

From the Flying Cardinals of Northern Kentucky, Inc., Hebron, Kentucky

Trimming an Airplane

The following chart may be used to systematically set up and trim a model for straight flight and aerobatic maneuvers. Please note that for best results, trimming should be done in near-calm conditions. Before you decide to make a change, be sure to try the test several times before making adjustments. If any changes are made, go back through the previous steps and verify that they are not also affected. If they are, make further adjustments as necessary. →

To Test for...	Test Procedure	Observations	Adjustments
1. Control neutrals	Fly the model straight and level.	Use the transmitter trims for hands-off straight-and-level flight.	Change the electronic subtrims or adjust clevises to center transmitter trims.
2. Control throws	Fly the model and apply full deflection of each control in turn.	Check the response of each control: —Aileron high rate: 3 rolls in 4 seconds; low rate: 3 rolls in 6 seconds —Elevator high rate: to give a smooth square corner; low rate gives approximately 130 foot diameter loop —Rudder: high rate 30-35° for stall turns; low rate maintains knife-edge	Change ATV (for high rates) to achieve desired responses.
3. Decalage	Power off vertical dive (crosswind if any). Release controls when model is vertical (elevator trim 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 b) Reduce incidence c) Increase incidence
4. Center of Gravity	Method 1: roll into near vertically banked turn. Method 2: roll model inverted	1a) Nose drops 1b) Tail drops 2a) Lots of forward stick (down elevator) required to maintain level flight 2b) No forward stick (down elevator) required to maintain level flight, or model climbs	a) Add weight to tail b) Add weight to nose
5. Tip weight (coarse adjustment)	Fly model straight and level upright. Check aileron trim, maintain level wings. Roll model inverted, wings level. Release aileron stick.	a) Model does not drop a wing b) Left wing drops c) Right wing drops	a) No adjustment b) Add weight to right tip c) Add weight to left tip
6. Side thrust and warped wing	Fly model away from you into any wind. Pull it into a vertical climb, watch; for deviations as it slows down.	a) Model continues straight up b) Model veers left c) Model veers right d) Model rolls right	a) No adjustment b) Add right thrust c) Reduce right thrust d) Put trim tab under left wing tip
7. Up/down thrust	Fly the model on normal path into any wind, parallel	a) Model continues to straighten up	a) No adjustment b) Add down thrust

	to strip; at a distance of around 100 meters from you (elevator trim should be neutral as per test 3). Pull it into a vertical climb and neutralize elevator.	b) Model pitches up (goes toward top of model). c) Model pitches down (goes toward bottom of model).	c) Reduce down thrust
8. Aileron differential	<p>Method 1: fly model toward you and pull into a vertical climb before it reaches you. Neutralize controls, then half roll the model.</p> <p>Method 2: fly model on normal pass and do three or more rolls.</p> <p>Method 3: fly the model straight and level and gently rock the aileron stick back and forth.</p>	<p>1a) No heading changes. 1b) Heading change opposite to roll command (i.e. heading veers left after right roll). 1c) Heading change in direction of roll command.</p> <p>2a) Roll axis on model centerline. 2b) Roll axis off to same side of model as roll command (i.e. right roll, roll axis off right wing tip). 2c) Roll axis off to opposite side of model as roll command.</p> <p>3a) Model flies straight ahead without yawing. 3b) Model yaws away from roll command (i.e. right roll, yaw left). 3c) Model yaws toward roll command (i.e. right roll, yaw right).</p>	<p>a) Differential settings okay. b) Increase differential. c) Decrease differential.</p>
9. Dihedral	<p>Method 1: fly the model on normal pass and roll into knife-edge flight; maintain flight with top rudder (do this test in both left and right knife-edge flight).</p> <p>Method 2: apply rudder in level flight.</p>	<p>a) Model had no tendency to roll. b) Model rolls in direction of applied rudder. c) Model rolls in opposite direction in both tests.</p>	<p>a) Dihedral okay. b1) Reduce dihedral. b2) Use mixed to produce aileron opposing rudder travel (start with 10%). c1) Increase dihedral. c2) Mix ailerons with rudder direction 10%.</p>
10. Elevator alignment (for models with independent elevator halves)	Fly the model as in Test 6 and pull up into an inside loop. Roll inverted and repeat the above by pushing up into an outside loop.	<p>a) No rolling tendency when elevator applied. b) Model rolls in the same direction in both tests—halves misaligned. c) Model rolls in opposite directions in both tests. One elevator half had more throw than the other (model rolls to side with most throw).</p>	<p>a) Elevators are in correct alignment. b) Either raise one half, or lower the other. c) Reduce throw on one side, or increase throw on the other.</p>

<p>11. Pitching in knife-edge flight</p>	<p>Fly the model as in test 9.</p>	<p>a) There is no pitch up or down. b) The nose pitches up (the model climbs laterally). c) Nose pitches down (model dives laterally).</p>	<p>a) No adjustment needed. b) Alternate cures: 1) move CG aft 2) increase incidence 3) droop ailerons 4) mix down elevator with Rudder c) Reverse "b" above.</p>
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