Simple Step by Step Trimming

Dave Drummer, PASO Flight C State Supervisor

This simple approach to trimming an indoor airplane assumes that the plane is built fairly well, and set up as indicated in the kit instructions, if kit-built. It also assumes that the plane turns to the left in a circle of the appropriate size. If this procedure does not result in satisfactory results, you may want to take a look at "Basic Step by Step Trimming" (find this in the "Flying" tab on the NFFS resources page), which discusses additional things to check.

Another option is to ask for assistance on the scioly.org Flight forum. There are several experienced mentors who monitor the forum, and who can provide you with valuable advice if given adequate information about the problems you are experiencing. For guidelines on what to submit, see the note at the very end.

1. The first step, perhaps the most important one, is to adjust the plane so that its center of gravity (cg)* is in a reasonable place. Typically, the kit instructions will suggest where this should be. Trust the kit designer, and make sure you follow their recommendation. To see how to locate the cg, look here.

* **cg and other trimming terminology are defined and explained in the Trimming Glossary, found in the Flying tab of the NFFS SO resources.**

2. For the first flight, you want the plane to climb rather than dive toward the floor to reduce chance of breakage. If the wing posts are adjustable, set the leading edge 5-6 mm higher than the trailing edge, as shown here. If your plane has a fixed incidence, play it safe by putting the cg a bit more rearward than recommended (slide the wing forward a few millimeters).

3. For trimming purposes, you want a partial wind that is sufficient to make the plane climb just a little - approximately 45 turns* on a 15:1 winder (675 actual turns on the rubber) is a reasonable starting point for the plane shown here. The rubber must be lubed, and stretched out to 4-5X its relaxed length. Wind about 60-70% of the final 45 winder turns at full stretch, then wind the rest as you approach the table (or whatever the other end of the motor is hooked to), finishing up with the rubber the same length that it will be when mounted on the plane. Video of this process can be seen here.

* **The trim wind of 675 turns was appropriate for this plane, but yours may require more, or fewer. The important thing is that you want enough turns so that the plane will either fly level or climb a little when released, but not so many that it climb way up or rocket into the floor.**

4. Transferring the rubber to the plane. You want only one person handling the plane and rubber when you do this to minimize chance of breaking the plane. Video of this process can be seen here.

5. Release technique: Get the plane moving at about flying speed, approximately shoulder high, release the prop first, then the plane. **DO NOT THROW IT!!!** Video of this launch technique.

6. If plane is not stalling as it flies, increase wing incidence in small increments, until it stalls. To do this, either move the front wing post up or the rear wing post down by about 1 mm at a time. Video of trim flight that stalls. If plane stalls with your initial incidence settings, keep it there and proceed to step 7.

7. Once the plane is stalling, gradually decrease the incidence until the stall just disappears. To do this, either move the front wing post down or the rear wing post up by about 1 mm at a time. Repeat until the plane flies smoothly without stalling. This is most likely close to the optimum trim setting for this plane, this prop, this size and mass of rubber motor. Record the optimum wing incidence in your log as shown here.

Note: Once the plane is trimmed using the procedure above, the trim settings will not change as long as nothing on the plane is changed. If ANYTHING else changes (move CG, repairs, other trim (washout*), etc), repeat the basic low power trim steps above.

* **wing wash-out (aka warp or twist) should only be added if you are told to do so in the kit instructions, and then only as much as told. It is not a basic trimming method, but rather is used to deal with specific problems - most planes do not need it!**

Likewise once the plane is trimmed, you DO NOT want to change the trim to adjust the climb. You change climb with torque, wash-in, and maybe moving the CG, but you don't want to increase the incidence to get the plane to climb better, or to climb less strongly.

8. The final step is to work toward the longest floor to ceiling flight. Launch low, and gradually increase the number of winds until the plane climbs up just short of the lowest ceiling obstructions is the goal. This launch technique and a flight with slightly increased winds are shown here, and the corresponding light log entries here. (Note that this flight is still stalling a bit, and needs additional reduction of incidence, per step 7.)

9. As you progress toward this goal, record the rubber parameters (size, winds, etc.), maximum height attained for the flight, and flight duration, for each flight in your log. Information like this is essential so that you can understand what you are doing! (blank flight log here). Detailed discussion of how to use a flight log here.

10. After you work through the procedure above, you should be getting some respectable flight times. However, there are some advanced winding techniques using a torque meter, and other things like the importance of matching the rubber size to the prop, that can help a lot. Take a look at some of the other resources on the NFFS SO resource pages to learn more about this.

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Asking for assistance on the scioly.org Flight forum: Post details of the problems you are experiencing, and one or more experienced mentors will reply. The following is a very comprehensive list of what you **can** include. **It is not necessary to include all of these if you don't know, just do the best you can.** More details are likely to result in more detailed advice!

Hint: to make this easier, copy/paste the list on the next page into a blank document. Add your answer behind each item for which you know the answer. Copy the finished list with answers, and paste it into your post on the forum.

Complete description of the problem

- How is the plane behaving?
- Approximate altitude attained (feet)
- Time attained (min:sec)

Details about the plane

- CG location relative to the rear wing post (+ in front of, - behind, 0 at post)
- Incidence measurements (wing and stab). Even if not adjustable, these can be measured as height in mm above the fuselage for the leading and trailing edge of each surface.
- Mass of plane without motor in grams
- Nose length of the plane, from the front of the prop hanger to the front post of the wing
- Tail tilt - which side is lower, and by how much, as viewed from the rear.
- Tail boom or rudder offset (best as an angle)
- Left wing wash in (aka twist or warp), if any
- Prop details (mfg, size).
- Prop pitch angle, specified as XX degrees at Y distance from center. Angle at a distance of 2/3 to 3/4 of the prop's radius is preferred.

Rubber details

- Rubber width, preferably expressed as g/in, or loop length before first stretch or wind. As a last resort, the purchased rubber width in inches.
- Rubber motor mass
- Rubber motor loop length, not including the knot
- Does motor include two black rubber o-rings? If other o-rings, what kind?
- What lube is used

Winding details

- Is stretch winding used?
- Do you wind to peak and then back off to launch winds/torque?
- Number max turns (in rubber turns, not winder cranks)
- Number turns backed off. (in rubber turns, not winder cranks)
- Peak torque if available
- Launch torque if available`