

Trimming for Precision Aerobatics *(written by Mike Chipchase)*

Trimming must be done in calm conditions. Make multiple tests before making adjustments. If any changes are made, go back over previous steps and verify or readjust, as necessary. A good decalage starting point is 0-degree wing, 0-degree stab, and 1.5-degree down thrust, and 1.5-degree right thrust. The model should be perfectly aligned while it is being constructed. Static balance the model prior to flying it. Setting the center of gravity to between 34% and 38% of the MAC is a good starting point. All vertical dives are power off. Setting up the model with 12-degrees up aileron and between 11- and 12-degrees down is a good starting point. Take your time. Trimming is a constant procedure throughout the life of your aircraft. If a trim condition changes noticeably, inspect all airframe and control components carefully to determine what caused the change!

TO TEST FOR:	TEST PROCEDURE:	OBSERVATIONS:	ADJUSTMENTS:
Control Neutrals	Fly the model straight and level.	Use the transmitter to achieve hands-off straight and level flight.	Adjust clevises to center transmitter trims.
Control Rolls	Fly model and apply full deflection of each control in turn.	Check response of each control.	<u>Aileron</u> : Hi-rate 3 rolls in 3-4 seconds; lo-rate in 6 seconds. <u>Elevator</u> : Hi-rate to 5 a smooth square corner; lo-rate to 5 a loop of ~130' in diameter. <u>Rudder</u> : Hi-rate ~30-35 degrees, for stall turns; lo-rate to maintain knife-edge flight.
Center of Gravity 1	Roll the model into a near vertically banked turn.	A. Nose drops. B. Tail drops.	A. Add weight to tail. B. Add weight to nose.
Center of Gravity 2	Roll model inverted.	A. Lots of down elevator required to maintain level flight. B. No elevator required to maintain level flight or model climbs.	A. Add weight to tail. B. Add weight to nose.
Decalage	Power off vertical dive, cross-wind (if any). Release controls when model is vertical (elevator must be neutral).	A. Model continues straight down. B. Model starts to pull out (nose up). C. Model starts to tuck in (nose down).	A. No adjustment required. B. Reduce incidence. C. Increase incidence.
Tip Weight (coarse)	Fly model straight and level, upright. Check aileron trim maintains wings level. Roll the model inverted, wings level. Release aileron stick.	A. Model does not drop a wing. B. The left wing drops. C. The right wing drops.	A. No adjustment required. B. Add weight to right tip. C. Add weight to left tip.
Tip Weight (final)	Fly the model high into the wind either coming towards you or going away from you, smoothly push the model into a vertical dive, pull out sharply and watch for a wing dropping.	A. Neither wing drops on pulling out. B. The right wing drops on pulling out. C. The left wing drops on pulling out.	A. No adjustment required. B. Add weight to the left wing tip. C. Add weight to the right wing tip.

TO TEST FOR:	TEST PROCEDURE:	OBSERVATIONS:	ADJUSTMENTS:
Elevator Alignment	Fly model away from you and into any wind. Pull it into an inside loop or vertical climb, roll it inverted and repeat by pushing it into an outside loop or vertical climb.	<ul style="list-style-type: none"> A. No rolling tendency when elevator applied. B. Model rolls in same direction in both tests. C. Model rolls in opposite directions in both tests. 	<ul style="list-style-type: none"> A. Elevators in correct alignment. B. Elevator halves misaligned. Either raise one half or lower the other. C. One elevator half has more throw than the other. Reduce throw on side with the most throw or increase throw on the other.
Dihedral	Fly the model straight and level into any wind, apply rudder and watch for any tendency for the model to roll. Test in both directions. Make changes in increments of no more than 1/8" at a time. Don't worry about the nose pitching up or down.	<ul style="list-style-type: none"> A. The model does not roll. B. The model rolls in the direction of the applied rudder. C. The model rolls in the opposite direction to the applied roll. 	<ul style="list-style-type: none"> A. No adjustment required. B. Reduce dihedral. C. Increase dihedral.
Side Thrust	Fly the model away from you into any wind. Pull it smoothly into a vertical climb going at least to normal maneuver height.	<ul style="list-style-type: none"> A. Model continues straight up. B. Model veers left. C. Model veers right. 	<ul style="list-style-type: none"> A. No adjustment required. B. Add right thrust. C. Add left thrust.
Up/Down Thrust	Fly the model cross-wind at a distance of ~300 feet from you. Elevator trim should be neutral. Pull it into a vertical climb and neutralize the elevator.	<ul style="list-style-type: none"> A. Model continues straight up. B. Model pitches up toward canopy. C. Model pitches down toward bottom. 	<ul style="list-style-type: none"> A. No adjustment required. B. Add down thrust. C. Reduce down thrust.
Aileron Differential	Fly the model level and into any wind going away from you. Pull it up into a 45-degree climb and roll to the right.	<ul style="list-style-type: none"> A. The model does not veer sideways. B. The model's path veers to the right. C. The model's path veers to the left. 	<ul style="list-style-type: none"> A. No adjustment required. B. Increase differential, increase the up throw on both ailerons. C. Increase the down throw on both ailerons.
Knife-edge Tracking 1	Fly the model on a normal pass and roll into knife-edge flight. Maintain height with top rudder.	<ul style="list-style-type: none"> A. There is no pitch up or down. B. The nose pitches up. C. The nose pitches down to bottom. 	<ul style="list-style-type: none"> A. No adjustment required. B. Alternative cures: Move the center of gravity aft and/or increase wing incidence and/or add down trim to ailerons. C. Reverse the above.
Knife-edge Tracking 2	Fly the model in a normal pass and roll into knife-edge flight. Maintain height with top rudder.	<ul style="list-style-type: none"> A. The model does not pitch up or down. B. The model pitches to the canopy in both knife-edges. C. The model pitches to its bottom in both knife-edges. D. The model pitches in opposite directions in each knife-edge. 	<ul style="list-style-type: none"> A. No adjustment required. B. Lower both ailerons slightly (~2 turns). C. Raise both ailerons slightly (~2 turns). D. Use mixing from rudder to elevator to fix the problem.

TO TEST FOR:	TEST PROCEDURE:	OBSERVATIONS:	ADJUSTMENTS:
Power Off Tracking 1	Fly the model level into any wind, pull the power off and watch for any roll off to either side.	<ul style="list-style-type: none"> A. No roll to either side. B. The model rolls left. C. The model rolls right. 	<ul style="list-style-type: none"> A. No adjustment required. B. Mix 2% - 3% right aileron to low throttle, enough to neutralize the roll. C. Mix 2% - 3% left aileron to low throttle, enough to neutralize the roll.
Power Off Tracking 2	Fly the model at a distance of ~300 feet into or across wind but sideways to yourself, push it into a vertical dive and watch for any tendency to roll while in the dive.	<ul style="list-style-type: none"> A. The model shows no tendency to roll. B. The model rolls to its left. C. The model rolls to its right. 	<ul style="list-style-type: none"> A. No adjustment required. B. Mix some right aileron to low throttle, enough to neutralize the roll. C. Mix some left aileron to low throttle, enough to neutralize the roll.
Power Off Tracking 3	Fly the model high at a distance of ~300 feet across any wind but sideways to yourself, push it into a vertical dive, watch for any tendency to pitch up or down while in a dive.	<ul style="list-style-type: none"> A. There is no pitching and the model continues straight. B. The model pitches up towards the canopy. C. The model pitches down toward the bottom of the model. 	<ul style="list-style-type: none"> A. No adjustment required. B. Mix 2% - 3% down elevator to low throttle. C. Mix 2% - 3% up elevator to low throttle.