

## 9303 PROGRAM MIX EXAMPLES

Here are a few examples of some common program mixes. They are intended as a quick reference guide and may require modification to suit a particular installation.

### SMOKE SYSTEM MIXER

This mixer is used to turn a smoke system on and off and is intended for a smoke system that plugs directly into the receiver (RX). The mix is turned on and off using a combination of the throttle stick position and a switch. When the switch is turned on and the throttle stick is moved above a certain point, the smoke system comes on. When the switch is turned off, the smoke system is disabled and will not come on when the throttle stick is advanced.

There are many ways to program this type of mixer and this is but one of them. The mixer will use the AUX4 channel (channel 9) for the smoke system and will use the GEAR switch to turn the smoke mixer on and off. The approach involves reducing the travel of the smoke channel (AUX4) to where the smoke system just turns off so there is not enough travel on the AUX4 channel to activate the smoke pump. Then the mix will add to the AUX4 travel, turning the smoke system on. The mixer uses the Throttle as the Master and AUX4 as the Slave and the Offset will be set so that the smoke system comes on at about ½ throttle.

1. Access the DEVIC.SEL function and temporarily Activate the Rudder D/R switch under the AUX4 channel. This activates AUX4.
2. Plug the smoke system into the AUX4 channel and turn on the Transmitter (TX) and RX.
3. Flip the Rudder D/R switch back and forth and the smoke pump should run when in one of the switch positions. Turn the smoke system off with the switch for now.
4. Access the TRVL ADJ. Function. With the Rudder D/R switch in the position that causes the smoke system to turn ON, reduce the travel of the AUX4 channel in both directions until the smoke pump just turns off (travel percentages should be equal for both directions). At this point there is not enough travel on the AUX4 channel to turn the smoke system on. Power everything off.
5. Return to the Devic.SEL function and Inhibit the AUX4 channel. The Rudder D/R switch can no longer control the smoke system.
6. Access an unused program mix (PROG MIX3, 4, 5, or 6)
7. Select #THR as the Master. This Throttle selection with the # sign at the beginning of the name indicates that the mixer is to ignore any throttle curves that may be associated with the throttle channel. The mixer will read only the physical position of the throttle stick.
8. Select AUX4 as the Slave.
9. Select the GEAR switch to turn the mixer on and off.
10. Highlight and select Offset and set the value to 0 which should represent ½ throttle.

11. Move the GEAR switch back and forth while observing the number directly to the right of the program mix name in the upper left portion of the display. The number will change between 0 and 1 as the switch is moved back and forth. When the number is 0, the mixer is looking at the Pos0 values (not programmed yet) and when it is 1, the mixer is looking at the Pos1 values (also not programmed). Put the GEAR switch in the position where you want the smoke system to turn ON. Look at the number directly to the right of the Program Mix name. If it is 0, highlight and select Pos0 on the display. If it is 1, highlight and select Pos1 on the display.
12. With the GEAR switch still in the ON position, move the throttle stick to full throttle causing upper Pos value to be highlighted. Set the percentage to +100%.
13. Lower the throttle stick to idle and turn the TX and RX on. Advancing the throttle above  $\frac{1}{2}$  should now turn the smoke system on and lowering the throttle below  $\frac{1}{2}$  stick should turn the smoke system off. If it does not, change the mix percentage from +100% to -100% and try again. Move the GEAR switch to the OFF position and the smoke system should not turn on regardless of throttle setting.
14. The point at which the throttle stick turns the smoke on and off can be adjusted by highlighting and selecting Offset. Lowering the Offset value causes the smoke to start at a lower throttle setting while increasing the value causes the smoke to come on at a higher throttle setting.

## **IDLE-UP MIXER**

This mixer is used to increase the idle slightly to help insure that the engine does not flame-out during spins and other maneuvers that are performed at idle. The mix is turned on using the GEAR switch just after take-off and turned off when it is time to land. The amount of Idle-Up (increase in RPM) can be adjusted from the front of the TX to compensate for varying conditions without having to enter the program mix to make adjustments. The mixer will use the Left Digital Flap Trim lever located next to the FLAP switch as the Master and the Throttle channel as the Slave. The GEAR switch is used to turn the mixer on and off.

1. Select an unused Program Mixer (PROG MIX3, 4, 5, or 6)
2. Select LTRM as the Master.
3. Select THRO as the Slave.
4. Move the Left Flap Trim Digital Trim switch downward and hold it until it reaches its lower limit
5. Highlight and select Offset and set the value to -200. This should represent the Flap Digital Trim at its lowest setting which will cause the mixer to move only in 1 direction. This is to guard against the mixer lowering the idle by mistake and causing a flame-out.
6. Select the GEAR switch as the switch to turn the mixer on and off.
7. Move the GEAR switch back and forth while observing the number directly to the right of the program mix name in the upper left portion of the display. The number will change between 0 and 1 as the switch is moved back and forth. When the number is 0, the mixer is looking at the Pos0 values (not programmed yet) and when it is 1, the mixer is looking at the Pos1 values (also not programmed). Put the GEAR switch in the position where you want the Idle-Up to turn ON. Look at the number directly to the right of the Program Mix name. If it is 0, highlight and select Pos0 on the display. If it is 1, highlight and select Pos1 on the display.
8. With the GEAR switch still in the ON position, set the percentage to +15%. This will cause the throttle channel to increase 15% from idle when the mixer is turned on and the Digital Flap Trim is advanced upwards to full. If the Digital Flap Trim is lowered from full, say to ½, then there will only be 7.5% added to the throttle. This allows adjustment of how much the engine Idles-up when the mixer is turned on.
9. The mixer should be adjusted with the engine running and up to operating temperature. With a helper securely holding the aircraft, start the engine and warm it up to normal operating temperature. Make sure the Gear switch is in the OFF position so there is no Idle-Up at this time. Also lower the throttle stick to the full Low position.

Access the TRVL.ADJ function and position the throttle trim lever in its center detent. With the trim at center, adjust the travel of the throttle servo to achieve the lowest dependable idle for landing. This is referred to as Low Idle and you should have to perform this adjustment only once unless there are dramatic changes in atmosphere or a change to the mechanical portion of the throttle linkage. Exit the TRVL ADJ function.

Now turn the Mixer on using the GEAR switch. Move the Digital Flap Trim lever up or down to achieve the desired amount of RPM increase. Moving the lever up will increase RPMs and moving it down decreases RPMs.

Turning the mixer off with the GEAR switch causes the engine to return to Low Idle and turning it on increases the RPM according to the setting of the Digital Flap Trim.

10. Stop the engine and observe the throttle linkage. Turn the Idle-Up on and advance the Throttle to Full. Use the TRAV ADJ. Function to adjust/reduce the throttle travel at the high-end if there is too much throw with the Idle-Up on.
11. To use the mixer for each flight, start the engine and warm it up to normal operating temperature. Turn the Idle-Up OFF and use the normal throttle trim lever to set the engine to the lowest dependable RPM. Now turn the Idle-Up on to realize an increase in RPM for flying. Be sure to remember to turn Idle-Up OFF before attempting to land.

## A MIXER TO ELIMINATE ROLL COUPLING

This mixer is used to eliminate any Proverse roll (rolling in the same direction as the rudder) coupling that may occur when Rudder input is applied. The mixer causes the ailerons to deflect just a bit in the opposite direction of the Rudder in order to keep the aircraft from rolling while holding Rudder for knife-edge flight. This mixer uses the Rudder as the Master and the Ailerons as the Slave. This type of mixer is typically left ON all of the time but may be turned ON and OFF using a switch if so desired. **Note:** If the model exhibits Adverse roll coupling where it rolls in the opposite direction of rudder input, then adjust the mix directions in step 6 so that the ailerons deflect slightly in the same direction as the rudder input.

1. Select an unused Program Mixer (PROG MIX3, 4, 5, or 6)
2. Select RUDD as the Master.
3. Select AILE as the Slave.
4. This mixer can usually be left on all of the time. However, if a Flight Mode or switch is to be used to turn the mixer on and off, highlight and select the Flight Mode or switch at the bottom of the display.
5. If a switch has been selected to turn the mixer on and off, move the switch back and forth while observing the number directly to the right of the program mix name in the upper left portion of the display. The number will change between 0 and 1 as the switch is moved back and forth. When the number is 0, the mixer is looking at the Pos0 values (not programmed yet) and when it is 1, the mixer is looking at the Pos1 values (also not programmed). Put the switch in the position where you want the mixer to turn ON. Look at the number directly to the right of the Program Mix name. If it is 0, highlight and select Pos0 on the display. If it is 1, highlight and select Pos1 on the display.

If the mixer is to remain on all of the time, highlight and select Pos0.

6. Move the rudder stick to the right a little and set the percentage to -3%. Move the rudder stick a little to the left and set the percentage to -3%. The negative percentages should cause the ailerons to move in the opposite direction of the rudder. When the rudder is moved to the right there should be just a little left aileron generated by the mixer. When moved to the left, there should be a little right aileron generated. If the percentage is too small to move the ailerons, increase the values (more negative). If the ailerons appear to be moving too much, decrease the percentage (less negative). If the ailerons are for some reason moving in the wrong direction (same direction as the rudder) then change the values to positive (+) percentages instead of negative.
7. If a switch has been selected, verify that the mixer is turned off when the switch is moved to the OFF position.
8. Test fly the aircraft and return to this mixer to adjust the percentages until the rudder does not cause the aircraft to roll when rudder is applied in knife-edge flight.

## **DOWN ELEVATOR AT IDLE TO ELIMINATE PITCHING TO CANOPY ON DOWN LINES**

This mixer is intended for aircraft that pull-out or pitch towards the canopy when flying a vertical down line at idle. If a mix is set up to provide a couple of degrees of down elevator when at idle, the aircraft will track straight down without input from the pilot. Once the throttle is advanced above idle, the mixer is turned off and the down elevator is removed. The mixer can also be turned off so the down elevator input does not occur during landing.

This mixer uses the Throttle as the Master and the Elevator as the Slave. The mix is turned on and off with the GEAR switch in combination with the position of the throttle stick – ON at idle and OFF above idle with the GEAR switch ON. When the GEAR switch is OFF, the mixer is turned off regardless of throttle setting.

1. Select an unused Program Mixer (PROG MIX3, 4, 5, or 6)
2. Select #THR as the Master and Select ELEV as the Slave.
3. Scroll down, highlight, and select GER as the switch to be used to turn the mixer on and off.
4. Move the Gear switch back and forth while observing the number directly to the right of the program mix name in the upper left portion of the display. The number will change between 0 and 1 as the switch is moved back and forth. When the number is 0, the mixer is looking at the Pos0 values (not programmed yet) and when it is 1, the mixer is looking at the Pos1 values (also not programmed). Put the switch in the position where you want the mixer to turn ON. Look at the number directly to the right of the Program Mix name. If it is 0, highlight and select Pos0 on the display. If it is 1, highlight and select Pos1 on the display.
5. With the switch still in the ON position, move the throttle stick to the full low position and the lower parameter next to the selected position should be highlighted. Set the lower parameter to a small negative value like -3%. This is the amount of deflection of the elevator that is to occur when the mixer is turned on and the throttle is reduced to idle.
6. The elevator should barely move downward when the throttle is set to idle. If the elevator moves upward, change the -3% to a +3% to reverse the direction that the elevator travels. The elevator can be made to move more by increasing the percentage (more negative or more positive) and move less by decreasing the percentage. After test flying the aircraft adjust the percentage as may be necessary. Leave the upper parameter of the selected position at 0% because there is to be no elevator input above idle.
7. Offset. Highlight and select OFFSET and set the value to -140 to -160. This represents a throttle stick position that is about 2-3 clicks up from full low stick. This is also the point where the mixer causes the elevator to deflect the -3%. Above this position there is no elevator deflection and the elevator returns to normal.
8. Verify Operation. Highlight and select the position with the -3% value. Move the Gear switch to the ON position and move the throttle stick from full throttle to idle while observing the values. When the stick is brought down to idle, the lower position value is highlighted indicating the down elevator deflection (-3%). Verify that the elevator is deflecting downward just a bit. When the stick is advanced above idle, the upper position value is highlighted (0%) and the elevator returns to normal (no mixing).

Now turn the Gear switch to the OFF position and note that the number next to the Program Mix Name is now 1 indicating that the mixer is looking at the other position values which are still set to 0%. Since both of the values are at 0% there is no deflection of the elevator – the mixer is turned OFF regardless of throttle stick position. Verify that the elevator does not move when the throttle stick is moved.

Test fly the aircraft and adjust the percentage as may be necessary.

## A MIXER TO ELIMINATE PITCH-COUPLING

This Multi-Point Program Mix is intended for aircraft that pitch towards the landing gear when holding rudder for knife-edge flight – commonly known as Pitch-Coupling. If a mix is set up to provide an appropriate amount of *Up elevator* for different amounts of rudder input, the aircraft will fly straight without pitching to the gear while holding rudder during knife-edge flight.

This mixer uses the Rudder as the Master and the Elevator as the Slave. The mix is turned on and off with the GEAR switch

1. Select an unused Multi-Point Program Mixer (PROG MIX1 or 2)
2. Select RUDD as the Master and Select ELEV as the Slave.
3. Highlight & select SW SWLECT and then select GER as the switch to turn the mixer on & off.
4. Set The Points to the following values:

Point-0 -10% (At Full Right Rudder the Elevator will deflect UP 10%).

Point-1 INH (Takes on value between Point-0 and Point-2).

Point-2 -3% (Elevator deflects upward 3% when Rudder is moved to point-2).

Point-3 0% (No-mixing – this is the Offset position and must remain at 0%).

Point-4 -3% (Elevator deflects upward 3% when Rudder is moved to point-4).

Point-5 INH (Takes on value between Point-4 and Point-6).

Point-6 -10% (at Full Left Rudder the Elevator will deflect UP 10%).

5. **Verify Operation.** Turn the RX on and turn the mix on using the Gear switch. Move the rudder stick from full right to full left. The elevator should deflect Up when the rudder is moved in both directions. If it moves down instead, change the percentages to + values instead of (-) values at each point. If the elevator appears to be moving too much, reduce the point values (less negative). If the elevator does not seem to move enough then increase the point values (more negative). Now turn the Gear switch to the OFF position and verify that the elevator does not move when the rudder stick is deflected.

While test flying the aircraft make note of the mixing and whether it is generating enough up-elevator during knife-edge to stop it from pitching to the gear, or generating too much elevator input causing it to pitch to the canopy instead of the gear. Also note the approximate position of the rudder stick when pitching occurs. Land the aircraft and adjust the points closest to the position of the rudder stick when pitching occurs for more or less elevator deflection until the aircraft no longer pitches during knife-edge. More negative typically generates more Up elevator and less negative generates less Up elevator. Points 1 and 5 may be activated and their value changed if necessary to fine-tune the mix.