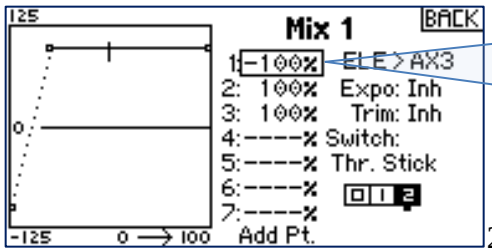
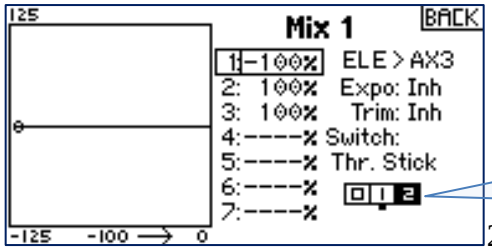
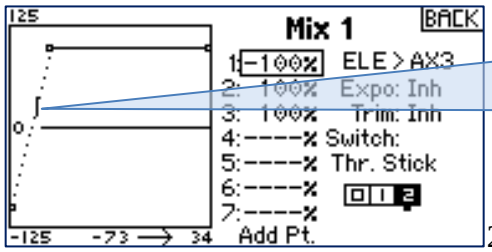


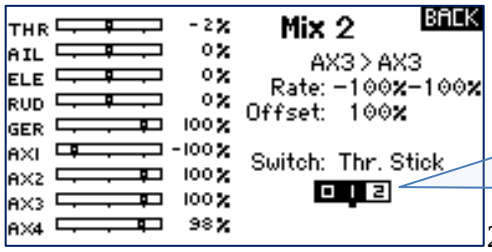
2524. Set the values for the three curve points as shown using the Thumb Roller to move the selection rectangle over the value, rolling the Thumb Roller to change the value, and pressing the Thumb Roller to set the new value. The curve appears on the left as you set the values.



2525. Just as a test, deflect the Throttle Joystick away from the near position — it should change to "Pos 1" and the curve, being inhibited, will disappear.



2526. Deflect the Elevator Joystick back to the near position (check that Position 2 has the black dot under it) and you will see the vertical bar corresponding to its current position slide down the slope of the curve as the braking action is applied.



2527. This mix is only active when the Throttle Joystick is in "Pos 0" or "Pos 1" and, when active, forces "AX3" to a value of +100%, ensuring that there the brakes are not applied.

2528. Be sure to test the correct operation of these mixes with the aircraft on the ground and, if the aircraft is electric, please remove the propeller! If you get the sign of "AX3" reversed for the brakes to be applied, the brakes will be fully applied when the motor starts. This will be an important clue that something is wrong. To correct this problem, reverse the "AX3" channel as described in the section entitled Servo Reverse Screen (page 376).

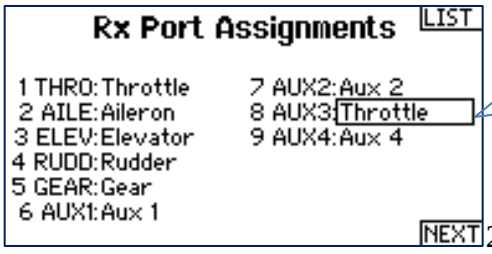
2529. We would have liked not to have to use a second mix, but we could not find a way to hold "AX3" at 100% when the Throttle Joystick was at anything other than -100%. Them's the brakes. ☺

14.5.15.32.9 *Mix for Differential Thrust*

2530. If your aircraft has more than one motor and the motors are not on the centerline of the fuselage, then you may find it useful to be able to control the amount of thrust each motor produces to help with ground handling or even aerial maneuvers.

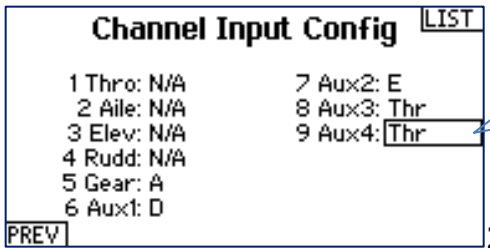
2531. For this example, we'll make the following assumptions:
1. We will use a default Acro model as the starting point.
2. The first motor on the aircraft's left wing will be controlled by the existing throttle channel. The second motor on the aircraft's right wing will be controlled by Aux 3.
3. The Servo Balance screen will be used to get symmetrical thrust from the two motors before starting this procedure. See the section entitled Servo Balance Screen (page 398).
4. The channel values of both channels will be symmetrical: -100% means the Throttle Joystick is fully deflected to the near position (throttle closed), +100% means that it is fully deflected to the far position (full throttle).
5. For a left-turning differential, we will reduce the power setting on the left motor and increase the power setting on the right motor and *vice versa*. If you want to just increase the outboard motor power and not reduce the inboard motor power, we'll tell you how to do that in the procedure below.
6. The Rotary Knob will be used to provide Throttle Cut to both motors by being used on the Throttle Cut Screen for the motor on the left wing and by activating a mix to force the Aux 3 channel to -100% for the motor on the right wing.
7. When the Throttle Cut is removed, if the Throttle Joystick is not fully deflected to the near position (throttle closed), the transmitter will take five seconds as it slowly increases the throttle channel to value corresponding to the Throttle Joysticks position so you can move body parts out of the way. (There is no easy way to implement this safety measure on the motor on the right wing — so beware!)
8. A first mix will be used to mix the Rudder to Throttle, reducing or increasing the throttle channel in opposition to the Rudder (Rudder Joystick deflected left will reduce the left motor's throttle and *vice versa*).
9. A second mix will be used to mix the Rudder to Aux 3, the throttle control for the motor on the right wing. This will work with the Rudder (Rudder Joystick deflected left will increase the right motor's throttle and *vice versa*).
10. The third mix is the one described in the section entitled Mix to Force a Channel Value to Specific Value (page 478) that forces Aux 3 to -100% when the Rotary Knob activates Throttle Cut for throttle channel for the motor on the left wing.

2532. The procedure for implementing differential thrust is:



2533.

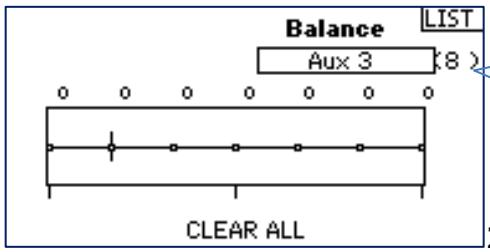
NOTE: Tempting as it is to just do this assignment, it will not work as the Rx Port Assignments happen after mixes have been applied in the transmitter.
So do not do this!
But do go to this screen via System Menu ↴ Channel Assign and roll the Thumb Roller to highlight "NEXT" and press the Thumb Roller.



2534.

Roll the Thumb Roller to move the selection rectangle over "8 Aux 3: Rkb" and press the Thumb Roller to make it flash. Then roll the Thumb Roller to select "Thr" and press the Thumb Roller. Repeat this for "9 Aux 4" for testing purposes.

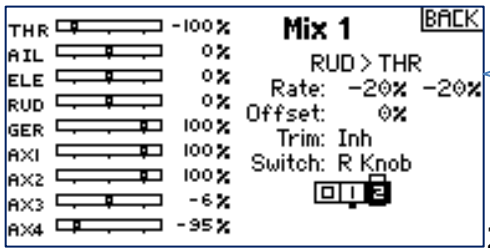
2535. By temporarily assigning "9 Aux4" to "Thr" in the step above it will act as a testing aid and you will be able to use the Monitor screen to see the unmixed value of the throttle channel and this is helpful to verify the mixes once you have set them up. Once you have completed this procedure you can remove the assignment of "9 Aux4" and either use it for some other purpose or set it to "Inh" (Inhibit).



2536.

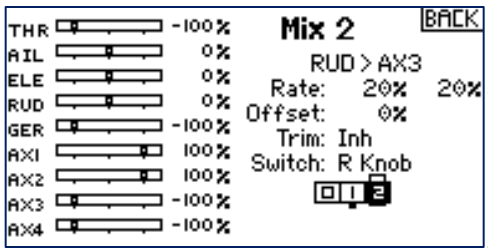
Before you proceed, go to Function List ↴ Servo Setup ↴ Balance and set up the balance adjustments you need to get equal thrust from each motor at different throttle settings. This will have to be done with propellers mounted, of course, and with the aircraft on the ground and restrained (and everyone's body parts well clear).

2537. The details of how to use the Balance Screen are in the section entitled Servo Balance Screen (page 398).



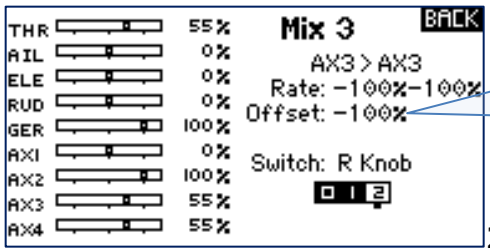
2538.

Then go to Function List ↴ Mixing and create a normal mix as shown with *negative* rates. You will have to experiment for the correct number. This mixes the Rudder with the Throttle. To implement Throttle Cut also then select the switch that you want to use. We're using "R Knob" and Position 2.



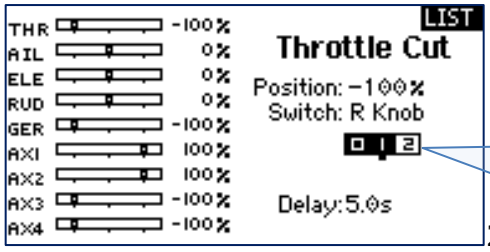
2539.

The second mix mixes the Rudder with "AX3" for the motor on the right wing. Note that the Rates are *positive* but the same numbers you used for Mix 1. To implement Throttle Cut also select the same switch and active position as you did for Mix 1. See the additional note about this mix and the "R Knob" below.



2540.

The third mix forces the "AX3" channel to -100% when the Rotary Knob is in positions 0 and 1. -100% is the safer value for electric motors rather than using -130% (see the note below).



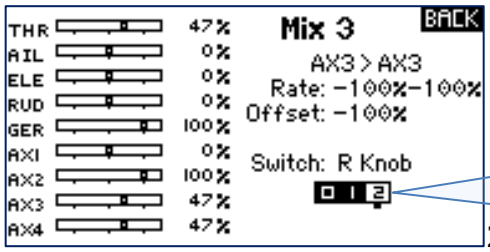
2541.

Go to Function List ↴ Throttle Cut to set it up for the Throttle channel. Note that you can only select the Rotary Knob by twisting it (it does not appear using the Thumb Roller to scroll through alternatives). The active positions 0 and 1 match those of Mix 3.

2542. Note about Mix 2 above: There is some low cunning going on in the Mix 2, Mix 3, and Throttle Cut above — the active positions of the "R Knob" in Mix 2 is the reverse of Mix 3 and the Throttle Cut. Thus, when Throttle Cut is active, Mix 3 is also active, holding AX3 at -100% and Mix 2 is inhibited so that the rudder does not affect AX3.

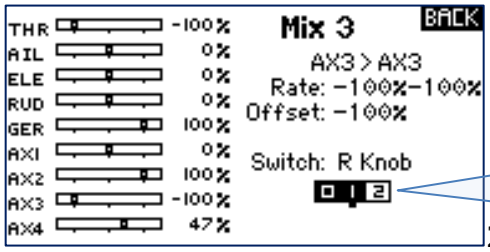
2543. If you do not want the differential thrust ever to *reduce* either motor's thrust, only increasing the thrust of the motor on the wing on the outside of the turn, then Mix 1's Rates need to be 0%, -20% and Mix 2's Rates need to be +20%, 0%.

2544. For versions of Airware® prior to 2.03, where the default Throttle Cut value was -130%, we prefer to set Throttle Cut to -100% just in case we encounter an electronic speed control that "learns" what the lowest throttle setting is and would otherwise learn that -130% (the default value) is Throttle Cut — which then means that a throttle channel value of -100% leaves the motor spinning — you cannot stop the motor using the Throttle Joystick! Note that -130% is fine for liquid fueled motors, though.



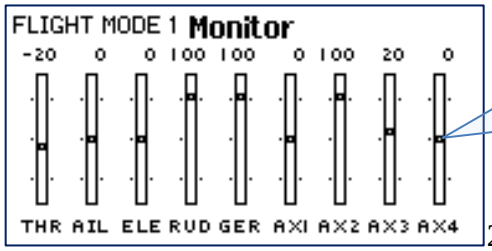
2545.

Test the Throttle Cut by moving the Throttle Joystick somewhere near the center point and then rotating the Rotary Knob so the tab points left (Throttle Cut inhibited). Note the values for "THR" and "AX3" should be something other than -100%.



2546.

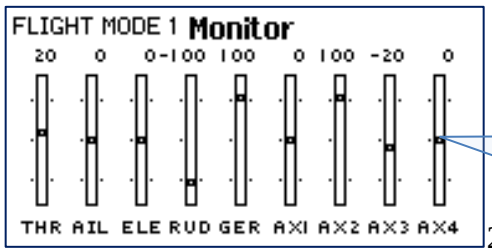
Then rotate the Rotary Knob so the tab points center or right (Throttle Cut active). Note the values for "THR" and "AX3" should now be -100%.



2547.

To test that the signs of the mixes are correct with the Rudder Joystick deflection, deflect the Rudder Joystick fully left, while reading out the throttle value on "AX4" and setting it to 0% (recall we set this up in the Channel Input Assign for testing purposes).

2548. In the screen print above you can see that, for left deflection of the Rudder, with the Throttle Joystick at 0% (see "AX4"), that the "THR" channel is reading -20% (thrust has been reduced) and "AX3" is reading +20% (thrust has been increased). This is consistent with a left turn.



2549.

Deflect the Rudder Joystick to the right with the Throttle Joystick still at 0% (see "AX4"), and you should see "THR" at +20% and "AX3" at -20% which is consistent for a right turn.

2550. Note that, in common with many mixes, you can end up with channel values outside the range of +100% to -100% and for liquid fueled engines controlling a mechanical throttle this has the possibility of stalling the servo or the mechanical linkage. You may therefore need to use Servo Absolute Travel to prevent this stalling from happening. The details of how to do this are in the section entitled Servo Abs. Travel Screen (Absolute Travel) (page 378). Also be careful with liquid fueled engines — a negative channel value might cause an engine to quit in mid-air. History has shown that this can often cause the aircraft to transition from flying mode to plummeting mode. The real moral, of course, is test the mixes carefully while the aircraft is on the ground. Plummeting from ground level is short-lived and never causes damage.

2551. If you want the turning effect of Differential Thrust to be stronger, then decrease the mix Rates for Mix 1 from -20% to lower numbers such as -60%. Similarly increase the mix Rates for Mix 2 from +20% to higher numbers such as +60%. But keep the numeric value (ignoring the signs) to be the same otherwise you will have Asymmetric Differential Thrust which, by and large, is probably not a good idea. If you insist on trying out Asymmetric Differential Thrust, please let us know how it works out — and how far the wreckage was from where you were standing.

14.5.15.32.10 *Mix to Activate Spoilers at Minimum Throttle*

2552. Some powered aircraft have spoilers or speed brakes to help them slow down and/or increase their descent rate.

2553. For this example, we will make the following assumptions:

1. We will start from a default Acro model.
2. The spoilers or speed brakes will be controlled by AX3.