

TIPS ON BUILDING AND FLYING JET CATAPULT GLIDERS

BY Rich Weber

An article published in the September/October 2012 Issue of Tailspin, Mike Nassise, Editor

This article was put together from the internet postings of Lee Hines and Stan Buddenbohm, two highly accomplished catapult glider fliers, by Flying Aces News editor Rich "Wingnut" Weber. It contains numerous suggestions that clubsters interested in getting involved in the revived FAC. Jet Catapult Scale event will find quite useful- Editor.

Construction

The most important tools for building catapult gliders are sanding blocks. You should make your own - don't worry it's easy. Use straight flat wood, firm balsa will do, and make at least two blocks. One should be about 1"x3"x8" and the other 1"x1"x4". Sandpaper, 100 grit on one side and 150 grit on the other, can be attached with spray contact cement. Don't use cheap sandpaper. Use the large block for fast wood removal over large areas and the small block when more control is needed. For final smoothing use a folded piece of 320 grit. You can't go wrong by making more blocks with different grits.

After tapering the wing thickness and roughing out the airfoil some use a broad tip marker to make line from the trailing edge (T.E.) to the leading edge (L.E.) at 1/2" intervals over the top of the entire wing. This is an aid in shaping the airfoil. As you sand and the marks disappear, you will get a better impression of how the work is progressing.

Be very careful with the final shaping of the L.E., this is important for top performance. When you've finished shaping the wing, run some thin instant glue along the L.E., a short section at a time, wiping it quickly with a paper towel. This will greatly increase the ding resistance. Trailing edges should not be paper thin, 1/32" is thin enough - wing, stab, or rudder.

Finish.

Adding some finish will reduce drag and prevent unwanted warps. Use Min-Wax Spar Urethane Varnish found at most hardware stores. With a small stick dip some varnish onto the glider and spread it as far as possible. Do one panel at a time. Now smear it around and wipe it off with a paper towel - gently. Wait a day and sand smooth with 400 grit - don't over do it. For easier spreading, the varnish can be thinned with 10-20% mineral spirits. Jet catapult gliders need to have an authentic paint job if you want to get the scale points. Design Master rattle can spray paints are good for applying scale color schemes to your models but use a very light touch.

Built-in Adjustments

Left and right are oriented looking from the back to the front of the model. These instructions are written for a right-handed

person (right bank on launch with a left glide circle). Lefthanders should reverse wing skew, stab tilt, rudder offset, wash-in, etc. Catapult gliders go through a major speed change between launch and glide. Various adjustments have more, or less, effect depending on speed. At high speed rudder turn has more effect, wash-in has its greatest effect at middle speed, and at low speed stab tilt and tip weight have their greatest effect.

Most trim should be built-in. Fine tuning can be done at the flying field by careful bending of the flying surfaces, but it's best to do as little of this as possible.

- (1) Build some incidence for the wing into the fuselage, about 1/32" for catapult gliders.
- (2) Glue the wing to the fuselage so that the wing centerline is 1/64" more to the left at the L.E. than at the T.E. - it's skewed
- (3) Attach the rudder so that the T.E. is 1/64" to 1/32" more to the left than at the L.E.
- (4) Attach the stab so that it has between zero and 1/8" tilt (right tip lower than the left tip). The way to measure this is to turn the model upside down on a flat surface so that it rests on its wing tips, prop up the fuselage, and measure from the stab tips to the table top.
- (5) Balance as per plan. If no C.G. point is shown, a good place to start is 50%. (6)
- (6) Wash-in is complicated but very important. Use the minimum amount that's needed. A balsa wash-in wedge glued under the T.E. of the left wing panel at about 2/3 span works well. What is a wash-in wedge? A half inch wide, 0.05" thick at the rear edge, and almost zero thick at the front edge piece of balsa. Length usually depends on the gliders wingspan. For 12-18 in. spans a 3/4" to 1" long wedge is good.

Flying

Add weight to the nose until the glider balances 1/8" in front of the C.G. Adjust the stabilizer incidence (T.E. up or down) until a gentle level toss into the wind produces a nearly level smooth glide. The forward C.G. and correct stab incidence will give the model a better chance of not crashing as you learn to launch it. It should gradually be reduced as your launch technique and the glider trim improves.

Launching

The optimum launch angles for most catapults are 50 to 75 degrees up with 15 to 30 degrees right bank. With the thumb and forefinger pointed up, grasp the rear of the model, either the fuselage behind the stab or just under the stab firmly. Hold the launcher in front of you, above your head and at the appropriate angle, and pull back hard to obtain maximum rubber stretch. Release your finger grip on the model and watch it zoom away. At the top of the launch the glider should almost stop before turning and plopping into the glide. At this point the model should be just past vertical, at about 100 degrees. If the ship is zooming past 100 degrees (looping too much), then decrease the stab incidence (T.E. up). If the ship never gets to the 100 degree angle before stopping, then increase the stab incidence (T.E. down). Take it slow and use very small increments (1/64" max).

Turn

Rudder turn is used to counter the right bank of the launch. You shouldn't bend the rudder T.E. more than $1/32$ ". This is different from the rudder turn you have already built in. Always bend the rudder near the fuselage. If the top of the rudder is bent it can exaggerate spiral problems at high speed even if the glide looks okay. Once you have the right rudder setting for launch, any further adjustments to the glide circle should be done with tip weight. Simply add weight to the left wing tip to make a smaller circle or to the right tip to open the circle. A 50-70 foot diameter circle is good.

Hopefully, this will get you started successfully and you'll have a bunch of fun. Always feel free to ask questions of anyone that looks like they know what they're doing. Most people in free flight are happy to help.