

Memo #1: Dragonfly building and flying

Unified team members, here's some additional information FYI.

1. I've put enough "c/a hinge papers" into the 'community property' boxes to cover everyone. There is an alternative using clear transparent tape:

- Align the control surface and the fixed surface about 1/16" apart - this dimension isn't critical. Run a single piece of tape, 1" wide will do, down the separation line, rub it into the wood for a good bond.
- Flip over the joined pieces and bend the elevator (or rudder) back 180 deg so its back-to-back against the fixed surface. Then put small pieces of the same tape (postage stamp sized) at several locations so that it touches the first piece of tape at the small gap; and then laps over front and back to the wood. This is easier to show than to write out in words - Omar Bashir did this trick yesterday, take a look at his plane.

2. Reversing switches on the transmitter. On the bottom surface of the transmitter are several small switches. These can be used to reverse the direction of the servos' rotation. The sequence of switches are as follows:

- #4 - unused
- #3 - throttle (be careful flipping this as it will turn the motor on even if the throttle stick is down)
- #2 - elevator (on right stick)
- #1 - rudder (on right stick)

3. Adjustable throw switches on the transmitter. On the front surface of the transmitter are 4 potentiometers that, when turned clockwise with a small screwdriver, adjust the total throw of the servos. You'd normally want to adjust ELE for elevator; and for adjusting your rudder, *adjust the AIL potentiometer* as we're using the function for rudder that's normally used for controlling ailerons.

4. Receiver plug-ins. The servo and motor control connectors fit into the receiver in one orientation only - where the metal tabs visible on the connectors face towards the top of the receiver. Don't force a connector in upside down!

The receiver ports are numbered and normally assigned as follows:

- #1 - rudder
- #2 - elevator
- #3 - motor control

5. Clear tape reinforcement on wings. We've learned that for extra robustness at light weight, a single piece of 3M transparent tape, 2" to 3" wide, running from tip to tip, one each on the top and bottom of the wing, adds a lot of strength in bending and prevents the styrofoam wings from breaking.

6. Wheel retainers. You can use the metal collars if you wish. A lighter alternative is to clean the ends of the gear wire with sandpaper; put the wheel on and wrap the wire end with 8-10 turns of the green thread supplied in the kit; then put one drop of superglue on the thread, trim off the ends when cured.

Memo #2: Building the Dragonfly, tips and hints

For those building the Dragonfly, here are some notes to assist you. These are changes to the instructions and will be modified as more 'lessons learned' pop up. So for those planning to build these or planning to, first read the kit instructions; then read these notes; and let me know of any further hints that can be added to this list.

Building the Dragonfly

1. General notes

- The wing white foam will get attacked by cyanoacrylate (c/a), the mist accelerator, or any solvents other than isopropyl alcohol. So use wood glue or 2 part epoxy when constructing the wing.
- The laser cut wood parts - are held in place by small (appr. 0.5 mm) uncut sections called "nibs" or "nits". Cut these sections with a razor blade rather than twisting or pushing out the wood parts. If you do so (especially on the thin plywood), the wood pieces will be damaged.

2. Assembling the fuselage.

- The fuselage takes quite a beating and the somewhat polished wood sometimes does not take adhesives well. I've found that the best adhesive is wood glue (Elmer's yellow carpenter glue). If this bond does separate after an impact, there is still a solid fillet there which takes kindly to c/a. The initial joint bond does not hold well with c/a, I've found, as c/a doesn't fill gaps in the joints well.
- The best way to assemble the fuselage is to string the 5 lower formers on the composite boom and then assemble the two sides and the formers with the fuselage resting sideways on the workbench. Get everything lined up and keyed together, then using a combination of c/a and aliphatic, bond it together. Use weights to keep everything aligned until dry. *Use wax paper or newspaper to protect the work surface so you don't glue everything to the workbench.*
- The front firewall requires 3 plies bonded together with the landing gear. Wood glue works well here. Do this in a vise or clamp as this takes quite a beating. I've also added small wood screws to cinch the plies together and may do this again.
- After bonding the front firewall and its landing gear as one unit, assemble this unit and the two other ply supports on the c/f boom using the electric motor to verify everything is aligned. This will guarantee the motor is aligned properly. The way the kit instructions suggest is way off target and won't assure a good fit.
- After assembling the fuselage with its formers, run a second bead of wood glue around every joint for extra robustness.
- The wooden fuselage can be fixed permanently to the c/f boom with a thin fillet of 2 part epoxy. Make sure the nose length is as per the instructions.

3. Assembling the wing.

- It's fairly important, as well as good for aerodynamics, to round the leading edges and also contour the tips.
- Join the wing panels with 2 part epoxy, run masking tape over the joint to preserve alignments, then prop up the tips at the right angle and let dry. By the way, use either plastic or wax paper to protect the work surfaces when building the fuselage or wing.
- I like to smooth off the wing surfaces with either a dry sponge or else, a flexible fine sandpaper block. Just remember that the removed

grit will act as an abrasive - so work slowly and clean as you go. Otherwise the grit will damage the wing surface.

- The fiberglass reinforcement around the wing center is really a good idea. To do this, lightly spray the fiberglass cloth with 3M77 spray contact cement and while still damp, run it over the wing, trailing edge to leading edge and back to the trailing edge, as one piece. The 3M77 will let the glass stick down without lifting later. A little overlap at the TE is ok, it can be trimmed later. Work in a thin layer of two part epoxy (thinned with isopropyl alcohol is nice but not essential), blot up the excess with napkins or toilet paper.

- A really good thing to do is add a thin layer of protection (coffee stirring stick, balsa, ply) at the wing TE center so that the rubber bands don't cut through the wing if the wing is twisted due to a hard crash or landing.

- I also like to add a strip of 3" wide 3M clear packing tape, misted with 3M77, from tip to tip, top and bottom both, as a cap spar. This prevents the wing from failing but in Johnson, is not absolutely essential.

4. Assembling the tail.

- The minimum job is to round off the leading and trailing edges. If you really want to, you can thin the movable elevators to come to a sharp edge at the TEs.

- The best hinging arrangement is either c/a hinge paper (come see me) or else, 3M vinyl clear tape. The c/a hinge paper is fast and easy to do and once installed, will never loosen.

5. Control linkages.

- Don't even think of using the kit's green thread linkages. We have commercial DuBro "wire in nylon tube" linkages that are much more robust and easier to install. Take a look at the trainer planes to see how they're installed. One important change required is the rudder control horn has to be installed slightly lower on the vertical stabilizer in order to fit properly.

- Installing the small servos is a little tricky and requires the small wood screws and small screwdrivers that will be part of "community property". It is important to power up the servos in order to electrically set the servos' neutral positions. When doing this task, be patient as it's a tight squeeze to get the servos installed properly.

That's it for now, more later.

Peter Young