MULTIPLEX®

Profi Tx – Tutorial – No2 Mixers

Revision 2

6th Dec 2015

Profi - Mixers

Revision history

Revision 1 – 24th Nov 2015 – Initial Issue

Revision 2 – 6th Dec 2015 – section 5 added and minor corrections

Profi - Mixers

This tutorial runs through the use of the mixers on the Profi, it will be in 4 sections

1 – Mixer Structure overview

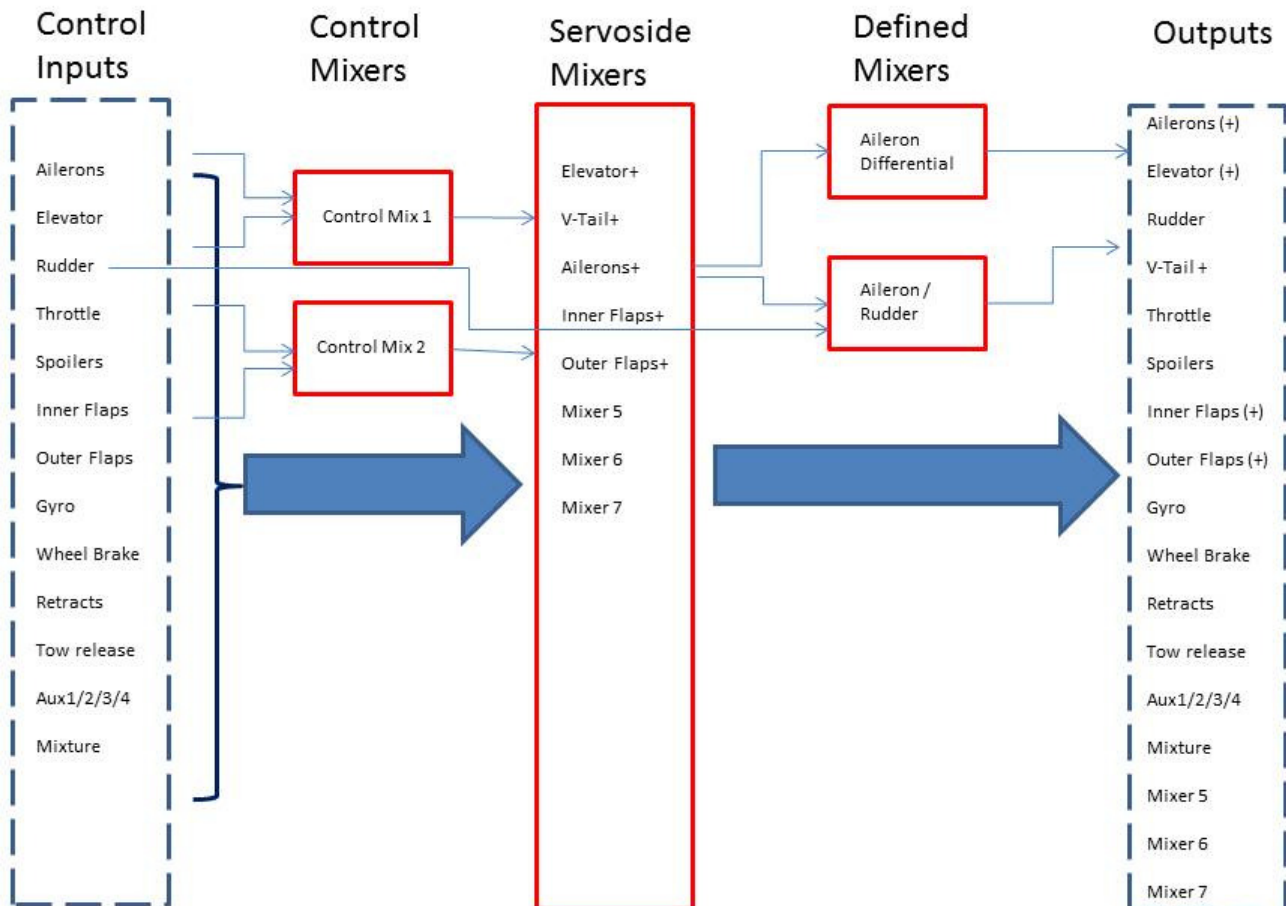2 – Inbuilt mixers for Aileron Differential and Aileron/Rudder mixing

3 - Servoside Multi-mixers

4 – Control mixers

5 - Other

Profi - Mixers

1 – Mixer overview

The above schematic simplified representation of the Profi mixer structure, key points to note are

- There are two control mixers which can have two inputs, or a control can be mixed with itself, the mix percentage can be flight phase specific. These are like the traditional P mixes on other radios
- The Servo-side mixers are the key to the Profi and replace the normal named mixers on other radios. These are created by the user, either from scratch or using the provided templates. The mixer outputs are then assigned to output channels, just like a non-mixed control. The Profi can use upto 5 mixers per model memory and each mixer can have upto 8 inputs, all switchable, each input can use either predefined curve or a user created curve. Each mixer can be used multiple times, i.e. only one mixer required for dual ailerons.
- There are two defined mixers for aileron differential and aileron/rudder, the mix percentages can be flight phase specific

Profi – Mixers
2 -Defined Mixers

The Profi includes 2 defined mixers which are non-editable, an aileron differential mixer and aileron-rudder combi mixer. These are always available and are setup by entering the Mixer settings menu (GHI2)
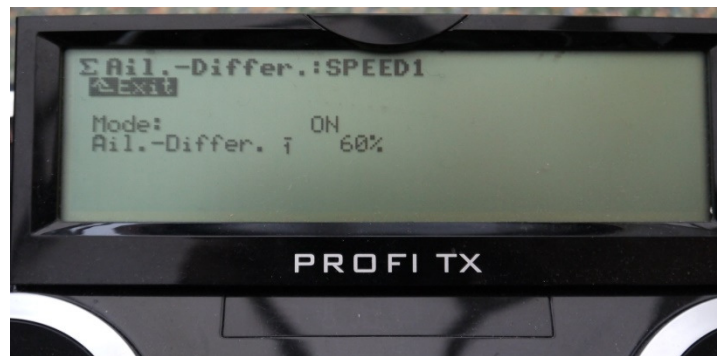
The aileron differential mixer is used to set the aileron differential to reduce adverse yaw and/or fine tuning the roll control on an aerobatic model to give a more axial roll. There are 3 settings for the differential mix, ON, OFF and SPOILER+, the last option is used when you have ailerons raised as spoilers (or in crow braking), in this mode the differential is suppressed when the ailerons are raised so that the down going aileron has full movement for better roll control with the spoilerons deployed. Note the differential can be set for individual flight phases and differential can be + ve or –ve, this will depend on the model and the aileron servo set up.
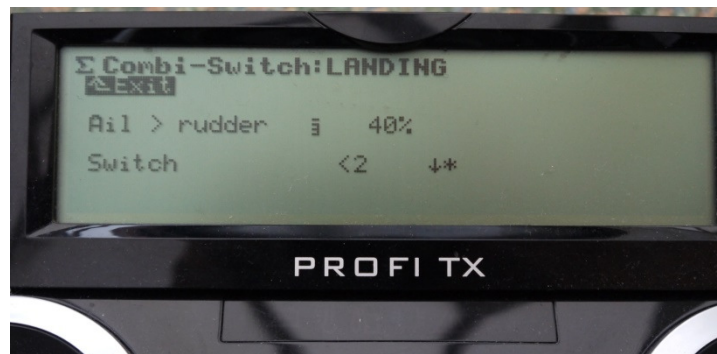
The aileron-rudder mix is found under the Combi-Switch tab and this is used to mix some rudder in when you move the aileron stick, useful for countering adverse yaw and balancing the turns without having to move the rudder control. As for the aileron differential mixer, the mix %age can be set for individual flight phases. Also the mix is switchable and a switch for this can be assigned in the switch assignment tab in the Setup menu (ABC1), the switch can also be used for another function if you wish, i.e. tow release on a glider so the aileron-rudder mix is off under tow but becomes active once the tow release is activated. If no switch is assigned the mix is on when a %age value is added.

Profi – Mixers
Servoside Mixers

The servoside mixers are the key to getting the best out of your Profi and are significantly different from the control mixers found on most other radios. In the Profi the mixers are created either from scratch or using the supplied editable templates and then assigned to outputs. Each mixer can have a total of 8 control inputs and each model memory can have 5 servoside mixers which can be used multiple times, i.e. you only need one Aileron+ mixer for 2 or 4 separate aileron surfaces. The first step in using the mixers is to edit one of the presupplied templates or create your own, this is done in the Define Mixer tab under Setup (ABC1)

Here the mixer list includes supplied templates for Elevator, V-Tail, Ailerons, Flaps Inner and Centre and two blank templates, 7 showing when you scroll down, to change any mixer settings scroll down to the mixer and enter. Note the above mixer list is the standard mixer templates loaded for the Glider+ template loading when selecting a new model.

Profi – Mixers
Servoside Mixers

This shows the name of the mixer, which you can edit, once a mixer is created it shows up in the servo assignment tab (under servo menu JKL4) and can be assigned to as many servo channels as you like

The 3rd column determines the mixer curve for that input, this can either be one of the predefined curves as shown by the below symbols or a user generated curve. These are selected by scrolling through them and pressing enter
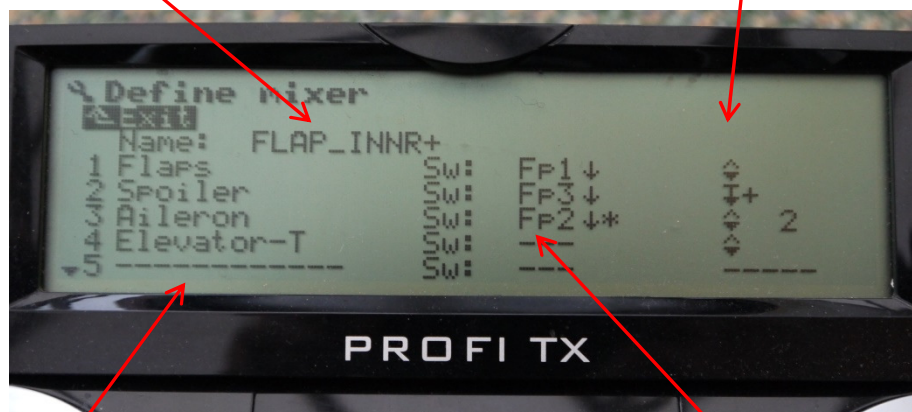
The control inputs are listed in the first column, these can be changed or new ones added by scrolling down to the input, pressing enter and then either operating the control or scrolling through them.

The 2nd column determines the switch that is used to activate this mix, this can be selected by either moving the switch or scrolling through them, note flight phases and magicswitches can only be selected by scrolling . Here the flight phases are used as switches to activate the mixer inputs. If no switch is selected then the mix is live and values entered in the mixer menu (GHI3) are always active.

Profi – Mixers
3 - Servoside Mixers

The mixer curves available in the 3rd column are listed below

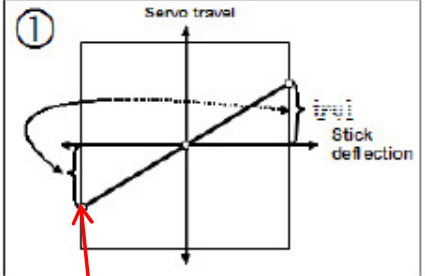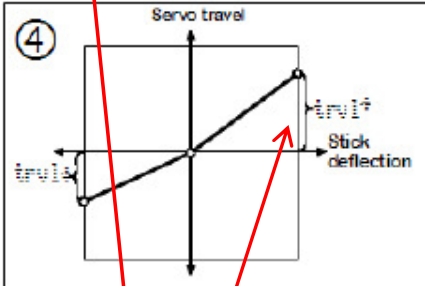| Icon	Effect
⬍ 2	Symmetrical, for surface pairs moving in opposite directions
⬍+ 2	Symmetrical, for surface pairs moving in opposite directions with offset
⬍+	Symmetrical, with offset
⬍− 2	Symmetrical, for surface pairs moving in opposite directions with deadband
⬍−	Symmetrical, with deadband
⬍	Symmetrical
⬦	Asymmetrical
⬦ 2	Asymmetrical, for surface pairs moving in opposite directions
⬇	Single-sided
⬇+	Single-sided, with offset
⬇−	Single-sided, with deadband
⬇	Single-sided, with additional set point at half travel
Cu1 to Cu8	Curve mixer: The mixer input passes through one of 8 control curves.
Cu1 2 to Cu8 2	Curve mixer for surface pairs moving in opposite directions.

Profi – Mixers
3 - Servoside Mixers

The standard mixer curves are shown in the manual and referenced here

8 options are available for adapting the mixing method. The options are represented by icons:

Icon	Effect	Figure
⬍	Symmetrical option: The neutral position of the control function is in the centre (aileron, elevator, rudder). The control travels on both sides of the neutral position are identical.	
⬍	Bilateral option: The neutral position of the control function is in the centre (aileron, elevator, rudder). The travels on both sides of the neutral position can be configured separately.	

Depending on the type of curve selected the amount of output from that input is selected in the mixer setup menu (GHI3)
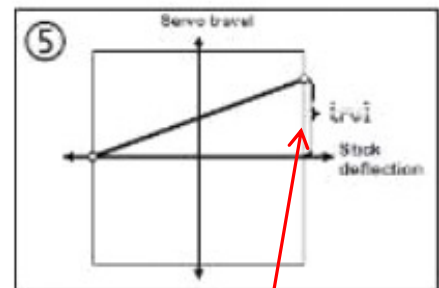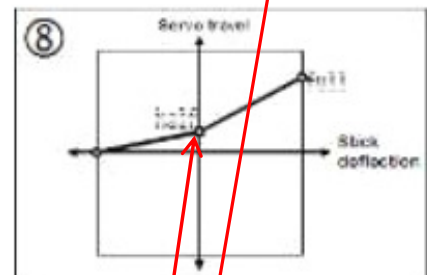
Profi – Mixers
3 - Servoside Mixers

The standard mixer curves are shown in the manual and referenced here

Single-sided option: The neutral position is located on one side (end-point) of the control. The end-travel is set.

Servo travel
Stick deflection

3P option: The neutral position is located on one side (end-point) of the control. The control travel is set at half and at full travel.

Servo travel
Stick deflection

Depending on the type of curve selected the amount of output from that input is selected in the mixer setup menu (GHI3) , on the standard curves this will be one or two values depending on the type of curve used
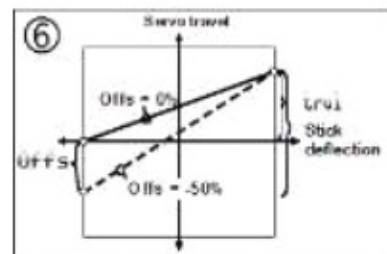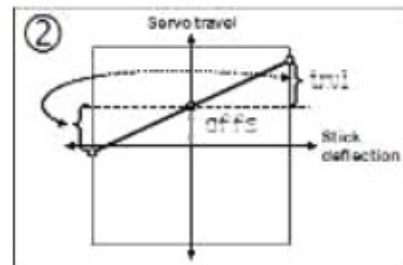
Profi – Mixers
3 - Servoside Mixers

The standard mixer curves can be augmented to adjust the nature of the curves as follows

2

Toggle option: The input control function (usually aileron) changes direction (is toggled) upon each assignment of this mixer to a servo. Example: The aileron moves up on one wing panel and down on the other. This option can be combined with ⊹, ⊹ and Cu.

+

Offset option: An offset shifts the origin of the mixer to one side. Example: The ailerons are raised as spoilers. The travel distance up (spoiler) is long, the travel distance down of the aileron is short. Part of the servo travel remains unused. The offset is used to shift the neutral position of the mixer down. This option can be combined with ⊹ and ⊹.

–

Deadband option: Mixing does not start immediately at the neutral position, but after the control has passed the set deadband.
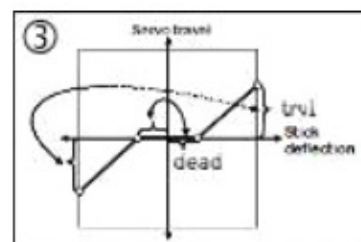
The option can be combined with ⊹ and ⊹.
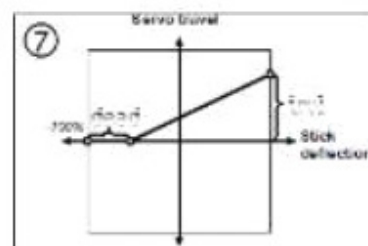
Here is an example of setting up the supplied flap mixer template, first in the mixer definition screen

The 3rd column determines the mixer curve for the representative input, in this example Flap is the primary input to the INNER FLAPS and is asymetrical with both surfaces moving in the same direction, in the mixer Menu (GHI3) the flap travel can be adjusted for reflex and thermal, Spoiler input is with a single sided curve with offset, so the position of the flaps is offset to allow full servo movement to be utilised, Aileron input is using an asymetric curve with surfaces moving in opposite directions, this allows flap to be mixed with aileron and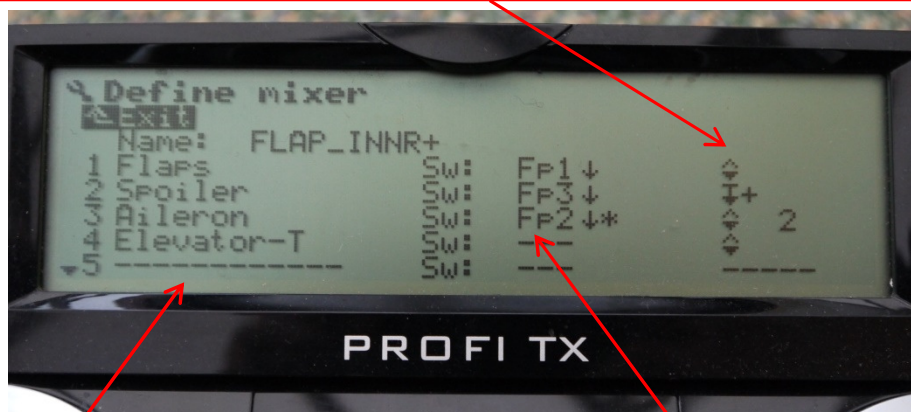 up and down travel to be set separately. The last remaining listed input is Elevator less Trim, asymetrical with both surfaces moving in the same direction, this allows the elevator to move the flaps (snap flap), note the input is –T, meaning input is from the stick movement only and trim has no effect on the flaps.

Only 4 control inputs are used in this mixer, but there are a further 4 slots for additional inputs if required. Elevator –T means that elevator trim has no effect and this option is available for rudder and aileron inputs as well.

The 2nd column shows that Flap control input is only active in flightphase 1, spoiler in flight phase 2, aileron in flight phase 3 and elevator input is always available

Profi – Mixers
3 - Servoside Mixers

This is an example of the mixer inputs in the Mixer menu (GHI3) for the FLAP_INNR+ mixer

Flap control input has been limited to 4% in one direction and 12% in the opposite direction, the reflex and thermal settings on this model, meaning when the flap slider is fully one way the model is in reflex mode and thermal mode when the slider is in the opposite direction.

In the spoiler input , with the spoiler control (e.g. slider or throttle stick) in the raised position then the flaps are offset by 5% and move to the -70% position when spoiler is deployed. Note that on this screen the spoiler is active as shown by the astrisk, so any changes made now would be seen on the model.
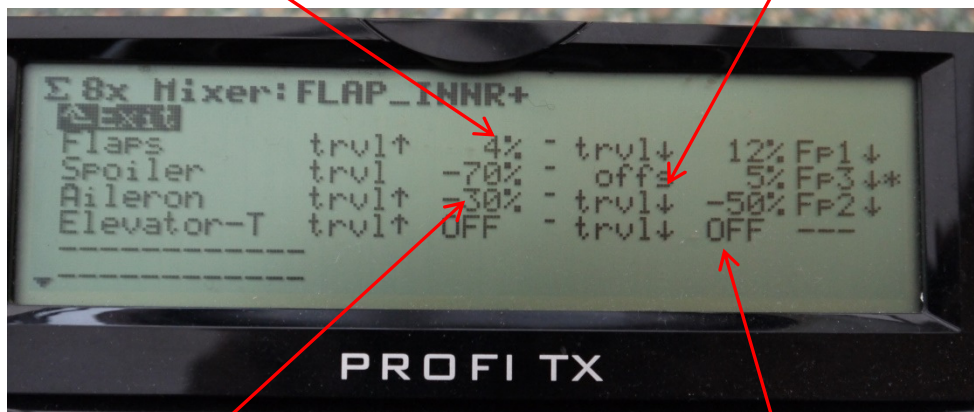
Aileron input to the flaps is 30% in one direction and 70% in the other, note "–" needed get the correct direction, rather than swap the flap channels over!

Elevator input to flaps is off in both directions, meaning there is no snap flap on this model

When I'm setting up flaps on a glider, I would normally start with flap input at 100% and all other inputs OFF, then in the servo calibrate menu, calibrate both servos so that their travel matches at both ends of the flap control and they match when the control is centred, or all 5 points if using a 5 point calibration curve. Then going to the mixer menu, make the spoiler control active and set the spoiler offset and spoiler travel, before inputting the required flap and aileron travels.
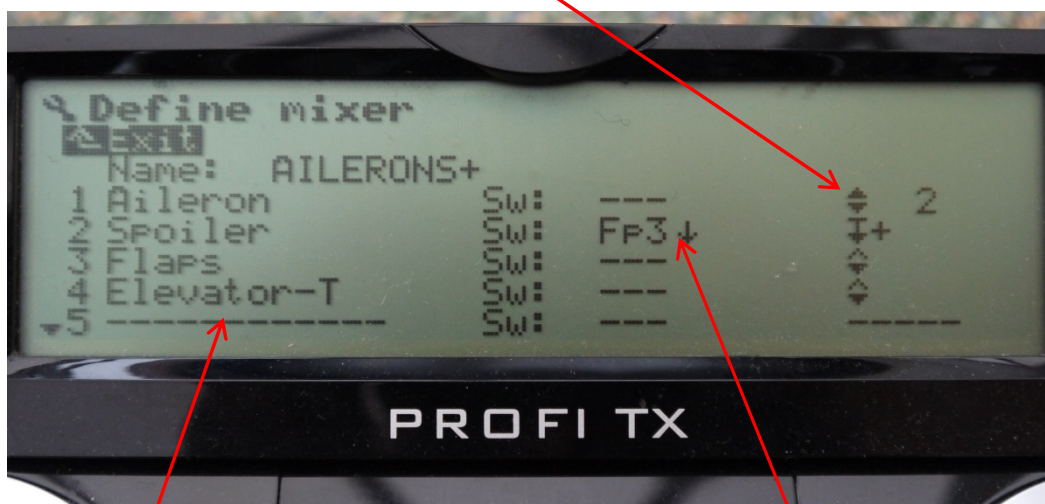
Profi – Mixers
3 - Servoside Mixers

Here is an example of setting up the supplied aileron mixer template, first in the mixer definition screen

The 3rd column determines the mixer curve for the representative input, in this example Aileron is the primary input to the AILERONS+ and is symmetrical with both surfaces moving in the opposite directions (2), in the mixer Menu (GHI3) the aileron travel can be adjusted (Differential is best adjusted in the specific differential mixer covered earlier) , Spoiler input is with a single sided curve with offset, allowing the ailerons to be raised more without wasting any available servo rotation by off setting the servo centre point., if you have both ailerons raised as spoilers it's recommended to set the aileron differential to SPOILER+ in the differential settings as this suppresses differential when both ailerons are raised. The last remaining 2 input are Flaps for using the ailerons to adjust the wing camber and Elevator less Trim, asymetrical with both surfaces moving in the same direction, this allows the elevator to move the ailerons (snap flap), note the input is –T, meaning input is from the stick movement only and trim has no effect on the AILERONS+ output.

Only 4 control inputs are used in this mixer, but there are a further 4 slots for additional inputs if required.

The 2nd column shows that Spoiler control input is only active in flightphase 3, aileron, flap and elevator input is always available
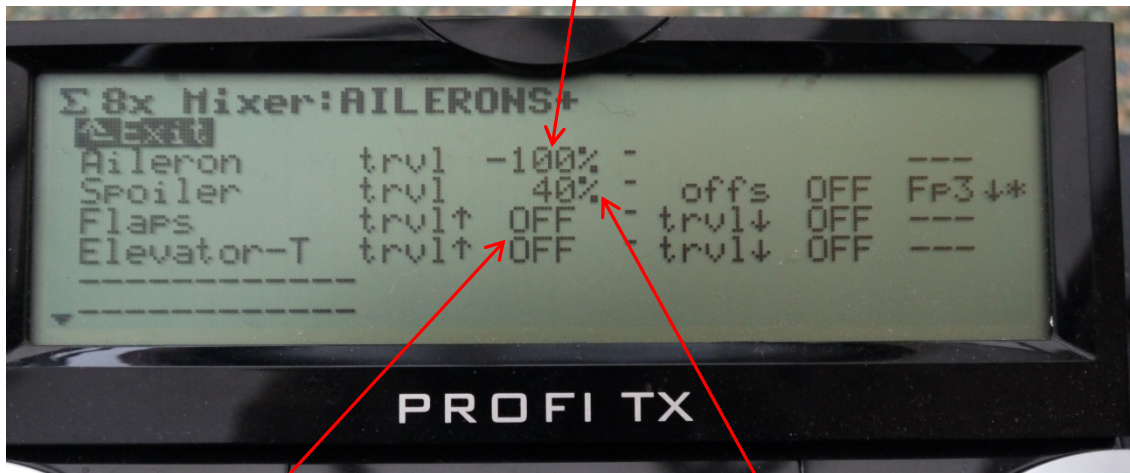
Profi – Mixers
3 - Servoside Mixers

Here is an example of setting up the supplied aileron mixer template, here are the settings in the mixer menu (GHI3)

As expected the aileron input is always on and set too 100% in both directions, with differential being set in the aileron differential mixer
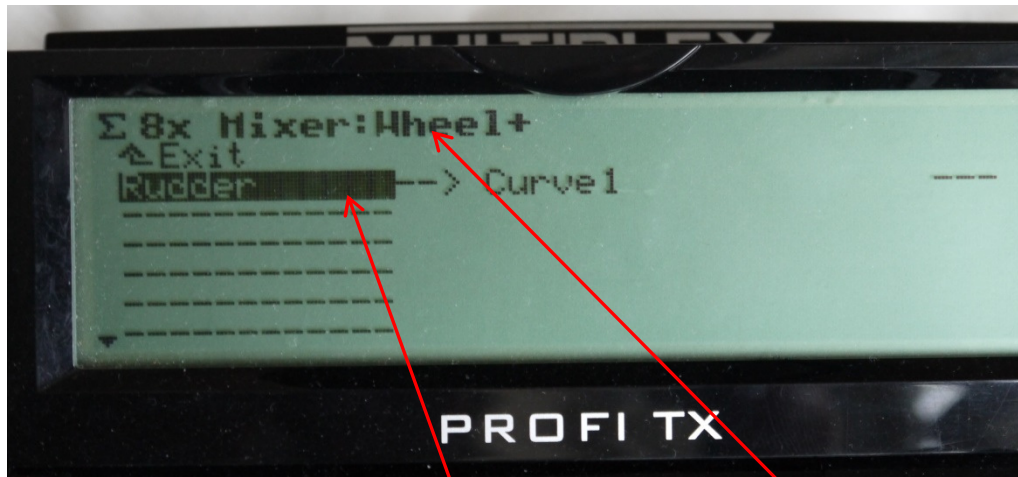

Although Flaps and Elevator inputs are available, no input has been specified so these controls have no effect on the AILERON+ output

Spoiler input is set at 40% and is active in Flightphase 3, note no offset required as servo centre point is with the ailerons at neutral position on this model.
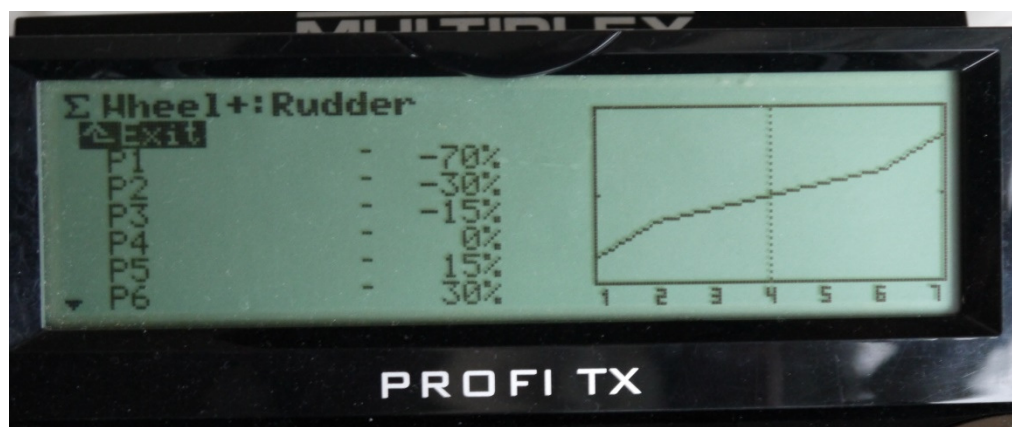
Profi – Mixers
3 - Servoside Mixers

Apart from the standard curves the Profi gives you the option to create a bespoke curve if you require, here's one made up to mix rudder control into nose wheel steering

In the mixer definition menu (ABC1) a new mixer called Wheel+ was created, which was assigned to the nose leg servo channel in the servo assignment menu (JKL4), an input from the rudder was added to use curve 1

In the mixer menu (GHI3) opening the Wheel+ mixer and rudder input opens the seven point curve, scrolling down to each position P1 thru P7 allows you to specify the mix input at each position.

Profi – Mixers
3 - Servoside Mixers

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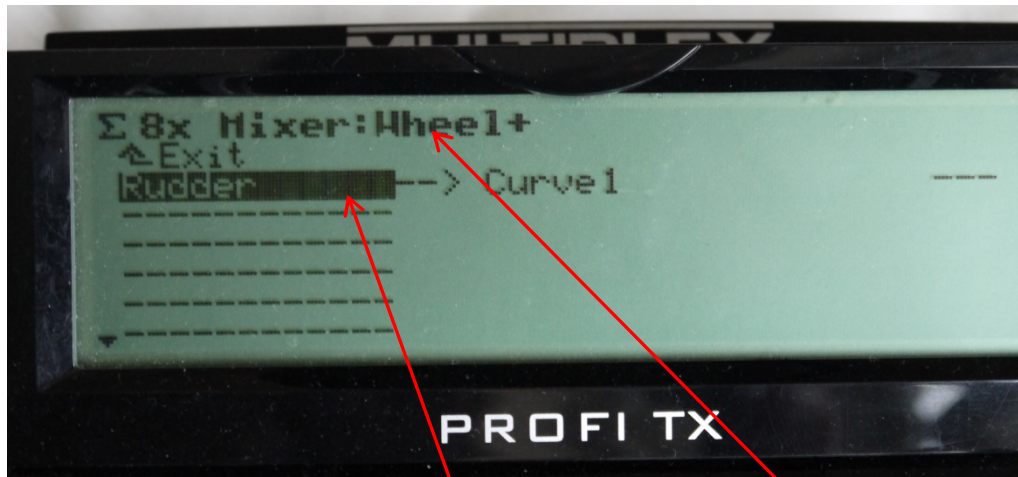

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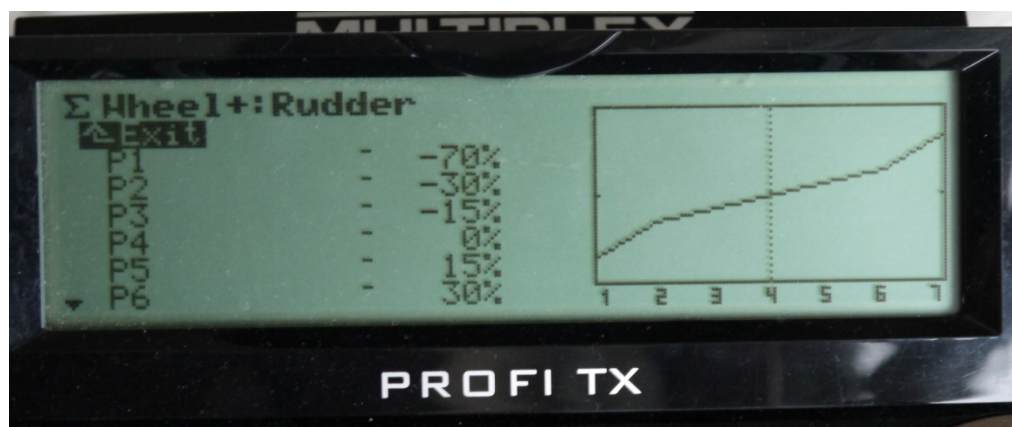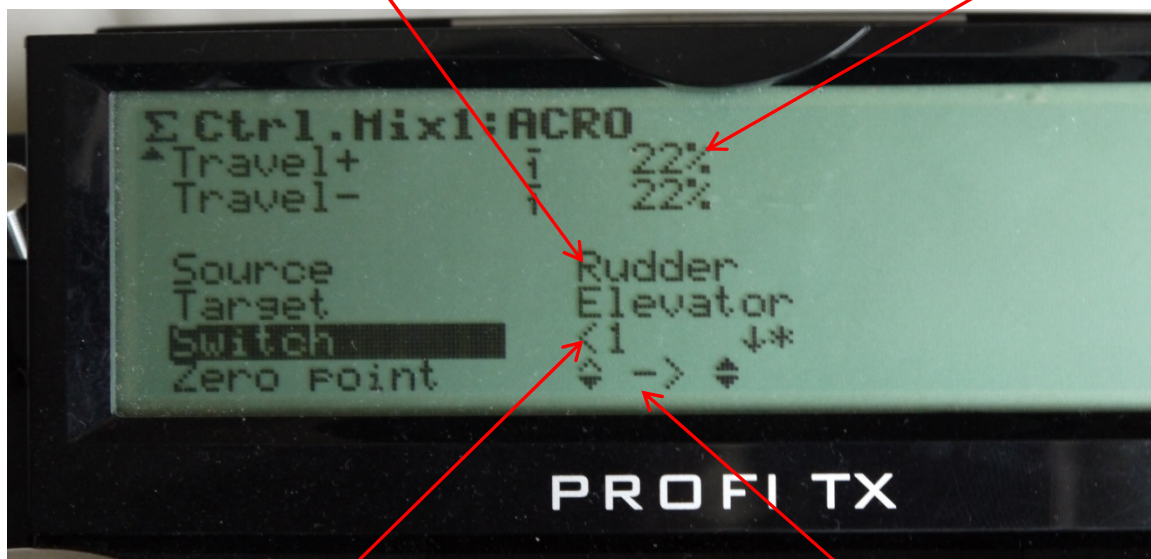
Profi – Mixers
4 - Control Mixers

In addition to the other mixers the Profi provides two control mixers and these are found in the Mixer Menu (GHI3) as Ctrl. Mix 1 and Ctrl. Mix 2, entering these brings up the screen where the controls to be mixed can be specified and set up.

The source and target controls are specified, here rudder is the source and will have effect on the elevator, i.e. to keep the model flying straight in knife edge.

The amount of mix input in each direction, can be specified, note these can be flight phase specific

The mix can be on a switch if required

The zero point of the mix, either symmetrical as shown here acting around the centre point or single sided acting from one side can be specified

i) Using Fight Phases to fix mixer inputs

An alternative to activating inputs in each mix is to us the settings in the controls menu (DEF2) for flaps, spoilers, aux, controls etc to lock those controls in different flight phases as follows. This locks the control and could be used to make it effective in say flight phase 1 and 3 and not in 2 or 4.

Here in flight phase 2, set as NORMAL on this model, the spoiler control is fixed at -100%, these means the spoiler control has no effect on the spoilers, if used, or any mixer that has spoiler as an input.
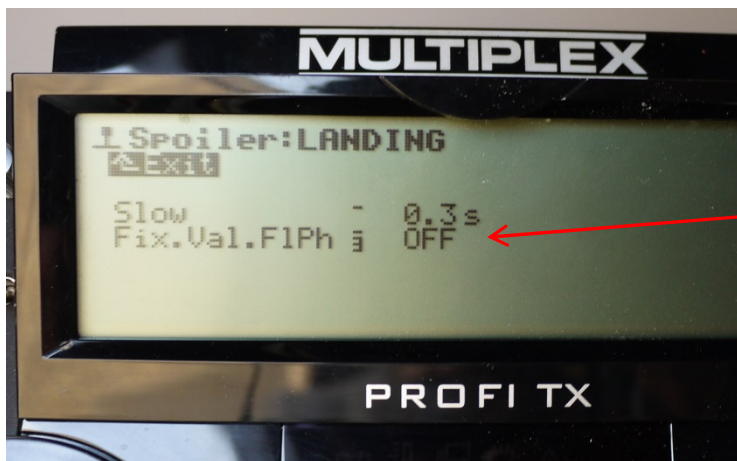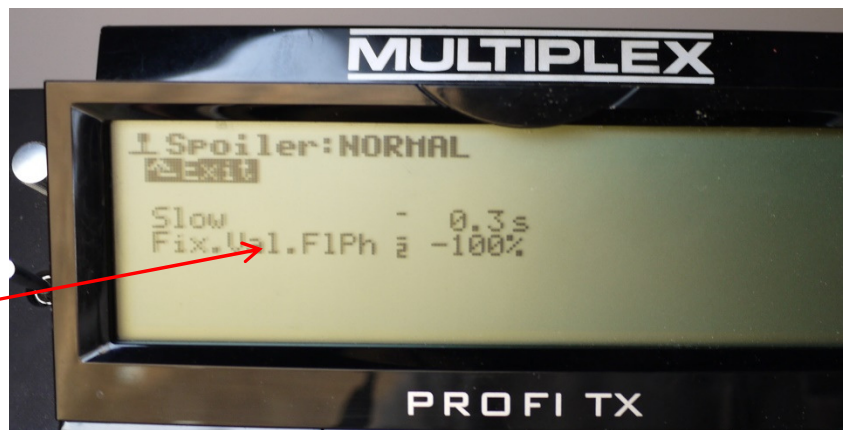
Here in flight phase 3, LANDING, the fixed input is OFF, this means that the spoiler control is active and the spoilers, if used, or any mixer that has spoilers as an input will respond to the spoiler control. Note also the slow setting, so if flight phase is switched and control is in fully deflected position , affected surfaces will only move slowly

ii) Using Flight Phases to adjust mixer inputs

If you wish to have a varying amount of mix depending on what flight phase you are in, e.g. say you wish to have more flap movement in the launch phase and less in the thermal phase this can be accomplished by using two input lines in the mixer definition screen activated by separate switches and then entering different values in the mixer menu.

In the mixer definition menu in setup (ABC1) add two inputs from the same control with separate mix switches. Here on the FLAP_INNR+ I've created two inputs for the flap control, inputs 1 and 3, and activated by flightphase 1 and 2. Note the curves are the same, but you could if you wish have different effect curves
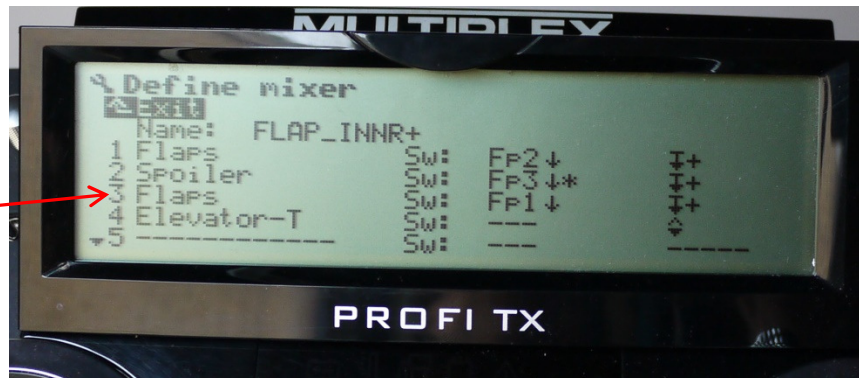
In the mixer set up menu (GHI3) different values can be entered for the two separate flap inputs.

Profi Mixers

That concludes the mixers, further presentations are being prepared on

- Setting and using flight phases
- Timers
- Telemetry
- Setting up and using Digiadjusters
- Setting up and using MagicSwitches
- Buddy box set up