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# BASIC TRIMMING for AEROBATICS

**Please read the preamble and end notes fully.**

**This chart assumes your aircraft was built accurately and you have set the Centre of Gravity close to the manufacturer's recommendation. Your aircraft has been designed to fly at or below a given weight and a heavy aircraft may never fully satisfy the conditions of this chart. Working through the chart you may have to accept some compromises, but time spent trimming will be well worth the effort. These tests should be carried out in reasonably calm weather.**

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| **The Basics** | | | |
| 1 | Trim your model for straight and level flight with the engine set at just over half throttle. Models smaller than two metres may need a slightly higher throttle setting but full throttle should not be required. If you have tailplane incidence adjusters, it is assumed that you have trimmed out the inaccuracies to leave the tailplane and elevators level. Check that all servo throws are matched to recommended settings and there is no play in the control linkages. | | |
| **Engine/Motor Thrust Line** | | | |
| 2 | Hold straight and level flight at just over half throttle then smoothly increase the throttle to full. | Model climbs<br><br>Model dives | Increase down thrust.<br><br>Decrease down thrust. |
| 3 | Fly straight and level pull to the vertical. | Model pulls to the left<br><br>Model pulls to the right | Add more motor right thrust.<br><br>Decrease motor right thrust. |
| **Balance**: Centre of Gravity | | | |
| 4 | Fly straight and level, increase the throttle to full and pull to a 45° climb. Hold the 45° line then roll to inverted. | After rolling inverted down elevator has to be used to maintain the 45° line<br><br>If the model climbs | Add weight to the tail.<br><br>Add weight to the nose. |
| 5 | If any changes to the thrust line or CG have been made go back to 1. | | |
| **Wing Incidence.** The degrees of incidence should be related to the datum line of the model. For ease of comparison it is sometimes related to the centre line of the tailplane airfoil. The two reference lines may be different. | | | |
| 6 | Start high and reduce throttle to tick over, dive in a straight line. | Model pulls to canopy<br><br>Model pulls to belly | Reduce wing incidence.<br><br>Increase wing incidence. |
| **OR** | | | |
| | | Model pulls to canopy<br>Model Pulls to belly | Increase tailplane incidence.<br>Decrease tailplane incidence. |
| 7 | If any incidence is changed go back to 1. | | |

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| **Lateral balance** | | | |
| 8 | Fly model towards you and pull a tight loop.<br>Repeat for outside loop. | Wing drops at exit | Add weight to high wing tip. |
| **OR** | Roll model inverted at half throttle. | Wing that drops is the heavy wing | Add weight to other wing. |
| **Aileron differential** …. to help achieve axial rolls | | | |
| 9 | Fly model towards you and pull into a vertical climb. Then half roll. | If after the half roll your model changes heading. In the same direction as the roll. (i.e. If the roll is to the right and after the half roll the models heads to the right)<br><br>Opposite direction to the roll | Increase aileron differential. (up going aileron to move further than down going aileron).<br><br>Decrease aileron differential. |
| **Dihedral:** To change - the centre joint, or the wing tube sockets would need to be repositioned, an electronic control mix may be considered to be an easier compromise here. | | | |
| 10 | From straight and level flight, roll to knife edge, hold top rudder to maintain level flight. | If the model rolls to inverted<br><br>Model rolls back to upright | Increase dihedral.<br><br>Decrease dihedral. |

Trimming should be a constant concern to make the most of your model and it is expected that you may have to revisit the above chart to improve your models flight characteristics. Always make one adjustment at a time and check the effect thoroughly before making any further adjustment. If all the above suggestions do not achieve the desired results, electronic mixing of the controls must be considered, for instance if to maintain a flat turn through 360° the nose drops, mixing some up elevator to react to 80% rudder may solve the problem without affecting other manoeuvres like knife edge fight where less rudder may be used, or you may wish to program a switch to apply the mix when required. Another example is that it will be a lot less work to apply a mix than change the dihedral, but whichever you choose the objective is to reduce the workload on the sticks whilst flying a schedule. There are some highly regarded pilots who are said to rely more on electronic mixing than mechanical trimming to achieve their 'required feel'. So trimming is an individual art which you need to develop with time and experience. This guide is intended as a starting place.

For those wishing to correct a basic design fault it is worth knowing the first action should be to decide on a fuselage datum line, this is the line you wish the fuselage to assume when flying straight and level, the way it sits in the air. All other incidences, (main wing, engine down thrust and tailplane) are then set with reference to this line. Rudder hinge line angle and proportions of the rudder are also very important.

The whole concept of going to these lengths to trim your model is to reduce the workload to correct your model in flight so you can concentrate on flying the schedule accurately.

Thanks to many members, past and present, and reference from other sources to compile this chart. A C Hoyland. PRO GBR/CAA March 2007.