PROBUILD
Model Aerobatic Specialists

Fact Sheet No. 9

Trimming Chart

These tests assume that the plane has been built perfectly aligned, wings square to fuz, stab in line with wings, vertical fin is exactly 90 Deg. to horizontal stab. Thrust, incidence, and balance (CG) are set according to the designer's recommendations. The wings are not warped as checked with an incidence meter, and the elevator halves are moving together as checked by a "Throw Meter". These flying tests should be done in near calm conditions. Double-check each of the following tests before making any changes.

The most critical component of aircraft set-up is finding the proper Centre-of-Gravity. It must be correct for each airplane, regardless of differences due to building variables and weight. Because of this requirement, it is important that this trim chart be followed in the order in which it is written.

Test for	Procedure	Results	Adjustments
Control Neutrals	test response to each control	Adjust trims for straight & level flight	adjust clevises to center xmter trims
Control Throws	Apply full deflection of each control	Check for response; Aileron hi rate 3 rolls in 3 secs. Elevator, square loop corners Rudder, 35 to 40 Deg.	Change control horns, ATV, and Duel Rates as required
Center of Gravity Method 1 Method 2	1. Roll into a vertically banked turn 2. Roll into inverted flight	1. A. Nose Drops 1. B. Tail Drops 2. A. lot of down required to hold level flight 2. B. up elevator needed to hold level flight	A. Add tail weight B. Add Nose weight (see **Note A** at bottom)
Up/ Down Thrust, test 1	Fly model straight & level, then cut throttle **Note** Either change B or C requires retest of Decalage and Verticals	A. Model continues level flight with a gradual drop B.Model abruptly dives C. Model abruptly climbs	A. No Change B. Increase down thrust C. Reduce down thrust
Up/Down Thrust, test 2	Fly model straight & level, then pull up **Note** Either change B or C requires retest of Decalage and Verticals	A.Model continues straight up B.Model pulls to canopy C.Model pulls to belly	A. No Adjustment B. Increase down thrust C. Reduce down thrust
Decalage, Angle of Incidence	Power off vertical dive from high altitude (neutralize elevator) (see **Note B** at bottom)	A. Model continues straight down B. Model pulls to canopy C. Model pulls to belly	A. No change needed B. Increase wing or stab incidence C. Reduce wing or stab incidence
Knife Edge Pitch	Fly model on normal pass, roll to knife edge, left and right	A. Model does not change pitch	A. No adjustment needed B. Either move CG aft; or

	use rudder to hold model level	B. Model pitches to canopy C. Model pitches to belly	increase wing incidence; or mix down elevator with rudder C. Reverse of B;
Tip Weight - Test1	Fly straight; level, roll inverted, 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
Tip Weight - Test 2	Fly model towards you / away from you, pull tight inside loop, repeat with outside loop	A. Model comes out with wings level B.Model comes out with right wing low C. Model comes out with left wing low	A. No adjustment B. Add weight to left tip C. Add weight to right tip
Side Thrust	Fly model away from you and pull up to vertical	A. Model continues straight up B. Model veers left C. Model veers right	A. No Adjustment B. Increase Right thrust C. Reduce Right thrust
Aileron Differential	Fly model toward you, pull into a vertical climb before it reaches you. Neutralize controls then half roll .	A. No Heading Changes B. Heading change opposite to roll command C. Heading change in direction of roll command	A. Differential settings OK B. Increase differential C. Decrease differential
Dihedral	Fly model on normal pass, roll to knife edge, left and right, use rudder to hold model level	A. Model does not roll B. Model rolls indirection of rudder C. Model rolls opposite to rudder	A. Dihedral OK B. Reduce dihedral C. Increase dihedral

Note A: These two methods for determining the C.G. of a model will give approximate results only. Start out with the C.G. where the Designer suggested, or somewhere between 25% to 35% of the Mean Aerodynamic Cord. The optimum C.G. for your model will require further testing while performing manoeuvres. The results will only be an approximation at best.

Note B: This portion of the trimming chart may be unclear for the following reason; In order to maintain level upright flight; the wing of a plane with a symmetrical airfoil wing needs to have a positive Angle of Attack (AOA, usually less than 1 degree). This positive angle provides the lift required to cause the plane to fly level. If the plane is balanced slightly to the nose heavy side (required for pitch stability), it will require a slight up elevator trim to hold level flight. A plane with a zero/ zero wing to elevator angle will also need a slight amount of up elevator trim to hold level flight. Therefore, a plane trimmed in this manner will have a tendency to pull to the canopy on a straight, thumbs off, down line because the elevator is controlling the AOA of the wing.

This positive AOA may also be achieved by a positive incidence change, which requires an offsetting down elevator for level flight. Thus, a power-off down line should fall straight down, with neutral controls. There are significant interactions between wing

incidence changes and CG; therefore it is most important that the C.G. of the airplane be established first.

In the final analysis, flight trimming an airplane is a personal preference issue after you have taken care of the basic essentials.