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Apr 20, 2022, 10:26 PM

Report #1

fnnwizard
Flying What?!?

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003
3,766 Posts

Discussion

F5J Template for Ethos

After having radio reception problems in my last few contests, I have looking to get a new radio; preferably with rssi indicator. But, I'm stuck on either the Jeti DS-24 or the Futaba 32MZ for my own reasons and just can't decide. Arhhggg...

In the mean time, I had this X20S sitting around for close to a year, figured it's time to at least dig into it.

So after 2 days of no sleep and little food, I finally figured out how to get a decent working program.

Here are the details:

Firmware Version 1.1.1

I programmed the template to be as close as possible in its current state to match real world mechanics. The X20S can output a signal between 734us - 2268us. Really good servos like the popular MKS 6110 are useable between 820 - 2180 and take between 10 - 12 us per degree. Which could translate to over 120 degrees of useable travel. I programed

the radio to use ~100° of servo travel.

Translated to sailplanes, in a decent install that's a :

1:1 for flaps (90 plus another 10 for up)
1:2.5 for ail (+-20°)
1:2 for ele (-20, +30)
1:1.6 for rudder (+-30)

So using these figures should give us an idea to throws shown in the TX OUTPUT menu.
The only thing to be aware of is then the servo direction, which is controlled in the OUTPUTS menu, then adjusted accordingly in the MIXER menu for the various mixes with either a POSITIVE or NEGATIVE VALUE.

9 flight modes

Looking at Flight Mode Screen from top to bottom:

Cruise - Default

Land ---------- <95% Throttle stick
Brings ail down about 10-15° and stays there, takes out flaperons, has a lot of differential since ail are down, and mixes in a lot of rud mix. Also has "eyeballed" ele comp. Change the main percentage first before changing the comp curve

Launch T4 (>80% throttle)---- SF + SG + L Slider at highest end
Equivalent to speed 2 settings... obviously plane will be faster than speed 2 settings, but compromise to keep it less complicated

Launch T3 (50-80% throttle) - SF + SG + L Slider mid to high dent
Same as Speed 1 settings

Launch T2 (20-50% Throttle) --SF + SG + L Slider >20% to mid detent
Setup for Cruise settings

Launch T1 (<20% Throttle)--- SF + SG + L Slider Lowest
Once in launch mode with motor spinning, the slider can not go lower than 1260us. This is above AMRT cutoff of "around 1200" which, for the Altis, is actually 1180us. In launch mode, the slider is proportional control.

This mode also adjusts Camber to same as Thermal 2 (T2) with T2 throws, basically flying in min sink mode, you'll have to dial in your ESC or

play with MOTOR CURVE in either the Curves menu or in the MIXER menu under Motor to match power levels for this phase. Changing the curve under either menu will make changes to the other.

Thermal 2 (T2) ----------SE towards + SA down

Thermal 1 (T1) ----------SE towards (SA center, can be left center if only using 3 speed modes)
Right slider activated for fine tuning of camber only in T1 mode

Speed 2 (S2) ----------SE back + SA up

Speed 1 (S1) ---------- SE back (SA center, see T1 above)

In each Flight mode, one can separately adjust:

Trims for Ail and Ele

Ail to Flap Mix for each individual Flap (Flaperon) with differential

Ail to Rud Mix

Ele to Camber (individually adjust each control surface)

The Ele settings (not the trim buttons) in each mode are at zero, so you need to adjust that if you want's the trim button to be at zero or near zero.

I added 3 timers to the screen.

10:10
0:30
0:40

Works like this... at exactly 10 seconds to launch, you pull SG towards, which starts the 10:10 countdown.

At the launch buzzer, pull SF Forward (SF+SG), this starts the motor and both the 30 and 40 seconds countdown with the 40 countdown only announcing from 8 seconds to zero for the burn. You should switch SF off after the 10 second burn so that motor restart is possible. I also make it a habit of returning the slider to at least the mid position before the motor is cut but of course will depend on your motor power curve at mid throttle.

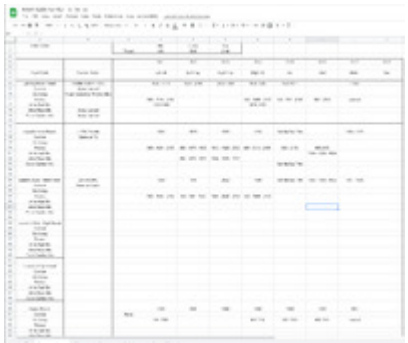
Either SF or Sg in any position other than both forward prevents motor from starting.

File attached, change extension to .bin to use.

Feel free to ask questions.

Images

View all Images in thread



Views: 47

I'm attaching a picture of some of the PWM "numbers" for reference. I need to finish up the spreadsheet.

Files

View all Files in thread

F5J_X_Template	(5.9 KB)	13 views	TXT
F5J_V_Template	(6.3 KB)	9 views	TXT

Last edited by fnnwizard; May 01, 2022 at 11:03 PM. Reason: Added more info

Quote

Apr 20, 2022, 10:27 PM Report #2

fnnwizard
Flying What?!?

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.

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003
3,766 Posts

I. - FLIGHT MODES
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

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%.

IV - MIXER.

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:

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

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 ~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. I choose to use that only while in T1 settings.

For this, 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.

ELE to CAMBER

Pretty Simple here. Various curves for the various conditions.

BRAKES for LANDING - FLAP MIXER

Ethos has a template called **BUTERFLY** 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.

1. Ail remains neutral while FLPs are deployed
2. AIL follows FLP partially to whatever you like and remains in cambered position. (BF CURVE)
3. AIL follows FLP to down, then back up through neutral to full up deflection (CROW CURVE)
4. AIL deflects opposite of FLP, to the up side and remains in the up position (Negative BF CURVE)

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.

Pics are lined up in order of written text.

Images

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Last edited by fnnwizard; Apr 26, 2022 at 05:17 PM.

Quote

Apr 21, 2022, 06:19 AM

Report #3

OhWell
Registered User

I am on Spektrum right now simply because of the interface. In my opinion, the case, switches and most of the TX is on par with something I

2148 miles from you in
United States, NC, Greensboro
Joined Sep 2020
129 Posts

would find at Toys-R-Us.

I tried the older Open TX and not being a computer guy I felt like a monkey trying to solve Algebra.

Is the Ethos easier to navigate?

Quote

Apr 21, 2022, 08:02 AM

Report #4

fnnwizard
Flying What?!?

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003
3,766 Posts

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

This can be used to tune in the model and once tuned, make it a permanent mix.

1st, a little info about the TRIM LEVERS. 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.

If we don't turn off the trim levers, the rudder channel will be affected by any movement of its lever, 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.

Setting it to INDEPENDENT TRIM PER FLIGHT MODE allows us to tune for each flight mode.

Do this also to the throttle trim lever setting.

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

I. AIL AND FLAPERON DIFFERENTIAL ADJUSTMENTS USING RUDDER TRIM.

In each of the MIXER for AIL (there are 6), where DIFFERENTIAL is, we change that to have the RUDDER TRIM LEVER control the output. Every MIXER has a left and right control surface that needs to be set.

Look at some graphs to see the trim lever at -100, 0, +100. Note that the WEIGHT/RATES is at 100% for AIL.

We also have to do that for every flaperon (AIL 2 FLP) in every flight mode (5 of them).

NOTE that the WEIGHT/RATE absolute value is 30% for the FLAP but needs to be set to each individuals' models. (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 ~ +- 15° from where the wing's best LD trailing edge is. This usually corresponds to speed 1 setting of ~ 1° reflex.

I 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°.

II. ELE TO CAMBER ADJUSTMENTS USING THROTTLE TRIM

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

For every MIXER that starts with the words EL 2 CBR… (5 for the AIL, 5 for the FLP), we need to apply the Throttle trim as the control.

See the pics for examples of the mix for "snap flap" of the ail in cruise mode (EL 2 CBR AIL CR).

See what the AIL "snapflap" curve for Cruise, T2 and S2 may look like.

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.

These tuning adjustments should be set as a hard figure once plane is optimized. to do that "long press" the % number in the Weight row in each MIXER menu.

A dialog box will pop up and hit "CONVERT TO VALUE). Make sure to note the value to input.

The template with these on-the-fly adjustments is the template 2 in post 1.
Hope these tips are helpful!

Images

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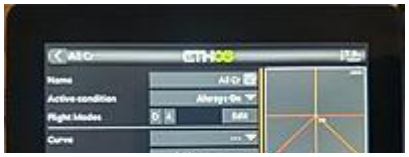

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Views: 4

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Last edited by fnnwizard; Apr 28, 2022 at 03:09 AM.

Quote

Apr 21, 2022, 08:22 AM Report #5

JOLOVINS
Registered User

823 miles from you in
United States, CO, Denver
Joined Sep 2004
992 Posts

Quote:

> Originally Posted by **OhWell**
> *I am on Spektrum right now simply because of the interface. In my opinion, the case, switches and most of the TX is on par with something I would find at Toys-R-Us.*
>
> *I tried the older Open TX and not being a computer guy I felt like a monkey trying to solve Algebra.*
>
> *Is the Ethos easier to navigate?*

Toys-R Us? Ive been using the X10S for years and its a solid radio IMHO. Didn't Spektrum have issues shooting down planes? Most guys I fly with got away from them.

Quote

Apr 21, 2022, 03:41 PM Report #6

OhWell
Registered User

2148 miles from you in

Quote:

> Originally Posted by **JOLOVINS**

United States, NC, Greensboro
Joined Sep 2020
129 Posts

> *Toys-R Us? Ive been using the X10S for years and its a solid radio IMHO. Didn't Spektrum have issues shooting down planes? Most guys I fly with got away from them.*

I have HAD some great Spektrum TXs. I have had two Gen II DX7s and did a dumb thing and passed them on. They were very solid feeling and always worked perfectly.

The newer stuff feels cheaper and the switches, especially the roller are prone to failure.

I have a DX8 and it literally uses the same switches as the 6E. I tore apart the 6E to have some spare switches when it died and they are the same part numbers as what is in my 8.

The Gen II DX7 was very well made.

Quote

Apr 22, 2022, 06:10 AM Report #7

JOLOVINS
Registered User

823 miles from you in
United States, CO, Denver
Joined Sep 2004
992 Posts

Quote:

> Originally Posted by **OhWell**
> *I have HAD some great Spektrum TXs. I have had two Gen II DX7s and did a dumb thing and passed them on. They were very solid feeling and always worked perfectly.*
>
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>
> *I have a DX8 and it literally uses the same switches as the 6E. I tore apart the 6E to have some spare switches when it died and they are the same part numbers as what is in my 8.*
>
> *The Gen II DX7 was very well made.*

Well that's why they make Chevy's and Fords. I stand by my statement....

Quote

Apr 22, 2022, 01:49 PM Report #8

OhWell
Registered User

2148 miles from you in
United States, NC, Greensboro
Joined Sep 2020
129 Posts

Quote:

> Originally Posted by **JOLOVINS**
> *Well that's why they make Chevy's and Fords. I stand by my statement....*

I agree 💯. Like I posted I have had some Spektrum TXs I really liked.

Quote

Apr 22, 2022, 03:18 PM Report #9

D T
Registered User

2457 miles from you in
Canada, QC, Montreal
Joined Nov 2019
211 Posts

Doesn't look like an easy OS to program.

Last edited by D T; Apr 22, 2022 at 08:23 PM.

Quote

Apr 22, 2022, 07:08 PM Report #10

mawz
Sagitta Fanboy

2162 miles from you in
Canada, ON, Toronto
Joined Nov 2015
15,076 Posts

PLUS

--irrelevant--

Won't let me delete

Quote

Apr 23, 2022, 10:57 PM Report #11

fnnwizard
Flying What?!?

Quote:

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003
3,766 Posts

> Originally Posted by **D T**
> *Doesn't look like an easy OS to program.*

I will admit that it is tedious due to the manual inputting.
But it's also due to the complete control of all the control surfaces possible.

It's actually fairly easy to grasp the understanding of how the programing works after a couple tries at it.

A big time saver is to keep names in CAPS with just 3 letters and if needed, a #.

That should cut down programming time by at least 25%, lol.

As soon as I have more time, I'll add to post number 2 with some screen shot of the Ethos Simulator to show some of the menus.

Quote

Apr 24, 2022, 09:22 AM Report #12

OhWell
Registered User

2148 miles from you in
United States, NC, Greensboro
Joined Sep 2020
129 Posts

Sad to admitt it is probably out of my grasp. I understand mechanical and physical concepts very quickly but I am quite intimidated by computers and other tech in that arena.

Quote

Apr 24, 2022, 03:00 PM Report #13

FASTBEN
Cumulus Altimus

1189 miles from you in
United States, TX, Keller
Joined Feb 2002

Quote:

> Originally Posted by **fnnwizard**
> *I will admit that it is tedious due to the manual inputting.*
> *But it's also due to the complete control of all the control surfaces possible.*
>
> *It's actually fairly easy to grasp the understanding of how the programing works after a couple tries at it.*

4,307 Posts

> *A big time saver is to keep names in CAPS with just 3 letters and if needed, a #.*
>
> *That should cut down programming time by at least 25%, lol.*
>
> *As soon as I have more time, I'll add to post number 2 with some screen shot of the Ethos Simulator to show some of the menus.*

I did download the program to my X20 S I can see it in the folder but just can't grasp the idea of how to implement it to my Ultima, I have red the manual but I can't get it, my first Frsky, I have gone through the radio and set it up but nothing close to that programm.
I guess it's not for Dummies. Last time I asked for help someone replayed go read the directions...
Lol.
Ben

Quote

Apr 24, 2022, 05:41 PM Report #14

OhWell
Registered User

2148 miles from you in
United States, NC, Greensboro
Joined Sep 2020
129 Posts

Quote:

> Originally Posted by **FASTBEN**
> *Last time I asked for help someone replayed go read the directions...*
> *Lol.*
> *Ben*

I hate when someone gives me that response. It would seem obvious to me that if someone has a question they could not find the answer in the manual....

If someone gives that response to a question about Spektrum they obviously have not seen how little information is actually in the manual.

I sat the other evening drooling over the X-20 only to come to my senses and realize in my hands it would be as useful of a TX as a cinder block.

Maybe I could get Jesper to help me if I did get one.

Quote

Apr 24, 2022, 06:17 PM Report #15

FASTBEN
Cumulus Altimus

1189 miles from you in
United States, TX, Keller
Joined Feb 2002
4,307 Posts

It is one heck of radio and I love mine I guess one day once I play with it more I'll get it, on my dx9 once I downloaded Sherman knights f5j it went straight to it, I have no idea how to activate the program so I could use it

Quote

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Discussion F5J Template for Ethos

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Apr 24, 2022, 06:54 PM Report #16

old1104
Registered User

1754 miles from you in
United States, AL, Decatur
Joined Nov 2013
2,007 Posts

****

Quote

Apr 24, 2022, 08:00 PM Report #17

fnnwizard
Flying What?!?

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003

Quote:

Originally Posted by **FASTBEN**
I did download the program to my X20 S I can see it in the folder but just can't grasp the idea of how to implement it to my Ultima, I have red the manual but I can't get it, my first Frsky, I have gone through the radio and set it up but nothing close to that program.
I guess it's not for Dummies. Last time I asked for help someone replayed go read the directions...

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> *Lol.*
> *Ben*

The most important screen to look at to get a better understanding of what the radio is doing is in the outputs menu.

The channel assignments are not the ETHOS default one.
I assigned them as:

ch 1 = left aileron
ch 2 = left flap
ch 3 = right flap
ch 4 = right ail
ch 5 = ele
ch 6 = rud
ch 7 = motor
ch 8 = aux (but on mine I will run it as a mirrored motor so another Altis will be on this ch to test out consistently between my Altis' and some CAMs I'm getting in.

Don't despair, the concept is very easy to grasp. There was just one nuance that had me head scratching at first.

What happened, was that the left slider could go beyond the 100% of travel physically due to the play in the slider and where it bottoms out against the case. That made it so my motor on/off trigger wouldn't work correctly.

I eventually figured it out and fixed it by calibrating the controls and for the sliders, using a bit more force to move it to its low/high.

This way, at low slider, butting up against the case, it reads around 98-99%. If you happen to really pull/push on it in the heat of competition, it may read 100%.

If the slider goes to 101% it stops functioning because, in the trigger menu, there is no option to trigger above 100%. So it will get stuck in no-mans land until you happened to bump the slider, then it works like normal due to seeing at value 100% or less.

It's very confusing to explain and I have not seen this issue brought up anywhere, but again, easy to solve.

I'll add to post 2 in a bit, but I am very confident in this radio so far and will implement it in one of my models soon.

Last edited by fnnwizard; Apr 25, 2022 at 12:29 AM.

Quote

Apr 25, 2022, 12:28 AM Report #18

gerhardl
Registered User

5957 miles from you in
Germany, BY, Reichertshausen
Joined Apr 2006
16 Posts

ch4 = right aileron

Quote

Apr 25, 2022, 12:29 AM Report #19

fnnwizard
Flying What?!?

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003
3,766 Posts

Quote:

> Originally Posted by **gerhardl**
> *ch4 = right aileron*

Good catch, fixed, thank you!

Quote

Apr 27, 2022, 11:32 PM Report #20

fnnwizard
Flying What?!?

Thread OP

9 miles from you in
United States, CA, Midway City
Joined Dec 2003

A quick update.

I added a couple features to the program and it's still very easy and intuitive to use.

The 2 new features are:

1. Using throttle trim to adjust volume of ELE to CAMBER (what some call snap flaps) on the fly in each flight mode

2. Using Rudder Trim to adjust % of Diff (for both ail and flap) on the

3,766 Posts

fly in each flight mode.

I only had to add 5 more mixers for separate FLAP pair control.

Each mixer will need a separate curve as you can imagine due to the delta between up and down for each control surface in their respective conditions.

I'll explain how to implement both in post # 4 and will post the template separately in post #1.

I'm pretty thrilled with ETHOS capabilities and relative ease so far. Stayed tune!

Quote

May 01, 2022, 11:16 PM Report #21

fnnwizard
Flying What?!?

Thread OP

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I've added a **Vtail Template.**

The default Vtail program in Ethos is lacking some important Vtail mixing which I added below.

To save time, I cloned the Xtail model and added some Vtail mixing capabilities. This means in the model setup menu, it will show as "Conventional Tail" still. If you clone a model and set it as a Vtail, all mixes will be erased except for the default ones.

Anyhow, the added Vtail mixes allow:

Vtail independent Differential in the various FM - You can set this for "on-the-fly" tuning capability by setting the down going ruddervator to the rudder trim.

This means you have to disable AIL DIFFERENTIAL tuning since the RUDDER TRIM is currently set for this.

Also, capable of individual up and down adjustment for each Ruddervator half to keep ruddervators symmetrical during pure ELE commands.

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