

# NO-CAL MISSTEPS

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Some years ago I wanted to create no-cal models of some favorite WW II fighters. Starting from a set of plans for outdoor rubber models I thought that it would only be a matter of scaling to the required no-cal wingspan of 16" and building it light. I was wrong in multiple dimensions. This note contains what I learned.

I started with the P-40C and P-47 plans that are in the old Model Builder book, "Flying Scale Models of WW-II". These were scaled to 16" and built in typical no-cal fashion. The resulting airplanes could barely fly. The first issue was the size of the horizontal stabilizer. Since the original model had stabilizers that were larger than scale, I thought that this was enough. Wrong Steve Canyon! The no-cal model flies much slower with less effective forces working on the tail. Also, the one surface wing airfoil is more sensitive to angle of attack than the original double surfaced outdoor airfoil. There is a particular narrow set of conditions that makes the model "happy". This includes the best prop, down thrust, c.g. location, and decalage. The first set of stabilizers I used drove me crazy because small changes took me from good flying to 'mushy' flight. Bigger horizontal stabilizers gave even me enough latitude to get things working.

The size of the vertical tail needed is related to the size of the prop used and the amount of dihedral. I started with a large wooden prop that then drove me into Dutch roll and spiral stability problems. Going to a smaller plastic prop and more dihedral tamed the beast.

As the modified model began to fly better the need for consistent flying became more evident. It is essential that the model fly consistently in order to power it up to the top of the National Building Museum and then settle back down. Any wandering meandering low stability flight would have it land on another floor, where the ever-present youthful assistants would 'help'.

Which leads to another point. I had built in an adjustable rudder and stabilizer. This made it easy to adjust between flights, but meant that I was always correcting for rough-and-tumble landings, bumps in the carrying box, or 'adjustments' by my proxy-flying daughter. No adjustment surfaces that are adjusted by regluing meant that once trimmed the model stays trimmed. I also had started with an adjustable pitch prop that got out of adjustment with every crash into a column.

Having fussed with every other parts of the design I thought that I was done. But no! Once the model started to fly, I would wind it up more and found that my motor stick twisted too much under load causing the turn to change for the power burst. No only that but my clever adjustable front end was too weak for the load. A bit of redesign and beefing up was required. The motor stick was wrapped with angled tissue to improve torsional rigidity. More standoff was added to the front end and tail post to deal with bunching rubber. I now have a sturdy reliable nose in which the angles (down thrust, side thrust) don't change without regluing.

Finally, by sequentially finding and fixing each weak and wayward part I then found that the airplane was heavier and the wing structure was too weak. Additional laminations on the inner part of the wing solved this.

*The lesson of all these no-cal missteps is the model has to be built with simple rigid but light parts with consistency in mind. Then it is just a matter of adding 'more power' to get above the National Building Museum's 4th floor. Oh, and if you ever fly outdoors think about how hard your camouflaged model will be to find in the green grass. The original P-40 was lost in the grass until after the thunderstorm, and the P-47 was lost in a cornfield. Next no-cal I build will be a night fighter in black or a training airplane in orange.*