

Electric 1/6 scale radio controlled DH-84 Dragon-2

By Rodger Farley, Columbia Maryland



Specifications

Wingspan = 94.66", airfoil = 10.3% flat-bottomed with slight re-flexed trailing edge

Length = 68.6"

Wing area = 1700 square inches

Weight = 14.5 lbs take-off weight, 12.5 lbs without motor batteries

Wing loading = 19.6 oz/ square foot

Static thrust ~ 10 lbs; Static thrust / weight ratio ~ 0.7

Power system

Motors = AXI 2826-10 brushless outrunners, 35-40 amps current each

Props = APC 11x5.5 props

Batteries = Poly-Quest TW 4350XP-45 Li-Po batteries (14.8 volt 4350 milli-amp-hour)

Controllers = JETI Advance 77 Opto plus controllers

Endurance ~ 10 minutes with a mixture of throttle settings

Note for the power system: there are 2 of everything, completely independent twin engines. Brushless motors rely on the feedback of the individual motor to know when to commutate the windings, thus the independence.

Construction

This is not a simple project, but the construction techniques individually are simple. The fuselage is built very light but strong, somewhat like a large stick&tissue model, but with 1/64 ply instead of tissue paper. Balsa wood, basswood, 1/64 3-lam plywood, 1/8" liteply, and aluminum are the basic materials. Flying surfaces are covered in Sig Koverall Dacron fabric attached with butyrate dope. Struts are K&S streamlined aluminum 0.5" tubing with hardwood end plugs. Finishing was accomplished with Lusterkote butyrate spray, first several coats of white primer, then dark red for the fuselage and aluminum for the flying surfaces. A clear lacquer sealer was used over all

after the decals were attached. The decals were drawn up on the computer, and then printed out on paper. Carefully cut out with an x-acto knife, they were attached with a glue stick. Adhesives used were thin and medium CA adhesive, sometimes mixed with wood flour for forming strong fillets. Form the fillets with smooth saw dust first, then drizzle thin CA over it, then back away from it while it rapidly cooks! There is a 1.5 deg down thrust for both motors and a 2.5 deg right offset only for the starboard motor. Since these are relatively un-tapered wings, tip stall was not as great a concern as it is with the DH 89 Rapide, so only 1deg of washout was used in the outer wing panels. With high aspect ratio wings, the chord width is relatively narrow (mean aerodynamic chord = 9") making the center of gravity placement fairly sensitive (3/8" too far back will be deadly). Small 1/8" dowels were glued to the bottom of the fuselage corresponding to the horizontal location of the c.g. when the passenger window line is level. This was used as a rocker level to determine the final position of the batteries in their 1/8" ply battery boxes. The landing gear is rigid except for the 4" balloon tires, so landings have to be pretty good. The tail wheel is custom built from 0.040" aluminum sheet, and unlike the free-castoring full scale version, this one is steerable with a spring isolation system. Control is affected with Kevlar kite strings terminating at bell cranks, avoiding long metallic lengths of wire which could affect the antenna reception.

Flying characteristics

Since the tail feathers are of scale size, they can be unduly influenced by the prop-wash when going slow. This means carefully ramping up the throttle while the plane gains speed and control. It has surprising performance on takeoff, but you must be prepared to give some down elevator as the prop-wash blankets the horizontal stabilizer and tries to pitch the nose up. It is not very aerobatic, and I would urge one not to do more than a wing-over. I have done rolls and low-g flip loops, but I may be pushing my luck... Turns are best done with some rudder coordination, but it is forgiving in that respect. Stalls are gentle with some small nose drop. Landings are easy, but the flare should be fairly smooth as the landing gear is rigid. Switch to low rates for landing so as to not over excite the pitch response. It likes both wheel and 3-point landings. In the air with its light wing loading, it has a very stately presence.

History of this particular aircraft

Built by de Havilland in Hatfield in 1934, certification number 6077, this aircraft was originally G-ACRF and was owned and operated by Aircrafts Pty Ltd (APL, forerunner of Queensland Airways) in 1936. It was mostly destroyed in 1954 by a crash and fire at Archerfield. It has undergone a superb restoration by owner Des Porter and was re-registered as VH-UXG.



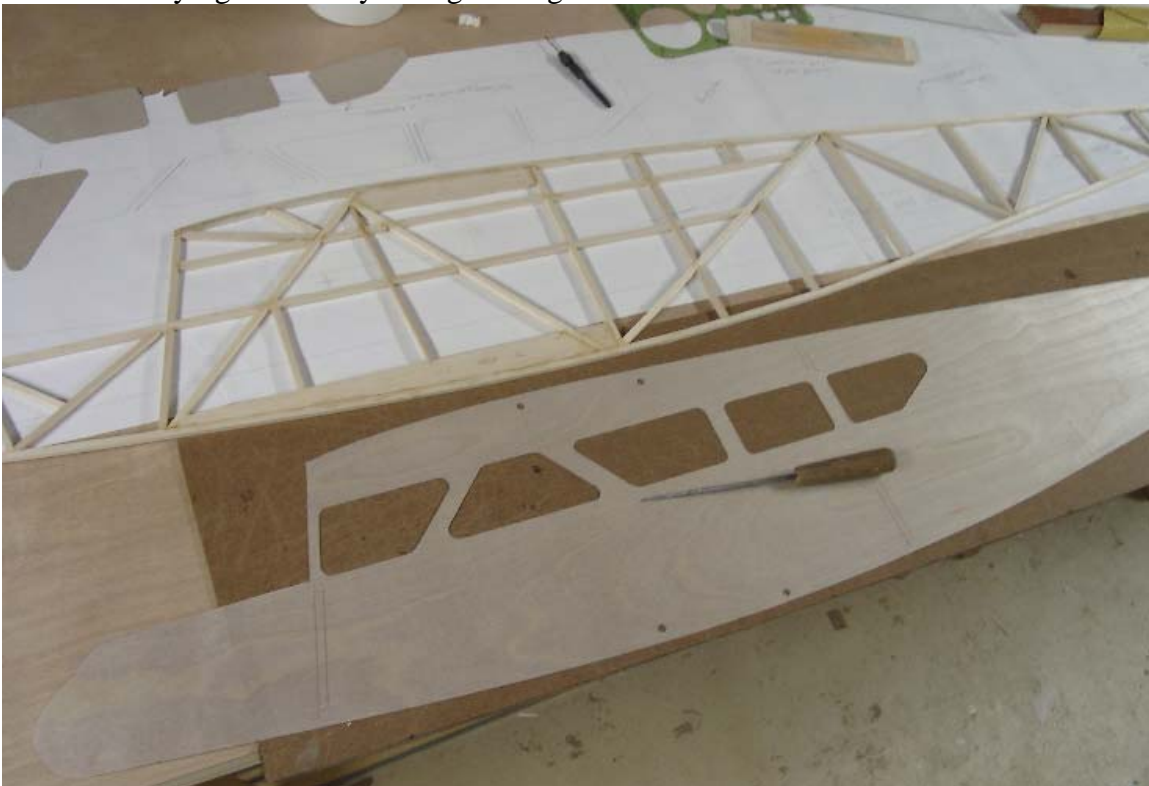
Then in 1935...



...and now in 2005

Photo log of the 1/6 scale model construction

Light frame made with 1/4x1/4 balsa and basswood is then covered with a skin of 1/64 plywood. This plywood is very easy to work with, as it can be cut with scissors. The result is a very light and very strong fuselage.



The 2 halves are then connected along the only two full fuselage bulkheads, with spacing cross sticks added. The fuselage structure is mostly self-jigging, but have a care...



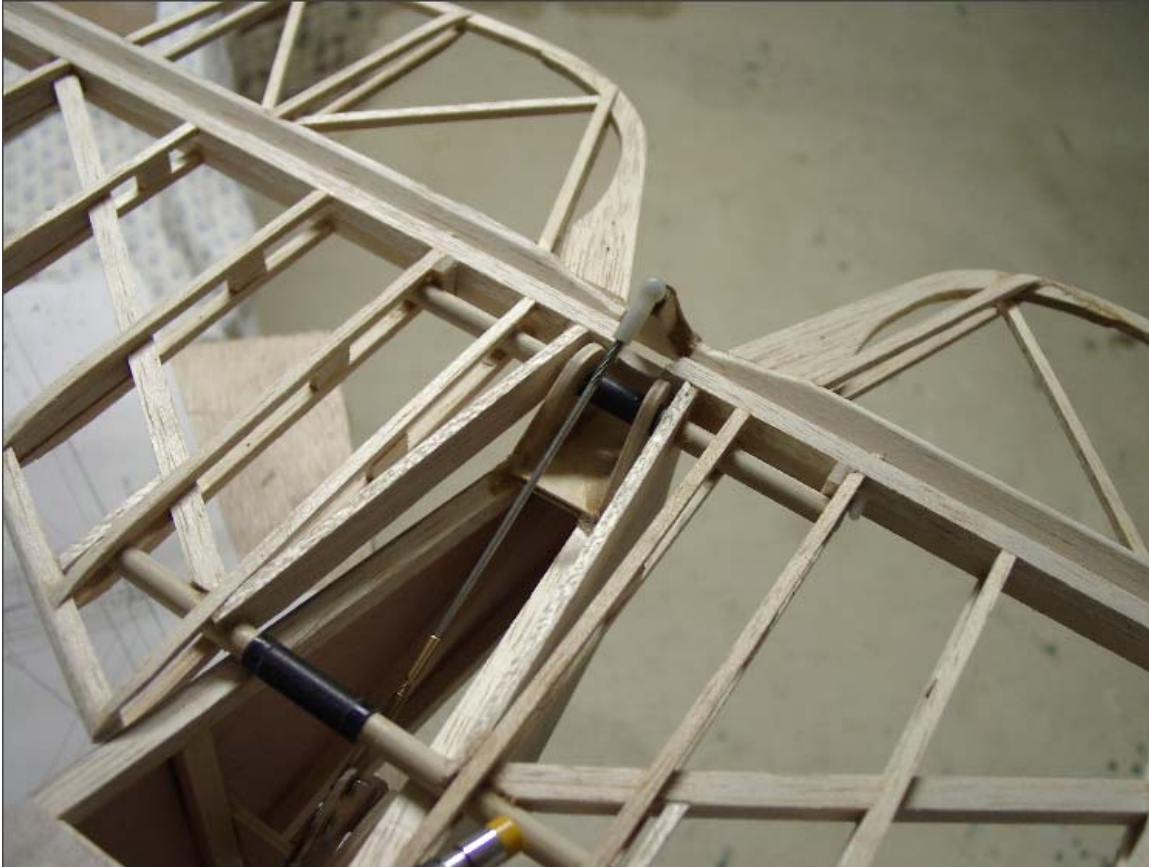
The top 1/64 ply sheeting needs to be “tortured” into place, afterwards buckling breaks are glued on the inside for the areas that have “oil-canned”. The overhanging thin ply is trimmed off after gluing, then sanded smooth.



Bottom view before sheeting in 1/64 ply



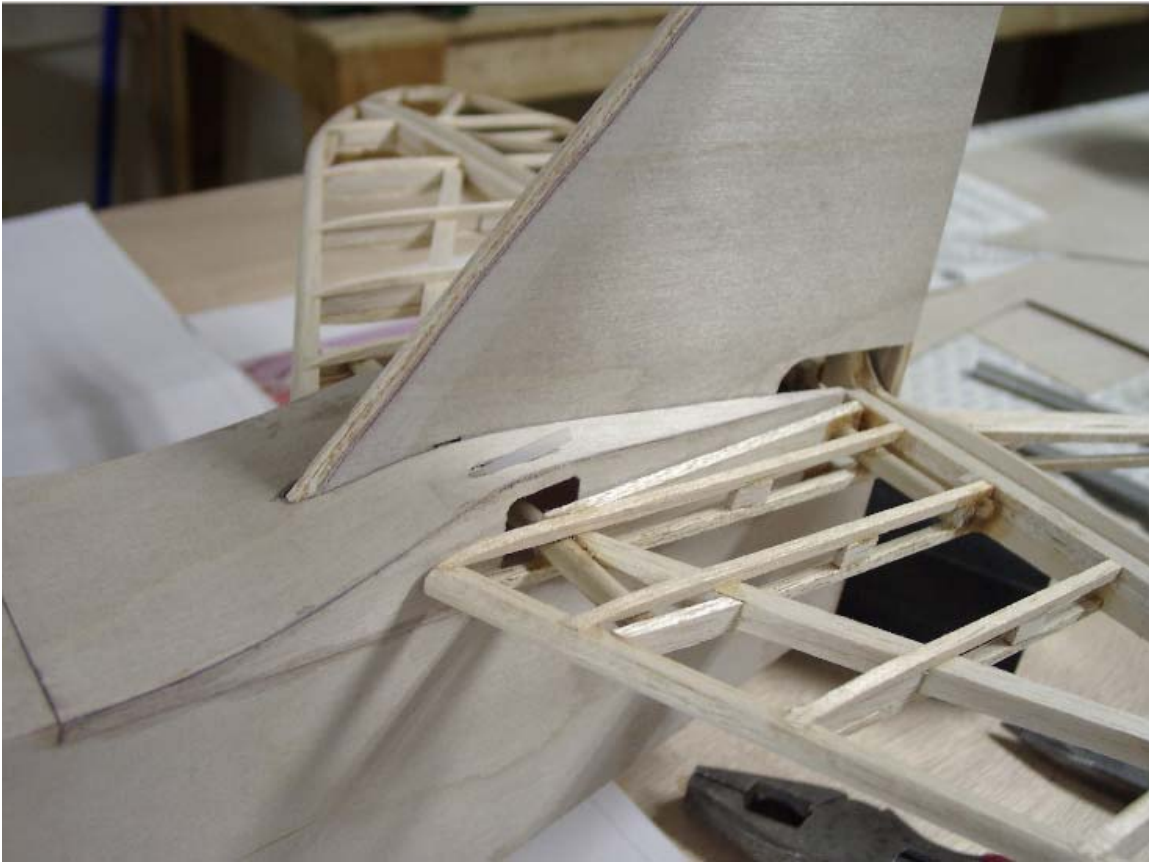
Elevator pushrod using a ball joint which will be hidden inside the vertical stabilizer.



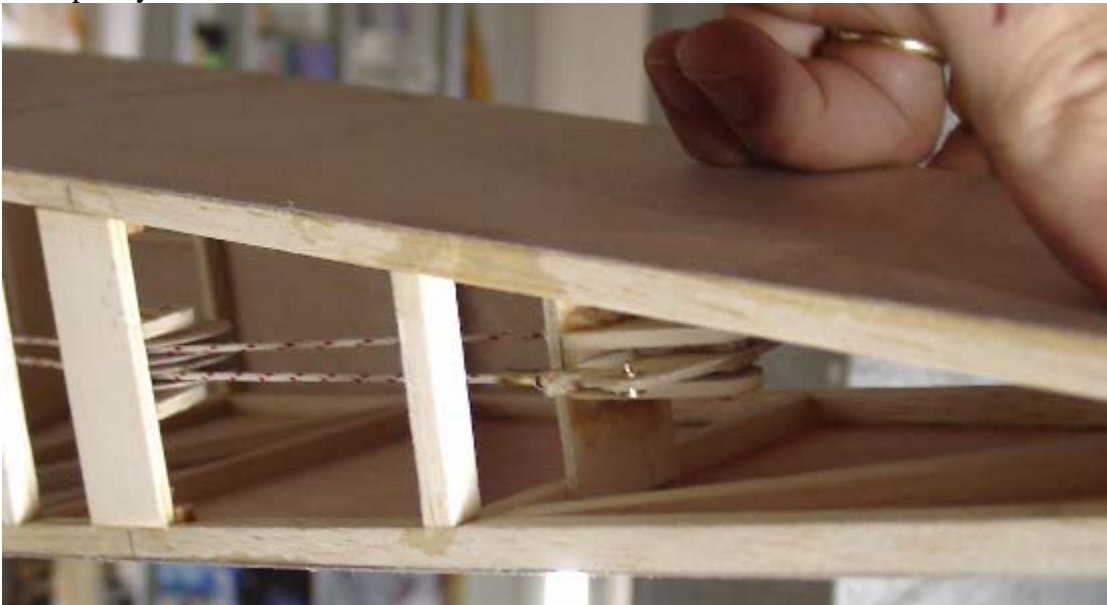
Partial sheeting of the bottom showing where the access panels will be.



Vertical stabilizer sheeted with 1/64 ply. Also visible is the horizontal stabilizer incidence trim.



Dual pulley and elevator bell crank from the bottom access under the horizontal stab.



Aluminum reinforcement mount points for the tail wires.



Tail wheel bracket made from 0.040" aircraft sheet aluminum



Cockpit wind screen bow made with basswood and graphite reinforcement.



Inboard wing panel with center section sheeted for nacelle construction.



Under view of the landing gear and nacelle structure



First steps in constructing the removable motor cover using block balsa and 1/16 sheet



Nacelle motor cover sanded



Diagonal strut interface to fuselage using cotter pins epoxied into upper fuse frames



Top aft nacelle structure showing the frames and 1/64 ply skirt sheeting



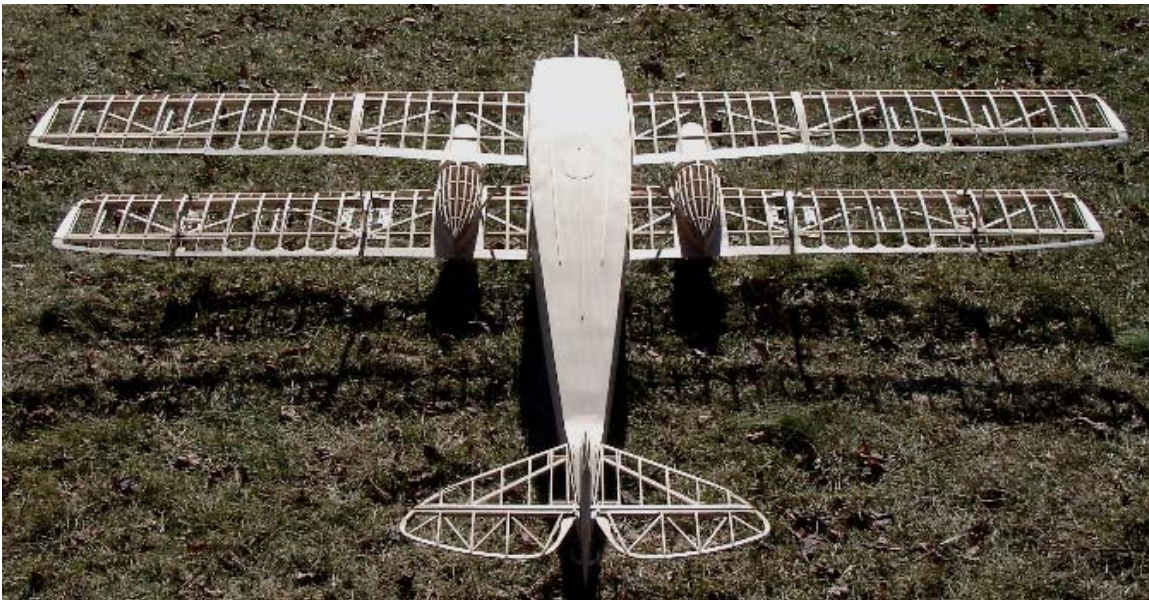
Bottom view showing access hatches and foam aft nacelle fairing



Beginning of outer wing panel construction which starts with a basic bridge frame



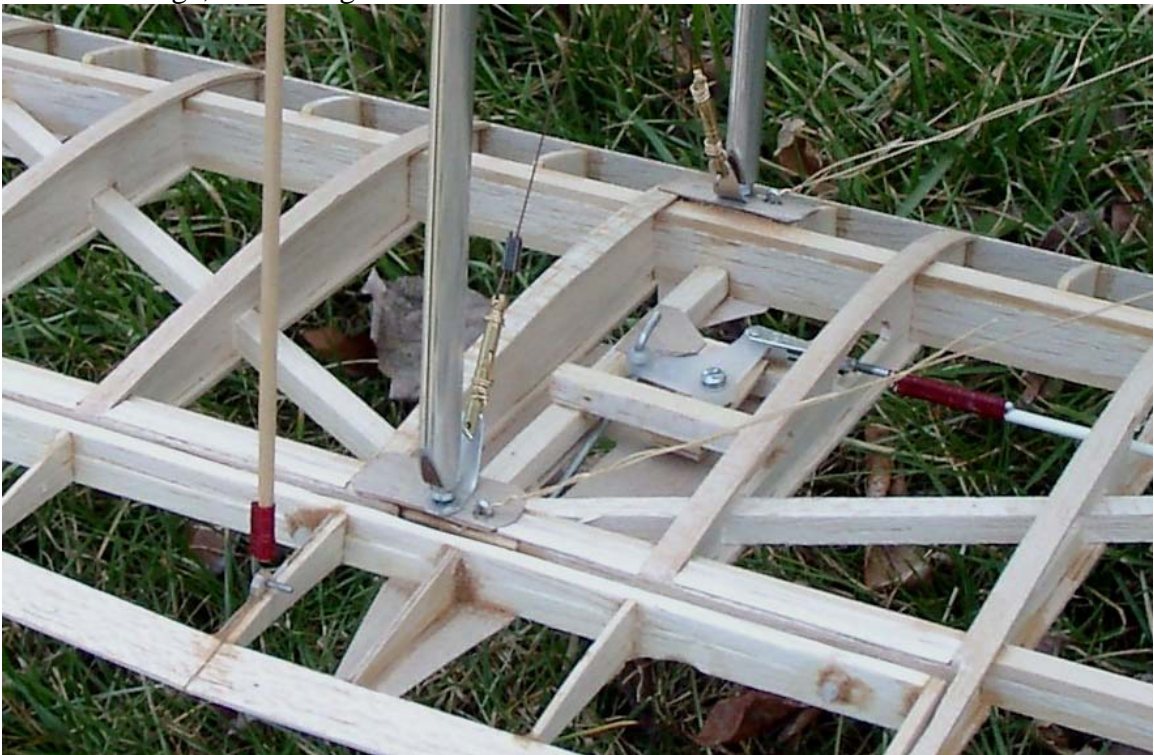
Nice skeletal view



Wing panel connection and the push-push aileron hassle-free connection



Aileron linkage, outer wing struts



A view of the inside shot thru the cockpit looking aft.

