVE)
[B]4[/B]. AIL deflects opposite of FLP, to the up side and remains in the up position (Negative BF CURVE)

-		
< BF Ail	ETHOS	8.1v
Name	BF Ail 🛃	100%
Active condition	Always On 🔻	
Flight Modes	D 1 2 Edit	0%
Input	Throttle 🔽	
Curve	BF AIL 1 🔽 Edit	-100%
	+ Add a new curve	
Channels count	2	
Weight	100%	
•		
• • • •		
< BFAT	ETH <b>OS</b>	<u>[8].</u>
C BF All	ETH <mark>os</mark> Bf Ail 🛃	Jeff Store Feder
C BF Ail Name Active condition	ETHOS BF Ail 🛃 Always On 💌	Same Same
EF Ail Name Active condition Flight Modes	ETHOS BF All Always On D 1 2 Edit	E Star Star Star Star Star
C BF All Name Active condition Flight Modes	ETHOS BF All Always On D 1 2 Edit Throttle	in the second se
CEF All Name Active condition Flight Modes Input Curve	ETHOS BF Ail Always On D 1 2 Edit Throttle Crow AIL 1 Edit	2000 1000
C BF Ail Name Active condition Flight Modes Input Curve	ETHOS BF Ail Always On D 1 2 Edit Throttle Crow AIL 1 Edit + Add a new curve	Choose a curve for the mise. This
EF Ail Name Active condition Flight Modes Input Curve Channels count	ETHOS BF Ail Always On D 1 2 Edit Throttle Crow AIL 1 Edit + Add a new curve	Choose a curve for the mixer. The param weight

I have the ELE comp MIXER for the flap brakes labeled as BF to ELE. I used a FREE MIX here so that I can add a slight delay to the ele going down and up when pulling and closing flaps respectively. From the F3J days, when coming in hot and pulling flaps quickly, I've seen instances where no delay results in smacking the model into the ground and stalling it when closing flaps quickly. Prob not as important for 5J bust still good practice.

100
0%
00%
ſ
0%

Ok, here's a way of adding some useful "on the fly" mixing adjustments to the ELE 2 CMBR and Aileron Differential.

This can be used to tune in the model and once tuned, make it a hard mix by touching the OUTPUT box next to the trim control and setting as displayed in the output box.

Ok, a little background for info. In the TRIM menu, under Rudder, we can DISABLE the trim levers. However, doing this completely "turns off" the trim levers so they can't be used at all.

<b>K</b> Trims	ETH <mark>OS</mark>	7.9 Tria
Trim Rudder		~
Trim Mode		Medium 🔽
Extended trims		OFF OD ON
Independent Trim per Fli	ght Mode	
Trim Elevator		>
Trim Throttle		>
Trim Aileron		2



If we don't turn off the trim levers, the rudder channel will be affected by any movement of the levers up to 25% of the servo travel ( in non-extended trim mode). To navigate around this, we simply create a mix outputting -25%, to both left and right, outputting to the rud channel. See pic.

If we don't turn off the trim levers, the rudder channel will be affected by any movement of the levers up to 25% of the servo travel ( in non-extended trim mode). To navigate around this, we simply create a mix outputting -25%, to both left and right, outputting to the rud channel. This mix is labeled RUD TRIM OFF Mix. See pic.

<b>Free Mix</b>	ETHOS	7.9
Name	RUD TRIM OFF 🕞	100
Active condition	Always On 🔻	
Flight Modes	D 1 2 Edit	0%
Source	Trim Rudder 🔻	
Function Type	Add 🔽 -100%	
Curve		
	+ Add a new curve	
	pane pane	
< Free Mix		17.9
Free Mix		7.9) Inter 100
Free Mix Ottset Weight Up	CTHOS 0% -25%	<b>7.9</b> 7.9 100
Free Mix Ottset Weight Up Weight Down	CTHOS 0% -25% -25%	17.9 Talar 100
Veight Up Slow Up	CTHOS 0% -25% -25% 0.0s	17.9 7.11 100
Veight Up Weight Down Slow Up	CTHOS 0% -25% -25% 0.0s 0.0s	17.9 7.94 100

DO this also to the throttle trim lever.

Now we can go use these levers for some fine-tuning adjustments.

We'll do the differential mix first using the RUD trim levers.

In each of the MIXER for AIL, where DIFFERENTIAL is, we change that to have the RUDDER TRIM LEVER control the output.

AilCr		
Name		+ Add a new weight
Flight Modes	D 4 Edit	Differential Trim Rudder 🔽 🕺 0%
Curve		Channels count 2
 Weight / Rates	+ Add a new curve	Output1 CH1 (AIL 1) V Ott Chareel 37.0% (1689un) Micer 30.9%
Differential	+ Add a new weight Trim Rudder 🔽 📕 0%	Output2 CH4 (AIL 2) V

Here are some graphs to show the trim lever at -100, 0, +100. Note that the WEIGHT/RATES is at 100%

< Ail Cr	ETHOS	7.9v
Name	Ail Cr 🕞	1009
Active condition	Always On 🔽	
Flight Modes	D 4 Edit	0%
Curve	+ Add a new curve	
Weight / Rates	- 100%	
	+ Add a new weight	
Differential	Trim Rudder 🔽 -100%	

< Ail Cr		7.8v
Name	Ail Cr 🕞	100%
Active condition	Always On 🔻	
Flight Modes	D 4 Edit	
Curve		
	+ Add a new curve	/
Weight / Rates	100%	
	+ Add a new weight	
Differential		
< Ail Cr		
< Ail Cr Name		
Ail Cr Name Active condition	Ail Cr 🗃	
Ail Cr Name Active condition Tight Modes	Ail Cr Cr Always On D 4 Edit	
<b>Ail Cr</b> Name Active condition Flight Modes Curve	Ail Cr C Always On V D 4 Edit	65
<b>Ail Cr</b> Name Active condition Flight Modes Curve	Ail Cr C Always On D 4 Edit + Add a new curve	0.5
Ail Cr Name Active condition Flight Modes Curve Weight / Rates	Ail Cr C Always On D 4 Edit + Add a new curve	œ

Then we also have to do that for every flaperon in every flight mode. NOTE that the WEIGHT/RATE absolute value is 30% ( the neg could be positive depending on servo make and linkage geometry).

In practice I run very little diff, but by default thermal 2 will have the most.

The reason is I run  $\sim$  +- 15° from where wing's best LD is. This usually corresponds to my speed 1 setting of  $\sim$  1° reflex, and use that as the envelope for AIL travel for all other modes. So say, if the ails are ready cambered 5°, the up going aileron will travel 21° up while the down will go another 9°.

Ail to Flp CrL2	ETHOS	100dB 0dB 7.8v
Name	Ail to Flp CrL2 🛃	100%
Active condition	Always On 🔻	
Flight Modes	D 4 Edit	0%
Curve	🔻	
	+ Add a new curve	-100%
Weight / Rates	-30%	
	+ Add a new weight	
Differential	Trim Rudder 🔽 📕 0%	

< Ail to Flp C	irL2 E	ETHOS		100dB 0dB 7.8	
	+ Add	a new weight		100	
Differential	Trim Rud	lder 🔽 🚪 09	%		
Channels count			2	0%	
Output1		CH2 (FLP 1) 🔻			
CH2	Channel: -83.7% (1072us)	Mixer: 69.79	×		
Output2		CH3 (FLP 2) 🔻			
СНЗ	Channel: 83.7% (1928us)	Mixer: 69.79	6		

### II. ELE to CMBR

For the ELE to CAMBER mix, we will use the throttle trim.

For every MIXER that starts with the words EL 2 CBR... we need to apply the Throttle trim as the control. Here is an example of the mix for elevator to camber of the ail in cruise mode (EL 2 CBR AIL CR)

< EL 2 CBR AIL CR	ETHOS	100 dB 0 dB 7.8v
Name	EL 2 CBR AIL CR 🛃	100%
Active condition	Always On 🔻	
Flight Modes	D 4 Edit	0%
Input	Elevator 🔻	
Curve	EL 2 CBR A 🔻 Edit	-100%
	+ Add a new curve	
Channels count	2	
Weight	Trim Throttle 🔽 📍 54%	



Here is an example of what the AIL "snapflap" curve for Cruise, T2 and S2 may look like:

Curve16	ETH <mark>OS</mark>	100dB 0dB 7.8
	100% Name	EL 2 CBR AIL CR 🗐
	Туре	Custom 🗸
	Points Count	3points
0%	Smooth	
	Easy Mode	
	Points Config	$\checkmark$

< Curve18	ETHOS	100 a 0 a 9 7.8
	100% Name	EL 2 CBR AIL T2
	Туре	Custom 🔻
	Points Count	3points
DM	Smooth	
	Easy Mode	
	Points Config	



Remember, we have to do this for all flap modes also. The BIG difference with flaps is that the curve shape is similar, but the throws (Y co-ordinates) are about ½ of the AIL CURVE.

In practice, I only set this "snap flaps" in Thermal 2 mode and once I think it is optimized, I set that as the envelope for all the other flight conditions.