

HLG & CLG GLIDER TIPS

by Jerry Barnette & Steve Smith

Published in the November 2014 Issue of Tailspin, Mike Nassise, Editor

These notes on glider basics were picked up over the years from here and there by the authors. Below you will find some of the more informative ones. All are addressed to right-handed individuals. Reverse for left-handed modelers. Via the old CAAMA Free Flight Web Site, and the NASA Quest Educational Web Site - Editor.

When building a glider, position the wing so that the heavier panel is on the inside of the glide turn. Put built in washin in the tip of the inside panel. The washin does two things; it makes the panel stall first, dropping the model into the core of a thermal, and it keeps the model from spiraling too tightly once it is in the thermal.

Do not use a large stab or rudder. If the model is too stable, it will not make the transition quickly and without altitude loss. With gliders, the transition is everything. If the stab is too large, it will tend to let the plane fly even though it may be badly out of longitudinal (fore and aft) trim. You will wonder why adjusting the stab does not produce better flights, when the glider is basically

out of balance. Too large a stab will keep a glider from snap recovery and the model will fly through the top of the launch. If the stab is too small, the stab will cause the model to sink out at gliding speeds because some weight is carried by it. Use white glue for attaching the stab so that it may be easily removed for making adjustments. Also, the stab leading edge should be relatively blunt. You don't want a stab that overlifts.

Some people prefer a wing airfoil with a thin section and a high point about 40% back from the leading edge. This type of section has less drag than a thicker wing section, but will result in a faster glide and less stability. A thicker section with a high point around 25-30% from the leading edge may have slightly more drag, but also a better glide and will be more stable, especially in windy weather.

In general, the rudder is too effective at high speeds, and not effective enough at low speeds. The solution is to use a little stab tilt for the glide turn, keeping just enough rudder for a transition. Remember, the model will turn in the direction of the higher tip. The four basic adjustments for gliders are: A rearward center of gravity (CG) and zero decalage (no incidence in wing or stab) to obtain loop free launches. Slight left rudder to provide launch turn. Stab tilt for left glide turn. Washin in left wingtip to prevent spiral dives. Control glide turn with stab tilt. Control climb pattern with rudder.

If your glider does everything almost perfectly, but spins to earth at the slightest upset, maybe the CG is too far aft, but more likely the left wing panel washin is too shallow. Bend washin into the left wing progressively from none at the wing root to about 1/16" at the polyhedral break (none in the tip). Bend in equal amounts of "up" on both sides of the stab until the glider has a slight stalling glide. When properly trimmed the glider should do a 220 to 270 degree climbing turn, and then drift gently into a left glide turn.

The center of gravity location is the primary variable for glider stability. It may be possible to get the trim right on an unstable glider, but just a little turbulence would upset it. Most likely, it's just too hard to get it trimmed out. When the glider is stable, however, it can be trimmed easily, and once trimmed, will tend to stay that way. It's way beyond just simple mathematics to show how to calculate the correct CG point for stability, but a good rule of thumb is that for most good glider designs, the center of gravity should be between 35% and 50% of the wing's chord. That is, just slightly ahead of the middle of the wing. If you have a glider with a rather small tail, then the CG may have to be further forward, say up to the 25% chord point. If you have one with an unusually large tail, then the CG may have to be slightly behind the middle of the wing. When the CG is about right, then just minor adjustments to the tail angle will make it possible to get the nice smooth, level glide that you want.

Ed Note: Hand launch and catapult gliders are very well known by Free Flight enthusiasts. Unfortunately, they are often ridiculed as just kid's stuff by those who have never tried to build and fly one. Those hobbyists who know better, respect them as difficult models to compete with successfully. Trimming a glider to turn one way (right in the launch), while climbing fast and high, decelerating to stall speed at the top, and transitioning into a flat glide while turning in left circles, requires much expertise and a consistent launch technique. Yes, they are small free flight models usually made out of sheet balsa, but they offer challenges not matched by other types of models -